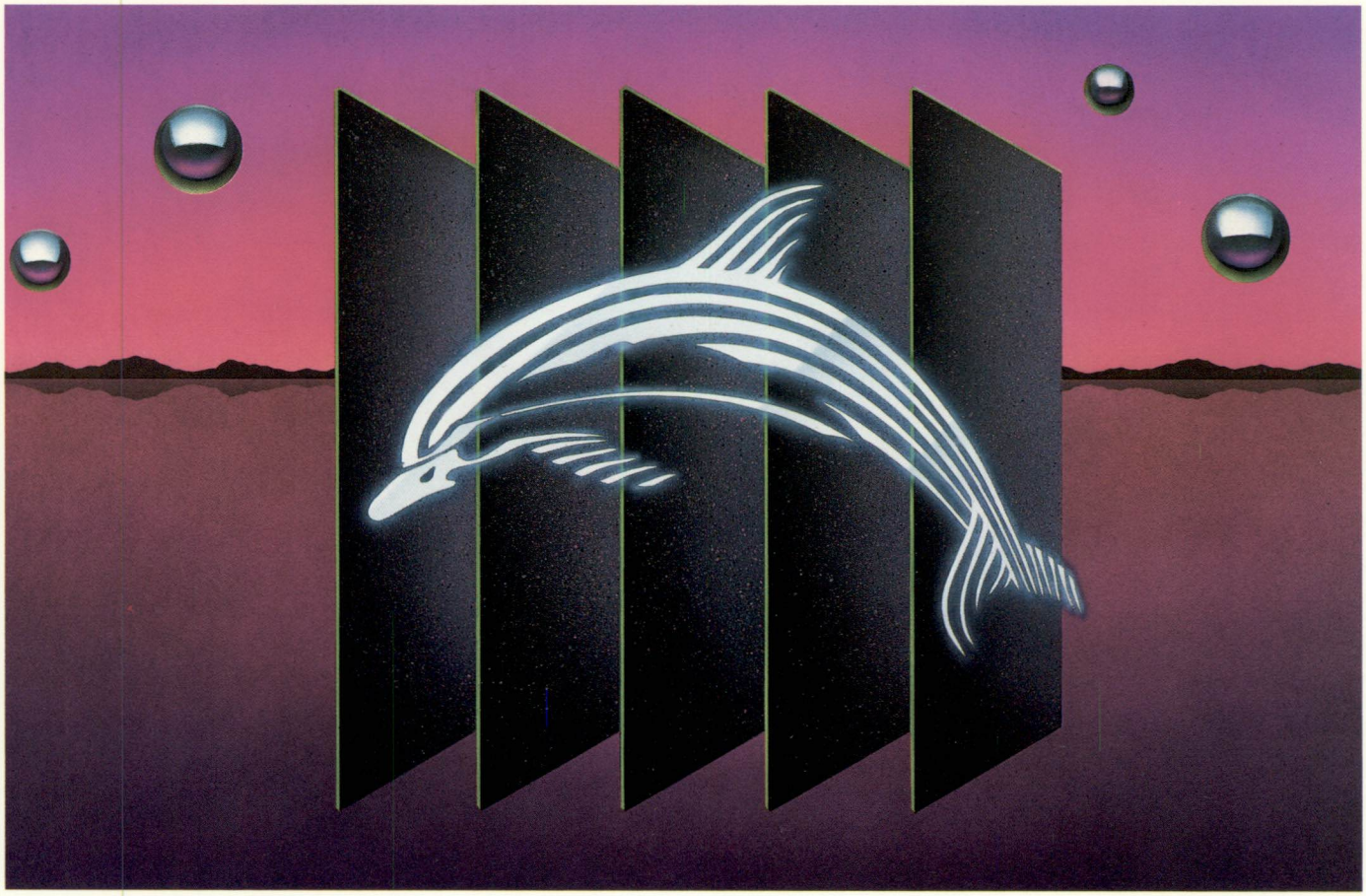
Delfin Systems



Providing Innovative Systems Solutions for...

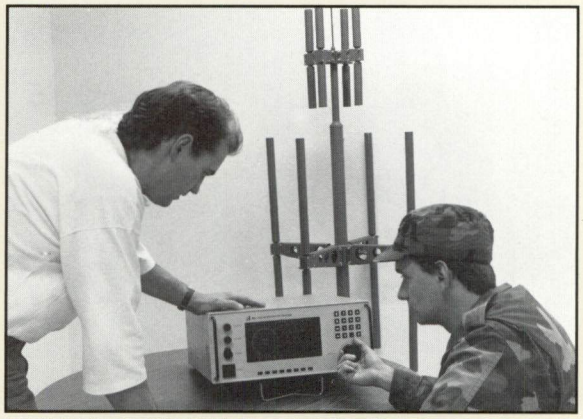
- *Signals Exploitation*
- *Intelligence Analysis*
- *Information Resource Management*

Delfin Systems

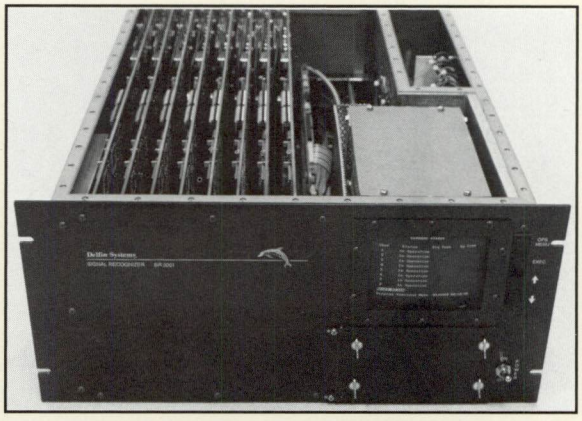
Innovative Systems Solutions to Problems of National Importance

- ***Hardware and software systems to collect, process, interpret and exploit signal intelligence using advanced signal processing and AI techniques***
- ***HF/VHF/UHF COMINT equipment and systems for signal acquisition, classification, recognition and direction finding***
- ***ELINT data processing systems for automated platform threat recognition and passive geolocation***
- ***Integrated software systems to enhance decision, planning and operational control processes, and to analyze and assess intelligence data***
- ***Information resource management systems, mass text and image storage and retrieval systems, and large-scale database production services***
- ***Management and engineering services for operations analysis, systems development and evaluation of C3I, over-the-horizon targeting, electronic warfare and space systems***

A SUMMARY OF DELFIN'S



HF/VHF/UHF COMINT DIRECTION FINDING AND SIGNAL INTERCEPT SYSTEMS provide automatic signal acquisition, emitter location and logging. This highly integrated functionality is enhanced by a variety of operator-specific displays and full remote control capability. Mission-specific antennas support fixed site, mobile, airborne, and sub- and surface shipboard applications.

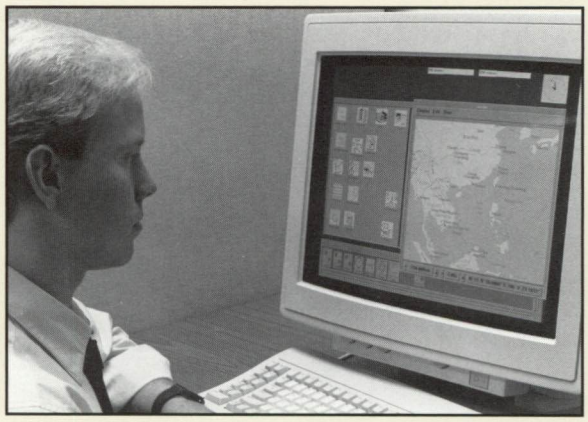


REAL-TIME SIGNAL RECOGNIZERS can be configured for parallel channel operation or signal search. Each channel is capable of simultaneous recognition and text decode of up to twenty different signal types. Signal bandwidths from audio to 8-MHz, AM/FM/PM digital demodulation, exceptional PD PFA and SNR performance and interference rejection are featured in a software programmable unit. A companion STRUCTURED SIGNAL GENERATOR offers a wide variety of user defined complex-modulated signals for test, training, and system simulation.

Delfin Systems provides a unique blend of analysis, development, and integrated systems solutions to signal exploitation, intelligence and information resource management requirements for the defense and intelligence communities. Our customers benefit from our extensive experience in problem solving and from our comprehensive capabilities provided by a diverse set of systems and products, languages and tools.

CAPABILITIES AND APPLICATION AREAS

ELINT SIGNAL PROCESSING SYSTEMS combine digital signal and image processing techniques to passively geolocate emitters using omnidirectional antennas, predict threats from unknown platforms using sophisticated parameter measurements, and classify, de-interleave and identify a wide variety of pulse signatures.



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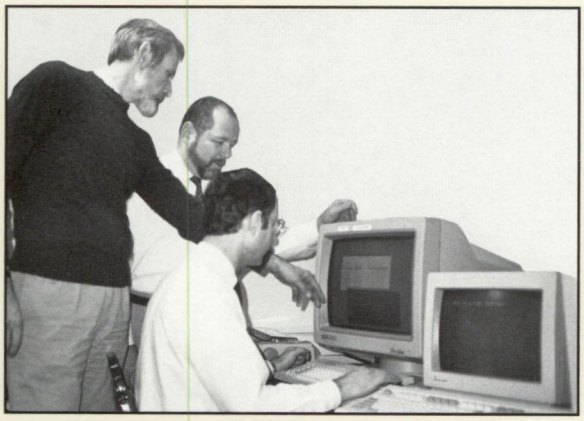

MANAGEMENT AND ENGINEERING SERVICES aid in analytical and development support. Highly skilled technical personnel with military cryptologic, intelligence and operations experience provide assistance to government agencies in requirements determination, SETA, and operational test and evaluation for C3I, OTHT, EW, and space systems. Custom C3I data base systems are presently installed on all USN aircraft carriers and command ships.

INFORMATION RESOURCE MANAGEMENT SYSTEMS aid storage and production of large-scale multi-media databases. Systems development and integration is provided for several standard platforms and architectures, as well as network support, system administration, O&M and production services. Terminals range from PCs to large workstations. Data may be stored magnetically or optically. Databases exceeding one million pages of text and digitized images are easily accommodated using digital, optical scanning, or manual entry.

Delfin's capabilities were augmented in 1991 through a merger with Maxim Technologies, Inc, an innovative company with complementary products and services. Our expanded team of highly qualified and experienced professionals is focused in the areas of analog and digital hardware development, software engineering, artificial intelligence, signal processing, direction finding, operations analysis and information processing and resource management. We thoroughly understand threat operations and military systems.

Our engineers, scientists and analysts hold various security accesses; our facilities on both coasts have areas with RFI shielded screen rooms for secure data processing and system development. We have a full complement of hardware and software development facilities with workstations, scientific processors and the associated design tools.

For more information please contact the nearest Delfin Systems office.

Headquarters

Sunnyvale
1349 Moffett Park Drive
Sunnyvale, CA 94089
Phone (408) 734-2400
FAX (408) 734-9312

San Diego Office
5055 Viewridge Avenue
Suite C
San Diego, CA 92123
Phone (619) 279-4141
FAX (619) 576-9017

Washington D.C. Office
2200 Clarendon Blvd.
Suite 1200
Arlington, VA 22201
Phone (703) 522-6112
FAX (703) 522-8843

Norfolk Office
621 Lynnhaven Parkway
Suite 401
Virginia Beach, VA
Phone (804) 486-5294
FAX (804) 486-1684

Maxim Technologies, Inc.
a subsidiary of Delfin Systems

Santa Clara Office
3000 Patrick Henry Drive
Santa Clara, CA 95054
Phone (408) 748-1130
FAX (408) 748-1140

Washington D.C. Office
8618 Westwood Center Drive
Suite 130
Vienna, VA 22182
Phone (703) 893-3660
FAX (703) 893-8518

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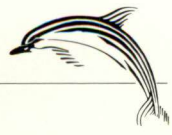

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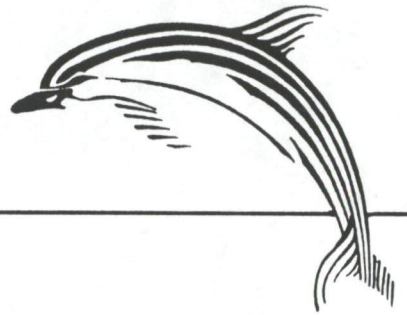

Corporate Overview

PRIMARY MARKET STRATEGY

- **Identify and Provide System Solutions to Gaps and Inefficiencies in:**
  - **Collection and exploitation of signal intelligence**
  - **Fusion and exploitation of all source intelligence**
  - **Analysis and assessment of intelligence data**
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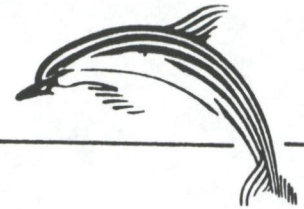
  - **Training and readiness**
  - **Information resources management**



OUR BUSINESS

Systems solutions to problems of National importance

- **Hardware and software systems to collect, process, interpret, Geolocate, and exploit signal intelligence using advanced signal processing and AI techniques**

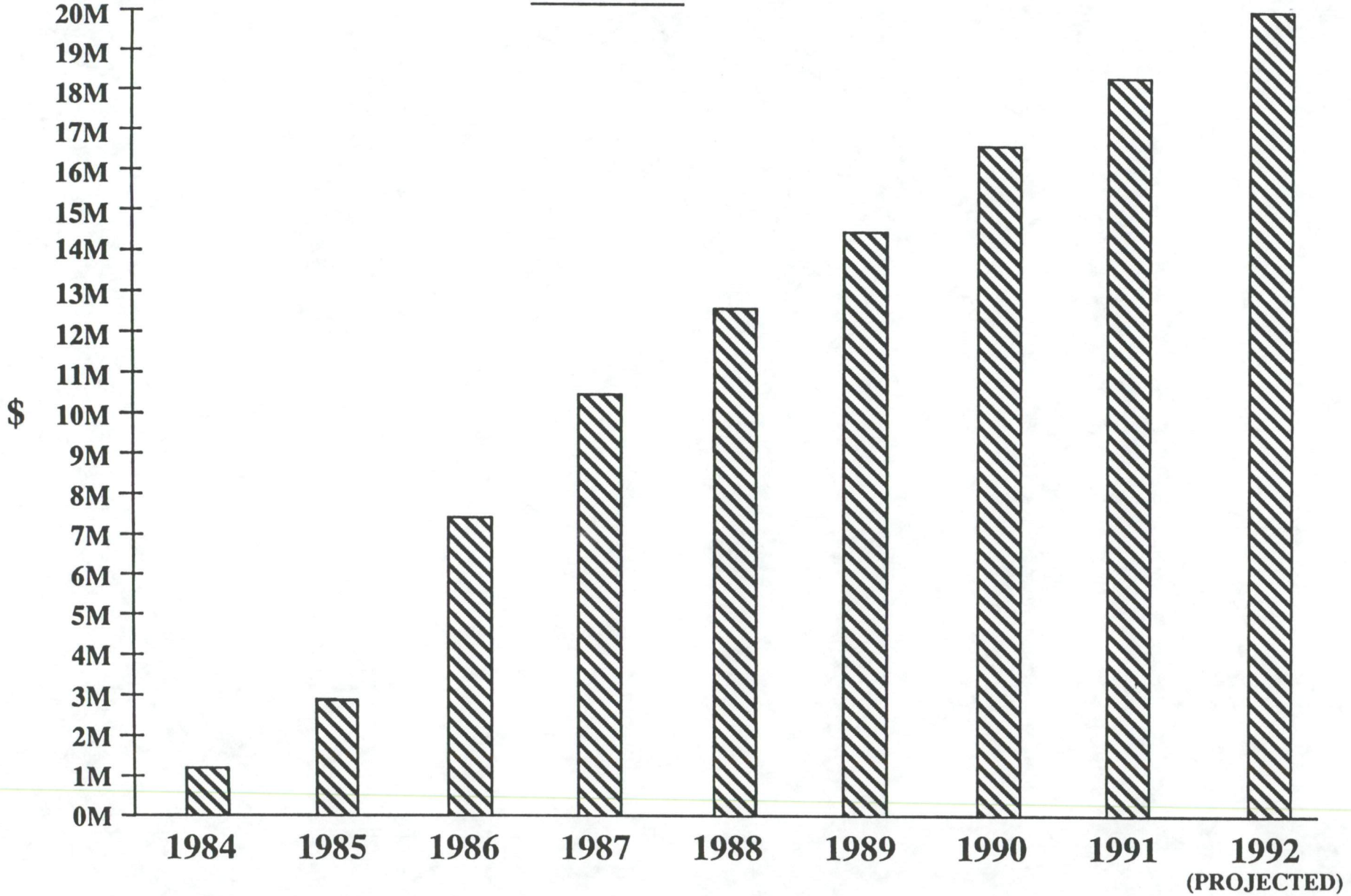
- **Systems employing AI techniques, advanced man machine interface, and other leading edge computer technology to enhance:**

  - **decision, planning and operational control processes**
  - **analysis, storage, retrieval, and assessment of intelligence data**

- **Provide uniquely qualified personnel for management, analysis, systems development, and engineering of C4I systems and sensors, over the horizon targeting and electronic warfare**

Delfin Systems

SALES



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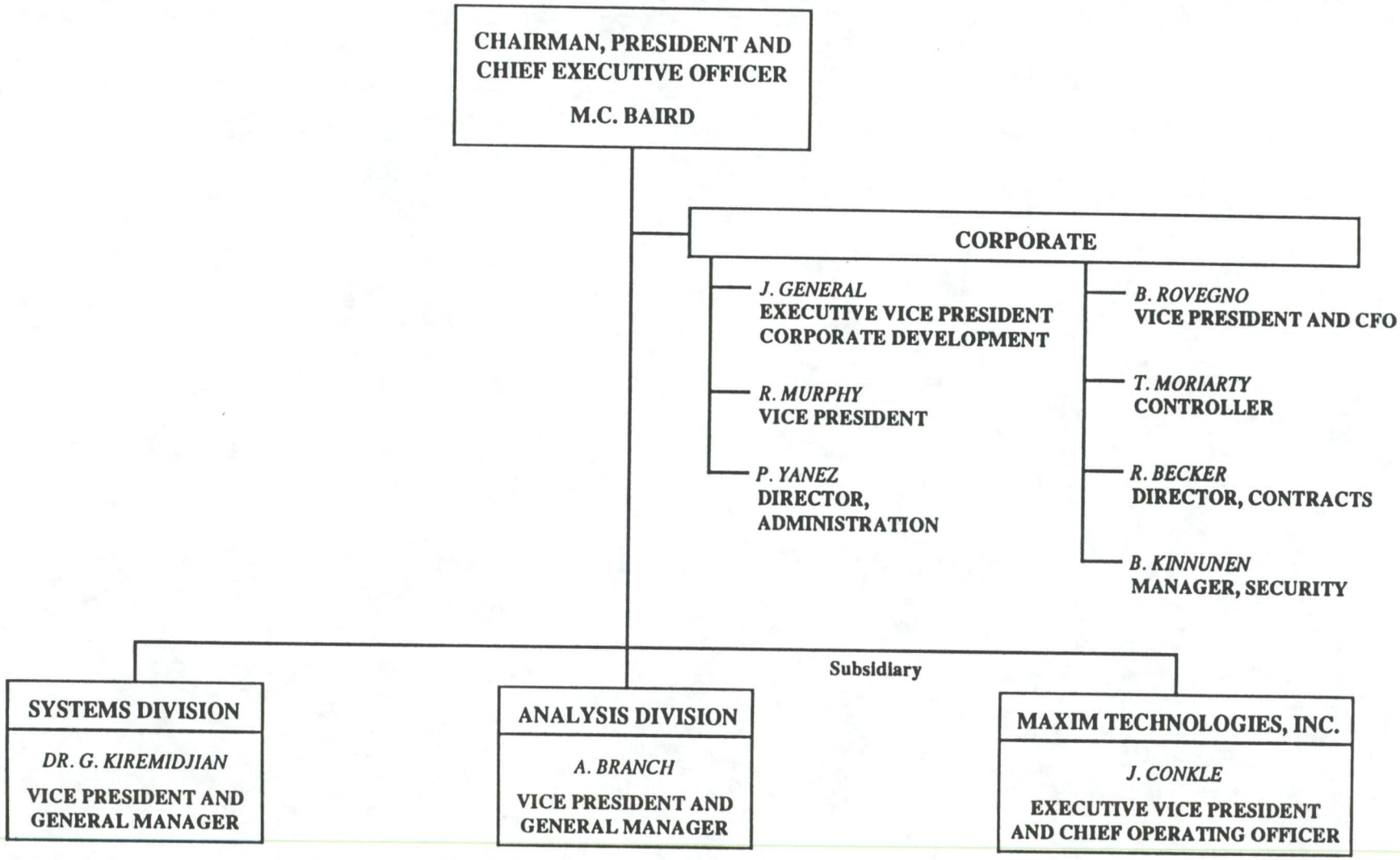
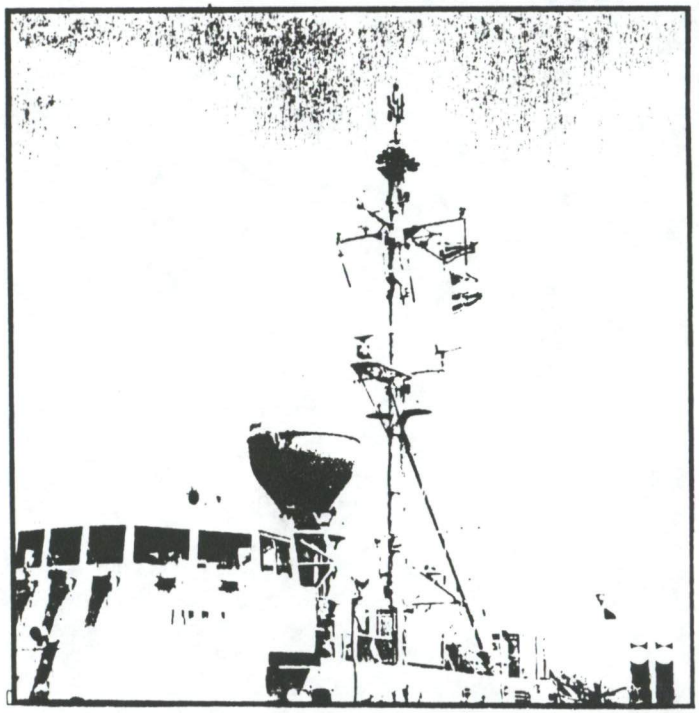
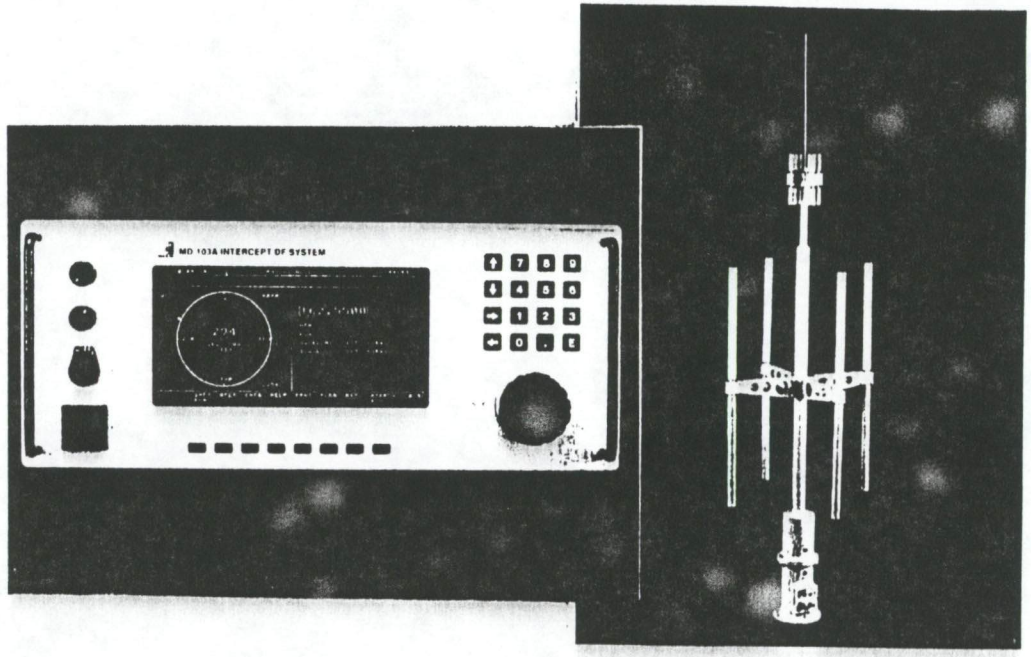


Delfin Systems

DIRECTION FINDING AND INTERCEPT SYSTEMS





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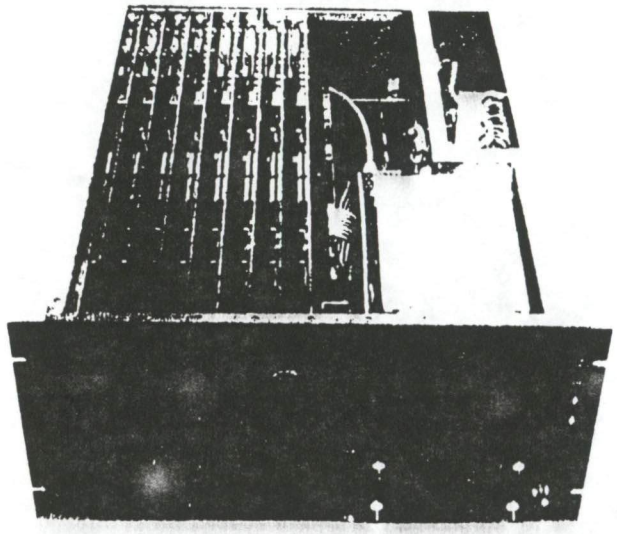
SIGNAL RECOGNIZERS



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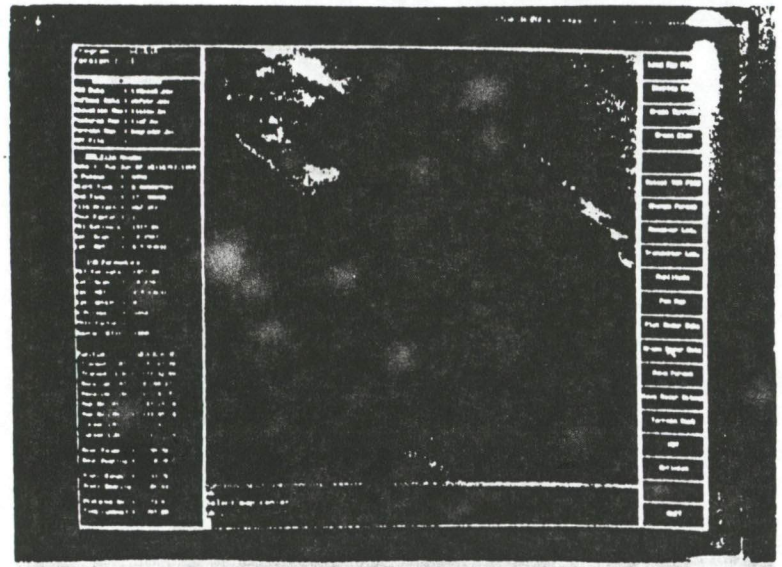

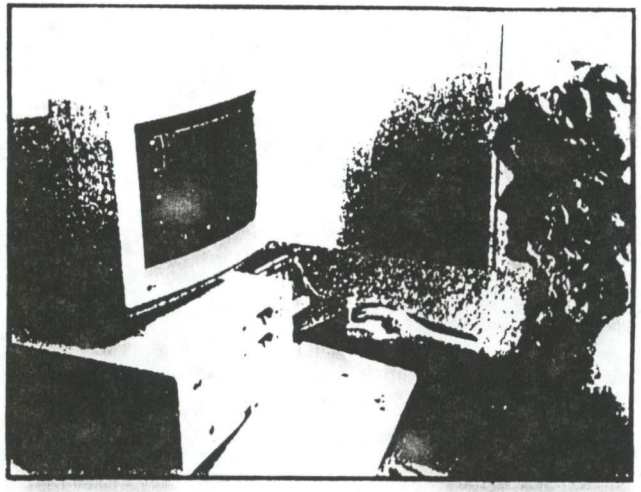

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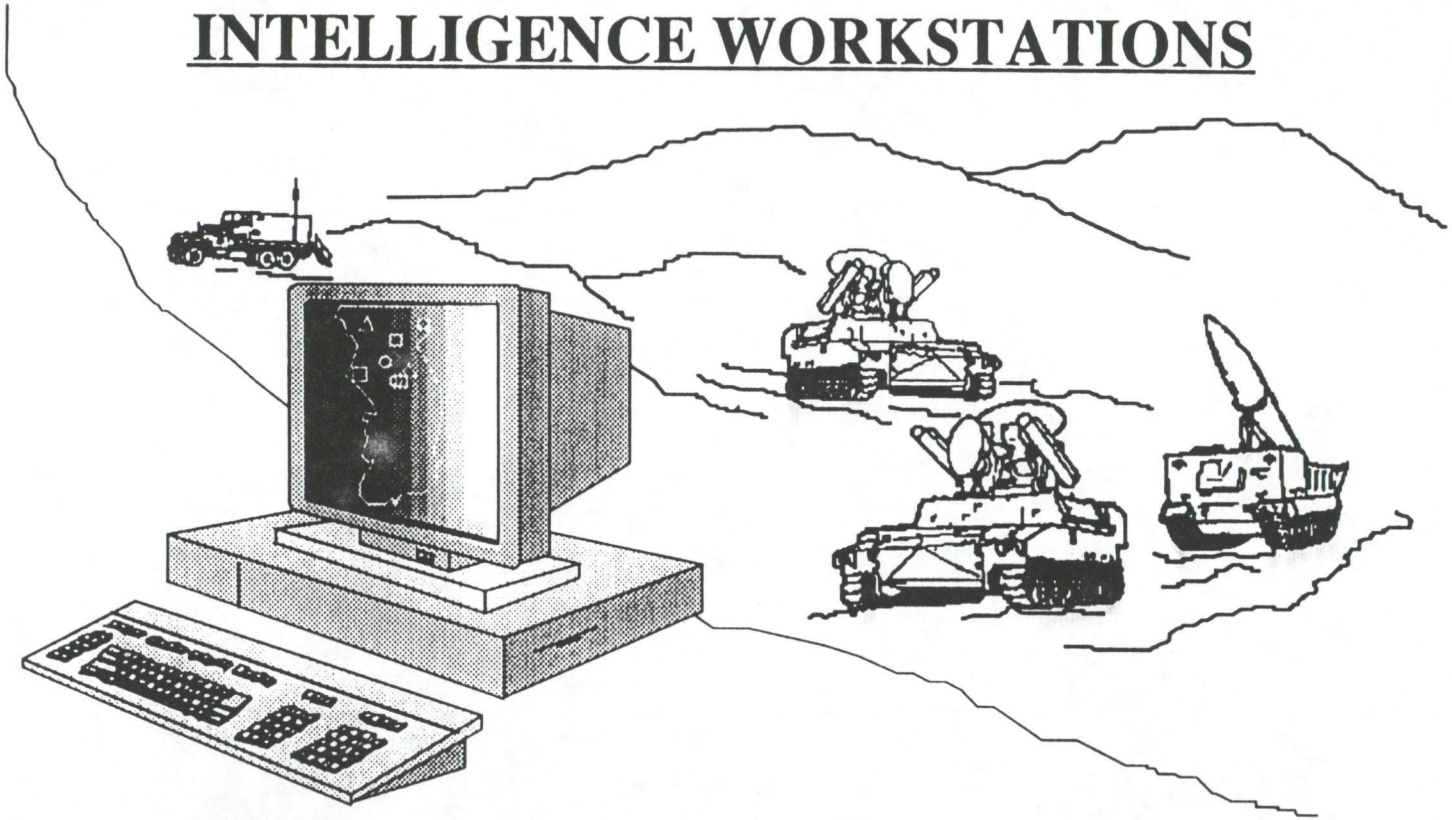
INTELLIGENCE WORKSTATIONS



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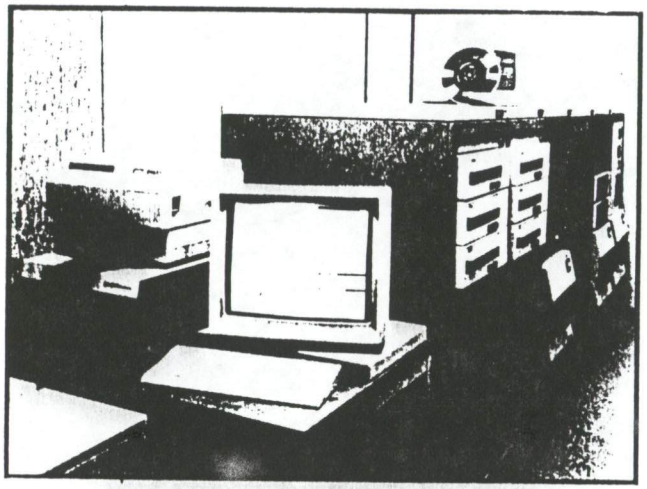

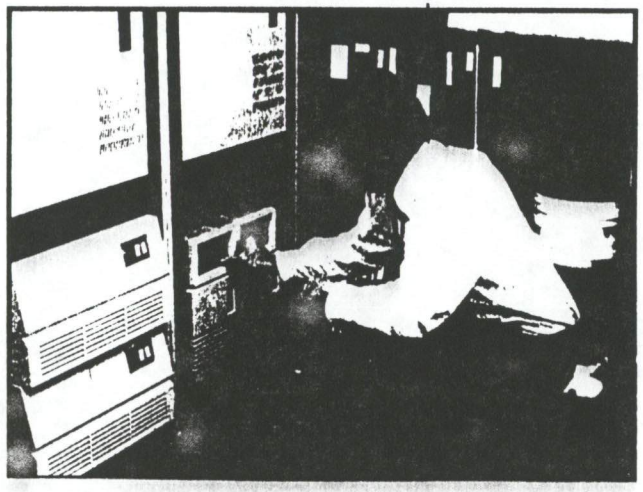

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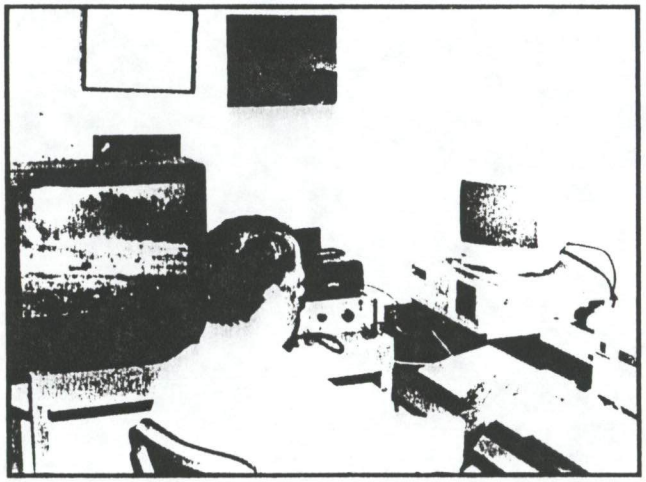

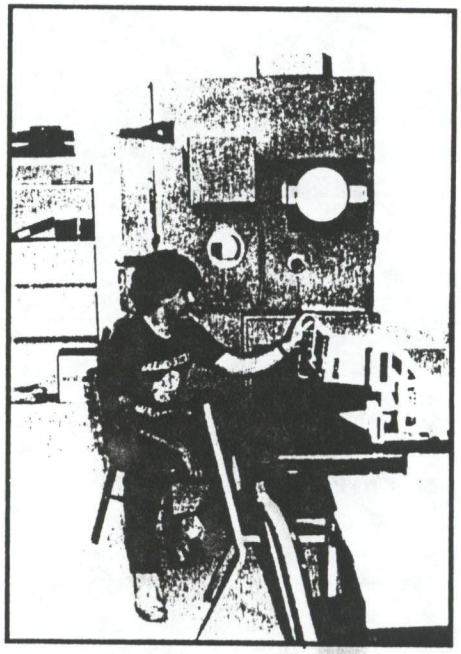

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- US NAVY

- SPAWAR
- DNI
- NWC
- NOSC
- PMTC
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- NSG
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- FLEET CINCS

- INTELLIGENCE AGENCIES

- VARIOUS

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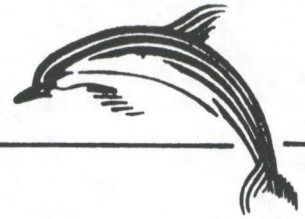
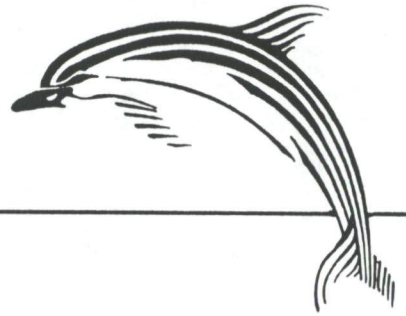


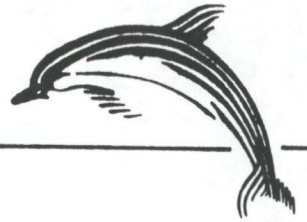
THE CONDUCT OF OUR BUSINESS

- Blend innovative concepts with proven technologies to achieve advanced system performance that is affordable and reliable
- Design with an understanding of the operational requirement and user environment
- Apply commercial technology to defense requirements when applicable
- Provide a company environment which attracts the best people, stimulates creativity, motivates and encourages productivity
- Company-wide total commitment to quality
- Integrity in all things we do

Delfin Systems



Corporate Overview



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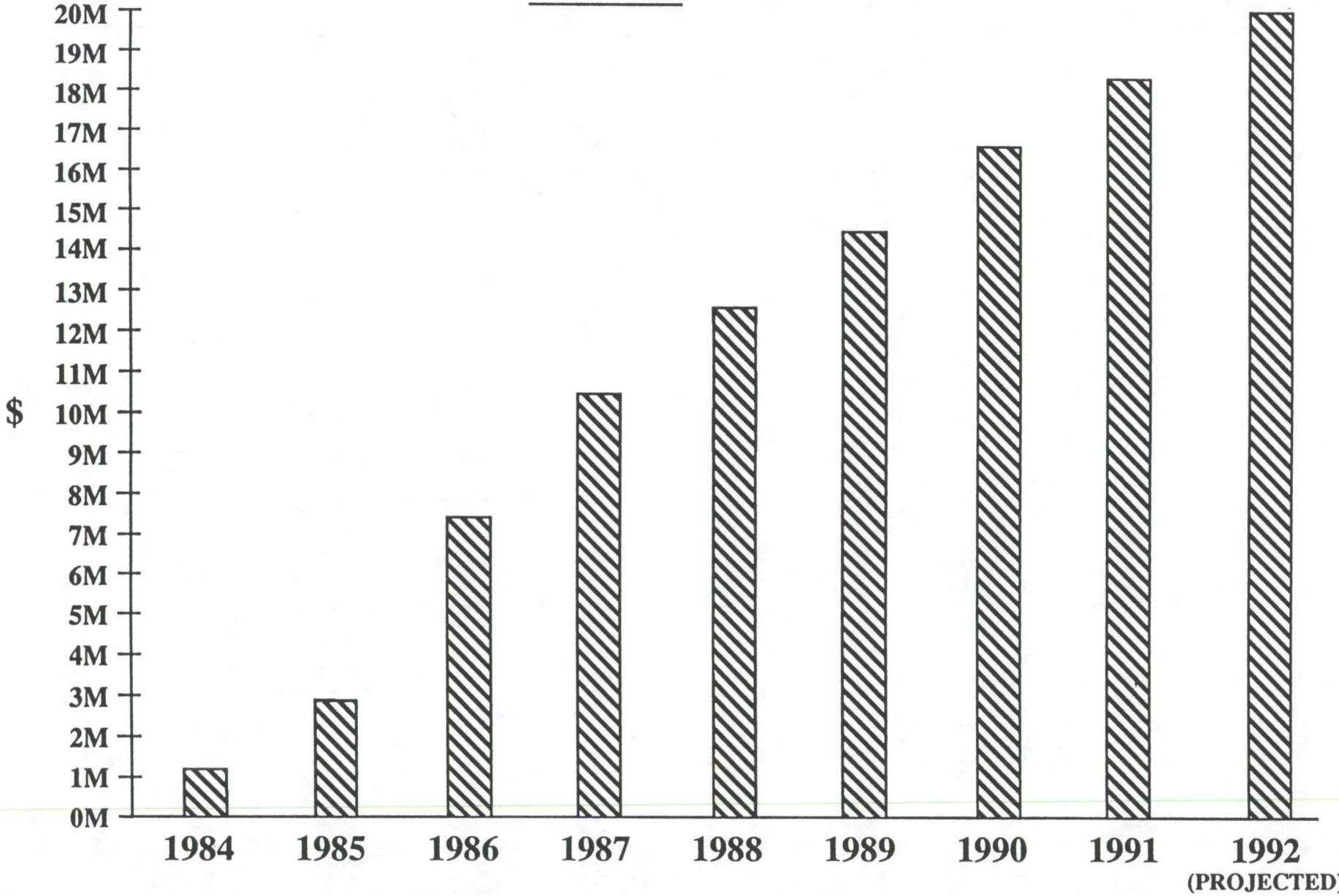

G

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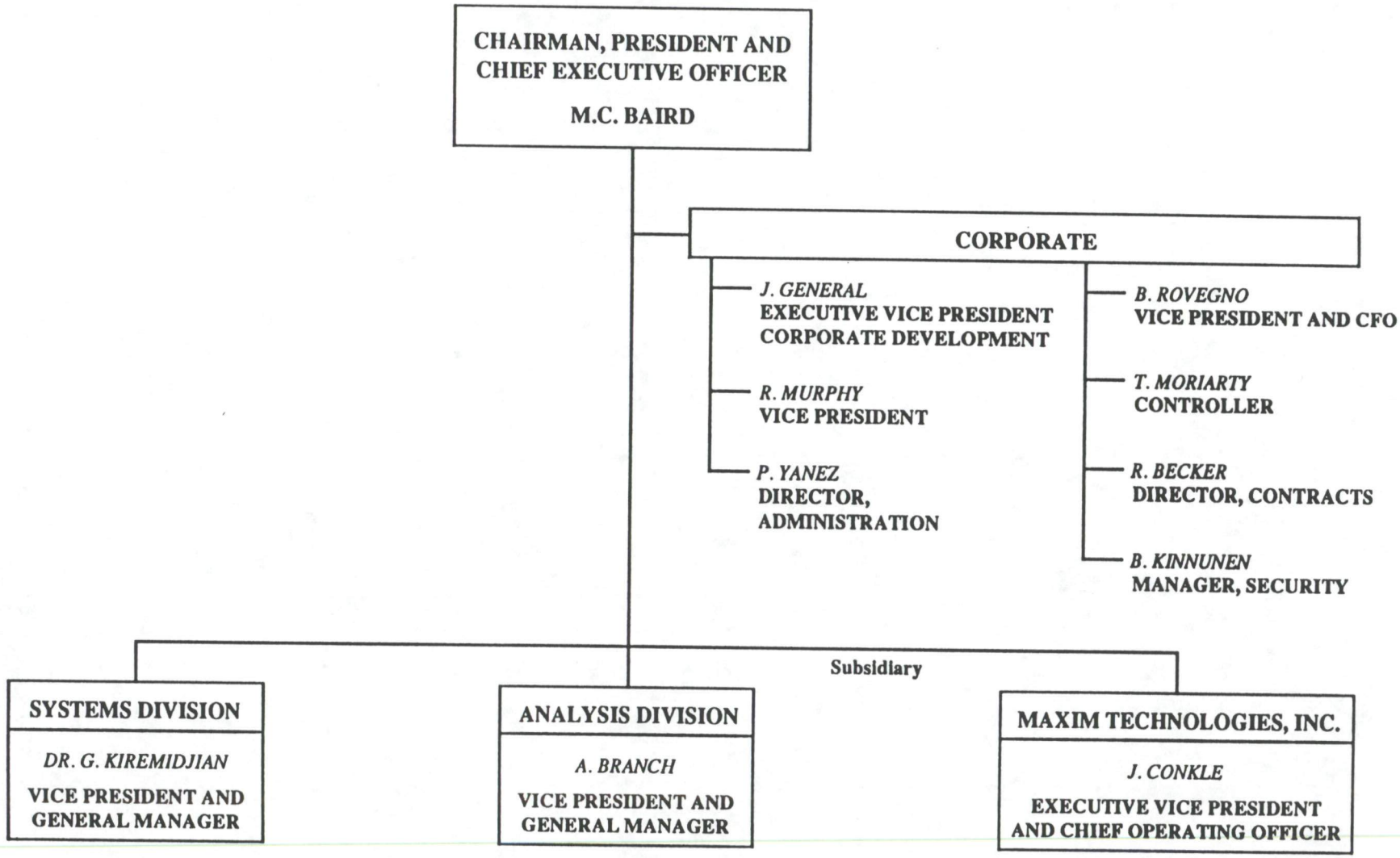
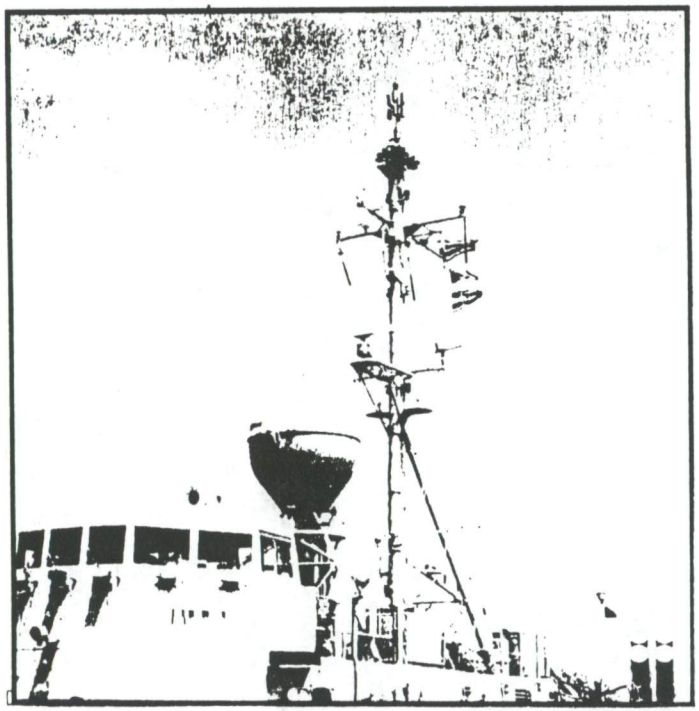
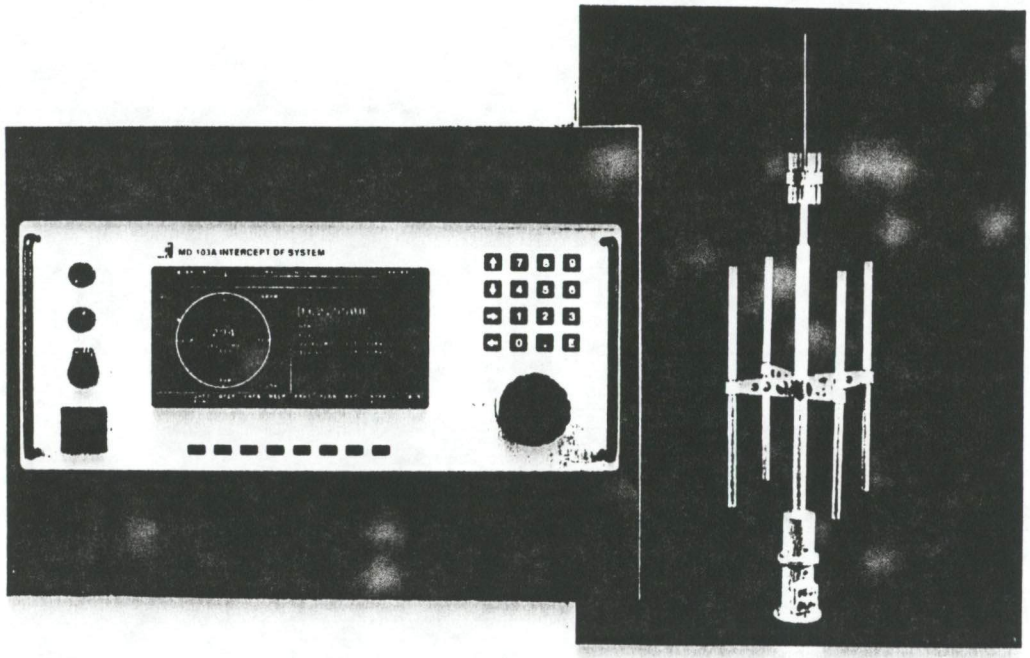


Delfin Systems

DIRECTION FINDING AND INTERCEPT SYSTEMS





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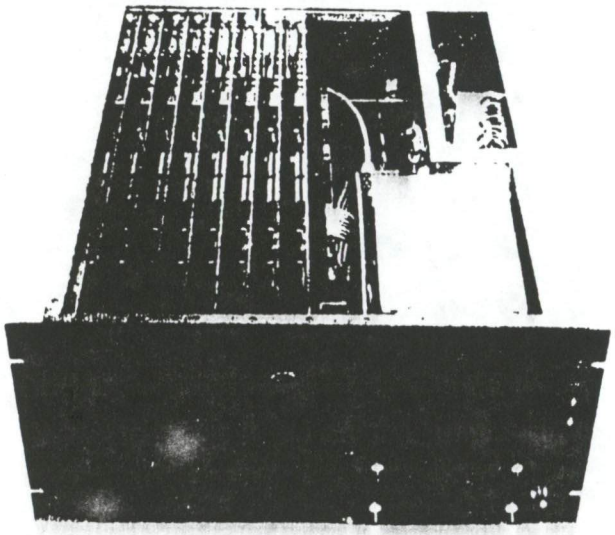

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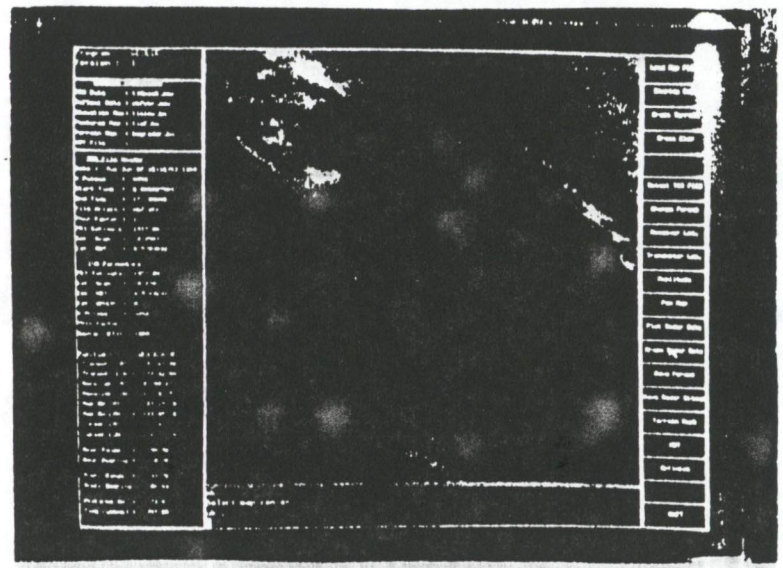

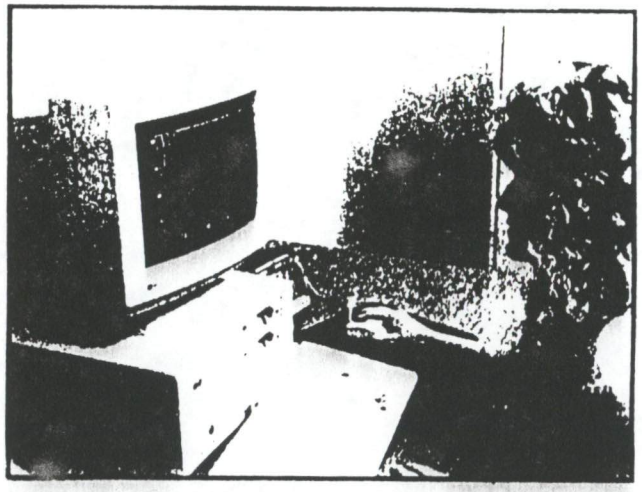

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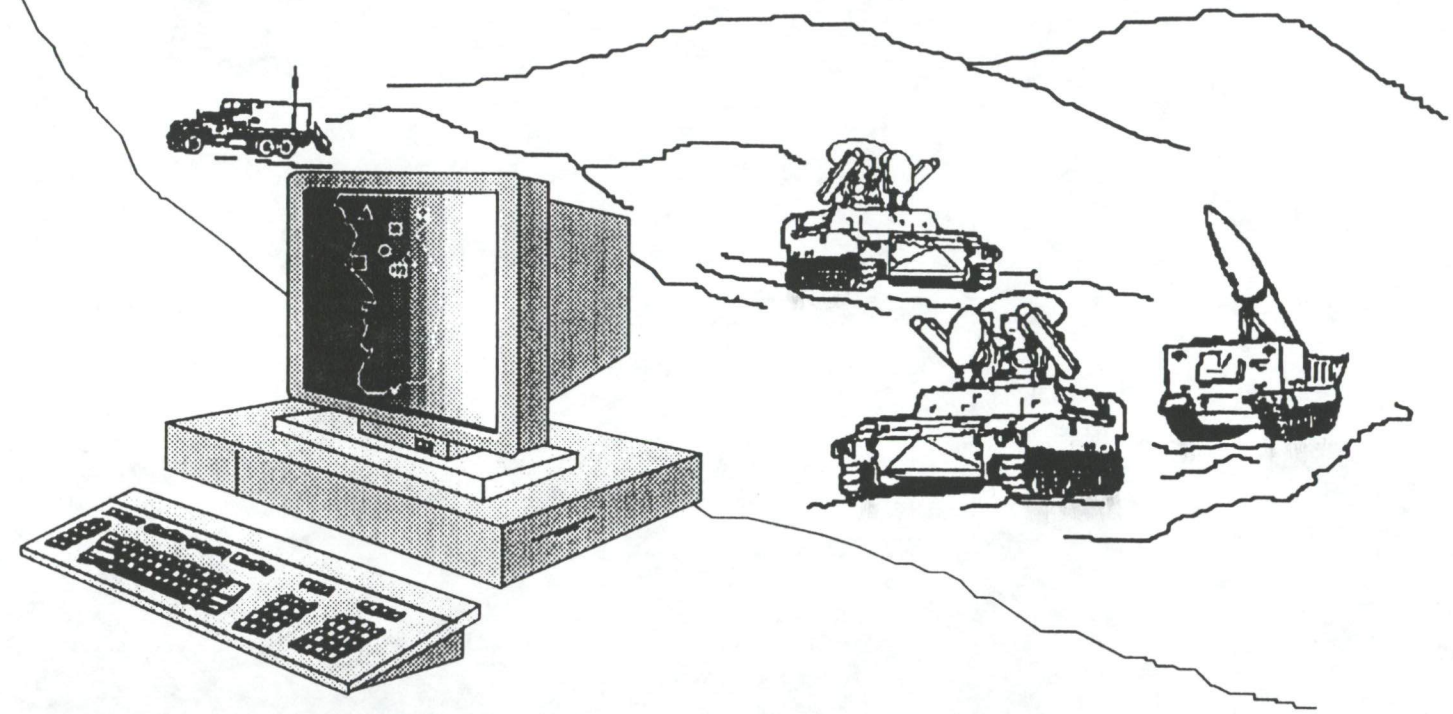

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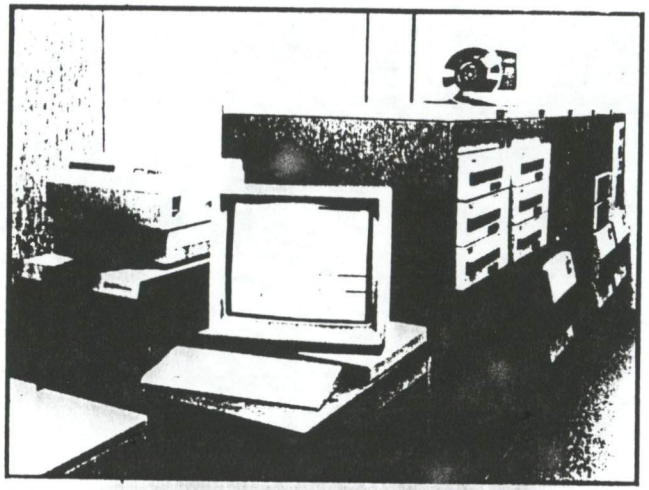

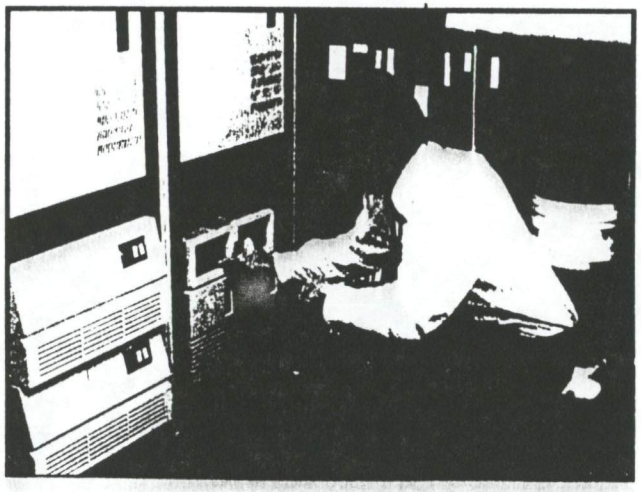

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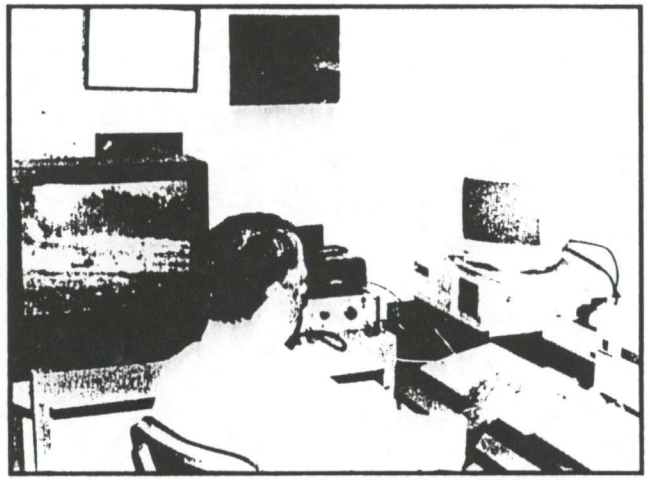

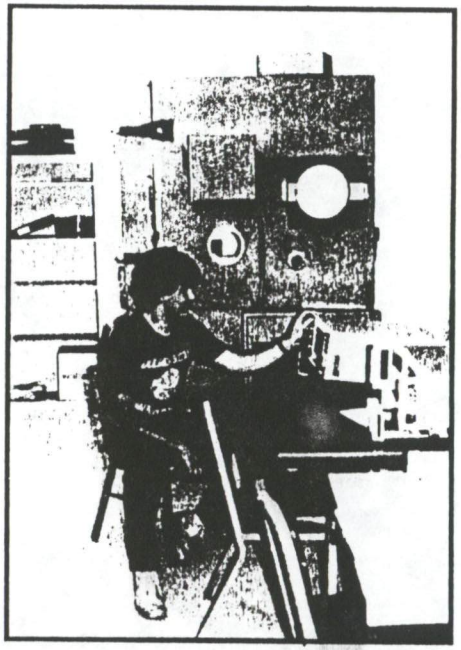

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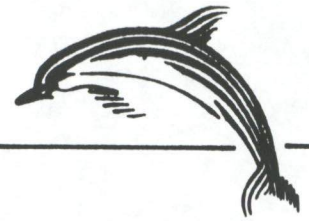

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- Design with an understanding of the operational requirement and user environment
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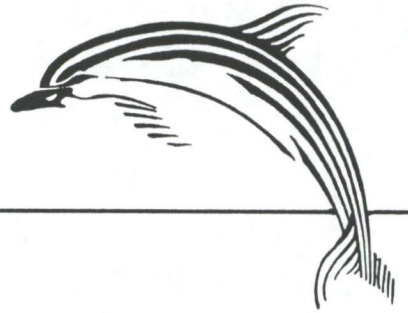
- Company-wide total commitment to quality
- Integrity in all things we do

Delfin Systems



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PRIMARY MARKET STRATEGY

- **Identify and Provide System Solutions to Gaps and Inefficiencies in:**
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  - **Planning processes**
  - **Management control processes**
  - **Training and readiness**
  - **Information resources management**

OUR BUSINESS

Systems solutions to problems of National importance

- **Hardware and software systems to collect, process, interpret, Geolocate, and exploit signal intelligence using advanced signal processing and AI techniques**

- **Systems employing AI techniques, advanced man machine interface, and other leading edge computer technology to enhance:**

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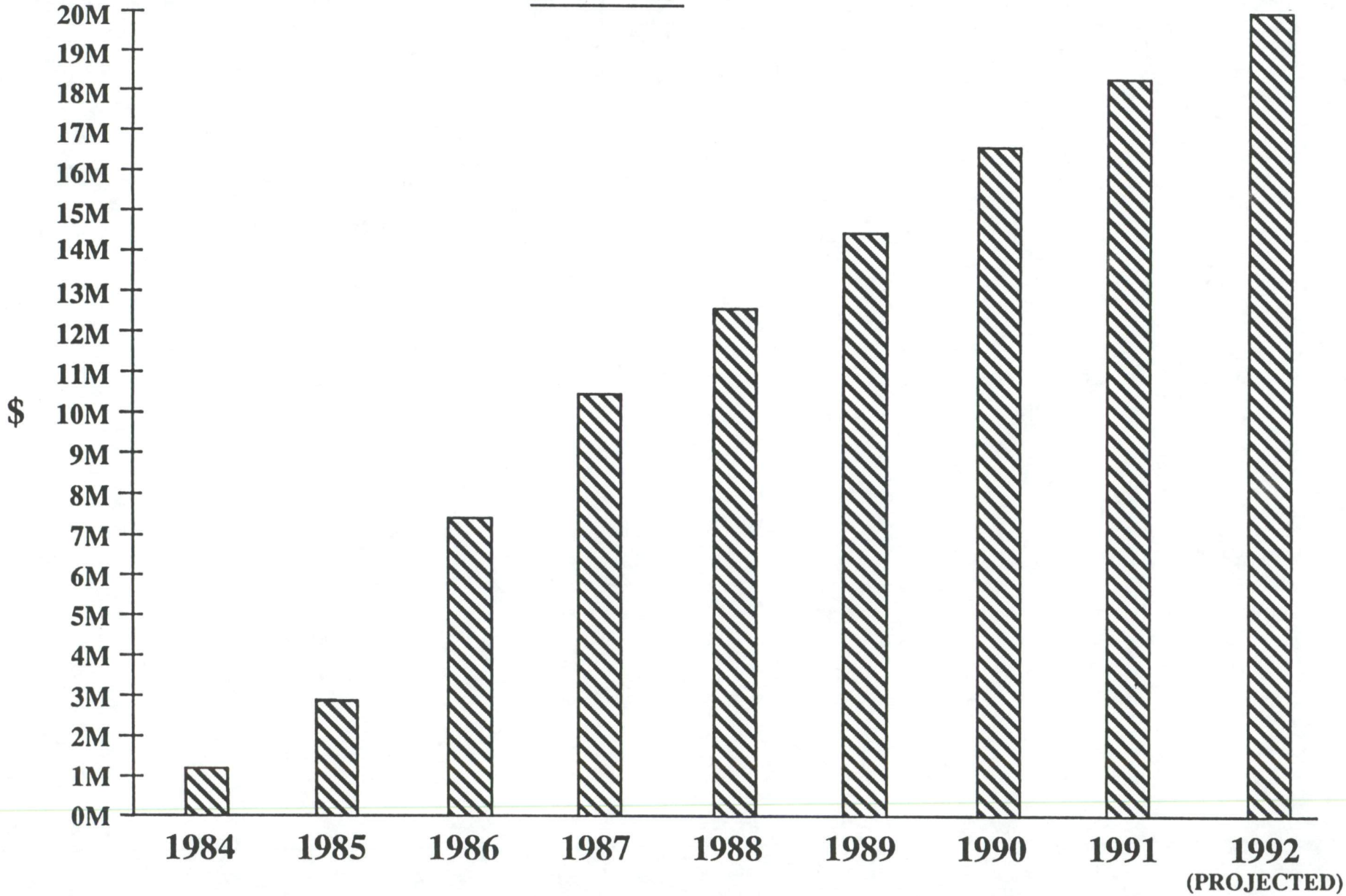
Delfin Systems

SALES



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- MULTI-LEVEL SCIFS
- SCREEN ROOMS

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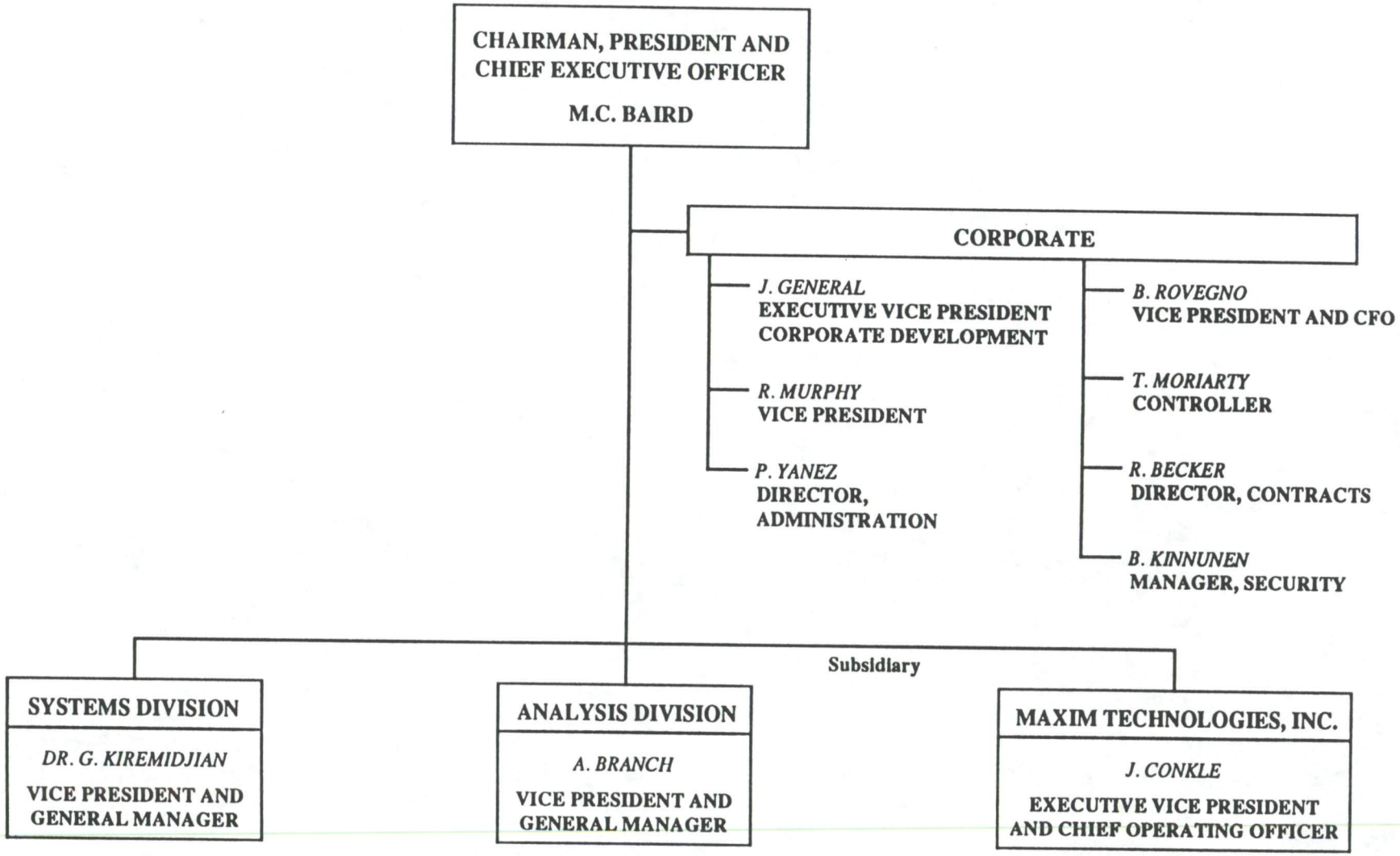
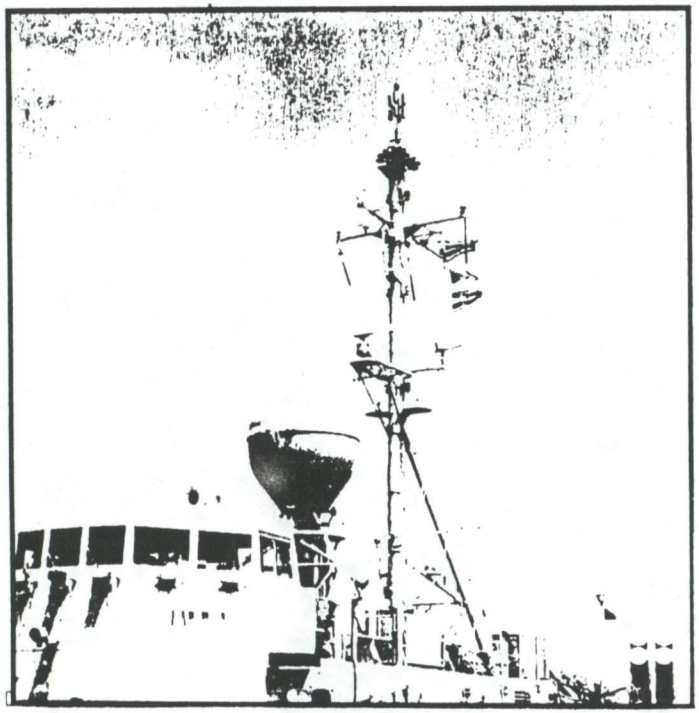
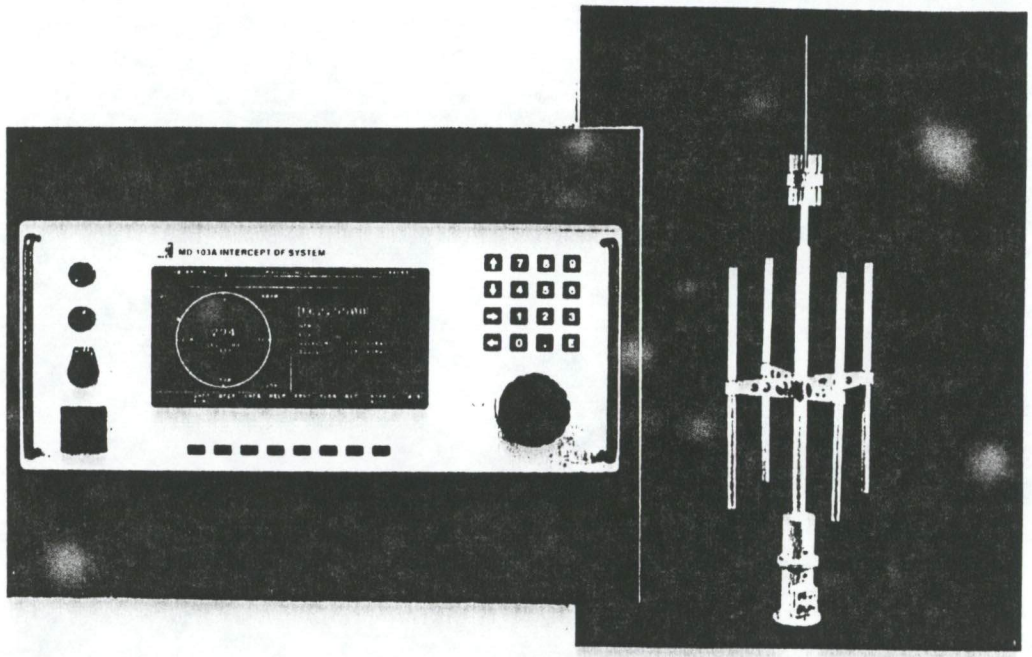
ORGANIZATION



Delfin Systems

DIRECTION FINDING AND INTERCEPT SYSTEMS





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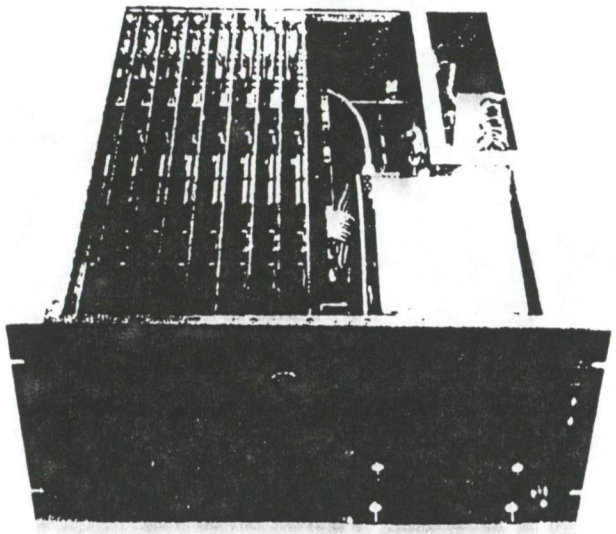
SIGNAL RECOGNIZERS



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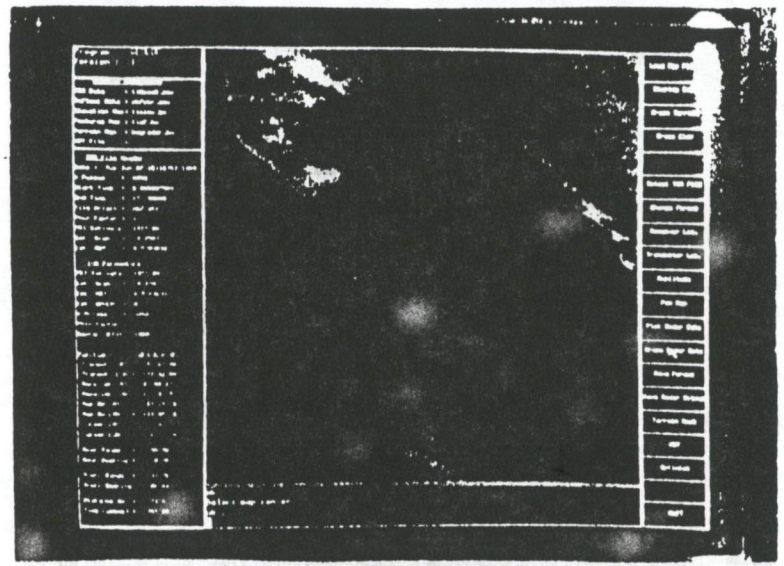
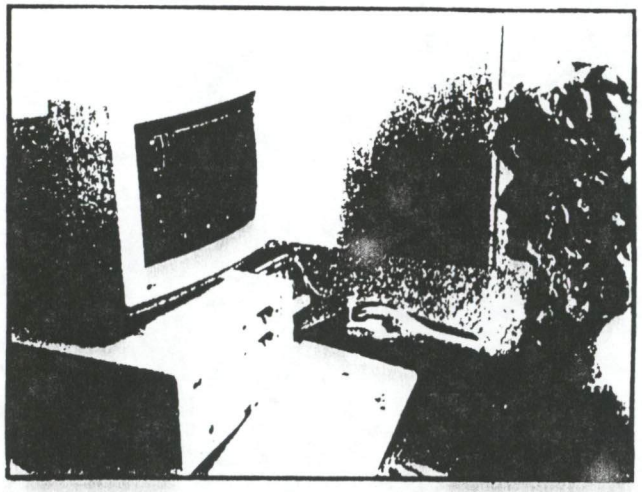
SIGNAL PROCESSING





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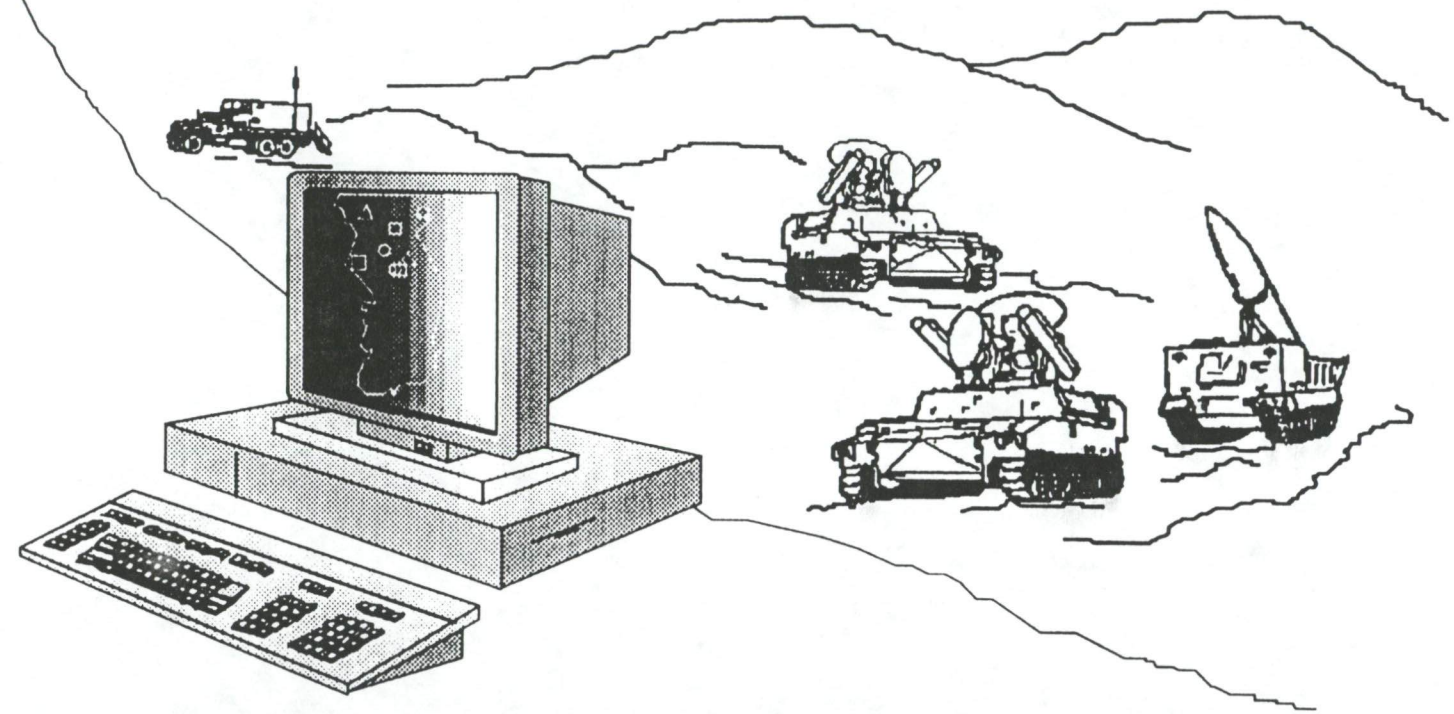
INTELLIGENCE WORKSTATIONS



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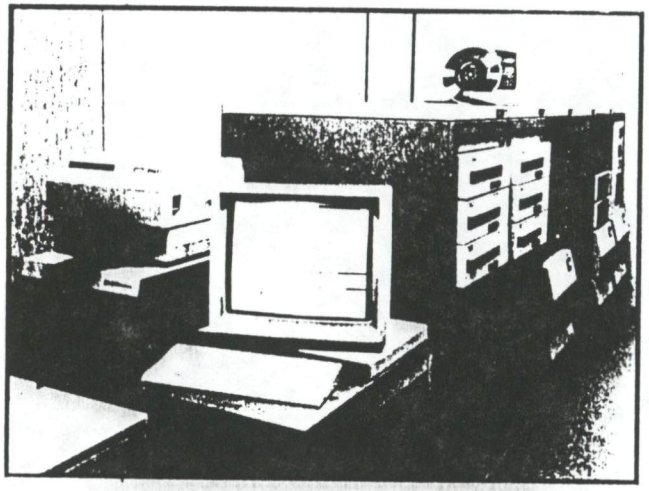
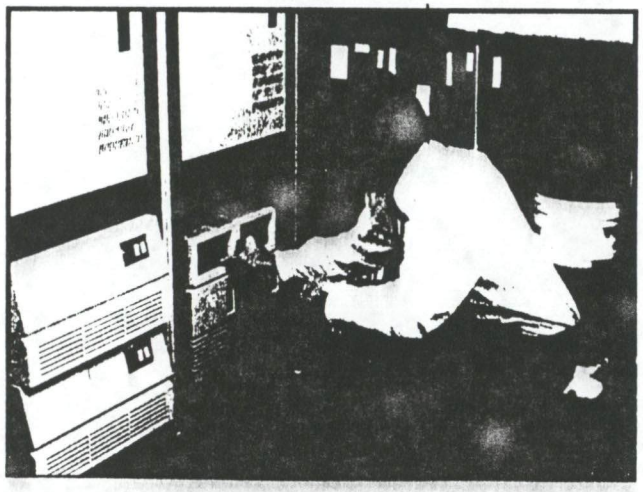
INFORMATION MANAGEMENT SYSTEMS





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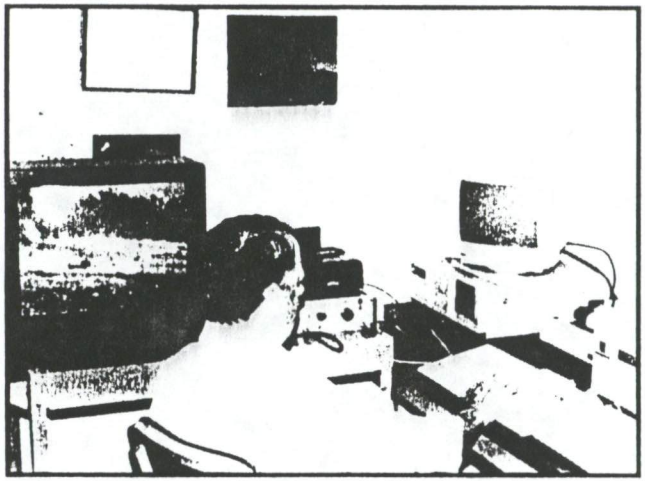

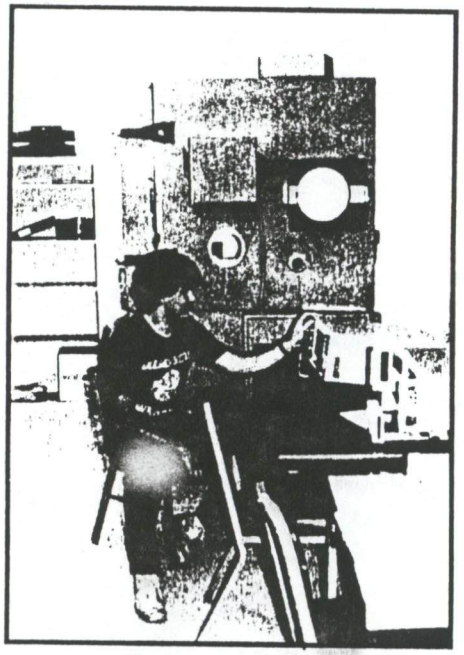

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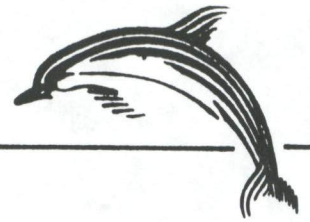

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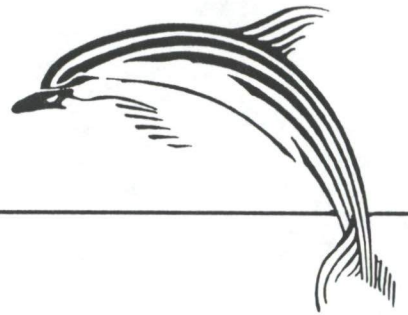

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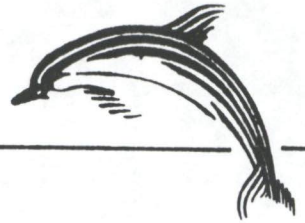

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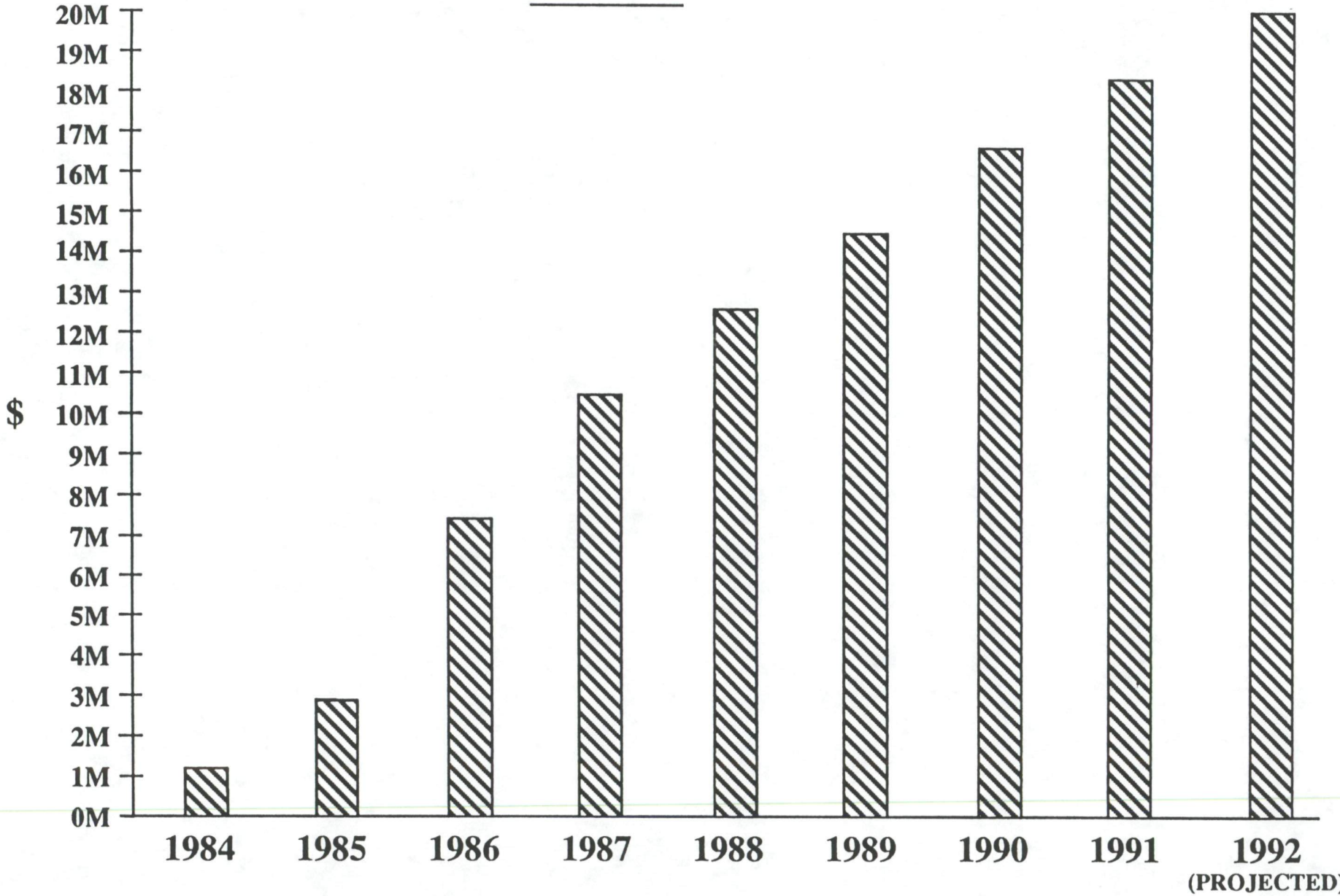

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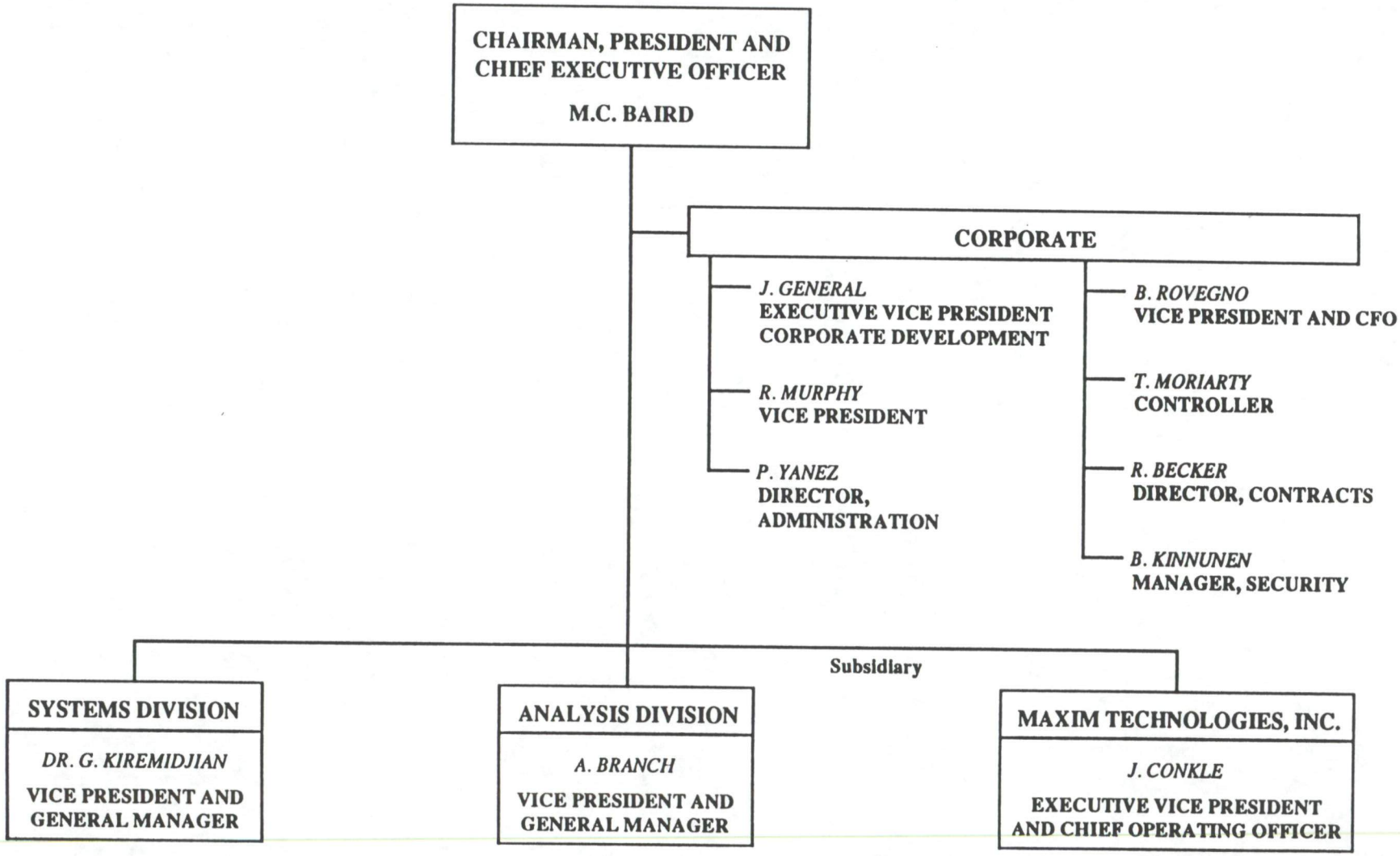

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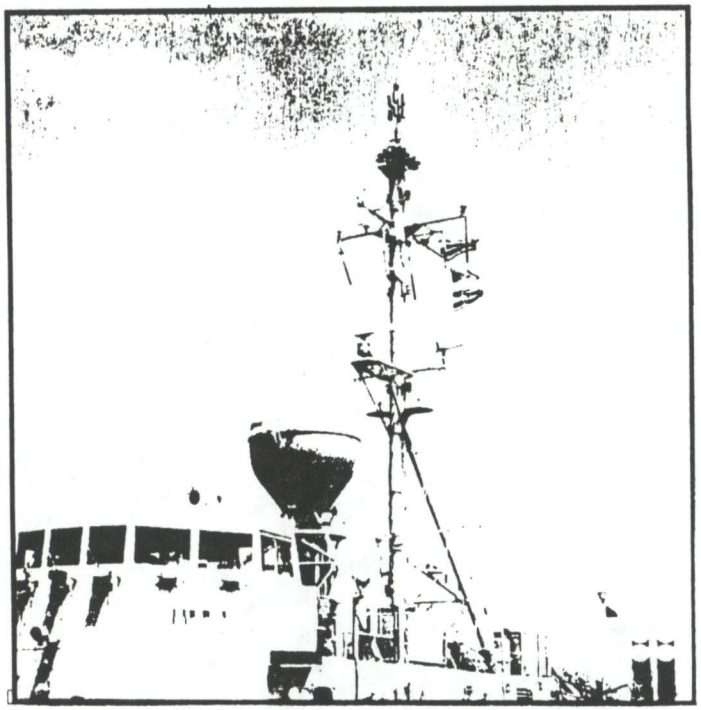

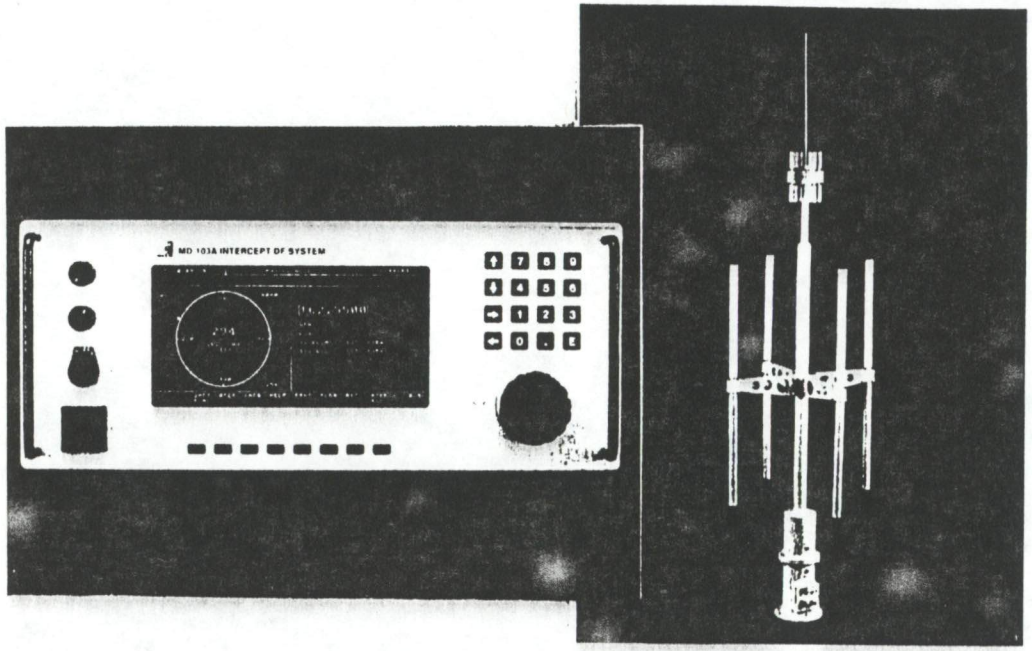

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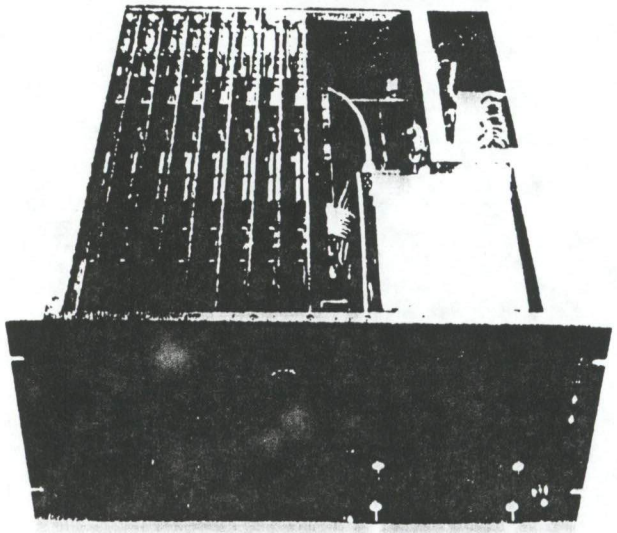

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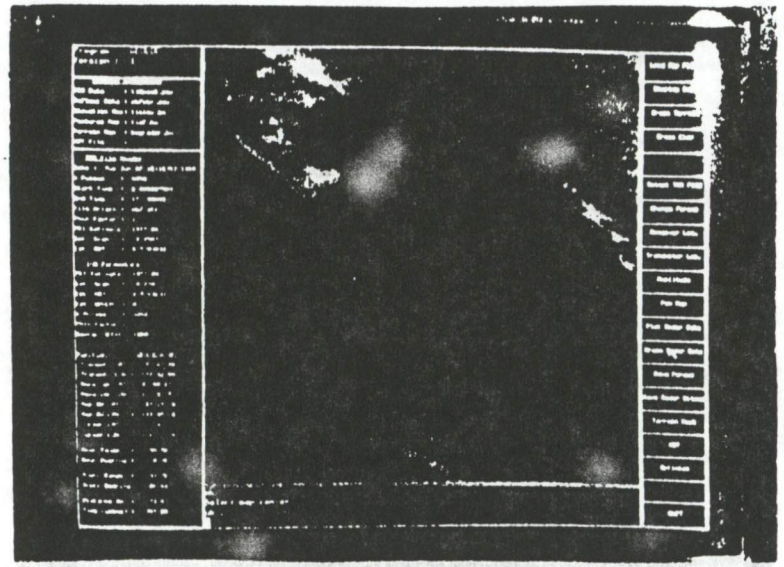

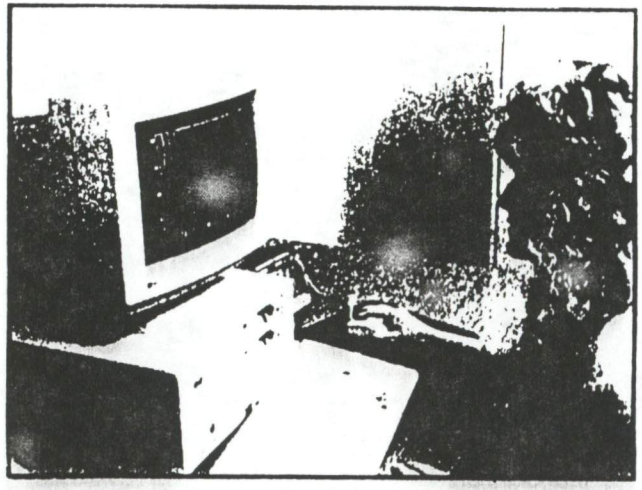

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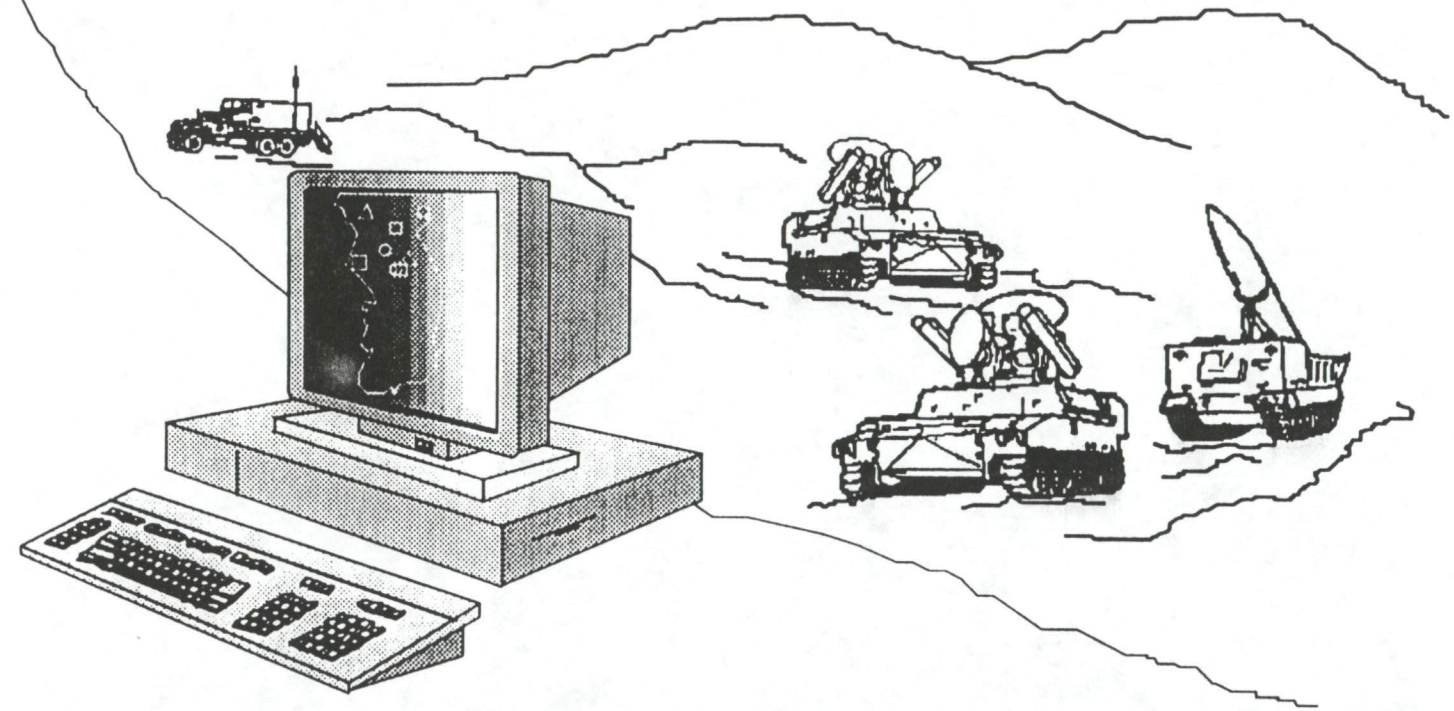

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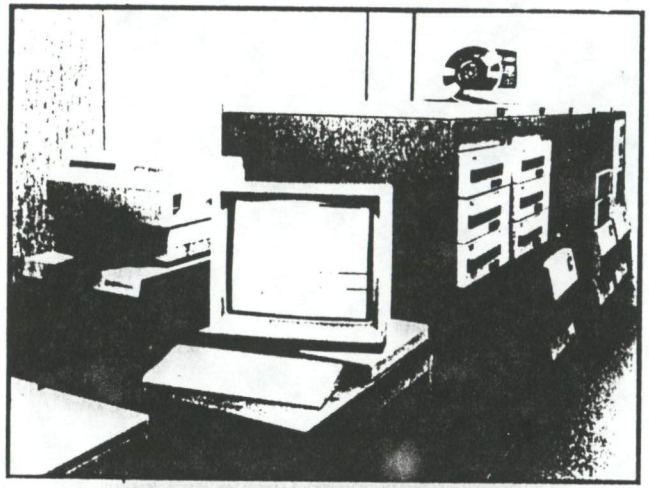

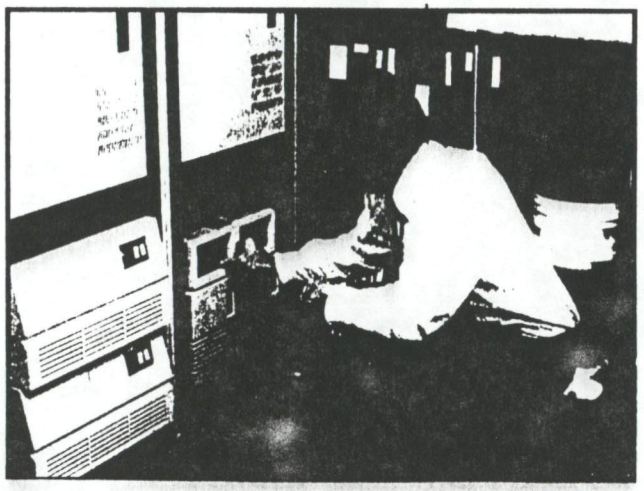

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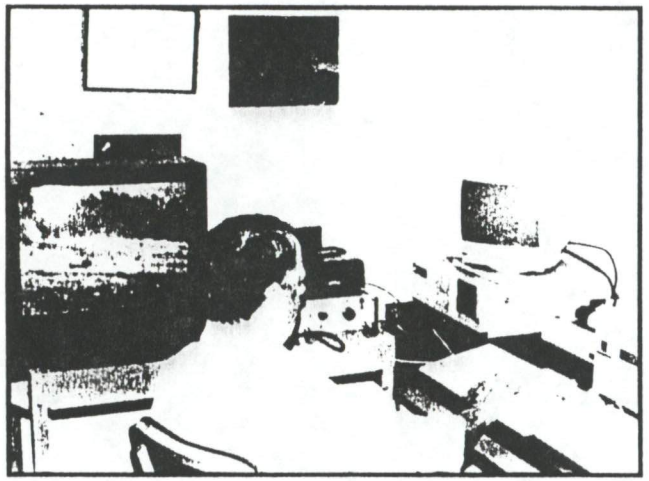

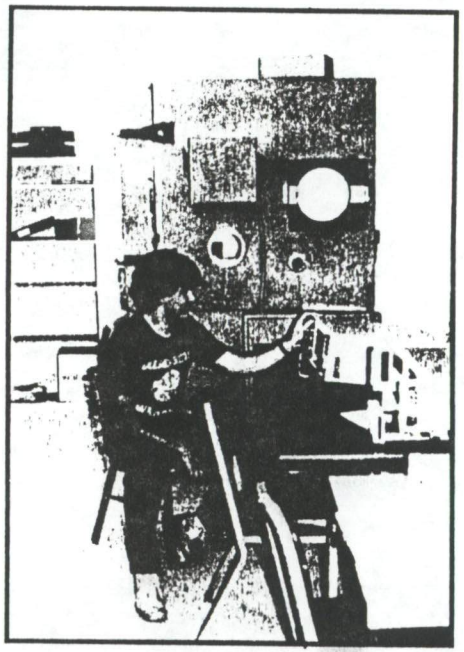

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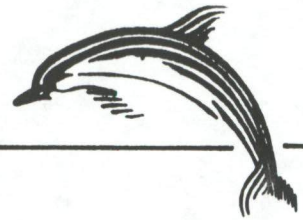

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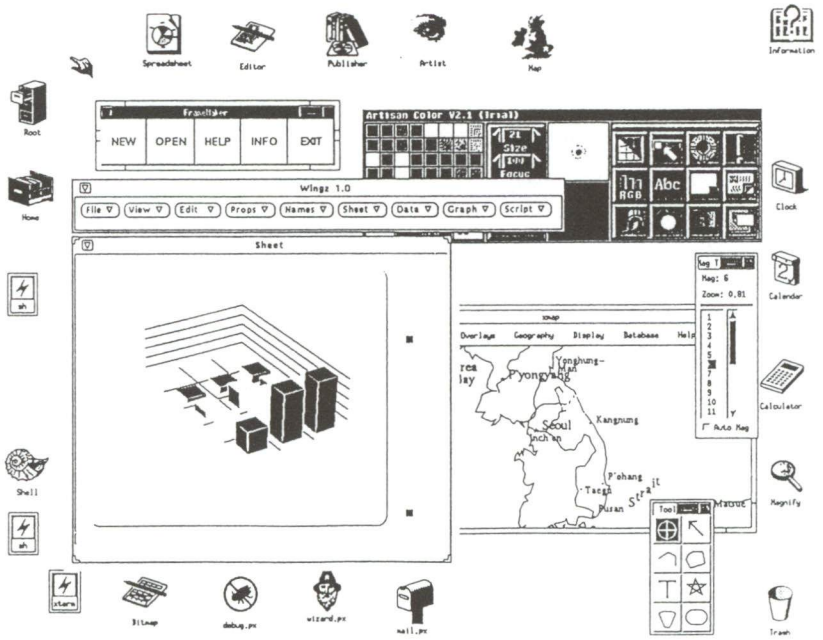
FOREIGN INTELLIGENCE DATA ANALYSIS



Delfin's Foreign Intelligence Module helps intelligence analysts perform foreign threat recognition and warning by providing flexible views into the vast interconnected realm of political, economic and military data. The system provides flexible access to a wide variety of data stored within its own database and supports on-line network retrieval of external documents and images. The system also provides automated decision aids which can help an analyst understand and then monitor the key aspects of the subject country, and allows an analyst to compose a polished and convincing report documenting his findings, which can then be published for dissemination.

The system is delivered on a SUN-4 workstation as an integrated suite of software partitioned into three categories: desktop productivity, knowledge manipulation, and automated reasoning. Desktop productivity software moves the analyst from a paper oriented environment to a graphics-based electronic environment, and includes such utilities as a word processor, spreadsheet, drawing package, calculator, clock, and more. Knowledge manipulation software controls the electronic storage and retrieval of vast quantities of diverse information, and makes use of such advanced tools as natural language interface and graphical hierarchy displays. Automated reasoning software helps the analyst investigate the vast on-line library, and includes such features as relevant information suggestion, historical scenario search, and real-time pattern identification and anomaly detection.

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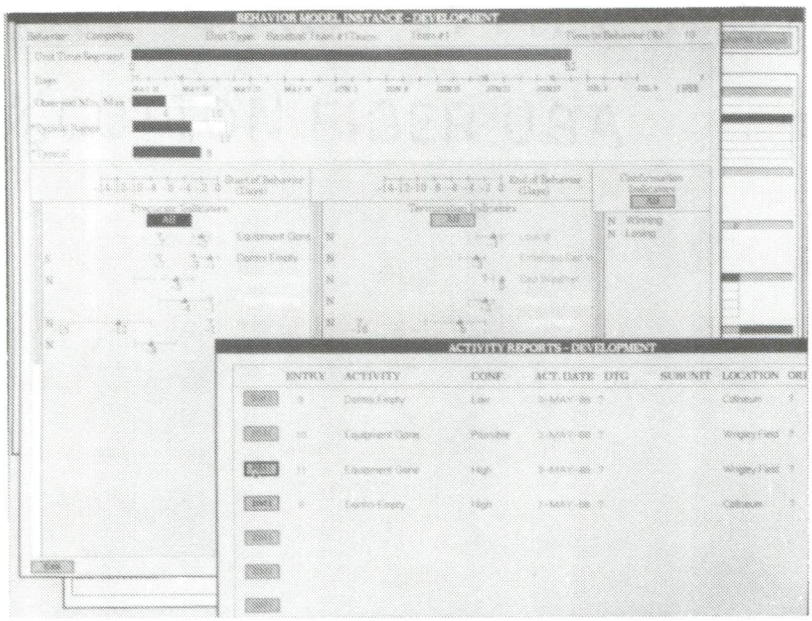
BEHAVIOR MODELING OF ORGANIZATIONS



Delfin Systems has implemented an expert system that monitors the behaviors of organizations and individuals using a combination of past and current activity data and established behavior models. The delivered system correlates activity reports from multiple sources and compares the developed activity patterns to stored behavior models. In accomplishing its objectives for providing timely indications and warning, this system detects and evaluates deviations between current or future situations and established patterns -- and its automated learning feature can update existing behavior models as the underlying patterns evolve. Users can create behavior model specializations for specific organizations or subcomponents that do not follow normal behavior patterns.

The system is delivered on a Sun-4 under Unix or on a DEC VAXStation under VMS. It comes with concurrent operations and development environments, supports distributed processing, and can interface to remote Oracle or Sybase databases. This system uses NEXPERT Object for its expert system engine, and uses VWS graphics on the VAXStation, X-Windows on the Sun; all external routines are written in "C".

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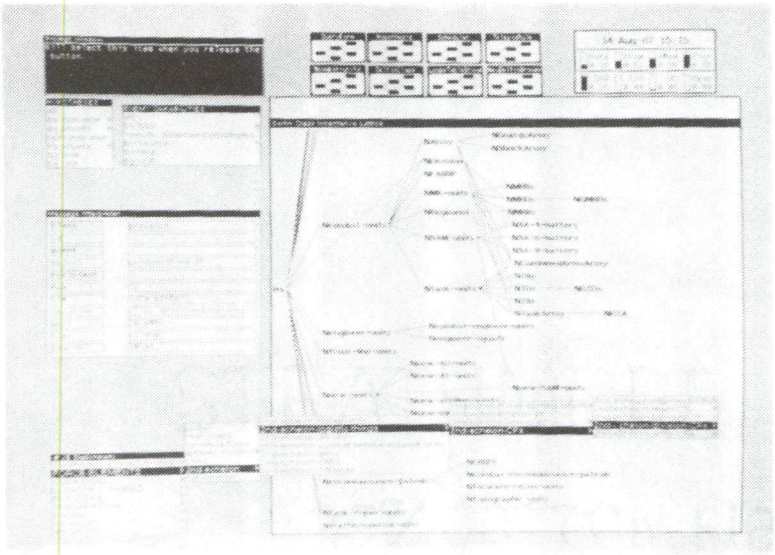
DN-88-382

AUTOMATED INTELLIGENCE PRODUCTION



The Intelligence Estimate
1. Mission
2. The Area of Operations
a. weather
b. terrain
3. Enemy Situation
a. disposition
b. composition
c. strength
d. significant activities
e. peculiarities and weaknesses
4. Enemy Capabilities
a. enumeration
b. analysis and discussion
5. Conclusions
a. probable enemy courses of action
b. enemy vulnerabilities

Tactical commanders require timely and accurate intelligence estimates of their evolving area of operations, of the enemy situation, and of the enemy's capabilities and probable courses of action. Production of an intelligence estimate is a complex problem with many aspects which are not quantifiable and decision processes not easily expressed. The expertise applied to producing an estimate ranges from the interpretation and understanding of a wide variety of input reports such as tactical reports (TACREP), spot reports (SPOTREP), radar exploitation reports (RADAREXREP), and report-like information about weather and terrain, to the development of high level conclusions that require abstract and complex reasoning.

Delfin's Automated Intelligence Production system applies artificial intelligence technology to automatically produce and continuously update a corps-level intelligence estimate. Incoming reports, at various levels of abstraction, are parsed, interpreted, and used to update appropriate paragraphs of the Intelligence Estimate. Those reports dealing with significant activities are further analyzed for their implications about strengths, capabilities, and potential indications of specific courses of action. This system is built in LOOPS and InterLisp-D language on a XEROX 1109 AI workstation.

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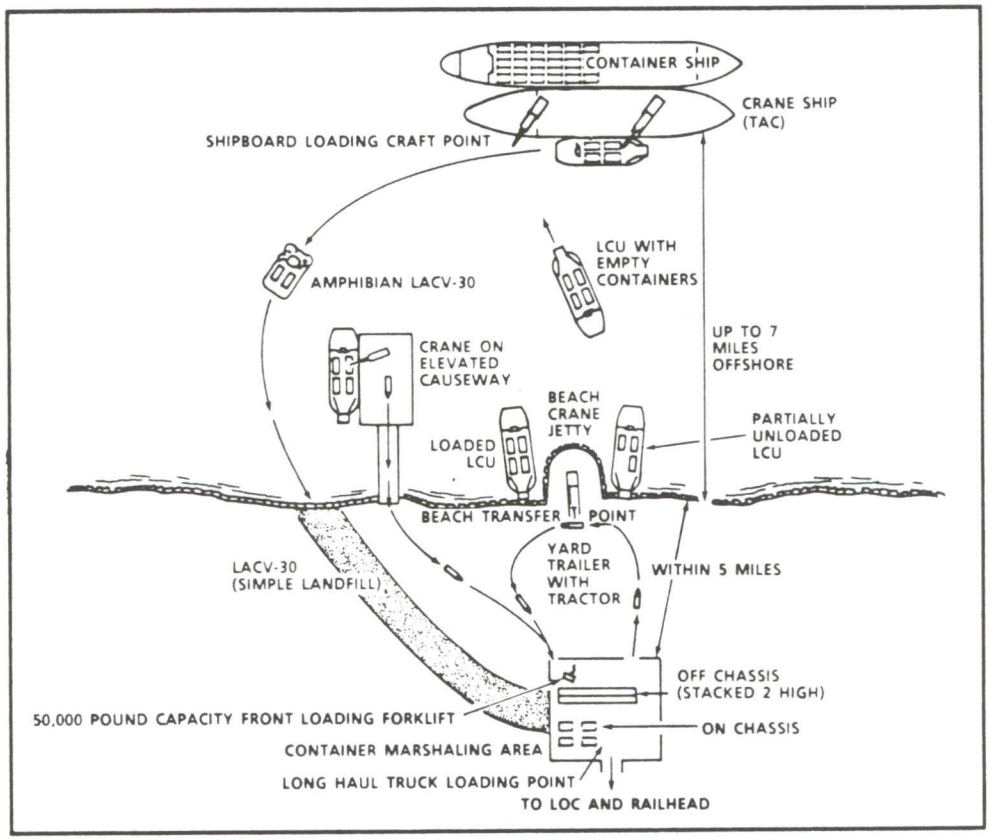
LOGISTICS OVER THE SHORE PLANNER



Army deployment includes moving forces into austere environments where there may be limited, damaged or non-existent facilities for moving cargo ashore. Logistics over the shore (LOTS) operations are conducted when fixed seaport discharge facilities are denied to cargo ships carrying combat equipment, sustaining supplies and resupply. Delfin and Vitro are developing an expert system-based planning aid to provide the ocean terminal commander a decision making tool for the utilization of watercraft lighterage in off-loading cargo ships to meet the required delivery dates of the theater commander.

A prototype LOTS discharge planning system is implemented on an IBM PC/AT computer using a custom-built framework on top of GOLDWORKS, Gold Hill's expert system development tool. This framework reasons with dynamically changing operational characteristics, supply requirements, ship arrivals, available lighterage and stevedore companies, and reference data about ship types and operational constraints.

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LOGISTICS MOVEMENTS PLANNERS

* Screens CONTROL MAP

PLANNED MOVEMENTS

Day	Class	Amount	From	To	RDD	Asset
D+30	I	95.67	LOTS	ARMORED	D+30	TRUCK-2
D+30	III	138.57	THEATER LSF	ARMORED	D+30	TRUCK-2
D+30	IV	222.26	THEATER LSF	ARMORED	D+30	TRUCK-1
D+30	V	226.78	THEATER LSF	ARMORED	D+29	TRUCK-1
D+30	I	78.68	LOTS	INFANTRY	D+30	TRUCK-3/RAIL-1
D+30	II	182.80	THEATER LSF	INFANTRY	D+30	RAIL-1
D+30	III	113.97	THEATER LSF	INFANTRY	D+30	RAIL-1
D+30	V	248.69	THEATER LSF	INFANTRY	D+30	RAIL-1

Selected Movement Details

```
Movement Start Day     : D+30
Point of Origin        : Theater LSF
Destination Point      : Trailer Transfer Point TT-1
Receiving Unit         : ARMORED
Scheduled Arrival      : D+30
Required Delivery Day  : D+29
DODIC Number           : D544
Nomenclature           : 155HE M107 for 155 HOWITZER
Required Amount        : 226.78
Planned to be Moved by: Truck Company 1
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In meeting the challenges of the modern theater battlefield, timely logistics planning is essential. This planning must be responsive to a broad range of dynamic factors that are dependent on variations in operational intensity, force dispersion, mobility and surge demands. To assist the logistics planner in dealing with these dynamic factors, Delfin Systems has developed an expert system-based planning aid that supports rapid replanning and the exploration of alternate plans.

The logistics planning aid is implemented on an IBM PC/AT computer using a custom built expert system framework on top of GOLDWORKS, Gold Hill's expert system development tool. This framework integrates and reasons with logistics planning expertise, regional environmental factors (such as terrain and weather), and man-made transportation features (such as roads, bridges, airfields, railroads, and pipelines) in order to automatically determine, recommend and justify optimum movement plans and to identify problems in meeting required delivery dates.

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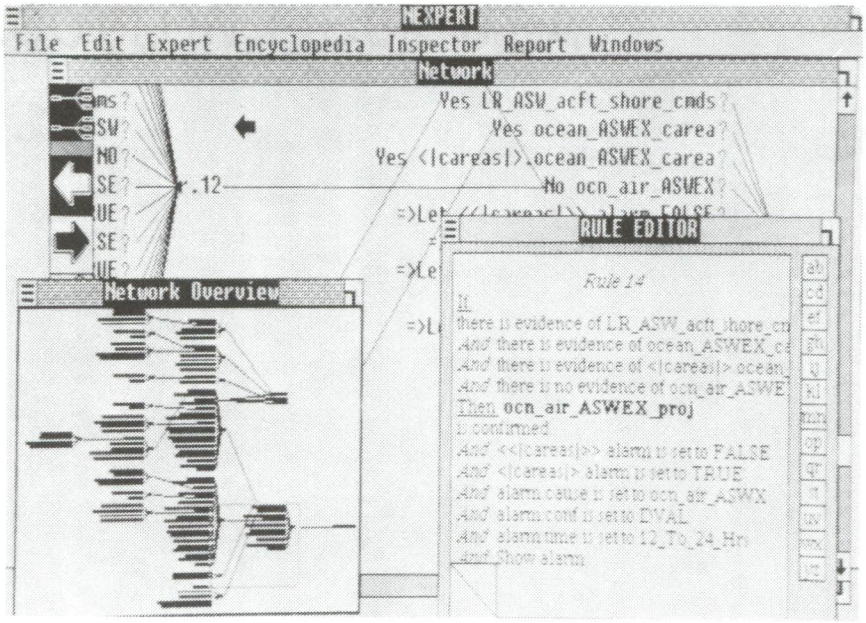
SENSOR EVENT CORRELATION



Individual signal search and collection sensors automatically detect and process signals of interest, and produce activity reports that contain concise, formatted descriptions of each signal intercept. Delfin's Sensor Event Correlation System is an expert system that automatically correlates and assembles input signal activity reports into communications profiles, matches these profiles to known operational event patterns, and identifies missing or expected signal data. The Event Correlation System also formulates queries for specific data contained in external operational event databases (such as closure areas) and in support databases (such as platform and emitter attributes). The system can also accept user-volunteered collateral data inputs. System outputs consist of event alarms, signal predictions, and justifications for alarms and predictions.

The configuration of the Event Correlation System for installation and operation at an overseas signal collection site consists of a DEC microVAX II connected via DECNET protocol over an Ethernet LAN to the external collection systems and databases. Database interface is via SQL-Net and ORACLE, and user interaction is forms-oriented using the FMS forms management package. Automatic event correlation functions are supported by specialized mechanisms coded in C, working with the NEXPERT OBJECT expert system building tool. A smaller version of the event correlation system is also available on an IBM PC/AT.

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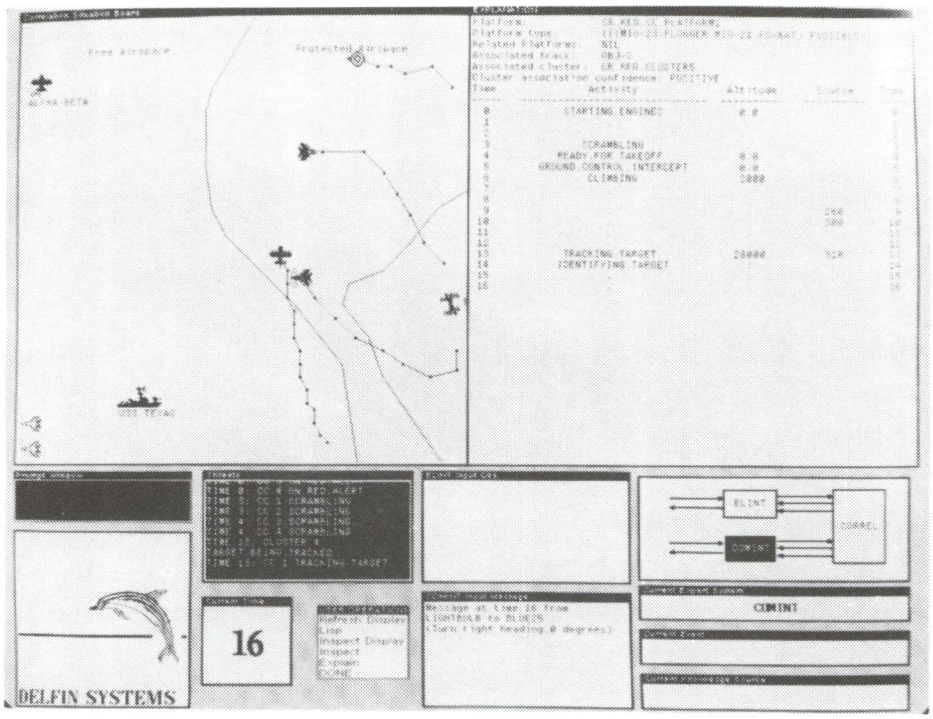
DISTRIBUTED SIGNAL UNDERSTANDING



Delfin Systems has developed specialized extensions to the Artificial Intelligence concept of the blackboard model of problem solving into the area of distributed computing. These architectural extensions allow problem solving expertise to be distributed into a network of independent, autonomous and cooperating expert systems. This architecture has been tailored to signal understanding problems that require (a) correlation and reasoning with data and information from dissimilar sources, (b) scenario hypothesizing based on incomplete data, (c) prediction of anticipated data based on the hypotheses, (d) uncertainty handling and decision making in the presence of uncertainty, and (e) conflict detection and resolution.

A demonstration prototype includes three expert systems: ELINT analysis, COMINT analysis, and ELINT-COMINT correlation in the domain of air defense. ELINT deduces intelligence data about airborne platforms and their activities from observations of their radar emissions. COMINT deduces intelligence data about the activities of platforms from intercepted message traffic. CORRELATION maintains and displays an integrated model of the current situation, analyzes global activities and recognizes threats. Communications between the three autonomous expert systems is through Reports, Feedback, and Tasking messages.

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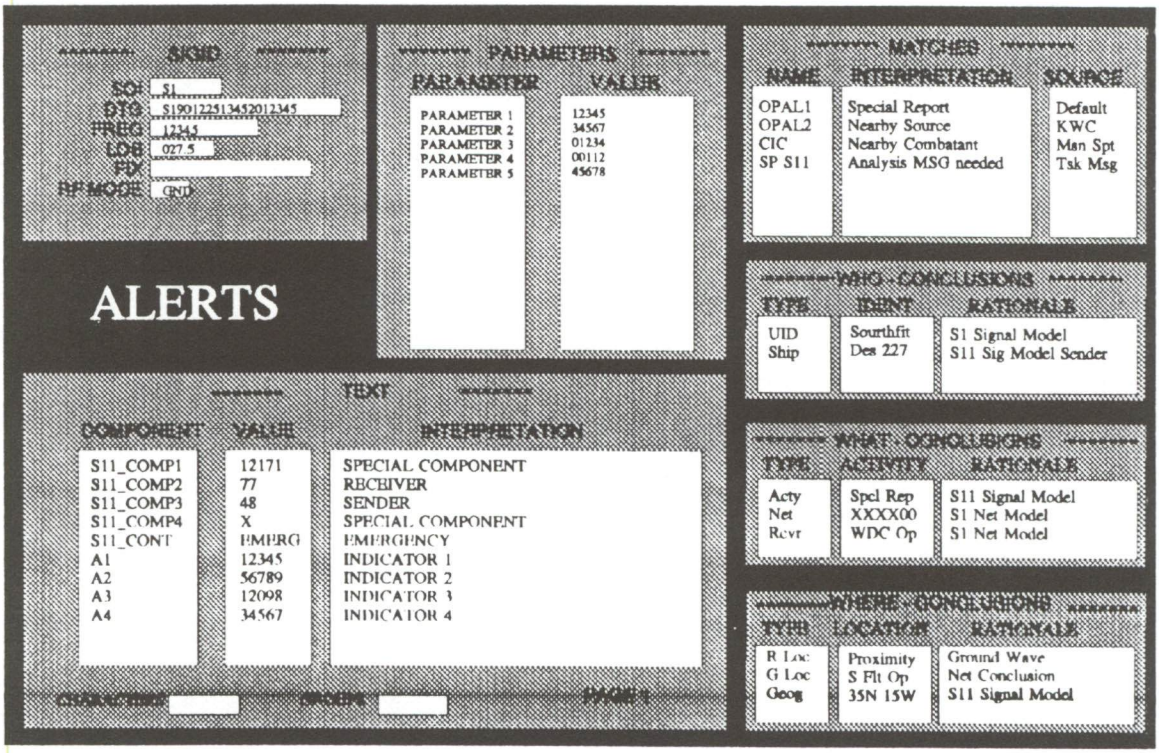
TACTICAL SIGNAL EVENT RECOGNITION



Delfin has developed a "Technical SIGINT" expert system designed to assist cryptologic operators at sea in recognizing and identifying key tactical communications signals of interest out of the thousands of signals simultaneously present in the operational environment. This system also assists the operator in managing the assignment of onboard assets to maximize collection of other signals that can contribute to the understanding of the tactical communications signal environment around the platform. Primary signal and data inputs are taken directly and unobtrusively from the system bus of existing search and collection front-ends. As key essential elements of signal information are extracted, the system alerts the operator of high priority signals by providing a concise description of the situation, its rationale for the assessment, and a recommended course of action.

The system runs on a VAXStation 3100 with software written using NEXPERT Object for the knowledge bases, and the C programming language for the procedural portions. Database support is provided via the ORACLE DBMS. Knowledge can be modified by users in the field to enable the system to stay abreast of dynamically changing operational environments.

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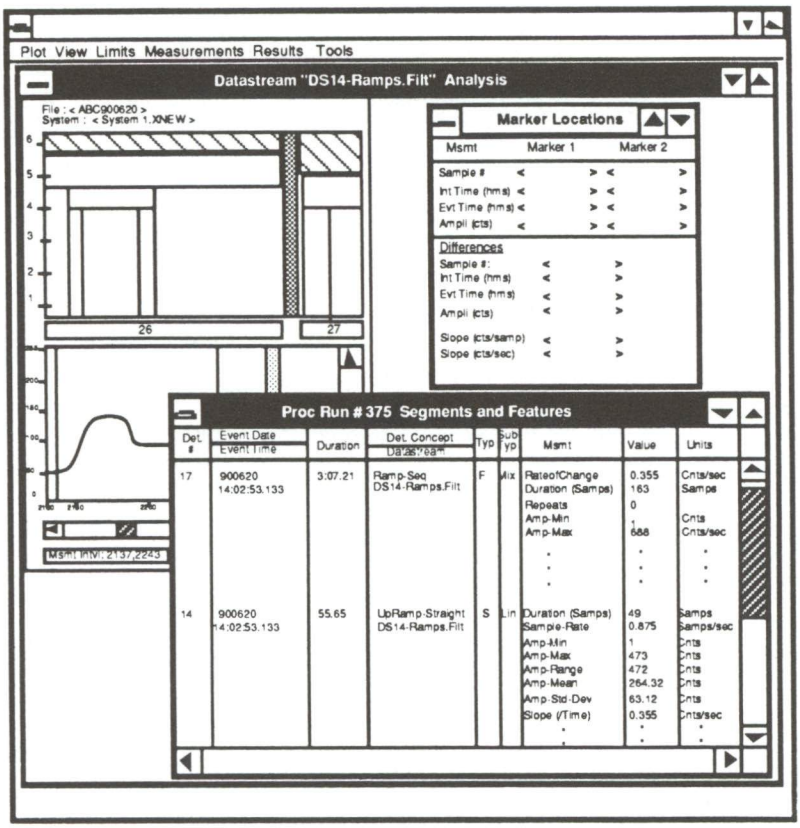
SIGNAL FEATURE ANALYSIS



Delfin has developed an automated signal scanning system that rapidly examines large volumes of digitized signal data to identify new, unusual or anomalous types of signal features associated with the activities of a source platform. Signal features of various shapes and durations are isolated, extracted and characterized using scale-space filtering techniques. Features are then combined to form activities, and activities are combined to form events through model-based reasoning and expert systems techniques. A hierarchical structure provides the ability to model actions at various levels of abstraction. Powerful model-matching mechanisms compare activities to normal situations and identify activities that are outside the norm. The feature, activity, and event models provide a structure for encoding knowledge that is readily understandable to analysts. These modules are easily modified and maintained by signals analysts.

The major processing components of this system are written in Objective-C and operate within an IBM PS/2 serving as the analyst's workstation for signal and platform activity monitoring, model development and model refinement.

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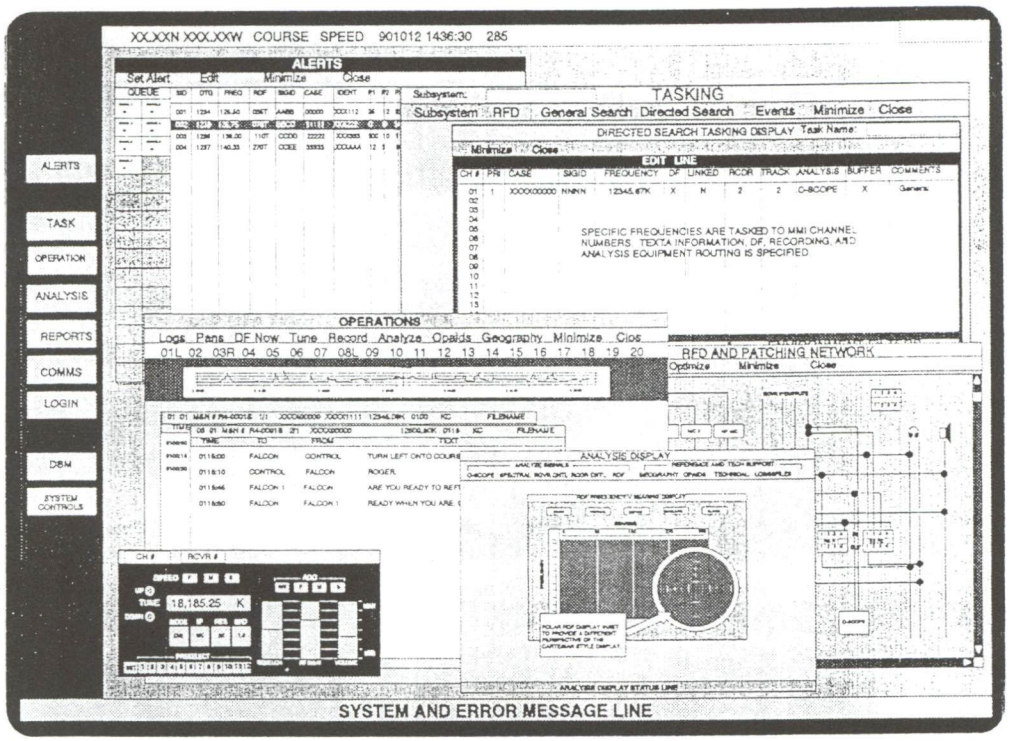
UNIVERSAL MMI FOR TACTICAL CRYPTOLOGIC SYSTEMS



Delfin has designed an expert system-based man-machine interface (MMI) that operates as a self-contained workstation capable of being connected to and interfaced with any Tactical Cryptologic System (TCS). Within Delfin's expert MMI system, specific knowledge about host TCS hardware configurations, RF distributions, analysis equipment, equipment control, software functionalities and capabilities, external interfaces, cryptologic operator aids, reporting, and communications is coupled with more general analysis and correlation knowledge to provide expert-level assessments of tasks and plans, operational configurations, analysis, collection, DF, geography, and operator efficiency. The system optimizes equipment settings, learns favorite operator procedures, and engenders immediate response to rapidly developing signal events. This universal MMI capability complements and enhances traditional procedural MMI modules and provides a consistent, user friendly interface readily understood by cryptologic technicians and usable by them across the entire range of fielded and emerging tactical cryptologic systems.

The Universal MMI system is being implemented on a Navy Standard Desktop Terminal Computer Version 3 (a SUN 4) in UNIX, using C++ for procedural software, NEXPERT Object for the expert system component and X-Windows for display.

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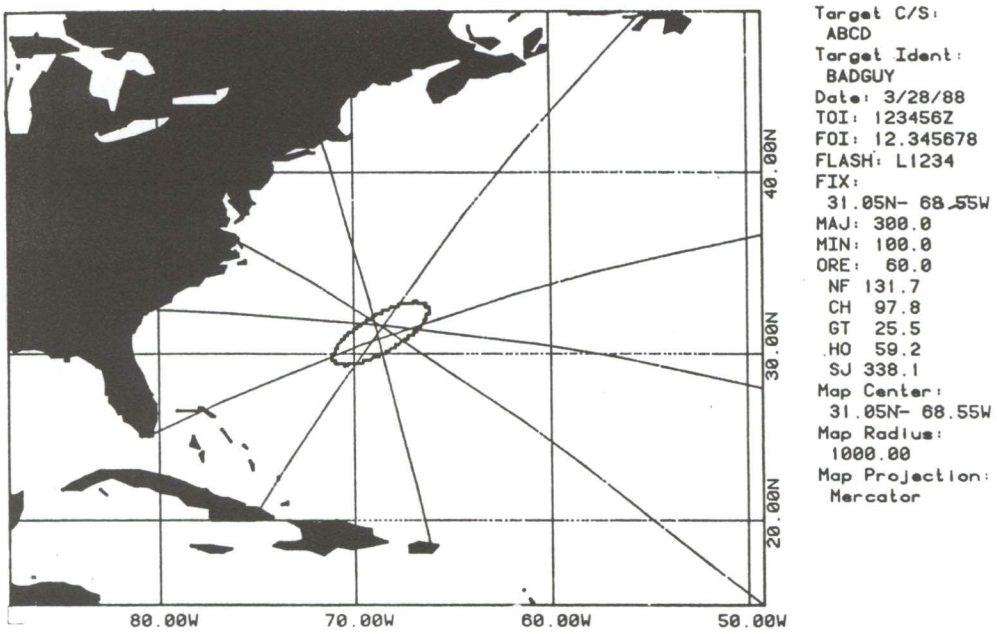
HFDF PERFORMANCE ANALYSIS



High Frequency Direction Finding (HFDF) is integral to piecing together a complete intelligence picture concerning the nature and intent of target military forces. The HFDF process involves the simultaneous acquisition and direction of arrival determination of a signal of interest by several HFDF acquisition sites, followed by the analysis of the acquired lines of bearing to geolocate the signal's source. Bearing quality is of paramount importance to obtaining acceptable fix geometry and accurate geolocations. Many factors can contribute to bearing error and other fix inaccuracies.

The BULLSEYE Offline Analysis Tool (BOAT) was developed by Delfin Systems as a low cost offline analysis system to evaluate the performance of HFDF Systems and to identify possible sources of inaccuracies. BOAT allows an operator or analyst to extract HFDF case data without impacting net operations. An analyst can extract subsets of information in any manner desired depending upon the type of analysis that must be performed. Extracted case information is stored and manipulated in a PC-AT microprocessor-based environment. A unique feature of the BOAT system is the utilization of two video monitors simultaneously. A monochrome monitor is used to display alpha-numeric data and an enhanced graphics adaptor (EGA) high-resolution color display with mouse support is used to display geographic map information, lines-of-bearing (LOBs), fix location, ellipse, track history, and other pertinent information about an individual HFDF case. BOAT displays geo-locational data in either MERCATOR or GNOMONIC map projections.

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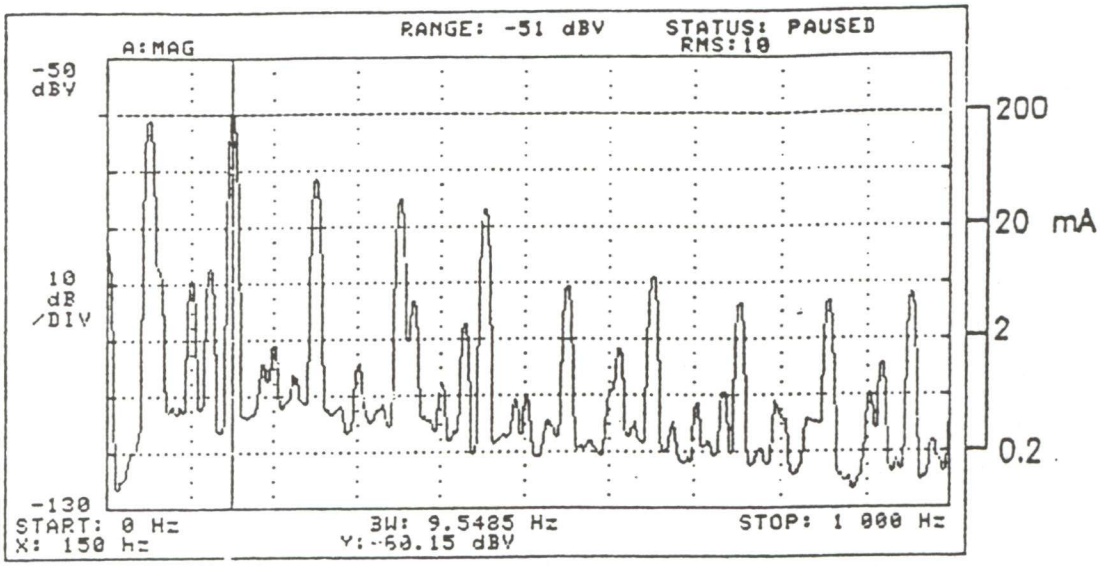
RFI/EMI REDUCTION ENGINEERING



Delfin Systems provides critically needed Electromagnetic Interference (EMI) and Radio Frequency Interference (RFI) engineering, analytical skills, and technology support required to efficiently search for, detect, identify, isolate, and mitigate the effects of EMI and RFI in Radio Frequency (RF) sensitive facilities and systems. A typical signal to noise enhancement program conducted by Delfin surveys fixed and mobile communications, signal processing, and related computer facilities to determine the levels and effects of EMI/RFI present at a particular site, then isolates and mitigates the effects of detected noise sources on site systems. Such a program significantly increases the sensitivity and dynamic range of communications receiving and signal processing systems, thus reducing processing errors caused by interference. Thus far Delfin has participated in EMI/RFI survey and noise reduction efforts at sites in Japan, Guam, Diego Garcia, Scotland, Germany, Spain, Puerto Rico, Iceland and the continental United States. Additionally, Delfin has conducted a number of field engineering tests concerning the effects of Over-The-Horizon (OTH) Radar Systems and other very powerful, discrete signals on victim signal collection systems as well as the influence of frequency agile, (e.g. Industrial-Scientific-Medical (ISM), ionospheric sounders), ground wave and near-field E and B radiation on these systems.

Delfin's success in RFI/EMI reduction is due to our in-depth understanding of the nature and the sources of noise and our innovative, proven techniques for isolating and mitigating the effects of noise.

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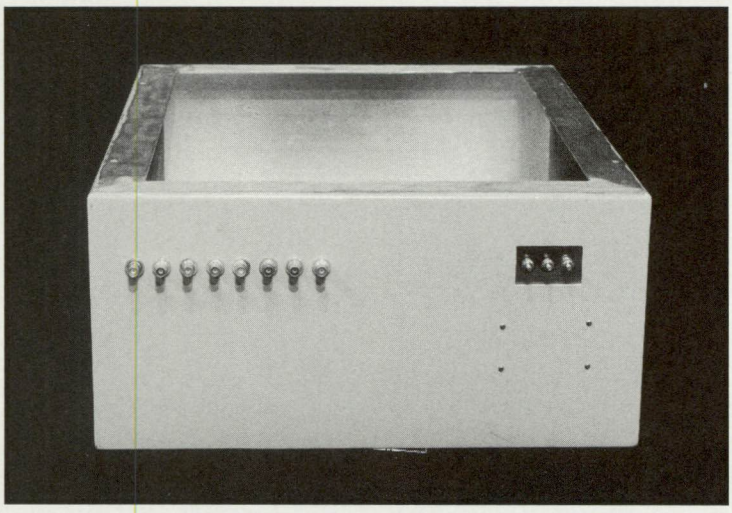
THE BFG BOX

An Integrated EMI Barrier



- **Use with equipment racks or cabinets to shield RF equipment, computers and UPS**
- **Reduces effects of EMI conducted in power wires and coaxial cable shields**
- **Easy to install, reliable, low cost**

The performance of RF sensitive equipment can be severely degraded in the presence of EMI. A major source of EMI comes from inductively coupled high frequency noise currents conducted along power wires and signal cable shields.

The BFG Box stops high frequency conducted noise currents from entering or leaving equipment cabinets or racks using a special integrated EMI power filter and cable connector interface that provides a complete EMI barrier to conducted HF noise currents. As shown in Figures A and B, conducted noise currents on power wires, green wire ground, and signal grounds (cable shields) are prevented from passing through the barrier in either direction.

High frequency hot and neutral wire noise currents shunt to the barrier surface. High frequency green wire ground currents are also shunted to the barrier surface. Only low frequency ground fault currents are allowed to pass.

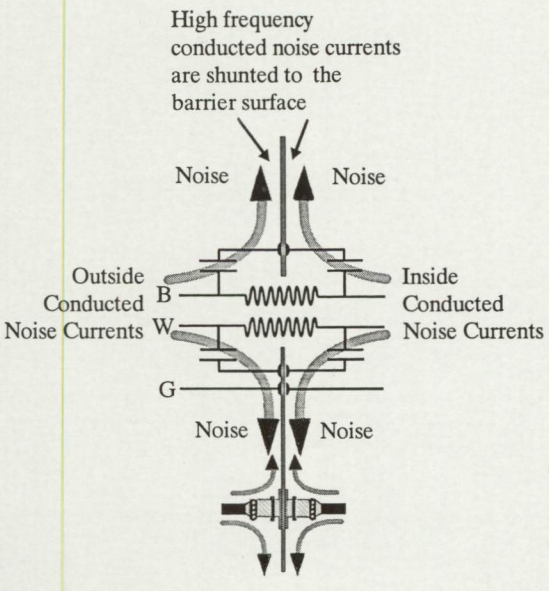


FIGURE A: Conducted noise currents are shunted to the barrier surface and not through the barrier.

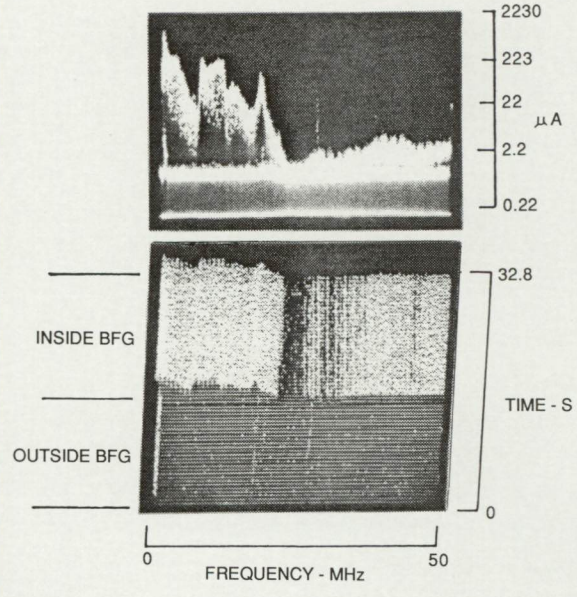


FIGURE B: Actual EMI suppression using a BFG filter connected to an uninterruptable power supply.

The power line filter normally installed is a single-phased filter rated at 30A at 120VAC and 25A at 250VAC. Three-phased power filter configurations are also available. Filter installation adheres to the total EMI barrier concept. The average noise current isolation measured with the filter mounted in the barrier enclosure is at least 40dB to frequencies of at least 50MHz.

Mounted at either the bottom or top of an equipment enclosure or cabinet, the BFG Box provides the extra space needed to handle all necessary power wires and cable conductors. Built to handle equipment rack and cabinet weights of up to 1000 lbs with lateral torque stress of up to 300 lbs, the BFG Box installs easily. If your application does not require a complete barrier enclosure, you can order a rack mounted barrier plate assembly like the one illustrated by Figure C.

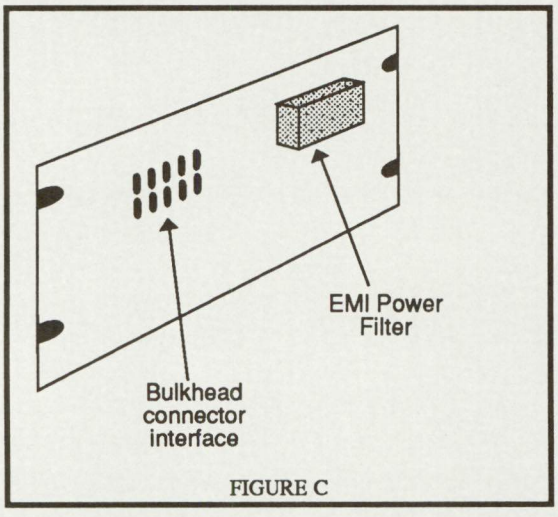


FIGURE C

ORDERING INFORMATION

BFG Boxes can be ordered painted, or unpainted, in a variety of configurations depending upon the dimensions of your equipment racks or cabinets and other specific requirements. To order, specify color, enclosure dimensions (A, B, C, and D), and desired filter/bulkhead connector placement location (locations 1,2,3,4,5, or 6) (see Figure D). Specify barrier plate height when ordering the rack-mounted barrier plate.

PRICING INFORMATION

Prices shown are for standard size painted enclosures. There is also a 15-percent price reduction from the prices shown for unpainted BFG boxes. For custom dimensions, call for prices.

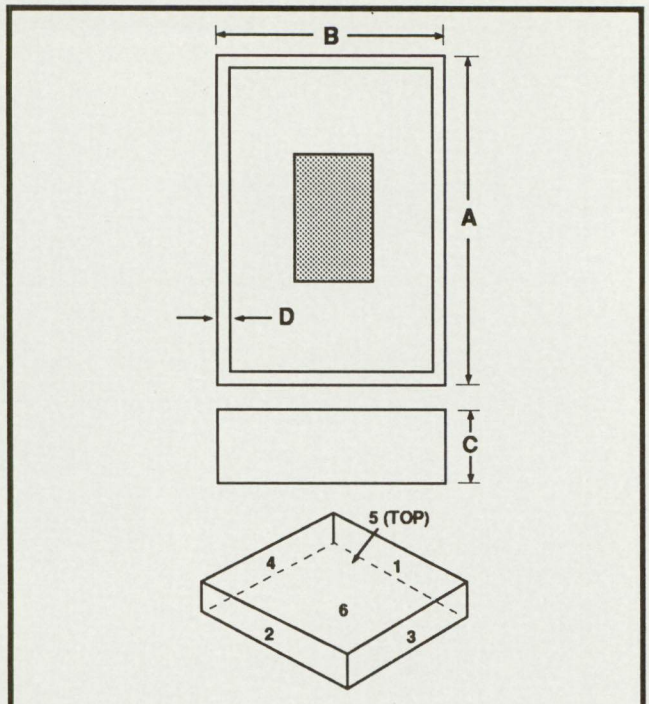


FIGURE D

BFG BOXES

Dimensions (inches)				Quantity/Prices			
A	B	C	D	1-5	6-10	11-20	>20
24	22	6	2	$1498	$1423	$1348	$1273
24	22	8	2	$1575	$1496	$1417	$1338
24	22	10	2	$1595	$1515	$1435	$1355
28	22	6	2	$1595	$1515	$1435	$1355
28	22	8	2	$1689	$1605	$1520	$1435
28	22	10	2	$1785	$1695	$1606	$1517
32	22	6	2	$1750	$1662	$1575	$1487
32	22	8	2	$1880	$1810	$1705	$1610
32	22	10	2	$1950	$1852	$1755	$1657
36	22	6	2	$1895	$1835	$1725	$1610
36	22	8	2	$1995	$1895	$1795	$1695
36	22	10	2	$2050	$1948	$1845	$1743

BARRIER PLATES

1-3	4-9	10-20	>20
$295	$280	$265	$250

All prices are effective 1/6/92 and are subject to change without notice.

Information and Orders:

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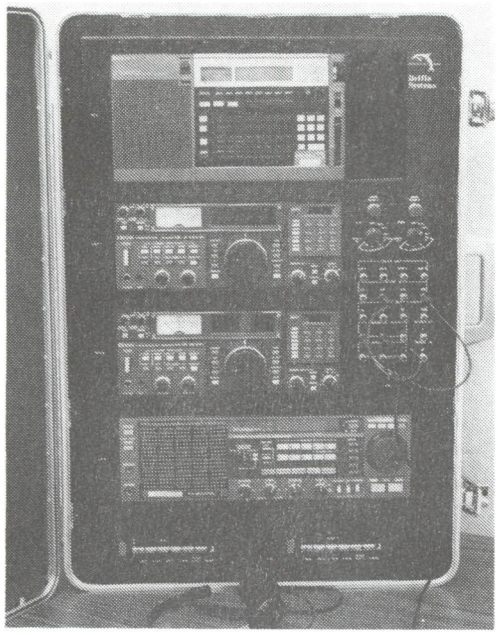
SUITCASE COMINT COLLECTION SYSTEM



Delfin has developed an extremely low-cost Suitcase COMINT Collection System (SCS) that is easily transported as checked airline baggage, and set up and used by untrained field operators. SCS provides continuous frequency coverage from .5 to 1200 MHz with detection and recording capability for all narrow-band AM, FM, FSK, and CW signals. SCS is complete in itself and is designed for use in situations where rapid, tactical response is needed. One or more suitcases can be deployed on board any platform or at any field site. Systems can be pre-positioned for deployment at a moment's notice. SCS can use platform or site-available antennas and RF distribution systems, or can be used with its own antennas. Attention has been paid to reducing own-system generated EMI by using the topological approach to signal grounding. Maintenance is inexpensive and easy in that all components and piece parts are available from a variety of commercial retail outlets worldwide. No maintenance personnel are required in the field to support system installation and use.

FEATURES

- Two HF and two VHF receivers
- Two audio cassette tape recorders
- Flexible audio and signal routing via patch panel
- DF, Pre-D recording and spectrum analyses options easily added
- 29" H x 20" W x 14" D aluminum weatherproof suitcase type enclosure
- 85 pounds total weight
- Continuous search, band search, directed search and step search in both HF and VHF

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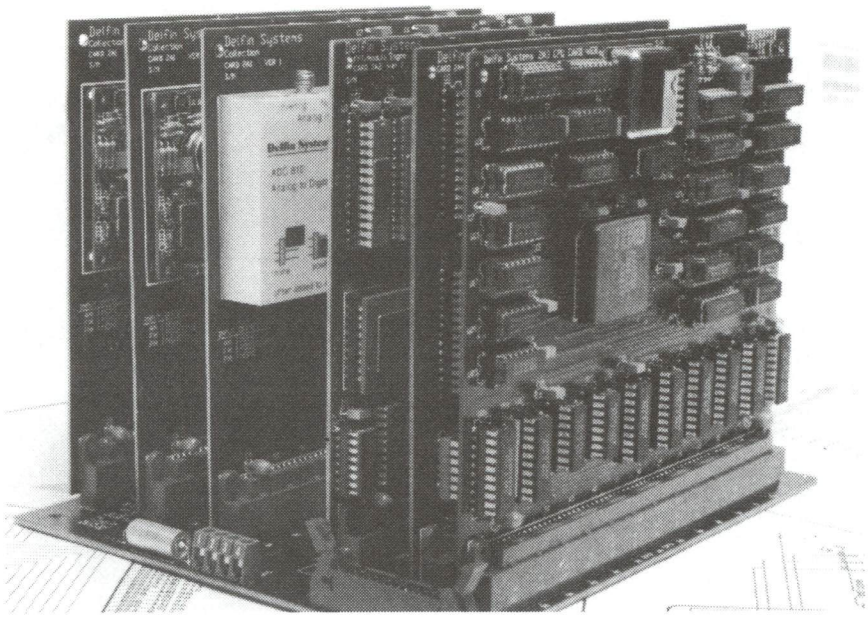
STRUCTURED SIGNAL RECOGNIZERS

- **Formatted Instrumentation, Bauded and automated Communications signals**
- **Operates at lower signal-to-noise and signal-to-interference ratios.**
- **Naturally rejects interference and impulsive noise.**
- **Determines modulation method and produces element and frame rates.**
- **Synchronizes to data, can provide imbedded text output.**



Real-time automatic recognizers for structured data signals-of-interest (SOIs) are an essential component in signal collection and exploitation, situation assessment and automatic threat identification. Delfin Systems has developed a new family of signal recognizers that, compared to their predecessors, provide signal recognition at lower signal-to-noise and signal-to-interference ratios while improving the capabilities for rejecting interferers. Delfin's recognition methodology quickly examines the AM, FM, and PM video outputs of a receiver to determine the modulation method and synchronously produces the element and frame rates, filtering out impulsive noise. If the measured parameters are reasonably close to those of a signal-of-interest, a more precise parameter measurement is made and the signal structure unique to the data format is sought. Recognition is declared when the parameters and structure match those of a signal-of-interest within an operator selectable latitude.

To further enhance performance at low SNR, two additional features may be added, Synchronous Video Integration and full bandwidth Digital Demodulation. These two features are available for those applications emphasizing SNR performance and recognizer connection to receiver IF. Digital Demodulation also allows for recognition in SOI-matched bandwidths using non-optimum (wider) receiver IF bandwidths, for example, the receiver IF bandwidths used for Pre-Detection recording of signals.

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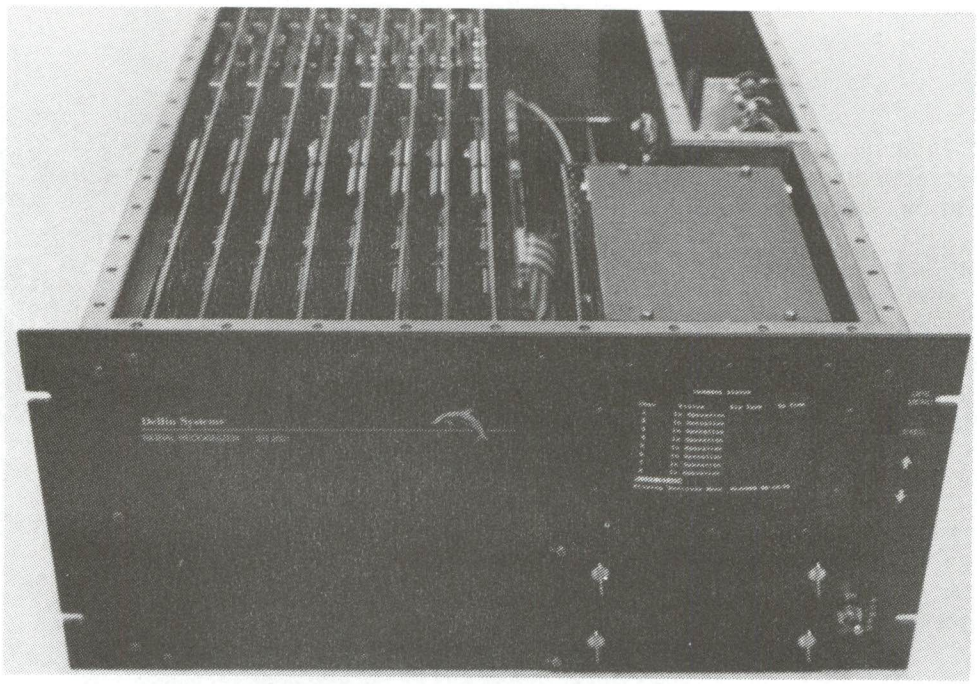

Delfin's data signal recognizer is implemented using the Intel 80X86 microprocessor family, custom ASIC, Zoran FIR and TMS 320 DSP chips on single or multiple circuit card assemblies, with a bus interface. A CMOS very low power version is also available. Recognition times are between 30ms and 100ms plus the signal sample time length for $P_D >> .9$ and $P_{FA} < 10^{-7}$. The recognizer hardware cards are non-signal specific and provide for expansion in the number and types of measurements made, including rapid and easy software accommodation of additions or substitutions of new signals-of-interest or to accommodate new variations as signals evolve.

The recognizer hardware is available as a set of circuit cards or in a stand-alone chassis. Parallel recognizer channels may be implemented as shown in the photograph above, an 8-channel parallel recognizer with operator interface. Signal parameters are downloaded via floppy disk and results are displayed on the front panel and to a host system via bus connection.

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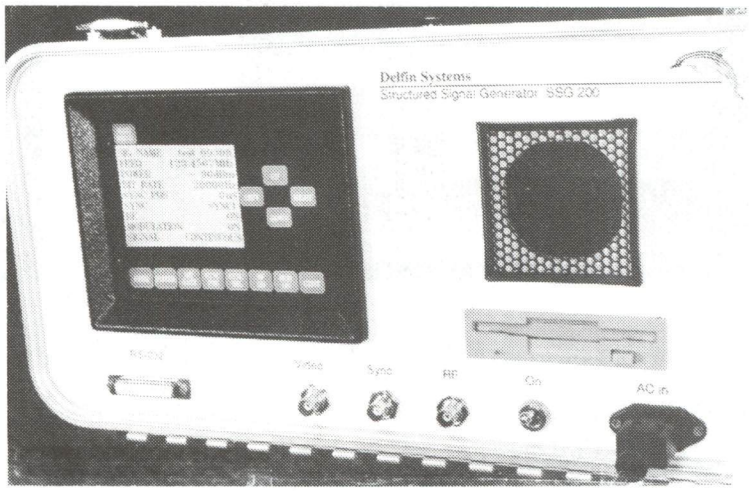
STRUCTURED SIGNAL GENERATOR
SSG - 200

- **Formatted instrumentation, bauded, and automated communications signals.**
- **Simultaneous AM, FM, PM.**
- **HF/VHF/UHF.**
- **RF output level: -20 to -120 dBm in a 60 dB range with 1dB steps.**
- **Single-shot or continuous signals.**
- **Stand alone or bus controllable.**



The Delfin Systems Structured Signal Generator is a programmable self-contained, RF test signal source. Available in rack-mount or portable case models, it provides formatted instrumentation, bauded, and automated communications signals for system development, test and operator training. Single-shot or continuously repetitive signals of precisely defined characteristics are generated at output frequencies selectable between baseband and 1200 MHz.

Hardware circuitry is not signal specific; signals of up to 8 MHz bandwidth may be generated with sub-microsecond parameter timing control. AM, FM and PM modulation is possible, simultaneously. Signal parameters are constructed externally, stored on a floppy disk or EEPROM key, and input to the generator via the front panel. Operator control of signal selection, RF output amplitude and frequency, and limited signal parameter modification is provided via a front panel color touch-screen CRT display. Front panel connectors provide sync signals (start of signal, frame mark, channel sync, etc.), RF output and signal video.

Typical modulation types may be OOK (Morse or pulsed), multilevel FSK, multilevel PSK, FSK-OOK, QAM, and compound (FM-FM, FM-PM, etc.). The generator is software driven with the signal parameters downloaded from memory. There is no resident permanent memory (ROM, etc.), so the generator hardware reverts to unclassified on removal of the signal disk or key and power-off.

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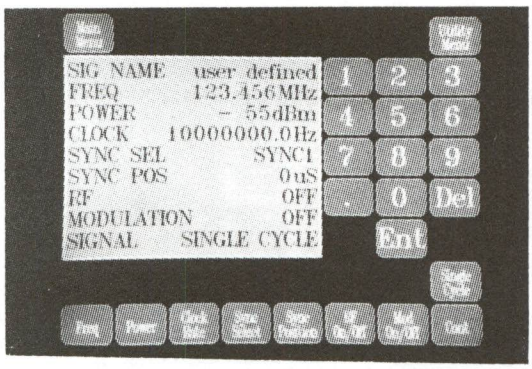

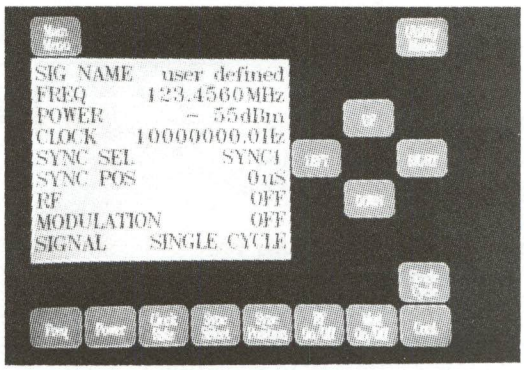

Examples of two of the touch-screen signal control displays are shown above. The photo on the left shows the display after operator selection of "Freq" and pressing the soft keys to select a frequency of 123.456 MHz. On pressing "ENT" the display on the right is presented, allowing the operator to incrementally adjust the frequency up or down and move the selected digit right or left. Similar displays are presented for selection of RF output level, clock and sync functions.

Prices start at less than US $30,000 per unit plus signal-specific software. Signals that have already been programmed are available for the cost of software duplication. New signals can be generated by Delfin Systems (simple ones by the user) at costs that are dependent only on signal complexity. Consult Delfin Systems for availability and cost of signal-specific software. Delfin has the facilities for generation of signals at any security level.

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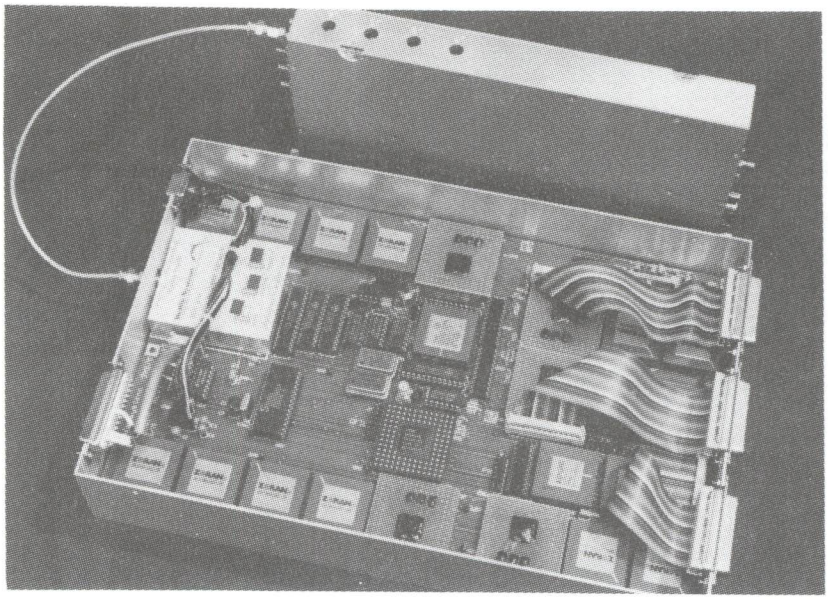
DIGITAL DEMODULATOR

- **21.4 MHz IF or baseband input.**
- **Digitizes input signal and provides all-digital AM, FM, and PM demodulation.**
- **Up to 8 MHz preD bandwidth.**
- **20 Msample per sec, 8 bit sampling.**
- **7.5 x 12 x 1 inches.**
- **Approximately 10 watts.**



The Delfin Systems Demodulation Subsystem is a general purpose demodulator for signals of up to 8 MHz predetection bandwidth. It accepts 21.4 MHz IF or baseband input and provides digitally derived AM, FM, and PM video.

The digital demodulator section operates on baseband signals in the range of 0 to 8 MHz. A simple change of digitizing rate and filter parameters allows operation at different bandwidths, for example 0 to 2 MHz. The companion baseband converter* is a high quality imageless mixer providing 50dB spur-free dynamic range at +13 dBm output and accepts a nominal -40 dBm 21.4 MHz IF input. This is translated to baseband with 40 dB rejection (min) of the unwanted image product and less than 100nsec p-p group delay ripple. The internal LO reference can be phaselocked to an external 5 MHz standard.

The demodulator digitizes the baseband signal at 20 megasamples per second at 8 bits. It derives the inphase (I) and quadrature (Q) signal components and, through a rectangular to polar conversion, produces the instantaneous signal phase and amplitude. The instantaneous amplitude is lowpass filtered at 4 MHz to produce the AM video output. The instantaneous phase is differentiated to produce instantaneous FM, which is low pass filtered at 4 MHz for the FM video output. It is also additionally filtered at 1 MHz and subtracted from the instantaneous phase to produce an instantaneous unwrapped (carrier removed) phase which is lowpass filtered at 4 MHz to produce the PM output. All filtering is done with linear phase FIR filters for best signal fidelity and all outputs are 8 bit parallel TTL signals at a 10 megasample per second rate.

Multiple demodulators can be ganged for predetection bandwidths up to 125 MHz.

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* Manufactured for Delfin by Maxtech, Inc., State College, PA.

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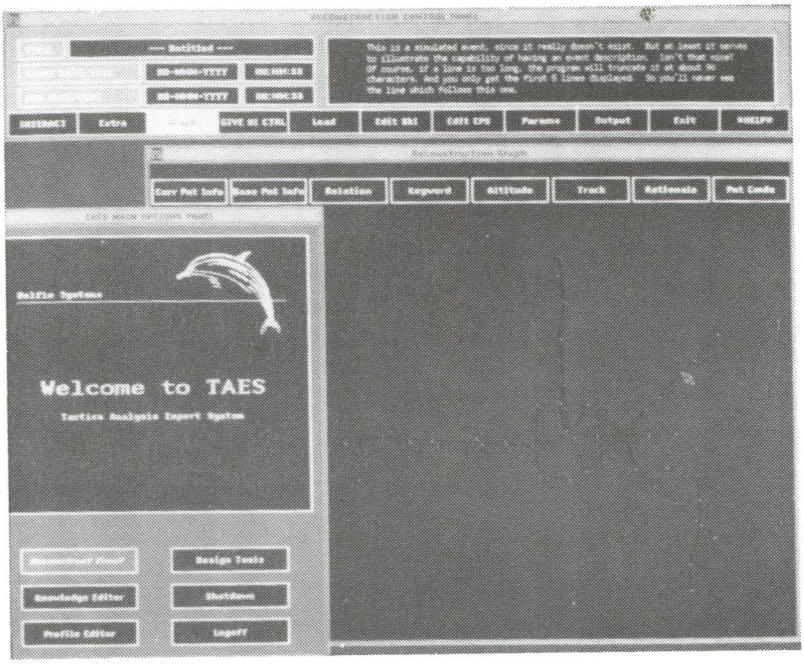
AIR TACTICS ANALYSIS



Delfin's Air Tactics Analysis Expert System performs automatic reconstruction of three dimensional aircraft tracks based on airframe performance characteristics, track skeleton information derived from communications intercepts, known maneuver profiles, correlated track data from a variety of sources, and analyst heuristics. The system combines independently collected data input files which contain azimuth, range and altitude position reports with analyst-provided event skeleton information and built-in maneuver profile model to automatically reconstruct the individual flight tracks for complex maneuvers involving multiple aircraft.

The delivered system runs on a DEC VAXStation 3100 under VMS operating system. A menu-driven user interface component consists of conventional software written in C language and VWS graphics. An expert system component makes use of the Mercury KBE expert system shell, VAX LISP and C to codify and apply general knowledge about track reconstruction processing, rules that specify what to do with certain pieces of knowledge, database software to store interim results and procedural code to perform traditional software processing. Multiple hypotheses are generated and ranked by using symbolic uncertainty handling techniques.

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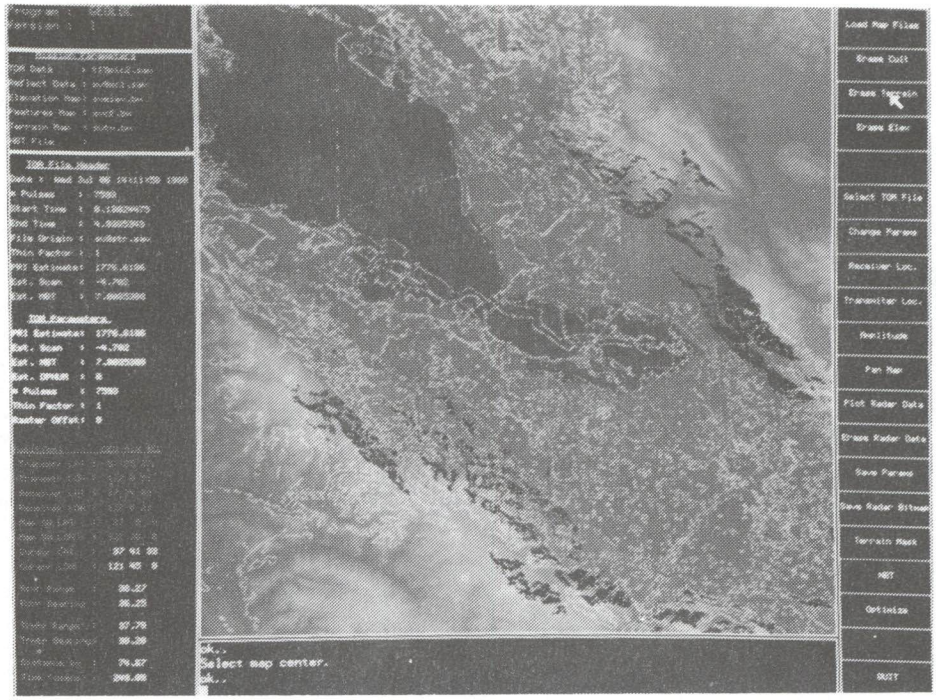
PASSIVE RADAR GEOLOCATION



Delfin's Shape Intersection Technique (SIT) combines signal and image processing methods to locate radar transmitters and receivers from radar signals collected passively with an omnidirectional antenna. The method is based on searching a calculated set of possible transmitter positions, receiver positions and radar parameters until the predicted locations of bistatic reflectors optimally match a feature reference data base of known reflector locations. Reflector locations are obtained by converting measured pulse times of arrival to two-dimensional locations based on a geometric model of the bistatic radar geometry. The feature reference data base can be extracted from the digital terrain elevation data (DTED) and digital cultural feature data (DCFD), both available from the Defense Mapping Agency (DMA) or directly from registered radar data.

The advantages of the SIT approach are that only a single collection site is needed for a very short length of time and the resulting location can be very accurate. In addition to its obvious military value in locating transmitters in the air, on land and at sea, the technique can also be used as a navigational aid to provide the position of the collection platform relative to previously known radar transmitter locations.

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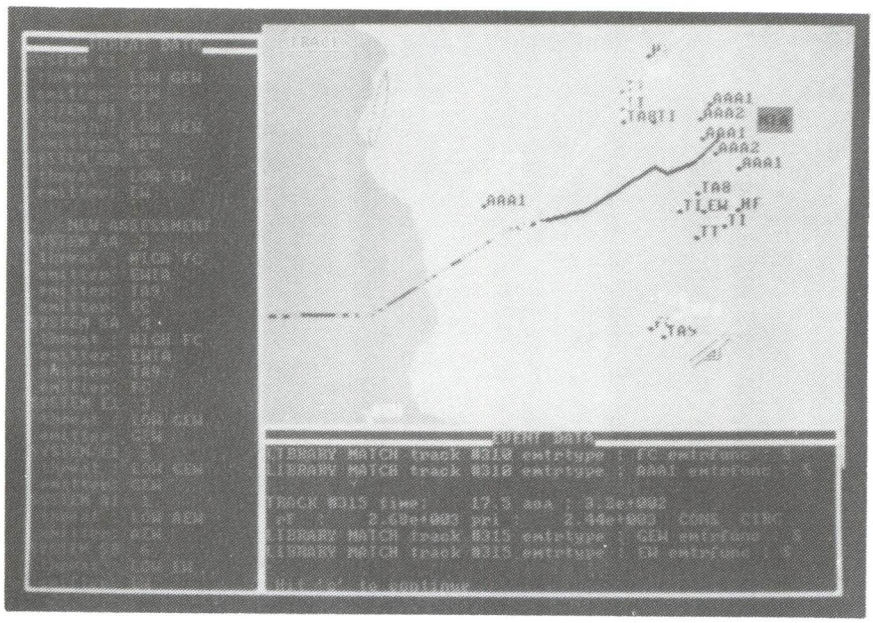
RADAR THREAT RECOGNITION



Radar threat projections indicate future engagements will encounter increased signal densities, higher radio frequencies, advanced modulation techniques, substantial use of frequency diversity and agility, and improved electronic counter-countermeasures, all of which compromise the ability of threat warning systems to isolate, detect, and classify threat emitters. Current self-protection systems fail to achieve proper threat identification due to the inadequacies of library matching techniques, parameter measurement errors due to missing or overlapping pulses, and failure to measure or characterize complex signal structures.

Delfin's Adaptive Threat Recognizer (ATR) is a prototype system designed to demonstrate and evaluate the feasibility of combining expert systems technology with radar signal processing techniques to provide threat recognition against existing, emerging, and anticipated threat signals. ATR addresses the recognition of tactical threats by analyzing signal characteristics against the context of emitter operational profiles and the developing electronic order of battle (EOB).

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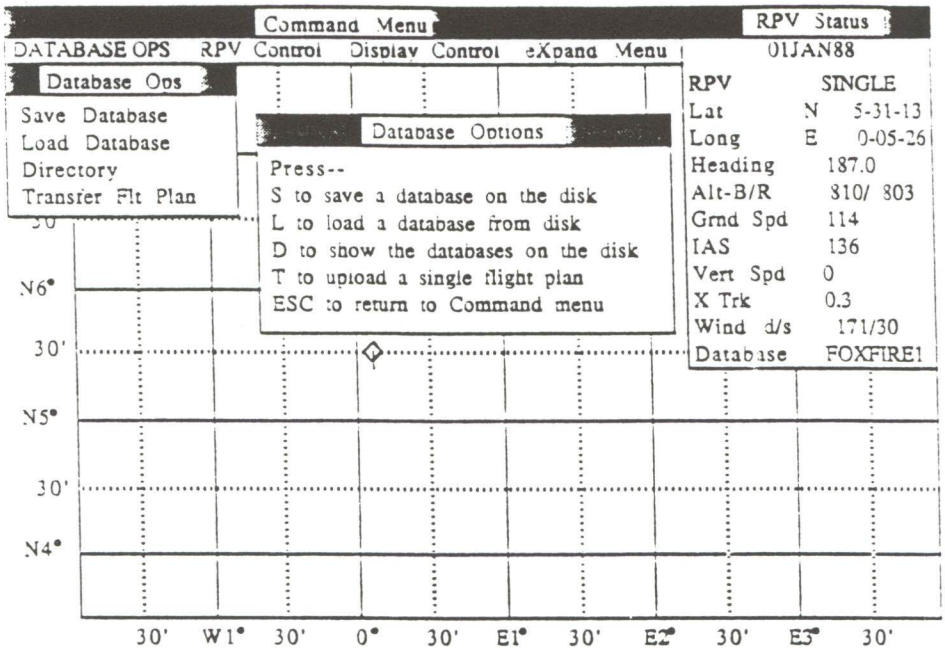
UAV CONTROLLERS



Ground-based and airborne controllers for Unmanned Air Vehicles (UAV) provide the essential processing intelligence for UAV mission planning and flight plan control. Delfin Systems has developed flexible airborne and ground-based controllers which interface to a variety of navigation and communication peripherals as well as mission-specific payload packages. The Airborne Controller utilizes navigational positions and heading inputs to calculate the guidance control data required by an autopilot system. The system can handle an unlimited number of waypoints for any number of mission flight plans. Flight plans provide the desired cross tracks, waypoint loiter patterns, and engine power settings. The Ground-Based Controller is a computer system with a user friendly operator interface to control and monitor the UAV and its associated peripherals. Operator selectable windows with minimal keystroke entries provide a modular environment for functional expandability. A communication link using off-the-shelf VHF/UHF transceivers and modems provides reliable line-of-sight air/ground interfacing. The communication message packet offers error detection/correction and networking capabilities.

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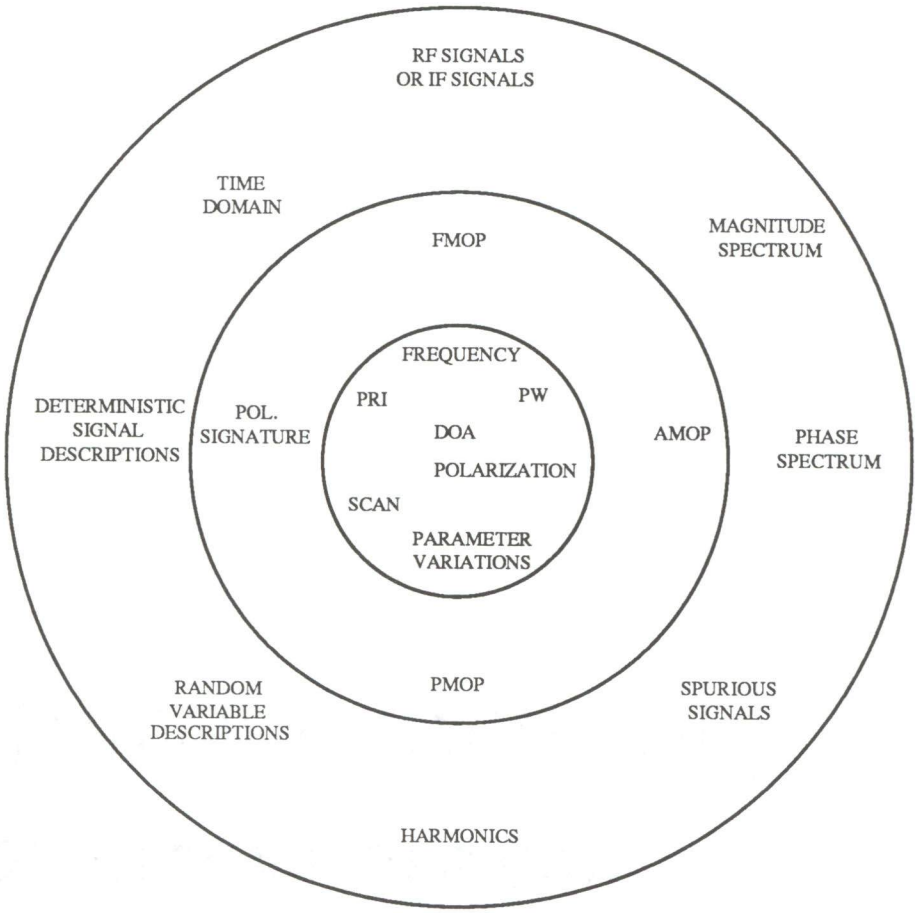
PULSE SIGNATURE CLASSIFICATION



Delfin's Pulse Signal Classification System is designed to classify, de-interleave and identify a variety of complex, sophisticated radar signals, including monopulse with intra-pulse FM, chirp, FSK and PCM FM and PCM AM. The system operates by measuring both intentional (IMOP) and unintentional (UMOP) modulation on radar pulses, de-interleaving a mixture of pulsed signals on the basis of their intra-pulse modulation characteristics, and then classifying these signals. The system also makes use of angle of arrival and carrier frequency data in de-interleaving, when provided as an external input.

The Pulse Signal Classification System employs state-of-the-art digital signal processing based on Delfin's proprietary digital demodulation technology, special-purpose ASIC and hybrid circuits developed by Delfin Systems, and a parallel design that achieves an instantaneous band width of 100MHz.

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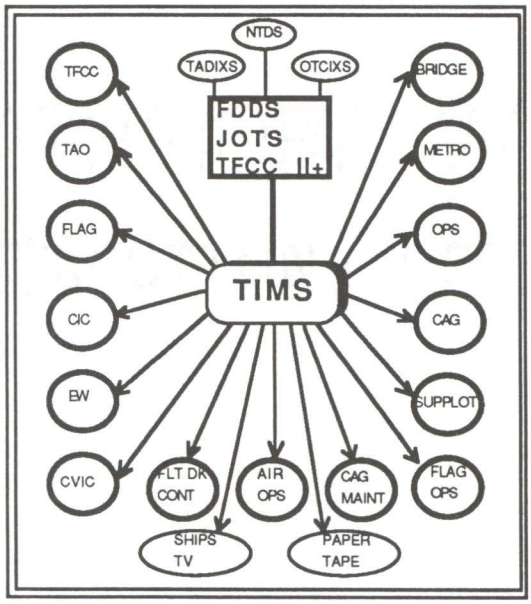
TFCC INFORMATION MANAGEMENT SYSTEM (TIMS)



TAO Menu (? at any OPTION for HELP)

1. This Menu
2. Display ASTAB (GASTAB)
3. Create/Edit an ASTAB (ASTAB)
4. Air Wing Aircraft Status
5. Dispaly Orange Force Summary
6. Display BG Weapon Inventory
7. Send Contact Data to FDDS
8. Compare JOTS/FDDS Tracks
9. Current Weather
10. Check Target Clearance
11. Enter Divert Field Local Tracks
12. Save Divert Fields to Backup
13. Check TIMS Tracks
14. Send Message to Terminals
15. Display TACAID Data
16. Electronic Mail
16. Execute Command
17. Help about ASTAB System
18. MENU - Text/Message Editing
19. MENU - JINTACCS Messages
20. MENU - Technical Characteristics
21. MENU - OPNOTE Preparation
22. MENU - Task Organization
23. MENU - Track File Menu
24. MENU - Embarked Units Menu
25. MENU - Schedule of Events
26. Generate FOTC SITREP
27. Edit FOTC SITREP
28. Print FOTC SITREP
29. Transmit FOTC SITREP to FDDS

TIMS is an auxiliary processing system of the Tactical Flag Command Center (TFCC), which allows the distribution of tactical locating data to desktop computers located in staff and ship workspaces which support TFCC. All data stored in TIMS is managed by a relational data base management system (DBMS).

Within TFCC, the principle function of TIMS is to provide tailored alphanumeric display support to the various graphic display systems. This function is provided through the generation of Automated Status Boards (ASTABS), which can be configured by TIMS users to fit the current tactical situation. These ASTABS can be displayed on any of the TIMS terminals, on color displays mounted in TFCC and on the ship's TV system. In addition to the automated display of tactical data, TIMS provides for the display of the Airwing Status, current and forecasted weather, and technical characteristics from the Naval Warfare Tactical Data Base (NWTDB). The system contains a one-line inter-terminal message system as well as an electronic mail system. Users can write Officer-in-Tactical-Command-Information-Exchange Subsystem (OTCIXS) opnotes and JINTACCS MARREPS on each of the terminals for output to the host tactical computer or to paper tape, as appropriate.

TIMS can best be described in a general sense as a "Tactical Office Automation System". As such, it provides support to the various ship and staff elements which directly support TFCC, and whose functions generally involve frequent reference to the current tactical or operational situation.

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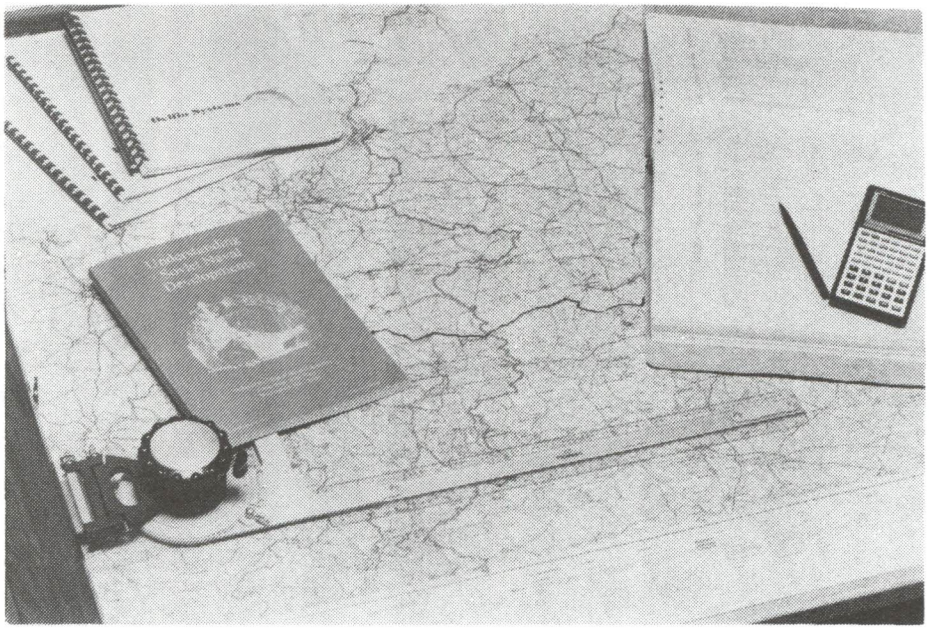
OPERATIONAL AND INTELLIGENCE SUPPORT



Delfin Systems provides operational and intelligence analyses that clearly define specific requirements for new defense electronic systems. Typical operational analysis involves examination of specific tactical or strategic problems in Electronic Warfare, SIGINT, C3 or C3I. Delfin's analytic resources are focused on the determination of impact upon current or projected operations through the analysis of new threat signals and related intelligence data.

Delfin Systems' supports customers in developing Test and Evaluations (T&E) strategies that ensure operational effectiveness and eliminate system incompatibilities. Delfin's T&E activities often include on-site test operations.