UNIVERSITY-NATIONAL OCEANOGRAPHIC LABORATORY SYSTEM

RESEARCH VESSEL OPERATORS' COMMITTEE

Volume 20, Number 1 | RVOC Newsletter | 20 March 1995

Well, with the 1994 RVOC Minutes behind, a shipyard period completed, and an approved Oil Spill Plan on file with the Coast Guard, I kept thinking it can't get any better than this. Then I realized it could; there was a RVOC Newsletter due.

I want to start off by pointing out to everyone that in the enclosures is a reprinted copy of the results of the Research Vessel Utilization and Future Planning Workshop. The charts and graphs had been printed on one sheet in their original form, in the Summary Report of the 1994 Annual Meeting for RVOC. The original that had been sent out for copying was small, but readable. Somewhere in the printing process the charts became illegible; I apologize.

Next, I would like to extend a welcome from RVOC to Fred Jones of Oregon State University who has assumed the duties as Marine Superintendent.

As a last item, I want to express my thanks to those of you, who were able to take the time and make a contribution to this newsletter by providing us with an update on your operation or sending along an article from a publication that you felt would be of interest.

Best Regards,

Paul Ljunggren

RVOC Annual Meeting - 1995

Greetings to everyone from not-so-sunny California. Lately, I have been doing more on the water navigation in my truck than at sea, driving on flooded roads and making 60 mile detours around rivers with washed out bridges just to get to work. I am not complaining though, Moss Landing Harbor and my home have been spared any real damage, while many folks in this area have lost their homes, possessions and jobs due to the flooding of some towns and the farmland adjacent to the Salinas, Pajaro and Carmel Rivers.

Despite all of the problems that mother nature throws at us, life still goes on and it's time we start putting together the agenda for this year's RVOC meeting. The meeting is scheduled for October 24 - 26 in San Diego. Tom has been working on locating a good place for us to stay and to hold the meetings. We will be providing information on the logistics at a later date.

At last year's meeting some ideas for the agenda were identified and reported in the minutes:

E-Mail
ISO 9000 Standards
Sexual Harassment
GMDSS equipment requirements and maintenance
Automatic inventory control and preventative maintenance systems
Contracting for a common oil spill cleanup contractor

Presentations on:

Mosaic
ISO 9000
Sexual harassment/diversity
ECDIS demonstration

If we follow roughly the same format as last year the meeting would be set up as follows:

First day:
Welcoming remarks, old & new business, committee & liaison reports, agency reports, Special reports by operators and others, Insurance/Liability (Dennis Nixon), Regulatory report (George Ireland) & Maritime Health Services.

Second day:
Workshops and special presentations. It has been suggested that the workshops be divided into two sessions so that each person could take part in two workshops. The presentation(s) could be on one of the subjects listed above or something different.

Third day:
Round table discussion and business meeting.

In reading my notes from last year I do not have a strong sense for what the main theme of this year's meeting would be. There seems to be some interest in personnel policies with regards to our crews as reflected by the interest in the medical standards work group, the interest in having someone from Scripps speak on sexual harassment/diversity and in the subjects discussed at last years round table session.

Now that we have been away from the meeting for a while, perhaps some of you have other ideas that have become more pressing. Please think about the agenda for this year's meeting and send any ideas that you may have to Paul Ljunggren and myself. We would prefer E-Mail so that we can plagiarize your thoughts without having to retype them. I will send out a request for agenda ideas in a few weeks but you never have to wait for me to ask if there is something you want me to consider.

Hope all is well with all of you, your ships and crews.

Regards, Mike Prince

RVOC Ship Updates

MLML - R/V POINT SUR - COAST GUARD INSPECTION OF UN-INSPECTED R/V

In early January, I submitted a letter to the local Coast Guard MSO requesting renewal of the letter of designation as an Oceanographic Research Vessel. As part of that process, the marine inspection office has for the past few years sent an inspector to the ship to verify that it is in fact an oceanographic research vessel and that the basic safety equipment is on board in compliance with Subchapter C. This year the process seemed to be getting a little more thorough when the inspector called to schedule an inspection during which he wanted to go through all our equipment and get University of Washington to verify operation of our propulsion and auxiliary equipment. At that point, I began to question the requirement for a full blown T-boat inspection on an un-inspected research vessel. I also pointed out that as a UNOLS vessel we undergo a thorough inspection through NSF/ABS. As it happened, POINT SUR was scheduled for just such an inspection on Feb. 14 and 15. After talking to Dick West and the Chief of Inspection in San Francisco we agreed that the Coast Guard could send an inspector to "observe" the NSF inspection. The end result is that we have shown the Coast Guard first hand that we have a fairly good program for inspecting the UNOLS operated research vessels and I may soon get the letter of designation for the POINT SUR.

WHOI - R/V KNORR Conversion

Joe Coburn has provided several pages of briefing material on the KNORR conversion for replacement of the ATLANTIS II as the National Deep Submergence Facility Support Ship.

Scripps - R/V ROGER REVELLE

R/V ROGER REVELLE will be launched on April 20, 1995 at Halter Marine Inc. yard at Moss Pt., MS. The ship will be christened by Mrs. Ellen Revelle Eckis, widow of Dr. Roger Revelle.

Construction efforts are progressing well. Major recent events include further definition of the Scientific Information System requirements, factory acceptance testing of the Markey traction winch and testing of the tooth contact of the bevel gears in the lower units of the thrusters at full design load at the LIPS factory in the Netherlands.

Pilot house arrangement modifications, positive control of the thrusters from the bridge wing consoles and uncontaminated seawater system details have also been finalized.

The ship is scheduled to be delivered to Scripps in early June of 1996.

R/V Utilization & Future Planning Workshop

Research Vessel Utilization and Future Planning Workshop

Participants: Mike Prince, Bill Hahn, Tim Pfieffer, Tom Smith, Bill Keefe, Ken Robertson, Chris Gobey, Jack Bash, Harry Barnes, Annette DeSilva, John Moore, Gene Almendinger, Gene Olsen.

The group discussed the impact of lost days and changes in the schedule on the daily rate and total budget. This led into a discussion of how UNOLS vessels account for their charges and whether or not you use a fixed daily rate or a provisional rate. The participants from England and Europe w more familiar with using cost structures similar to commercial contractors that have fixed rates. Spreadsheets and graphs showing the impact of charging for inport days on the daily rate of UNOLS vessels were presented. One graph showed what percentage of days are inport operational and the effect on the daily rat if only at sea days are charged for. The second spreadsheet and graph showed the effect on daily rates if all ships could charge for a day of mobilization and a day of demobilization for each trip. The discussion centered around the fact that in terms of comparing the daily costs of some vessels with others, especially commercial vessels, the structure of operating days and sea days can have an adverse affect on the competitiveness of UNOLS vessels that operate exclusively out of their home port. Some people pointed out that the daily rate was an artificial figure and that what counted to the funding agencies was the bottom line, the total cost of operating the vessel, The counter argument to this is that when it comes to bringing in users from other than NSF and maybe ONR the daily rate is in fact very significant. These funding agencies would like to see the UNOLS fleet bring in operating money from other sources and in most cases this means being financially competitive. In general the actual cost to complete a project should be the determining factor, however, many times the daily rate is the factor used to determine whether or not to pursue scheduling work on a particular vessel. The daily rate and the number of operating days are utilized to determine whether or not a vessel is efficiently and fully utilized. In the case of many vessels the days spent in port before and after a particular cruise are largely devoted to the support of that project. Our group agreed that there could be a better way of recognizing the direct support provided to a project while a vessel is in port whether or not that port was the vessels home port. If these in port support days could be effectively recognized and accounted for then it might also be possible to incorporate them into the system for charging the costs of operation. the desired end result would be to better reflect the amount of support received by each project to include inport time and to be able to distribute the costs accordingly. An ad hoc committee was formed to pursue alternate mechanisms to account for the

use of UNOLS research vessels in port and at sea. This committee consists of Mike Prince, Bill Hahn, Tim Pfeiffer, and Rose Dufour(or Tom Althouse).

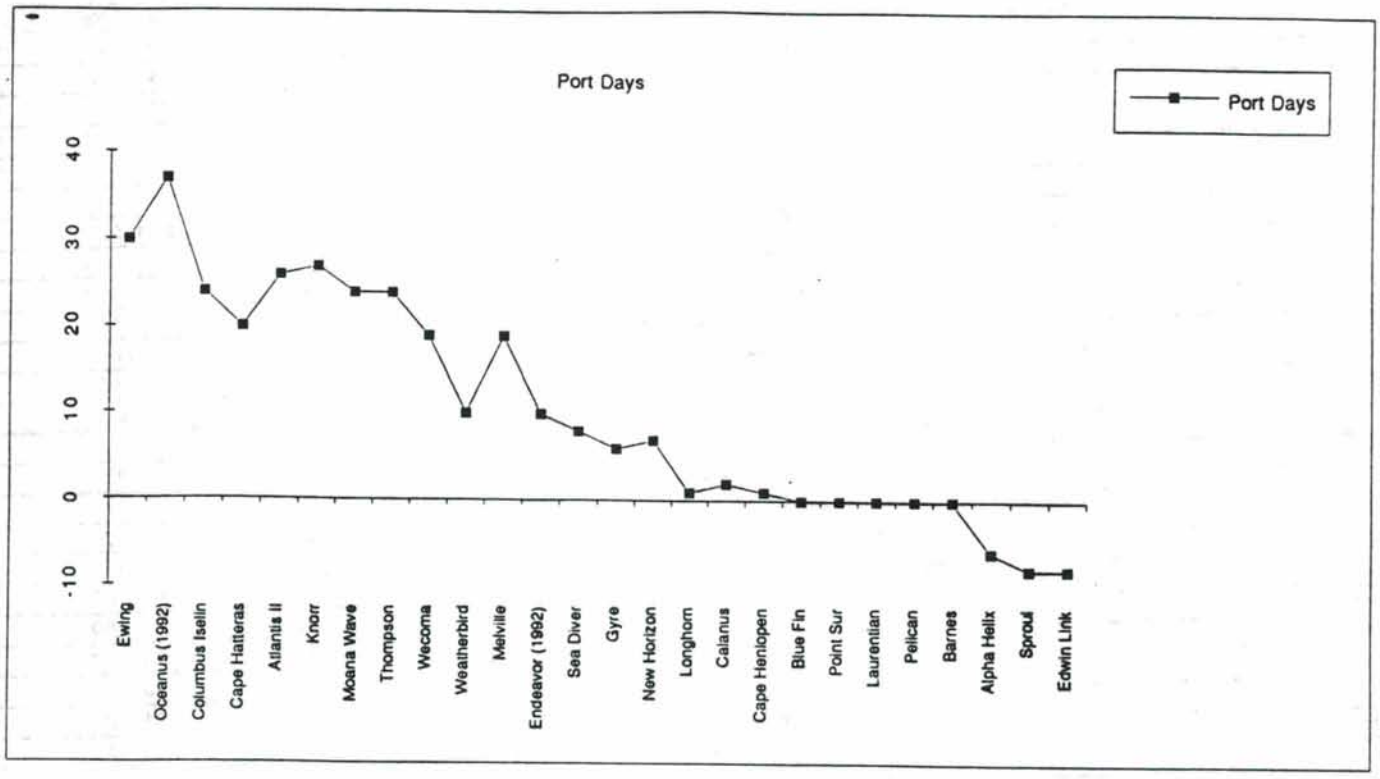
A short discussion of the usefulness of the Chief Scientist's evaluation and the Captain's evaluation was conducted. it was decided that we should ask the UNOLS Council to evaluate what purpose the post cruise reports were supposed to fulfill and then start a process to re-evaluate the format of the report and how it is completed to see if it can better fulfill that purpose.

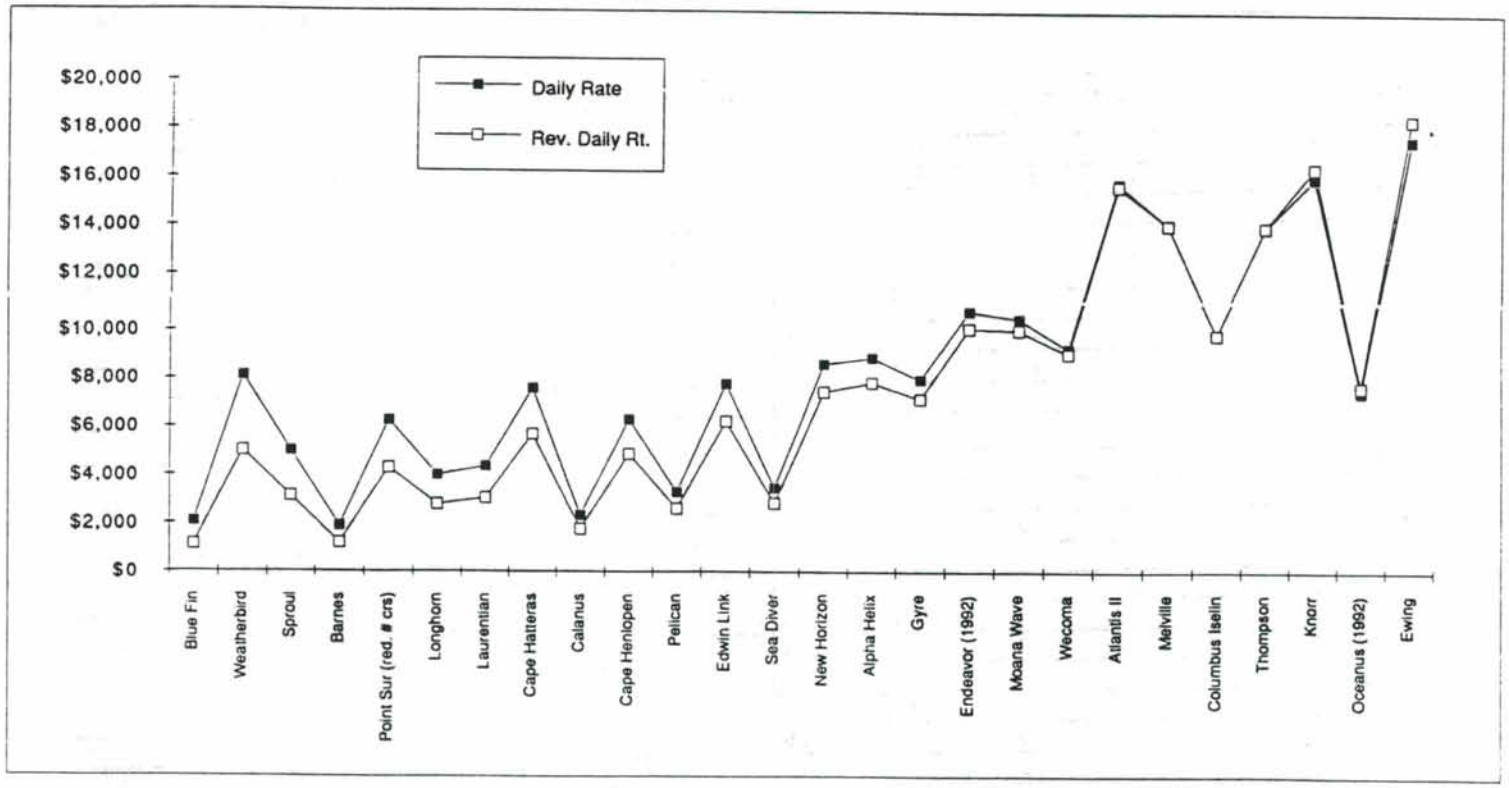
UNOLS Research Vessels
Operating Days vs Days at Sea
1993 (except as noted)

Ship	# Crs.	O. D.	DAS	Port Days	Maint	Out of Serv.	Daily Rate	Sea Day Rate	% P.Days
Ewing	10	221	191	30	45	99	$17,647	$20,419	14%
Oceanus (1992)	14	313	276	37	20	0	$7,489	$8,493	12%
Columbus Iselin	12	221	197	24	73	0	$9,839	$11,038	11%
Cape Hatteras	41	187	167	20	40	0	$7,599	$8,509	11%
Atlantis II	14	245	219	26	99	0	$15,864	$17,747	11%
Knorr	10	278	251	27	64	0	$16,125	$17,860	10%
Moana Wave	18	266	242	24	73	0	$10,489	$11,529	9%
Thompson	12	273	249	24	30	0	$14,091	$15,449	9%
Wecoma	12	220	201	19	10	101	$9,275	$10,152	9%
Weatherbird	46	132	122	10	156	0	$8,130	$8,796	8%
Melville	10	306	287	19	59	0	$14,200	$15,140	6%
Endeavor (1992)	12	201	191	10	162	2	$10,800	$11,365	5%
Sea Diver	25	191	183	8	108	108	$3,500	$3,653	4%
Gyre	12	162	156	6	75	128	$7,985	$8,292	4%
New Horizon	22	240	233	7	125	0	$8,612	$8,871	3%
Longhorn	12	53	52	1	100	0	$4,000	$4,077	2%
Calanus	19	112	110	2	30	0	$2,335	$2,377	2%
Cape Henlopen	25	164	163	1	10	0	$6,327	$6,366	1%
Blue Fin	44	108	108	0	14	0	$2,087	$2,087	0%
Point Sur	56	177	177	0	40	0	$6,280	$6,280	0%
Laurentian	14	65	65	0	0	0	$4,360	$4,360	0%
Pelican	30	238	238	0	10	0	$3,292	$3,292	0%
Barnes	18	61	61	0	30	0	$1,924	$1,924	0%
Alpha Helix	8	167	173	-6	75	10	$8,879	$8,571	-4%
Sproul	41	152	160	-8	205	0	$5,012	$4,762	-5%
Edwin Link	12	128	136	-8	28	28	$7,800	$7,341	-6%

Ship	# Crs.	O. D.	DAS	Load Days	Mod O. Days	Daily Rate	Rev. Daily Rt.	% Chg in D.R.
Blue Fin	44	108	108	88	196	$2,087	$1,150	55%
Weatherbird	46	132	122	92	214	$8,130	$5,015	62%
Sproul	41	152	160	82	242	$5,012	$3,148	63%
Barnes	18	61	61	36	97	$1,924	$1,210	63%
Point Sur (red. # crs)	40	177	177	80	257	$6,280	$4,325	69%
Longhorn	12	53	52	24	76	$4,000	$2,789	70%
Laurentian	14	65	65	28	93	$4,360	$3,047	70%
Cape Hatteras	41	187	167	82	249	$7,599	$5,707	75%
Calanus	19	112	110	38	148	$2,335	$1,767	76%
Cape Henlopen	25	164	163	50	213	$6,327	$4,871	77%
Pelican	30	238	238	60	298	$3,292	$2,629	80%
Edwin Link	12	128	136	24	160	$7,800	$6,240	80%
Sea Diver	25	191	183	50	233	$3,500	$2,869	82%
New Horizon	22	240	233	44	277	$8,612	$7,462	87%
Alpha Helix	8	167	173	16	189	$8,879	$7,845	88%
Gyre	12	162	156	24	180	$7,985	$7,187	90%
Endeavor (1992)	12	201	191	24	215	$10,800	$10,097	93%
Moana Wave	18	266	242	36	278	$10,489	$10,036	96%
Wecoma	12	220	201	24	225	$9,275	$9,069	98%
Atlantis II	14	245	219	28	247	$15,864	$15,736	99%
Melville	10	306	287	20	307	$14,200	$14,154	100%
Columbus Iselin	12	221	197	24	221	$9,839	$9,839	100%
Thompson	12	273	249	24	273	$14,091	$14,091	100%
Knorr	10	278	251	20	271	$16,125	$16,542	103%
Oceanus (1992)	14	313	276	28	304	$7,489	$7,711	103%
Ewing	10	221	191	20	211	$17,647	$18,483	105%

UNOLS Research Vessels
Operating Days vs Days at Sea
1993 (except as noted)





Knorr Conversion

Briefing Material
for
DESSC/FIC Science Oversight Committee

31 January 1995

Knorr Conversion to National Deep Submergence Facility Support Ship

Big Picture
(Overview)

- *Atlantis II* aging (replacement plans vague)
- WHOI proposed to replace *Atlantis II* with *Knorr* (AGOR-25/*Atlantis* to replace *Knorr*)
- Schedule for *Atlantis II* retirement, *Knorr* adaptation keyed to *Alvin* 3-year overhaul (planned for early 1996)
- Advanced design complete (ONR funded)
- SeaBeam installed (ONR, WHOI funded)
- FIC/DESSC advisory panel providing community inputs
- Community support
  - ◊ *Alvin* - high/growing - DESSC key
  - ◊ ROV's - soft/growing?

Knorr Conversion to National Deep Submergence Facility Support Ship
DESSC/FIC Science Oversight Committee
31 January 1994

Background and History

- *Alvin - Lulu*
- *Atlantis II*
  - » Successes
  - » Limitations
  - » Maintenance & reliability
- *Knorr* Refit
  - » Tailored for global programs
  - » Difficulties - shipyard and shakedown
  - » Current Successes
- AGOR 24/25 Program
  - » More capable than *Knorr*
  - » WHOI proposal

Plan Overview - 1

- **Objectives**

  - ◊ ***Alvin*** **and ROV Support**

  - ◊ **Maintain maximum general science capability consistent with above - Secondary to *Alvin* and ROV Support**

- **Funding**

  - ◊ **WHOI Cost Sharing**
    Proceeds from sale of *Atlantis II*, guaranteed to $900,000 and WHOI-owned traction winch and fiber optic cable

  - ◊ **ONR**
    Anticipates proposal

  - ◊ **NSF**
    Science support components
    - **Second winch drum**
    - **Support vans**
    - **U/W navigation system**
    - **Other ?**

Plan Overview - 2

- **Design Approach**

  - ◊ **Phase 1 Design**
    Glosten visits to *Knorr* & *Atlantis II* (twice)

  - ◊ **Phase 2 Design**
    Needed because best information generated late revisions to:
    Hanger, track arrangement
    Weight handling

  - ◊ **Final focus and control of inputs to designer**

  - ◊ **Design products**
    Resolve arrangements and concepts
    Set of drawings
    Complete shipyard specs
    Weight and stability calculations
    Material for submission to ABS & USCG

Plan Overview - 3

- **Management Approach**

  - ◊ **Strong Central Control**

  - ◊ **Management Objectives**
    Quality conversion:
    - **Control growth (cost)**
    - **Minimize down time**
    - **Minimize risks**

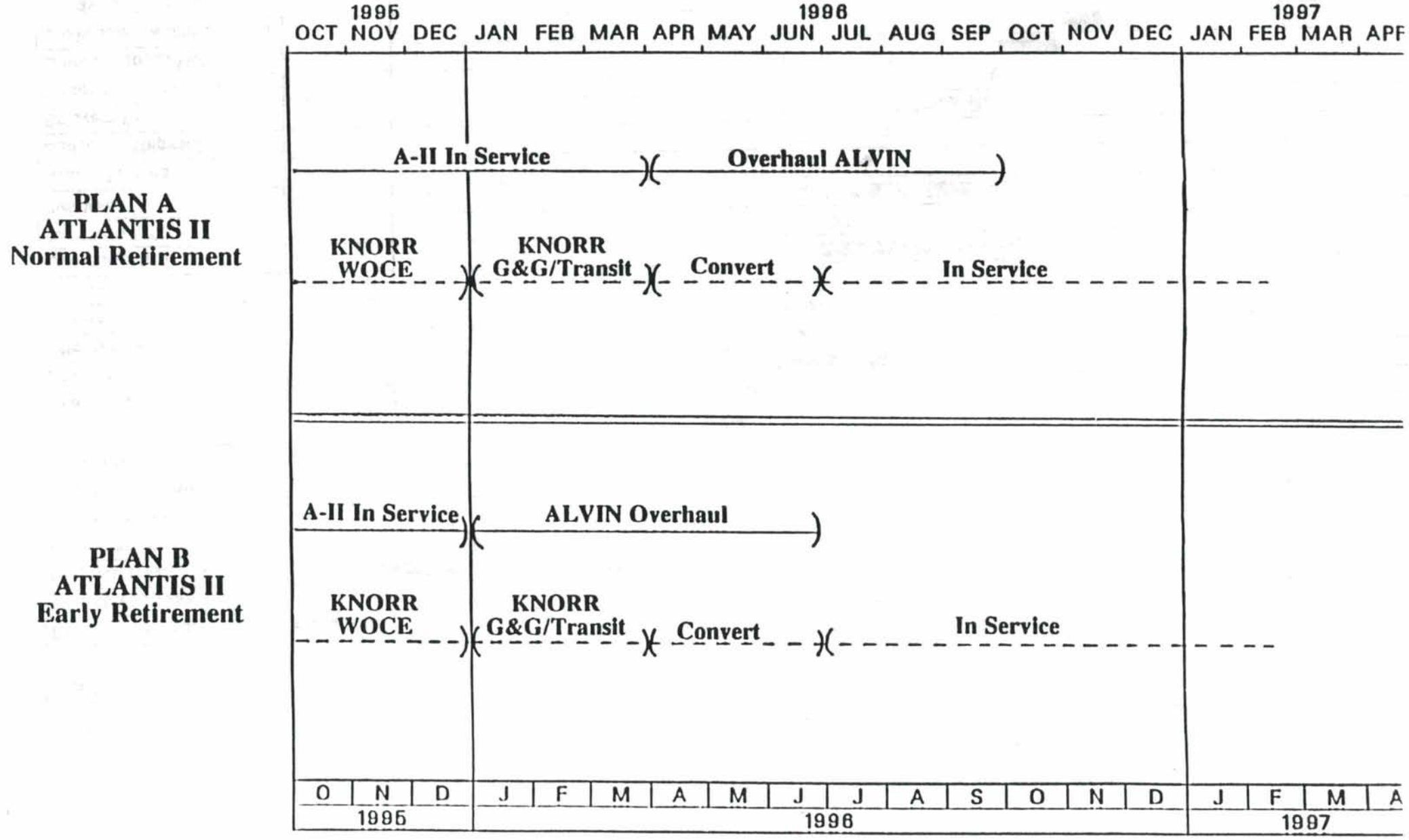
  - ◊ **Similar to *Oceanus* Mid-Life Overhaul**
    Incorporating "lessons learned"
    Single all-encompassing contract
    Minimum (zero) owner furnished equipment

  - ◊ **Bid base (minimum) job plus options**

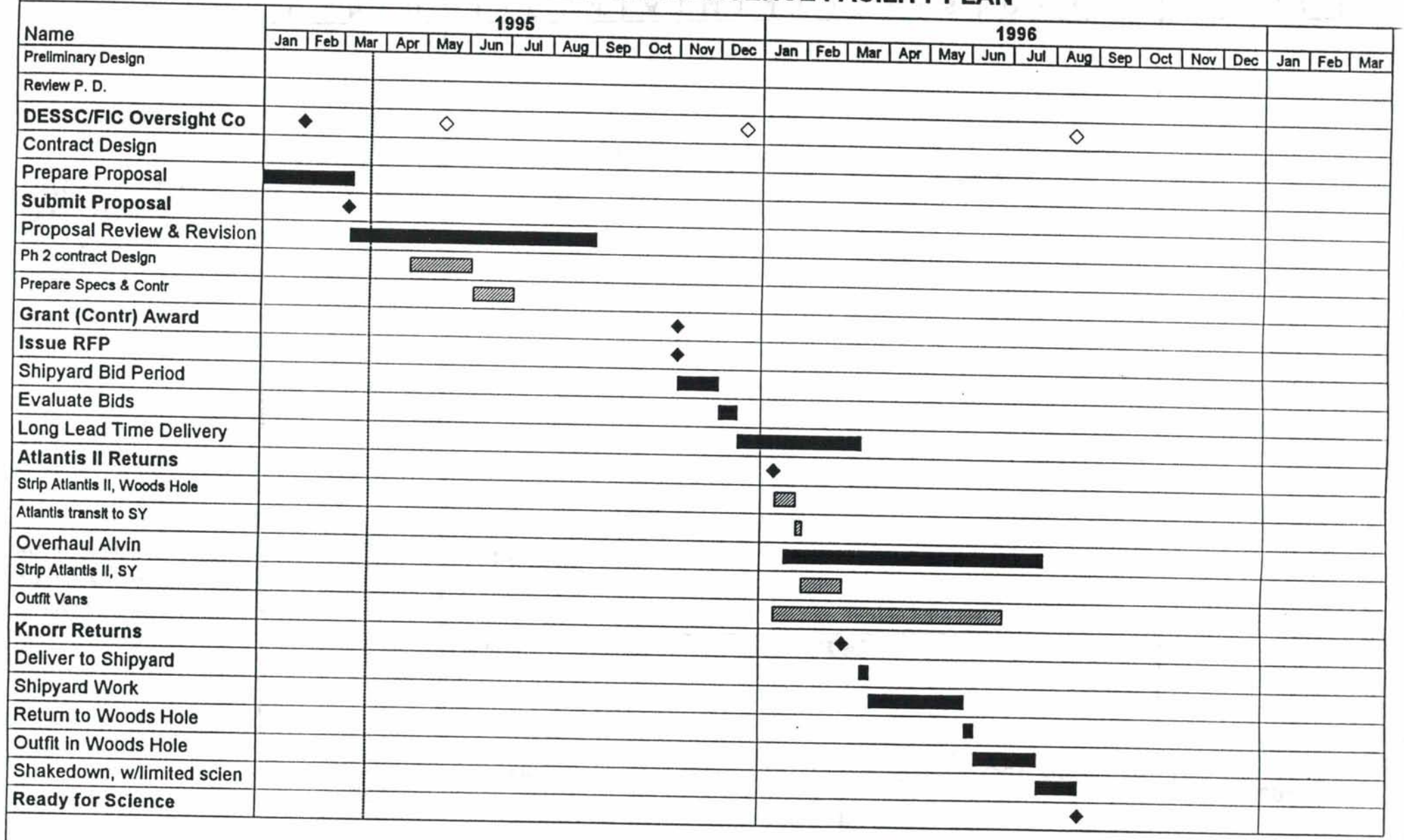
  - ◊ **Regular dry-docking work**

  - ◊ **Task shipyard to:**
    Remove A-Frame
    Order Caley components
    Mod A-Frame under Caley's direction
    Install all new components
    Completely test system

KNORR Conversion/ALVIN Overhaul Planning Schedules



KNORR: DEEP SUBMERGENCE FACILITY PLAN



Work Tasks

- Relocate *Alvin*
  - Move A-Frame
    - . Renovate, Replace Hydraulics
  - Handling System
  - Hangar
  - Topside Control/Navigation
  - Shops/Stores
  - Battery Service
  - Weight Stowage & Handling

- Accommodate ROVs
  - Handling/Tending Systems
  - Topside Control/Navigation
  - Shops/Stores
  - Service/Storage

- Retain *Knorr* General Purpose

- Related Science Issues
  - P-Code GPS
  - SeaBeam
  - Dynamic Positioning

- Related Ship Impact Issues
  - Laboratory Space
  - Berthing
  - Stores

- General Issues
  - Slamming/Rapid Ballast

Clippings,

Etc.

The backbone of NRC's response & compliance capability is the **Independent Contractor Network (ICN)**. The ICN is comprised of over 50 local emergency response contractors. NRC has agreements with these contractors to form this experienced and capable network.

NRC has made a substantial investment in the purchase of the latest spill response equipment, with an emphasis on **capability** and **mobility**. This versatile and effective equipment was placed with the ICN to augment their existing resources. Importantly, NRC provides the ICN regular training on the operation and maintenance of the NRC Equipment that they store. This policy not only ensures that the ICN is well trained and familiar with NRC's response resources, but also ensures the operational readiness of the equipment. This massive pool of resources, both NRC-owned and ICN-owned, coupled with NRC's in-house expertise in **Command, Control, Logistics** and **Communications**, allows NRC to mount an efficient and effective response while keeping costs to a minimum.

Through the utilization of the ICN, NRC is able to cascade resources to the scene of the spill and routinely exceed regulatory requirements. This ability greatly aids in the **reduction of environmental impact and helps reduce our clients' response costs.**

This concept has been proven as NRC has successfully responded to over 130 oil spills since August 1993. **NRC has the capability, experience, knowledge and expertise to handle your oil spill response and regulatory compliance needs.**

For further information, please contact NRC's Corporate Headquarters in Calverton, NY.

NATIONAL RESPONSE CORPORATION

CORPORATE HEADQUARTERS
446 Edwards Avenue
PO Box 609
Calverton, NY 11933
Phone (516) 369 - 8644
Fax (516) 369 - 4908
Telex 49617380 NRC UI

REGIONAL OFFICES
New York
Houston
Tampa
Memphis
San Juan
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Responding to the needs of Industry and the Environment.

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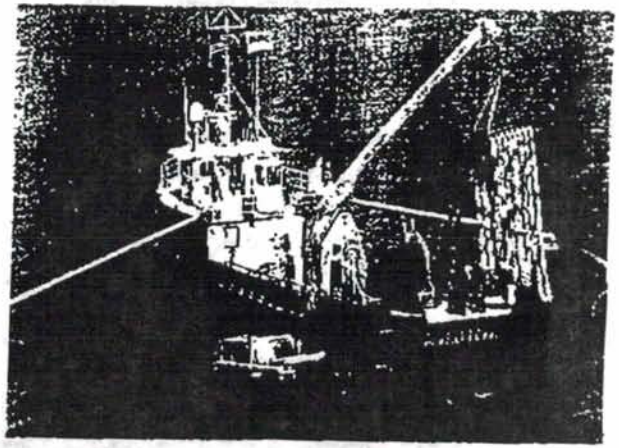
International Operations Center
(800) 899 - 4672

NATIONAL RESPONSE CORPORATION

YOUR COMPLETE ANSWER TO OPA 90 REGULATORY COMPLIANCE AND OIL SPILL RESPONSE RESOURCES



* Full Range **OPA' 90** Services
* **USCG Level E OSRO** Classification
* Oil Spill Response **Vessels & Resources**
* Independent Contractor Network (ICN)
* Response to Spills of **All Sizes**

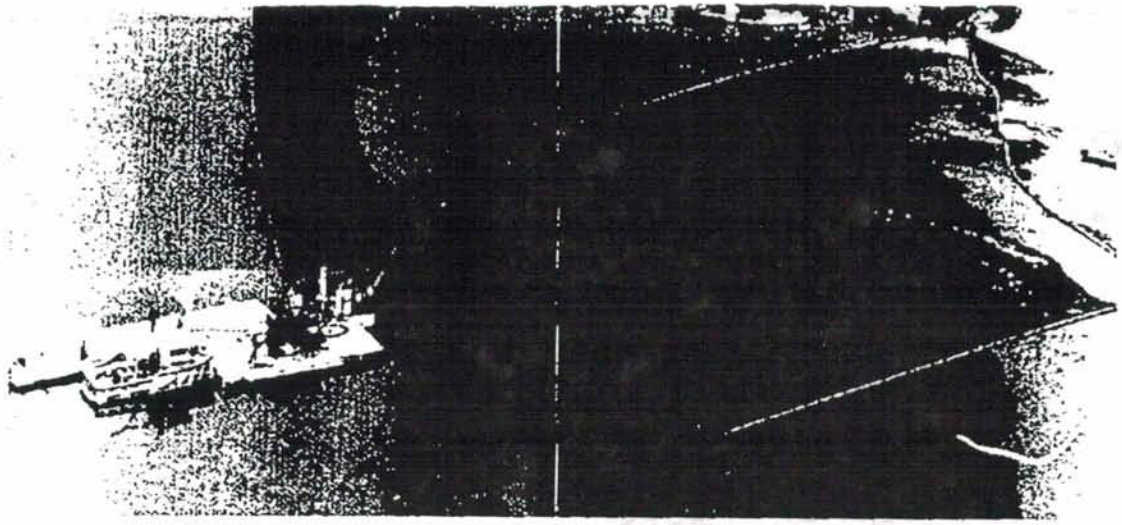
National Response Corporation (NRC), provides those who store, transport, handle and produce oil within the Exclusive Economic Zone of the United States, **an affordable and efficient means of maintaining the organization, personnel and equipment necessary to respond to oil spills** as required by Federal and applicable State laws.

NRC provides both proven oil spill response services and full regulatory compliance with the requirements of Section 4202 of **the Oil Pollution Act of 1990 (OPA '90)** and the US EPA's Final Rule, **40 CFR Parts 9 &112**. NRC also offers a wide array of value added services to further meet our clients' needs.

National Response Corporation holds the highest USCG Oil Spill Removal Organization (OSRO) classification, **Level E**, in the Rivers/Canals, Inland/Nearshore and Offshore/Open Ocean operating environments. NRC provides Level E OSRO coverage throughout **the US East & Gulf Coasts, the US Caribbean, and the US Inland River System**.

NRC provides full range OSRO services to **Tanker & Dry Cargo Vessel Owners, Tank Barge Operators, Refiners, Terminals, Utilities, Facilities and Offshore E & P Platforms**.

NRC has implemented a unique strategy that offers superior OSRO services at competitive rates. Currently, **National Response Corporation is listed in over 3,000 oil spill response plans** filed with both the USCG and the US EPA as the plan holder's primary and contractual OSRO.



One of NRC's High Capacity Shallow Water Skimming Systems at work recovering product from an oil spill in the San Jacinto River in Houston, TX.

Full Range Services

* OPA '90 Section 4202 Compliance
* 40 CFR Parts 9 & 112 Compliance
* Resource Management & Control
* Response to Spills of All Sizes (Including Spills of less than 1200 bbls)
* Shoreline Remediation
* Monitoring & Reporting Regulatory Developments
* Drill Participation & Documentation
* Logistics & Communication Support
* Spill Response & Planning Consultancy

Value Added Services

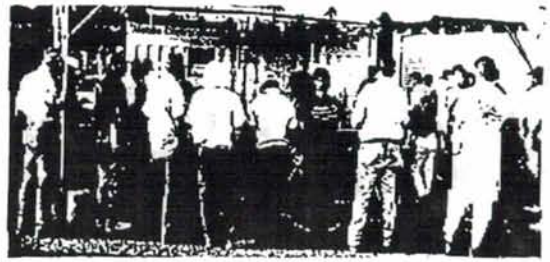
* Low API Gravity Oil (LAPIO) Coverage
* AMPD Coverage
* PREP Compliance & Credit Sharing Reports
* West Coast Contingency Augmentation Package
* Emergency Response Accounting Package
* Arrangement for Salvage, Emergency Lightering, Firefighting, and Towing Services
* NRC Client Liaison Program
* Spill / Drill Retainer Fee Credit Program
* Customized Regulatory & Response Training

NRC-Owned Response Resources

12	Certified Oil Spill Response Vessels
123	High Capacity Skimming Systems
22	Nearshore Response Vessels
28	Shallow Water Recovery Barges
37	Vacuum Transfer Units
119	Mobility Trailers
3	Mobile Communication Centers
1	International Operations Center

Resource Summary - NRC & ICN

Containment Boom	650,000	feet
Skimming Capacity	952,027	bbls/day
Temporary Storage	1,327,600	bbls
Support Vessels	560	
Heavy Equipment	927	
Hazwoper Trained Manpower	4,290	



Highly sophisticated and effective Mobile Communication Centers are the nerve center of NRC's rapid and efficient response capability.

7. A formal relationship between NRC and Client shall be culminated with the acceptance of comprehensive terms and conditions.

Sincerely,

NATIONAL RESPONSE CORPORATION

By: _____

Date: _____

Acknowledged by: _____

_____

By: _____

Date: _____

NATIONAL RESPONSE CORPORATION

LETTER OF INTENT TO RETAIN NRC RESOURCES

It is the intent of the National Response Corporation ("NRC") and _____ ("Client") to enter into discussions which may lead to a formal arrangement; which the following will outline:

1. NRC shall provide services either directly or through its Independent Contractor Network ("ICN") to all Client chartered vessels as a spill response contractor, for Oil(s), per the Federal Water Pollution Control Act ("FWPCA") as amended by the Oil Pollution Act of 1990 (OPA '90).

2. NRC shall similarly provide oil spill response services, or arrange to provide such resources through its ICN, as a Texas certified Discharge Cleanup Organization ("DCO").

3. NRC shall provide the services outlined in Section 1, as defined in the regulations as "Open Ocean", "Offshore", "Nearshore", "Inshore", "Rivers" and "Canals" within the defined Area of Operations.

4. NRC shall receive consideration in an amount to be mutually agreed. The Client shall have access to NRC's resources for response to an Oil Discharge on a priority basis at its published rates for its retainer clients.

5. NRC shall provide the following information to the Client for review:

   a. NRC's "Spill Response Organization Resources",
   b. NRC's Time and Materials Schedule
   c. a copy of present NRC promotional literature;
   d. the most recent version of NRC's "Independent Contractor Network Participant Newsletter".

6. NRC and Client shall be able to publicly reference this Letter of Intent, either through conversation or through a press release. However, the contents of this Letter of Intent shall remain confidential.

REGISTRY OF SHIPPING

MEMORANDUM

FROM: PRINCIPAL MARINE SURVEYOR

TO: DIRECTOR MARINE & PORTS SERVICES

DATE: 14 FEBRUARY 1995

OUR REFERENCE: SG 11/11

SUBJECT **PORT STATE CONTROL INSPECTIONS**

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1. The attached correspondence to the Ministry of Transport informs the Minister of Bermuda's affiliation to the Paris Memorandum of Understanding on Port State Control.

2. Before the Registry of Shipping surveyors commence Port State Control Inspections under these new arrangements it would be prudent to warn the Shipping Agents.

3. I have copied this memorandum to the Harbour Master. It is requested that he advise them that inspections will commence in the near future, and the second and subsequent visits to ships with deficiencies will be chargeable at the current rate of $110 per hour.

David Wright

David Wright
Principal Marine Surveyor

Encl/

cc: Harbour Master

PRESS RELEASE

BERMUDA HAS BEEN AFFILIATED TO THE PARIS MEMORANDUM ON PORT STATE CONTROL.

Bermuda Government surveyors from the Registry of Shipping have in the past conducted Port State Control Inspections on non-Bermudian ships which visit Bermuda. The purpose of these Inspections has been to ensure that visiting ships comply with International Maritime Organisation Conventions on Load Lines, the Safety of Life at Sea, Prevention of Pollution from Ships, Standards of Training Certification and Watchkeeping for Seafarers, International Regulations for Preventing Collisions at Sea and the International Labour Organisation Minimum Standards Convention on Seafarer's Living Conditions. Ships which violate local regulations made under these Conventions and Regulations have been liable to detention until the deficiencies have been corrected.

The Paris Memorandum of Understanding [MOU] on Port State Control was adopted on 2 December 1980 so that countries could exchange information on ships which have been inspected. The purpose of this exchange of information was to ensure that sub-standard ships could be closely monitored and good quality ships could be spared unnecessary inspections. Countries which are signatory to the Paris MOU include Canada, Finland, Norway, Poland, Sweden and the EC countries.

Bermuda has now become affiliated to the Paris MOU. Reports on inspections by Bermuda Government surveyors will now be forwarded to the United Kingdom, with whom Bermuda's inspections will be collated. This information will then be included on the Paris MOU database. Ships which are due to visit Bermuda can be checked against the database to see if they warrant inspection on arrival. If a ship is inspected and found to have deficiencies which require further visits to ensure it is safe to sail, the ship will be charged for the surveyor's time on the second and subsequent visits. Bermuda's affiliation to the Paris MOU will ensure that sub-standard ships visiting Bermuda will be checked to ensure that they will not cause pollution or put at risk the lives of seafarers.

Safety at sea . . . is a lot like baseball

By Mr. Thomas S. Anderson

While injury prevention measures may seem more difficult to execute than a double steal, they needn't be. Keep your eye on the basics, cover all your bases and you should be home safe.

Admittedly, safety at sea is more likely to conjure up an image of a stormlashed ship with the crew desperately trying to save it, rather than a peaceful baseball game. Traditionally, safety aboard ship focuses on saving ship, crew and cargo (and more recently, the environment) from catastrophe.

Safety at sea, however, really comes about through basic prevention measures. A shipboard program with policies and procedures for hazard recognition, safety inspection and auditing mirrors the true image of safety at sea.

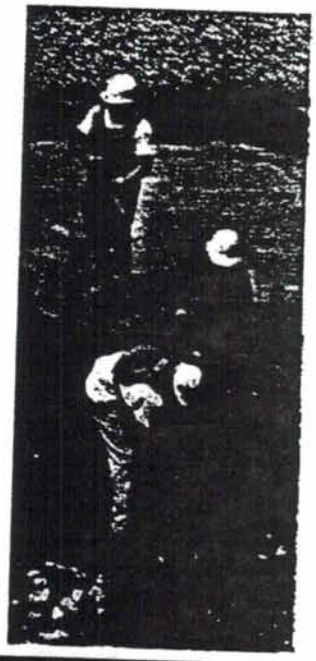
Five steps

The basics of an effective safety inspection and audit program are a five-step process:

1) **identify problems,**
2) **determine causes,**
3) **formulate solutions,**
4) **implement solutions, and**
5) **follow-up and monitor.**

As with any other workplace process, the employees must be involved to be effective. This is very important aboard ship. Crew members usually know where many of the problems are — and have a pretty good idea about the solutions.

Careful attention is required handling mooring cables and getting line handlers ashore.



1) Identify problems

An effective mechanism for identifying existing and potential problems is through a formal safety inspection and auditing program, with established policy and procedures. The policy, in broad terms, should state objectives and responsibilities, while the procedures should specifically set forth the who, how and when regarding the inspection or audit process.

Audits are broader in scope than inspections. They include an assessment of the status of the ship's compliance with company policy and applicable state and federal safety, health and environmental regulations. The company safety manager or a qualified consultant should conduct audits.

Inspections are walking tours of particular areas looking for specific safety hazards. They should be conducted by licensed and unlicensed personnel familiar with the vessel and its equipment.

Published check lists are helpful when conducting safety inspections. To ensure a thorough walk through of a space, use landmarks or check points, such as fire stations, which are tagged and dated. Upon entering an area or space, inspectors should pause for about 30 seconds to observe the work in progress, see how personnel are accomplishing their tasks and get a feel for the operation.

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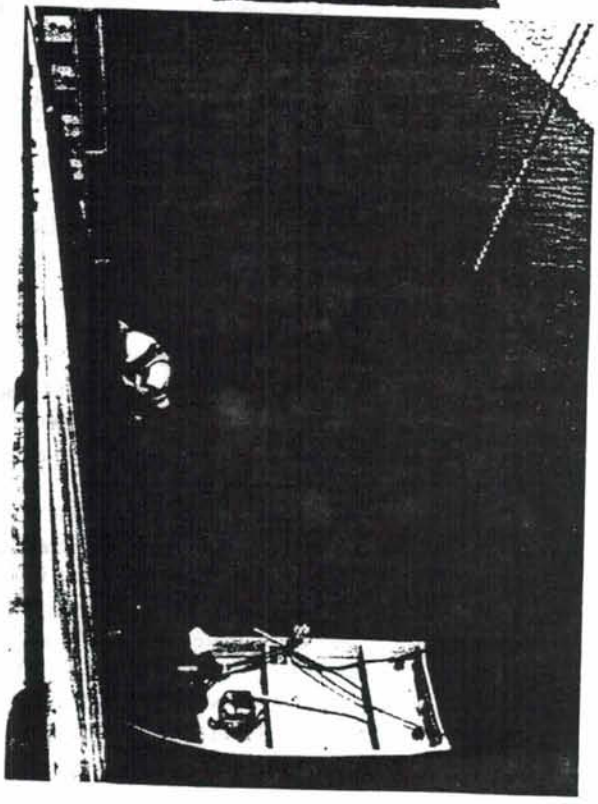


On deck -- look out for trip, slip and fall hazards.

Continued from page 3

Inspectors should be on the lookout for unsafe practices and conditions (such as trip, slip or fall hazards or inadequate machine guarding). Problems found should either be corrected on the spot or noted on the inspection form for rapid follow-up action. The forms should be reviewed and signed by the appropriate department head.

There is no shame in finding and noting problems. The real risks occur when follow-up corrective action is either untimely or not taken at all.

2) Determine causes

Why does a condition such as spilled hydraulic oil on deck exist? In order to arrive at a satisfactory solution, the root cause of the problem must be determined. It is not enough to simply clean up the spill. It is important to know why the oil was spilled. If a line or pump is leaking, repairs must be made to avoid further spillage.

Safety inspections must find out "why" problems occur, rather than accept conditions on face value as coincidences or as isolated events. Determining problem causes is the only real way to find appropriate solutions.

3) Formulate solutions

Once problems and their root causes have been identified, solutions or fixes can be devised. Problems found during safety inspections should be brought to the attention of the department head. If the solution is anything except an "on-the-spot" immediate fix, a corrective action plan should be documented, designating what will be done, by whom and in what time frame.

Crew member involvement at this stage can be invaluable to the ultimate success of the corrective action. Frequently, this prevents a situation or condition from being made worse by well-intentioned, but unworkable solutions arrived at through unfamiliarity.

4) Implement solutions

Safety inspections and audits should document specific time periods in which corrective action - solutions - will be completed. Responsibility for ensuring that corrective action is taken on schedule should be assigned. Communicating solutions to all affected personnel is essential. Get the word out!

5) Follow-up and monitor

If there were just six words to describe what it takes to administer a successful safety inspection/audit program, they are:

follow-up - follow-up - follow-up.

It does absolutely no good to identify problems and hazards, find their causes, formulate solutions and implement them if there are no provisions for going back to make sure the solutions work. The inspection/audit policy should include a formal process or means for providing follow-up actions, and who is responsible for carrying them out. Audits and inspections should be considered incomplete until follow-up actions are completed and documented.

Conclusion

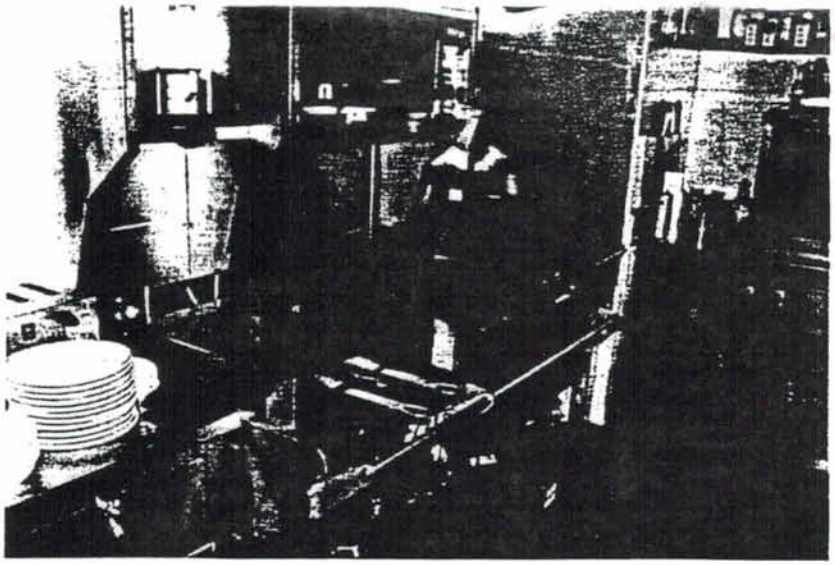
A safe operation encompasses many components of a thorough shipboard safety program, including inspections and audits. Finding and correcting safety problems prevents injury and damage to vessel and equipment.

The total cost of a disabling injury is significant, considering lost wages, medical treatment, replacement training and potential litigation-related expenses. Gone are the days when these expenditures were "written off" as a cost of doing business.

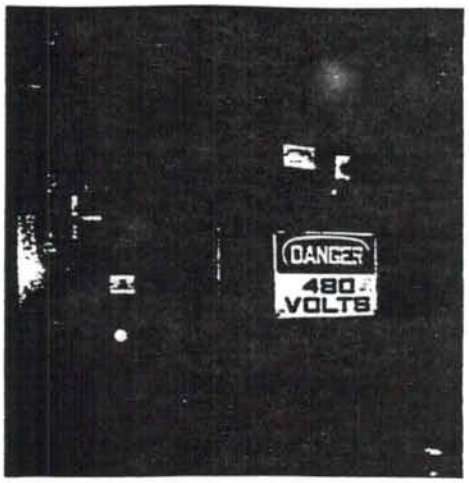
Conducting a vigorous, thorough safety inspection/audit program is the right game plan - in both a business sense and a human sense. It is an essential element in the overall "safety at sea" picture.

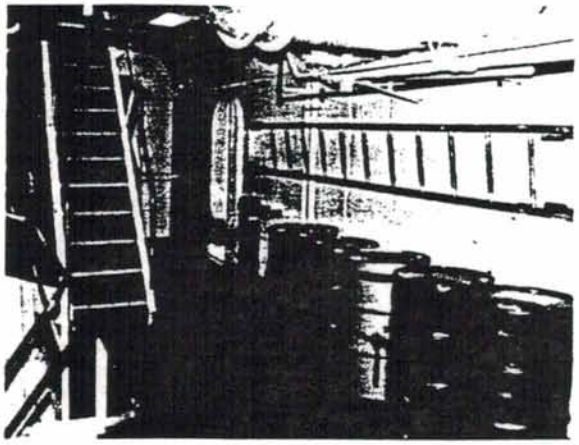
Mr. Thomas S. Anderson is the director of Safety and Health of the American Steamship Company, 500 Essjay Road, Williamsville, New York 14221.

Telephone: (716) 635-0222.

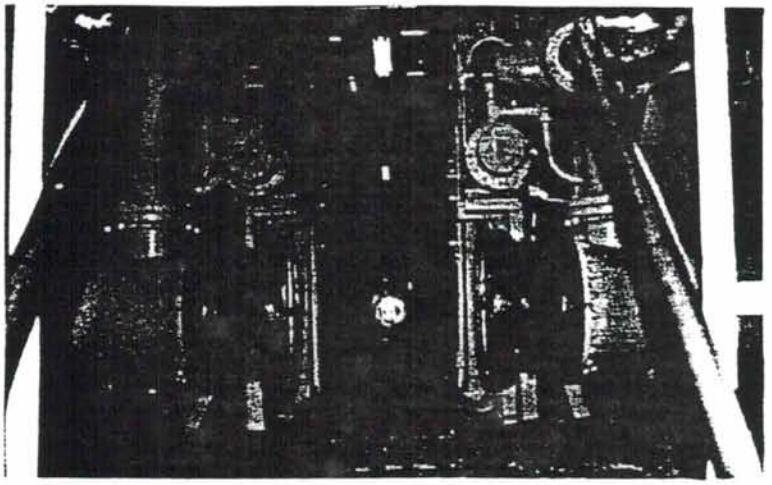


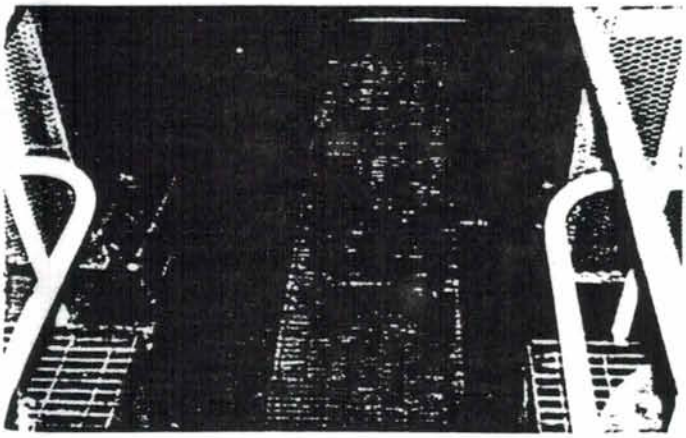
Left) Galleys must be spotless.



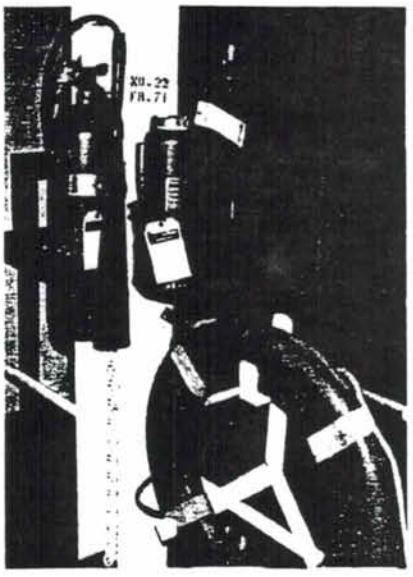


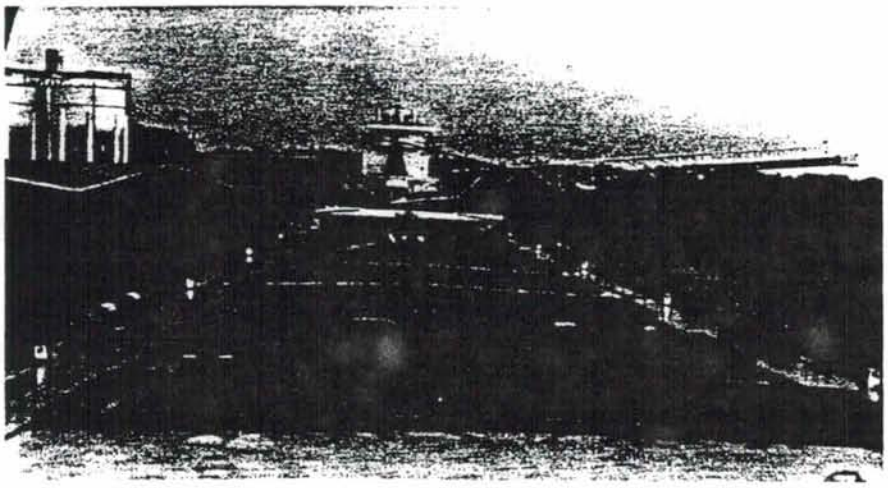
-- Engine room --
Right) Warning signs must be posted.
Left) Supplies must be secured and ladders clear.
Below right) Gratings must be level, clean and secure.





Left) Bilges should be free of oil.
Right) Safety inspection tags must be affixed to fire stations.
Below) Pause to observe the whole operation.





Setting the Stage

BY MICHAEL CROWLEY, CORRESPONDENT

Since the passage of the 1990 Clean Air Act, diesel engine manufacturers have watched the environmental axe steadily descend. First hit were the heavy-duty engines used in urban buses and trucks. Then came off-road diesels. The next target? Marine diesels.

We won't demand changes that can't be done to the existing engines' designs. You won't need to add turbochargers or go to something like DDEC.
— EPA

No emission standards have been enacted for marine engines yet. But soon, commercial boat operators and manufacturers of marine diesels will know that their turn in the Environmental Protection Agency's regulatory barrel has finally arrived.

"A proposed ruling for marine engines will be made by the end of September," said the EPA's Joann Goldhand. She added that nothing will be finalized until the end of 1995. Then, according to Goldhand, it will probably take three years for Stage 1 of the rules to be implemented.

The emission standards for marine diesels are expected to resemble those for heavy-duty on-road vehicles. There's general agreement, though, that the requirements "won't be at the level of stringency that we've had to deal with for on-road vehicles," said Cummins Engine Co. Inc.'s Mike Brand. "We'll be able to carry our techniques and designs into the marine market."

Goldhand said, "We won't demand changes that can't be done to the existing engines' designs. You won't need to add turbochargers or go to something like DDEC (Detroit Diesel Electronic Control)."

However, when the time comes for the second stage of regulations, the standards will be much more stringent.

"It will be more of a regulatory forcing standard," Goldhand said. Neither she nor anyone else is sure what those standards will be, but she guesses there will probably be a three-year period between Stages 1 and 2.

Borrowed solutions

No single technological breakthrough will solve the marine diesel air-emission puzzle.

"Everything helps," said Paxman Diesels' Richard Van Damn. "But there's not a single thing that's the one solution."

With the exception of some medium- and slow-speed diesels, whatever emission-beating technologies finally end up in the engine rooms of tugs, crewboats and patrol boats, they will probably have originally been developed for the heavy-duty and off-road vehicles industry.

For instance, MAN Marine Engines, a company very involved in producing diesels for trucks and buses, first used its waste-gate technology on land-based vehicles. The waste gate, combined with high-output turbochargers, allows a boat to optimize its power in both the low-speed and high-speed ranges.

This is accomplished by mounting a smaller compressor housing on the turbocharger. The compressor forces more air into the combustion chamber at low rpm's, maximizing power. But when the engine is operating at a high rpm, a valve in the exhaust-manifold elbow senses the boost in pressure and permits exhaust gas to bypass the turbocharger. Thus, the charged-air pressure doesn't become too high, and the output to the compression chambers is maintained.

Air, along with heat and fuel, is what allows diesels to operate. And developing methods to maximize the delivery of air to the combustion chamber is an ongoing effort among engine makers.

In the 1,200- to 5,000-hp range for diesels operating at 1,800 to 2,000 rpm, Paxman is the only engine manufacturer that's been able to design a two-stage turbocharger, said Van Damn. The primary stage cools and boosts the air pressure to between 15 and 30 psi. The second stage again cools and boosts the air pressure. (The exact pressure rating for both stages depends on such things as the engine's rpm level and its compression ratio.)

Diesel manufacturers prepare for the first stage of the EPA's emissions standards for marine engines.

Besides insuring a constant supply of air, explained Van Damn, "the advantage of this technology is that it's simpler ... it avoids sophisticated electronics. The trick is to avoid a lag between the stages. You don't want the second stage hesitating before it kicks in."

Not surprisingly, Van Damn isn't saying how Paxman did this.

Trap approach

Controlling the effects of another type of air has been the concern of Detroit Diesel Corp., whose DDEC was the first electronic-engine control system to hit the marine market. The company has experimented with a number of exhaust aftertreatment devices on buses and trucks. A major area of technology research called for designing a particulate-trap system for diesel-fueled buses.

In one case, a prototype trap collected particulates in a filter composed of ceramic fibers. DDEC measured the pressure across the filter, and when it went below a certain point, a bypass valve sent the exhaust through a standard muffler. At the same time, the particulates in the trap were ignited and burned off. The exhaust was then redirected through the filter.

Filter durability was a major concern in the particulate-trap work. And eventually the program was discontinued because the trap manufacturer halted production after the EPA raised its particulate levels from 0.05 g/bhp-hr. to 0.07 g/bhp-hr.

Based on Detroit Diesel's experience with land-based vehicles, if particulate traps are ever designed for marine engines, they won't be cheap.

"The bus engines equipped with particulate traps were very expensive," said company spokesperson Nancy Martin. "A particulate-equipped engine costs one-and-a-half times that of a regular engine."

Catalytic converters, another form of particulate entrapment, are being experimented with as well. Three-stage converters for NOx reduction are potentially very expensive, especially for the larger diesels. They are also big.

"Four feet to 5' round and 4' to 5' long, in some cases," said Jeff Conrad of Cummins Marine.

Cummins Engine is developing its own catalytic converter for NOx reduction called, appropriately, NOXTeck. It's mounted downstream of the turbocharger and features a benign acid that basically reduces NOx emissions to water through a chemical reaction, explained Mike Brand. Currently, Cummins has several NOXTeck pilot installations on land-based power generators.

Catalytic converters, however, don't solve everything. As Conrad noted, "Just because the particulate matter has been contained, you still have to get rid of it. The converter has to be cleaned."

Better burn through electronics

When it comes to electronic ignition systems, Detroit Diesel remains the major player. But other companies are working to develop the same type of technology.

Caterpillar Inc.'s Dave Jackson said his company probably wouldn't develop electronic ignition just to meet the emissions standards. But Caterpillar has equipped its 3412 and 3408 models with optional electronic unit injectors, and its soon-to-be-released 3176 will also have electronically monitored injectors.

Besides giving a better fuel-burn, engines with an electronic ignition system put out more horsepower than their non-electronic counterparts. "A 3412 with electronics will develop 1,250 hp," said Jackson. "The non-electronic model pushes 860 hp."

From Caterpillar's standpoint, members of the workboat sector don't see the value of adding electronic controls to engines, said Jackson. "They like it simple."

With the flow

Most engine manufacturers use high-pressure fuel-injection systems to achieve the proper mix of fuel and air. Some boost the pressure at the fuel pump, though this requires specially designed fuel lines to avoid metal fatigue caused by vibration.

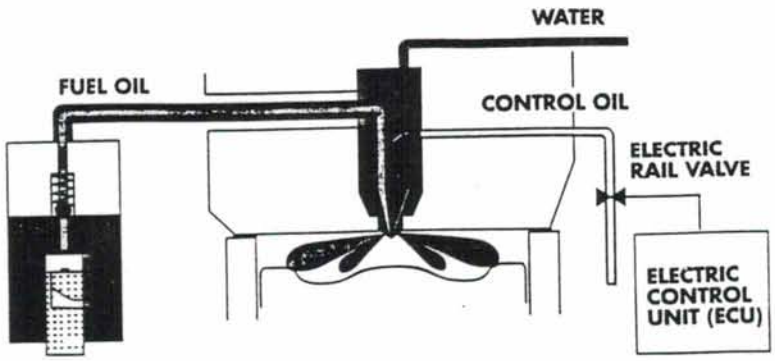
Other engine companies give the fuel a small boost (50 to 100 psi) at the fuel pump. When the fuel reaches the unit injector, housed in the cylinder head, the injector raises the pressure to about 20,000 psi — at least in the case of Paxman diesels — and also meters the fuel.

A slightly different design twist for delivering fuel to injectors was developed by a company that wishes to remain anonymous. In that firm's system, the fuel flow is controlled by the fuel pump, which electronically senses the load on the prop. Whether the boat is carrying cargo and 50 people or traveling empty, the manufacturer claims that the correct amount of fuel is delivered, based on current operating conditions.

"Control from the pump to the injectors is more precise," said a spokesperson, "and there's a definite smoke reduction."

A different injector-centered technology comes from Wärtsilä Diesel.

Direct Injection of Water for Reduction of NOx



Wärtsilä is experimenting with an injector designed to reduce NOx by directly injecting water into the combustion chamber. The system cools the high-temperature regions of the chamber, suppressing NOx formation.

It's designed to reduce NOx by injecting water directly into the combustion chamber. The injected water lowers the high-temperature regions, suppressing NOx formation.

Wärtsilä's Christer Broman pointed out that direct water injection shouldn't be confused with water emulsion injection. The disadvantage of the latter method is that it restricts the amount of water applied, due to inversion of the emulsion and the capacity of the injection system. The advantages of direct water injection are that the appropriate amount of water is used, and the injection occurs at a time that maximizes NOx reduction while minimizing any detrimental effect on fuel consumption.

The company has a prototype injector on one of its 3,000-hp Vasa 6R32 diesels, installed on a ship running between Denmark and Sweden. Broman reported that the technology looks promising.

Wärtsilä is taking the technology a step further, trying to determine if the water-injection system works with its other engines. "The problem is that diesels are so sophisticated that what works for one engine won't work on another," said Broman.

Ceramics research

To reduce BTU loss and provide more horsepower and cleaner combustion, "everyone," according to MAN Marine's Phil Watson, "is experimenting with ceramic linings for the inside of the engine." The beauty of ceramics is that they can withstand higher temperatures than either aluminum or cast iron. So, for example, ceramic linings could prevent heat from being transferred to components outside the combustion chamber, leading to a more efficient engine.

Companies have tried to design ceramic engines, but the material's brittleness has proved problematic. Most believe that eventually a hybrid material incorporating ceramics will be developed that's heat- and fracture-resistant.

"That will be the next giant leap forward ... the next generation of engines," said Van Damn, who added that ceramic components would allow the engine's cooling system to be eliminated.

Whether or not ceramics is all or part of the answer, developing the technology needed to reduce air emissions will obviously be difficult and expensive.

And while few in the industry know for sure what the EPA's Stage 1 or Stage 2 standards will be, "one thing we know is that there will have to be reduced emissions in the future," said Broman. WB

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Don't be sued for disability discrimination

By Phillip M. Perry

Remember those posters in which Uncle Sam points a threatening finger straight at you and says, "I WANT YOU!" Well sir, if you employ 15 people or more, he does want you to comply with the Americans With Disabilities Act. If you don't comply, the Uncle will lower the boom on you. But this article tells how you can avoid being tagged. Follow its advice.

So you thought you were immune from the requirements of the Americans With Disabilities Act, because your business had only a few employees?

Surprise! As of last July [July of 1994], the law applies to businesses with as few as 15 workers. That's a dramatic change from the previous floor of 25 employees, when the act became effective two years ago.

"Small businesses need to take action fast," says Gary Phelan, a partner with the New Haven, Conn., law firm of Garrison & Arterton. "The Americans With Disabilities Act (ADA) has already had a major impact on the workplace. Now smaller employers will face the same obligations and risks."

What kind of impact? To date, employees have filed a whopping 21,500 ADA-related complaints with the Equal Employment Opportunity Commission. "We anticipate that employees will continue to file complaints at a pace of some 18,000 per year," says Phelan. Indeed, ADA complaints now account for 15 to 20 percent of all claims filed with the EEOC. (See sidebar, "Lawsuit Scorecard.")

"The ADA has become the problem of the decade, given the large number of cases that have been filed," said Don Schackne, president of Personnel Management and Administration Associates, Delaware, Ohio.

In light of this change in the law, and the rapid pace of litigation, managers need to put their employment practices under a strong microscope.

Be aware of this vital fact: The ADA prohibits employment discrimination against people who are otherwise qualified for a position, but who may have any of a host of mental and physical disabilities. And employers may not discriminate against individuals whom they only *perceive* to be disabled. (See the sidebar, "Who is Disabled?" for a list).

Individuals can sue your business for any apparent disability discrimination in your procedures for hirings promotions, bonus awards, benefi plans, terminations, or other proce dures. The law also requires that yo make reasonable accommodations i your workplace for disabled employ ees, unless you can prove that such ac commodations would pose an undu hardship on your company. It's obviou that special accommodations would b a tough proposition in the rough envi ronment of a wire rope sling shop!

That's not all. State law (which typ cally apply to smaller businesses) ar also becoming more stringent in re sponse to the new federal law. Alread over 40 states have legislation tha outlaws discrimination against th disabled for employers large an small. The California law, for exampl triggers at five workers and the Con necticut law at three.

Here's another indication tha smaller businesses are getting hit wit charges: So far, the heaviest concer trations of ADA lawsuits (when com paring the number of lawsuits to th size of the workforce) are in Kansa New Mexico, and Colorado – state where small enterprises predominate

To protect yourself, be aware of th important trends that have develope over the past year. For example, ba backs are the most common disabili cited in the cascade of lawsuits me tioned above. Mental illness comes second. (See sidebar, "Disabiliti Cited in Lawsuits.")

Attorneys have had time to gath information on the most common e rors managers are making in compl ing with the law. Purge your busine of the following practices that ha gotten others into hot water:

Firing an employee for a disab ity. Nearly half of all ADA lawsuits the largest portion by far – are fil because terminated employees a claiming they were wrongfully di charged.

Lesson learned: Don't fire an e

Who is Disabled

Among the conditions that are considered disabilities by the Americans with Disabilities Act:

- Deafness
- Wheelchair use
- Mental illness
- Cancer
- Learning disabilities
- Recovering alcoholism
- Multiple sclerosis
- Blindness
- Epilepsy
- Diabetes
- Heart disease
- AIDS
- Recovering drug abuse
- Bad backs

Conditions Specifically Excluded by the Act:

- Kleptomania
- Psychoactive substance abuse disorders
- Transvestism
- Pyromania
- Homosexuality
- Voyeurism

Lawsuit Scorecard

- Number of complaints filed with EEOC: 21,500
- Dismissed for lack of jurisdiction: 40%
- Found without merit: 30%
- Settled: 30%
- Total payout to plaintiffs: $11 million
- Biggest jury verdict: $572,000

About a third of all disability discrimination complaints are settled out of court through financial payments to plaintiffs. Employers face the greatest risk from jury trials.

Disabilities Cited in Lawsuits

- Back problems: 18%
- Mental illness: 9.8%
- Heart trouble: 4.3%
- Neurological disorders: 3.7%
- Diabetes: 3.6%

Bad backs were the most common disability cited by plaintiffs filing disability-related complaints with the EEOC.

ployee for a real or perceived disability. You should terminate individuals only for legitimate reasons, such as poor work performance.

Instead of firing people because they have disabilities, make reasonable accommodations in your workplace for them. Some 22 percent of the disability lawsuits, so far, are based on charges that employers would not provide reasonable accommodations for disabilities. A person with a bad back, for example, may need special seating or a varied work schedule.

Here's some good news: the vast majority of accommodations can be accomplished quite easily, and at minimal cost. According to the EEOC, about 60 percent of the disabled require no accommodations at all. And some 70 percent of accommodations cost employers less than $100.

"That's a fair estimate, based on our experience throughout the country during the last 12 years," says John C. Fox, an employment attorney at Fenwick & West, Palo Alto, Calif. "We have found that the average accommodation costs less than $250. This is a great source of comfort to business people."

Consider how a change in a work procedure can accommodate a disability. After all, there is little or no cost involved to changing a work process and often this is all that someone with a disability requires. In some cases this may involve allowing an individual to take time out from work, or adjusting work schedules, or re-arranging work stations, or breaking jobs down into components that can be reassigned to individuals. Businesses often don't think of these alternatives until someone brings them up.

Try to spot policy risks before they turn into problems. Look around your business. What kinds of policies have you in place for the disabled ?

In particular, dust off your policies concerning the way employees are evaluated. Failing to make honest evaluations – and failing to put those evaluations in writing – can be dangerous.

Suppose you have an employee who is not performing up to the level required by the job. Because you believe he will eventually develop the skills needed by the job, you decide to avoid giving him a bad performance review. When his performance does not improve, you fire him.

Now, suppose that individual has a disability. You are open to a wrongful discharge lawsuit for disability discrimination, because the employee's written evaluations – if any – do not reflect the poor performance level that was the actual – and legitimate – reasons for dismissal.

"You should establish good procedures for reviewing the performance of employees and maintain records of such reviews," says Charles G. Bakaly, Jr., a labor and employment lawyer with the Los Angeles firm of O'Melveny & Myers. "Develop a disciplinary system that causes employees to be counselled and warned for improper performance."

"Many employers don't like to give negative evaluations because they feel it's bad for morale," says Theodore J. St. Antoine, professor of law at the University of Michigan. "Then, when they fire an employee suddenly, it looks suspicious." Without documentation, a worker has a leg up in a lawsuit when claiming dismissal was for other – illegal – reasons.

Establishing discharge procedures isn't enough. You have to make sure supervisors know and use them. "Communicate your policies so a supervisor does not fire someone in the wrong manner and drag the company into court, says Schackne.

"Training supervisors in good personnel practices includes instruction on how to counsel employees," says

Nancy L. Abell, partner at the Santa Monica, Calif., firm of Paul, Hastings, Janofsky & Walker. Be safe: institute procedures to double check supervisors' actions to assure adherence to company policies.

Refusing to hire an individual because of a disability.

Of the lawsuits relating to disability to date, some 15 percent claim that employers discriminated when hiring the plaintiffs.

Don't *you* make that mistake! You may not consider a person's disability when making a hiring decision. To determine the best job applicant, consider only skills.

To do this correctly, you must first define the essential functions of each position and then list the skills required to perform those functions. "The law prohibits discrimination against any person who can perform the essential functions of a job," says Phelan. "So the critical thing is to analyze each of your tasks, then identify which facets of them are indispensable."

During the interview, each of your questions and statements to the applicant should relate to the skills required to carry out the written job descriptions. Avoid basing your employment decision on the inability of any applicant to perform an activity which is *marginal* – or not essential to performing the work.

Be safe: Just as a paper trail can help defend you against wrongful discharge lawsuits, so it can protect you from charges of hiring discrimination. "One of the biggest mistakes is failing to take notes about what transpired during the hiring interview," says Ralph C. Smith, Jr., a partner at Smith, Perry & Epps, Bainbridge, Ga. Your notes should record the questions you asked, and should reveal how those questions were intended to elicit responses that related to skills necessary for the position to be filled.

The alternative to a written paper trail is a fuzzy memory about what transpired during the screening process. Having to admit that you have forgotten what transpired at an interview, and most likely even forgotten the applicant, can make a defense very difficult. Comments Smith: "You can be faced two years down the road with having to try to remember what the applicant was saying."

Smith suggests sending letters that explain why applicants were turned down. Say something such as "We have examined your qualifications and we have other applicants who are more qualified for the job." How about adding more detail? No. "The more you say the more you may have to hold yourself out to prove later," says Smith.

No Protection for Poor Performance

What if you hire a person with a disability, and it becomes clear that the person cannot perform the essential functions of a job, after you have tried to make reasonable accommodations for the disability? Is your business stuck with an expensive addition to the payroll?

Not at all. The law does not protect a disabled individual if, in fact, that individual cannot perform the essential duties of a position after reasonable accommodations have been made.

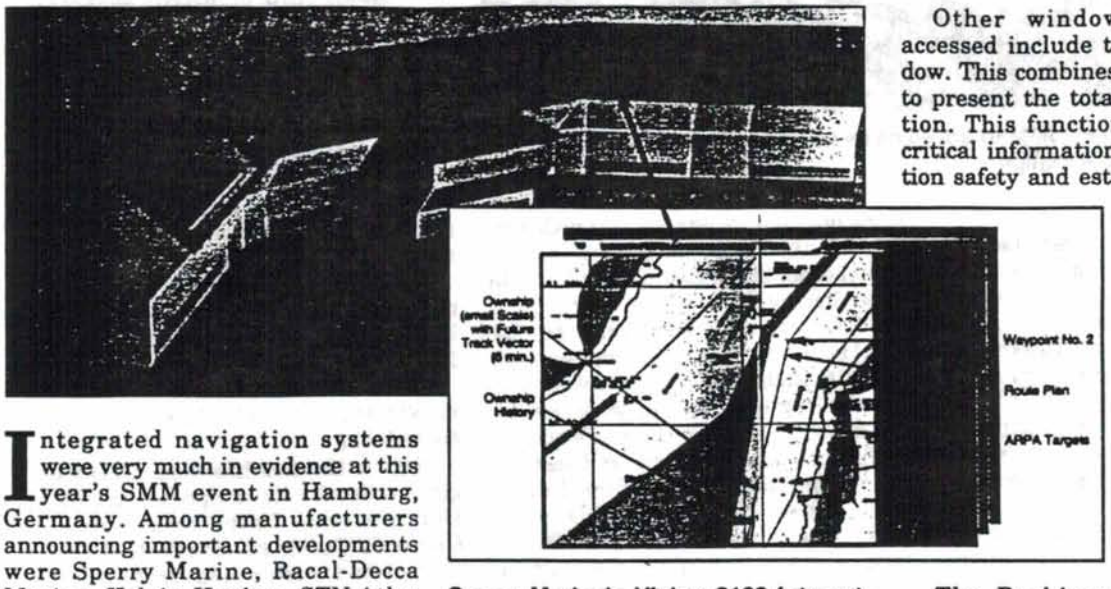
Here's an example: To fill a sales position, you have hired a person with a bad back. You believed that the new hire would be able to handle the work load of the new position in your wire rope business, despite the disability.

As it turns out, you were wrong. Your new hire misses a lot of work, is unable to attend important meetings, and so on. You attempt to make reasonable accommodations for the individual, to no avail. You change seating arrangements, juggle work hours, set meetings up in advance, and try other tactics. Still, the new hire misses a lot of work. In this case you can legally act on that fact, even though it is a result of a disability. (This example is only included to illustrate a point. You should always seek advice from your attorney before making employment decisions similar to this one.)

Act now. It won't help to hide and hope the problem goes away. You want to undertake the right moves to preempt problems down the road. Says Phelan: "With the expansion of remedies to plaintiffs to include punitive and compensatory damages under the Civil Rights Act of 1991, as well as the attorney fees involved, the ramifications of not taking this issue seriously are very costly."

Bridge integration on show at SMM

Major marine electronics manufacturers announce important advances in navigation systems



Sperry Marine's Vision 2100 integrated bridge uses a new voyage management system (VMS-VT) featuring Microsoft Windows NT

Integrated navigation systems were very much in evidence at this year's SMM event in Hamburg, Germany. Among manufacturers announcing important developments were Sperry Marine, Racal-Decca Marine, Kelvin Hughes, STN Atlas Elektronik and Norcontrol Seacraft.

VISION, WINDOWS AND NEW PARTNERSHIPS

Sperry Marine chose SMM to introduce its new, second generation Vision 2100 integrated bridge and a new voyage management system (VMS-VT) using the Microsoft Windows NT operating system. The capabilities of Vision 2100 have also been extended by teaming arrangements with the marine engineering division of Germany's Siemens AG and with Ocean Systems, Inc. (OSI). Through these partnerships Vision 2100 can now incorporate the Siemens integrated ship control system and the OSI voyage optimization and heavy weather damage prevention system.

The Vision 2100 bridge integrates navigation planning station, conning station, radar/ARPA, ECDIS, docking display, engine room monitors and other equipment into a single. highly automated assembly. It can be shipped and installed as a prefabricated unit that, says Sperry Marine president George A. Sawyer, represents "the highest systems level of factory preassembly and test" that the firm has ever undertaken. He adds that "shipyards worldwide will appreciate the ease of installation and check-out of this new system, both for new construction and major retrofit projects."

The new VMS-VT voyage management system introduces a universal electronic chart format module for both raster scan and vector type electronic chart requirements—including Electronic Chart System (ECS) and Electronic Chart Display and Information System (ECDIS) applications. It offers seamless transitions between raster scan and vector charts and compatibility with charts from leading hydrographic offices and commercial suppliers. In addition, electronic charts can be generated and updated at an onboard work station.

The basic Navigation Window display presents the electronic chart display with ownship to the left and information required to be permanently displayed to the right along with controls required to be permanently accessible. The ECDIS is IMO/IHO-compliant and the automatic navigation and track keeping system is DNV-certified.

The display is compatible with official hydrographic office and commercial raster scan and vector electronic charts. This window includes integrated track keeping and speed pilot. A voyage recorder with playback is optional.

Other windows that can be accessed include the Radchart Window. This combines radar and ECDIS to present the total navigation situation. This functional integration of critical information enhances navigation safety and establishes a primary navigation display.

The Conning Information Window presents an alpha numeric and mimic presentation of all important maneuvering and navigation information. Screens are configurable to each customer's requirements.

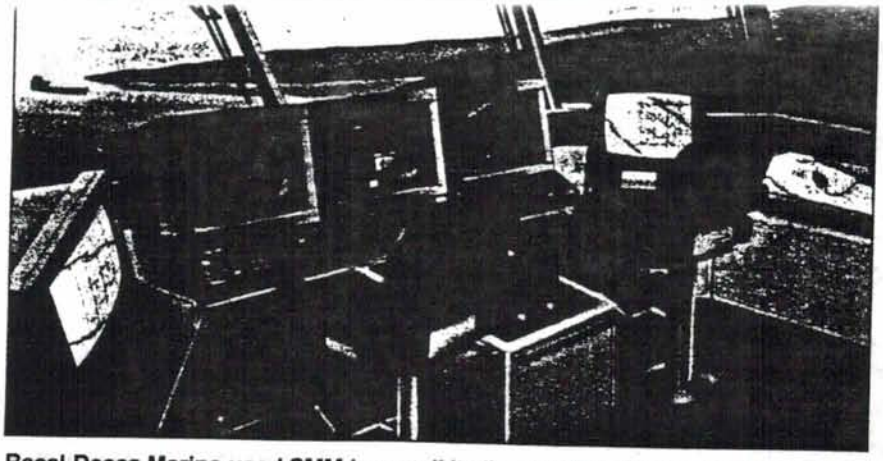
The Docking Window gives a mimic presentation of ship's velocity against a scaled grid. Available on displays suitable for enclosed and outdoor wing stations, the window provides selectable future and history interval. Multisensor configuration includes doppler, rate gyro and GPS. An option is a window-in-window video capability that would allow pictures from, for example, a bow camera to be displayed.

The Vision 2100 planning station is an independent work station, typically located at the main chart station. Using it, the watch officer can devise an optimized route.

INTEGRATED BRIDGE FOR SMALL SHIPS

Much interest at Racal-Decca Marine's SMM presentation focused on integrated navigation systems for smaller vessels. Potential markets for the firm's new MIRANS 2000 and 1000 (Modular Integrated Radar and Navigation Systems) are seen as any vessels with a need for sophisticated wheelhouse electronics that lack the space to accommodate currently available big-ship systems.

The new additions to the MIRANS range allow users to choose a system of a size and capability exactly suiting their requirements. Modules from the range can be built into the vessel's own bridge console for space-saving



Racal-Decca Marine used SMM to unveil its line of MIRANS 2000 and 1000 integrated bridges for smaller ships

and styling coordination.

MIRANS 2000 systems use the ChartMaster electronic module. This is supplied with a 20-in, high resolution display that can show vector charts and which is upgradable to meet future ECDIS specifications. Charts for the system are available from Livechart of Romsey, England.

The ChartMaster can be linked to one or more BridgeMaster radars. Either 14-in, 20-in or 26-in displays can be chosen, depending on available space. When equipped with autotrack option and linked to the ChartMaster, the radar enables the position of other ships to be plotted on the chart display.

MIRANS 1000 systems use the MapMaster module. Used in conjunction with a chart digitizing table, this allows electronic maps to be drawn by the user. This, says Racal-Decca, is useful for vessels sailing in areas for which commercially-produced electronic charts are not available, or to those owners who cannot justify the expense of a full portfolio of electronic charts. The firm says "the graphics facilities offered by MapMaster mean that the finished map is displayed with an appearance comparable to a professionally-prepared electronic chart." Owners have the option of upgrading the MapMaster to a full ChartMaster at a later date.

Other modules available in the new small ship MIRANS systems include a Live Situation Report (LSR) display. Available with either a 14-in or 20-in display, this can show a wide range of information on screen pages assigned for "maneuvering" and "voyage plan," including ownship position, tidal effects and waypoint data. Machinery data, such as engine rpm, rudder angle, bow thruster power and rate of turn can also be included.

Monitoring and control of ship's machinery and cargo is possible by including an ISIS (Integrated Ship Information System) module.

KELVIN HUGHES LAUNCHES NUCLEUS 2

Kelvin Hughes has won a prestigious order for its integrated navigation systems. Later this month, Cunard's *Queen Elizabeth 2* will be retrofitted with a comprehensive

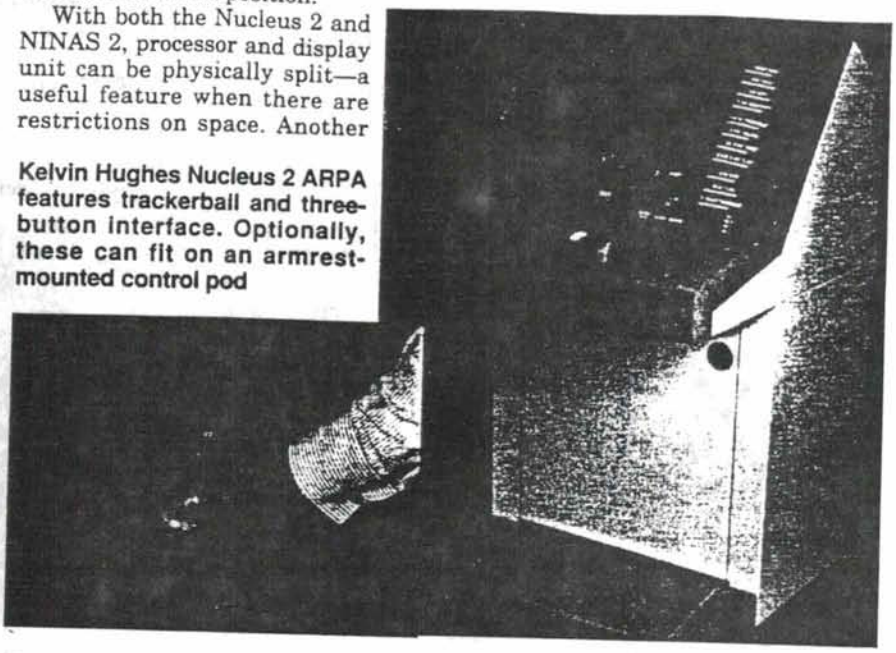
Kelvin Hughes installation during its extensive refit. The QE2's wheelhouse will be equipped with three Nucleus ARPA radar displays, an integrated navigation workstation combined with an electronic chart display and a Qubit Master Yeoman plotting table. The chartroom will be fitted with an electronic chart display and a further Master Yeoman plotting table. The electronic chart displays will utilize the U.K. Admiralty Raster Charts System (ARCS).

Kelvin Hughes has just announced enhanced capabilities for its Nucleus ARPA, NINAS (Nucleus Integrated Navigation System) and CDU (Chart Display Unit) systems and these were the focus of its SMM presentation.

The new systems have all been developed taking into account customer and operator requirements and extensive sea trial experience with the original Nucleus systems. Though all feature a new housing meeting IACS (International Association of Classification Societies) standards for bridge housings, there has been little change to overall dimensions or the consoles' mechanical fixing points, so easy upgrading of Nucleus 1 installations is possible.

The user-friendly Kelvin Hughes operating interface of a single trackerball and three buttons has been retained. It is now available as a removable module fitting an optional compact control pod that can be fitted on an armrest to allow remote operation from a seated position.

With both the Nucleus 2 and NINAS 2, processor and display unit can be physically split—a useful feature when there are restrictions on space. Another option is to install two NINAS 2 processors in a single console along with a remote monitor and control unit. This allows forward route planning without affecting real-time display of navigational information.



Kelvin Hughes Nucleus 2 ARPA features trackerball and three-button interface. Optionally, these can fit on an armrest-mounted control pod

NINAS 2 interfaces with a wide range of other devices, including GPS, doppler logs, echo sounders and autopilots. An electronic plotting table can be interfaced to provide the system interface with paper charts. A comprehensive data logging suite includes ownship position and ARPA target data. Notes can be stored in the form of a navigator's notebook and pages are provided for captain's standing orders.

The CDU 2 electronic chart system, together with NINAS 2 and Nucleus radars, builds into a Nucleus integrated navigation system. It incorporates route planning facilities and displays U.K. Admiralty raster charts (ARCS), thus benefiting from the official chart correction service that is part of ARCS. It will also display full DX90 charts as they become available.

Able to track up to 50 targets, the Nucleus 2 6000 has a unique "footprint acquisition zone." This allows selection of a number of inclusion and exclusion zones within which the computer will initiate automatic target tracking, reducing operator workload in high density traffic areas.

An 11-color display presentation covers the entire CRT screen, including the data panels. Important alarm signals can be presented as highly-visible "pop-up" dialogue windows—easily recognized even at some distance from the display.

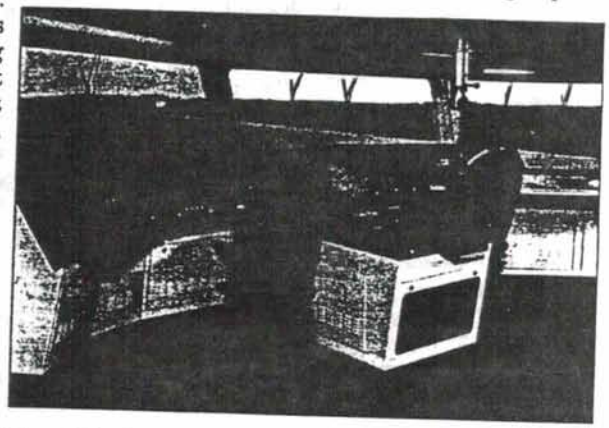
A mapping facility allows the operator to draw simplified charts using a library of lines, colors and international symbols. The maps are stored on a smart card that can be removed and used on other displays and other ships. Maps can be stored against their actual position and superimposed over the radar video.

Besides two standard EBLs (electronic bearing lines) Nucleus 2 can display a curved EBL, allowing a vessel to carry out a controlled turn, and a "roaming" EBL for taking bearings from one target to another. Other features include trial maneuver and training simulator facilities.

SHIP CONTROL CENTER FROM STN ATLAS ELEKTRONIK

Vulkan Group member STN Atlas Elektronik, formed by the recent merger of Atlas Elektronik and STN Systemtechnik Mord introduced a new series of SCC (ship control center) systems at SMM. These integrate all navigation, communications and main control operations as a single-sourced package solution for ships' bridges.

Ergonomically designed for single manning of a bridge, SCC is available in three basic versions: SCC Standard, SCC Nav and SCC W1. SCC standard, a cockpit-type assemby meets IMO individual equipment requirements and includes a NACOS 15-2 integrated navigation command system. The Nav version features a NACOS 25-2 system plus extended acquisition and processing facilities necessary for one-man bridge operation. The SCC W1 integrates all primary planning and ship handling tasks, incorporating a NACOS 35-2, 45-2 or 55-2 navigation unit with which radar, track control and ECDIS operations can be carried out via a single Atlas Multipilot console. All three versions incorporate a range of internal and external GMDSS communications facilities.



New Ship Control Center from STN Atlas Elektronik

Overall continuous monitoring and control of systems is provided by a Geamar integrated control facility for all ship management, safety and cargo control operations together with a Geamot main engine remote control system. For more automated requirements, a Damatic XD control system is available as an option.

CHINESE ORDERS

SMM marked the first display of the Norcontrol Seacraft BridgeLine integrated bridge system at a major trade show. The BridgeLine system combines the use of electronic charts and satnav with ARPA in an advanced multipurpose display. The first system was installed last year in the Norwegian Coastal Express vessel *Kong Harald*. The latest contract is from Dalian New Shipyard of China and covers a BridgeLine system for a tanker building for Norway's Anders Wilhelmsen. **ML**

A STAR TO STEER BY

A civil, internationally owned satellite navigation system is no longer just a pipe-dream. *Lee Adamson* reveals the broader implications of Inmarsat's recent step into the satnav arena

A replacement for GPS (left) m be welcomed both by the sh ping marine industry (centre) a the manufacturers of electro chart systems (above)

It's a navigator's dream: instant and accurate position finding, on demand, 24-hours-a-day, at the push of a button. And fifteen years ago, it was just a fantasy. Now, notwithstanding some restrictions and limitations, it's a dream come true.

The Global Positioning System, universally known as GPS, is now mature. A direct descendant of the Transit system of the late 70s and early 80s, it has survived the pains of birth, developed through various stages of partial implementation, and now reaches out to an eager, and grateful, mass market.

Its ubiquity is unrivalled. Its potential is almost unlimited. But, despite its widespread adoption and universal welcome, clouds of uncertainty linger on its horizon. What concerns some is that GPS is, and remains, a military system, paid for and operated by the government of a single state – the USA.

As a matter of course, the US Department of Defense (DoD) degrades the quality of GPS service available to civilian users. Even if it did not, the mere fact that it retained the ability and the right to do so would be seen as a potential flaw. Civilian reliance on GPS in critical applications, such as vessel navigation by electronic chart, is inevitably compromised.

To an outsider, the spectacle of the military trying to protect its investment with selective availability and even denial, while inventive civilian users devise correction and augmentation schemes to claw back the lost accuracy, is a curious one. But it is the direct consequence of that inevitable, if uncomfortable, compromise.

Earlier this year, Inmarsat threw its hat firmly into the navigation ring by formally inviting bids for use of the navigation transponders that will be carried on its third generation satellites. Although these transponders will only provide an augmentation to GPS, the organisation's Director General, Olof Lundberg, has s revealed that they could be just the step on a road leading eventually to a independent, internationally owned, ian satellite navigation system.

For Inmarsat, the association with gation is a long one. Although organisation has become synonym with mobile satellite communication, provision of navigation services has in its constitution since its beginning.

"The symbiosis of mobile sate communication and navigation was ous even before the creation of Inmar says Lundberg. Indeed, Inmarsat termi with GPS capability built in are commonplace.

But Inmarsat is looking to the future preparing for a time when it may be upon to play a much more substantial in the provision of navigation services is possible," says Lundberg, "that civil military satnav will go their own w leaving the military GPS and a civil g navigation satellite system (GNSS) to in parallel to serve their different communities."

The vision

revealed by Lundberg is of a four-part evolution from Inmarsat's current supplementary role in satellite navigation to the provision of a completely independent, civil, GNSS.

The navigation payload, to be carried on the Inmarsat-3 satellites, is the first waypoint. It will augment GPS by providing ground-derived integrity information, additional ranging signals and wide-area differential corrections. The net result will be better coverage, more reliability and improved accuracy.

The Inmarsat-3s will be the first geostationary satellites to play a role in a satnav system. They will be the first satellites capable of providing both navigation signals and independently monitored integrity information. And they will be the first civil, internationally-owned contribution to any GNSS that may emerge in the years to come.

Launching the new satellites will begin around the end of 1995. According to Lundberg, "Satellite navigation will never be quite the same afterwards."

Despite the improvements Inmarsat's overlay will bring, the organisation believes that further augmentation will be required in the longer term. This might best be achieved, it believes, by the introduction of a modest number of civil satellites carrying a new, more capable payload. While not dedicated solely to navigation, these satellites would offer much of the capability of GPS.

But the payload itself could be much simpler. It would not have to conform to military standards for radiation hardening, encrypted code and other criteria. And the existence of the integrity monitoring network supported by Inmarsat-3 would allow a reduction in on-board clock stability and data storage.

Inmarsat calls this the Navigation Lightsat Payload and sees it as waypoint two on the route to a civil GNSS. Its own fourth generation of geostationary communication satellites, due to be launched early in the next century, is a likely "host" for the payload. Thus equipped, these satellites would act much more like autonomous navigation satellites than the Inmarsat-3s.

Technicians at Inmarsat have also been considering the merits of orbits other than geostationary for payload host purposes. Their conclusion is that, while most of the low-earth orbit (LEO) systems currently in development could provide some form of position determination, it would be difficult, if not impossible, to use signals from LEOs to augment GPS or Glonass. The difficulty arises from the large Doppler shifts and brief periods of satellite visibility inherent in these orbits.

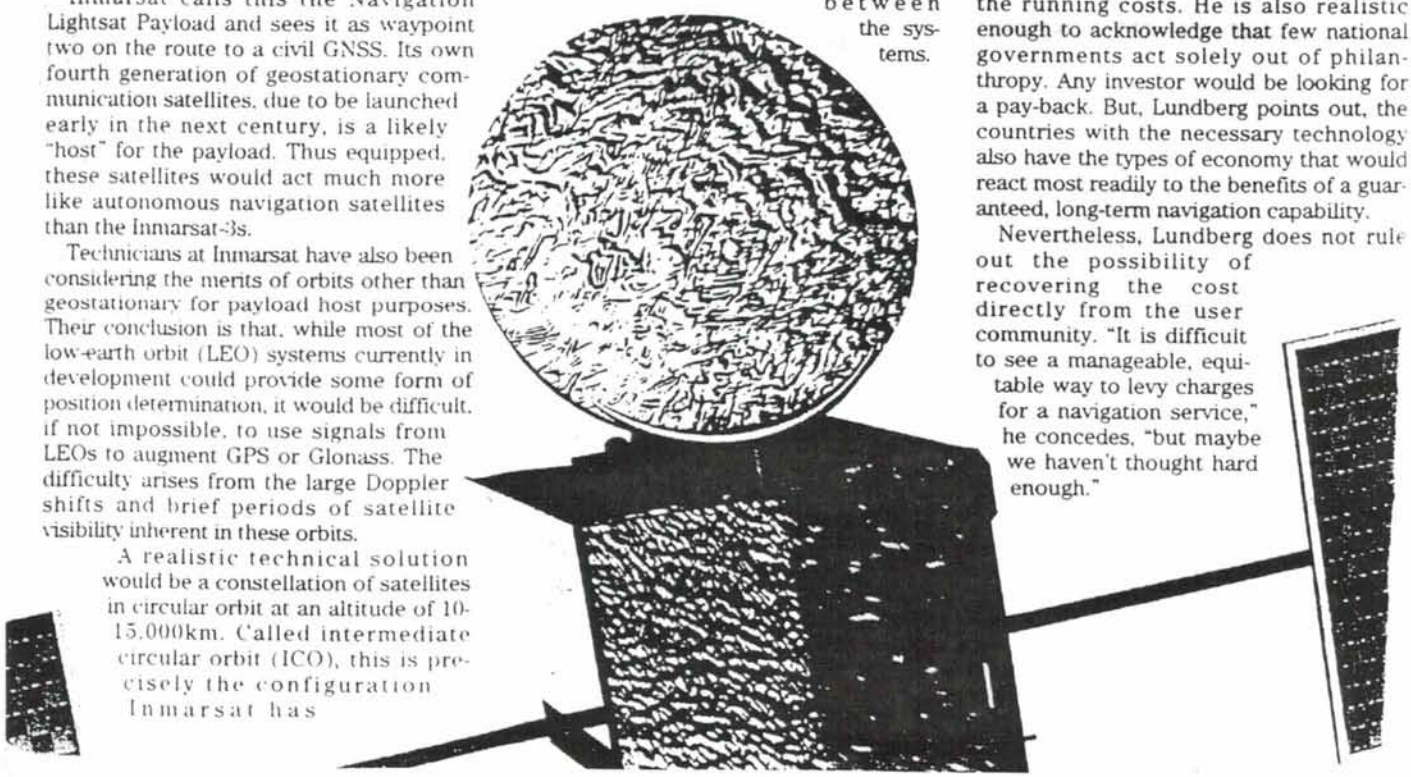
A realistic technical solution would be a constellation of satellites in circular orbit at an altitude of 10-15,000km. Called intermediate circular orbit (ICO), this is precisely the configuration Inmarsat has chosen for its hand-held satellite telephone system, Inmarsat-P.

Putting "Lightsat" payloads on ICO satellites could be the third waypoint on the civil GNSS road. According to Lundberg, "teaming 15 ICO payloads with six to eight in geostationary orbit would provide an extremely robust augmentation to GPS. But don't forget, we're still talking about augmentation at this stage. GPS remains the keystone of the total system."

Nevertheless, if GPS were taken away at this point, the mix of civil satellites could support a two-dimensional position-determining service. "It would be a safety net," says Lundberg, "that would go some way toward calming fears over the sudden withdrawal or degradation of GPS."

... "satellite navigation will never be quite the same afterwards" ...

But if the civil user community wanted something more than a safety net, Inmarsat's fourth and final waypoint would complete the picture. A modified version of the Navigation Lightsat Payload would be flown aboard a spacecraft of its own. Fifteen of these, in orbits similar to or higher than those of the existing ICO hosts, would complete the constellation. The whole system, consisting of 30 satellites in intermediate circular orbit and six to eight in geostationary orbit, would offer performance similar to that of augmented GPS. An all-civil GNSS would be in place and users could migrate to it in due course – helped by equipment compatibility between the systems.



So that's the vision. But will it ever happen? "Technically, the evolution is quite straightforward," says Lundberg. "The really big questions are institutional and financial. Who would run such a system and how would it be paid for?"

If the current misgivings concerning sole-nation ownership that are felt about GPS are to be satisfied, the answer to the first question will clearly involve some sort of international co-operative body. Lundberg modestly puts forward Inmarsat's own credentials in this respect. "Our 75 member nations believe it right and proper that we help to provide satellite navigation services. They put substance into this conviction when they voted the funds for the Inmarsat-3 navigation payloads well in advance of any commitment by users. I feel confident that if Inmarsat were called on to play a more substantial role, the backing of our owners would not be long in coming."

The question of finance has two parts. First, how do you pay for the system itself and, second, how do you cover its subsequent running costs? Again, Lundberg believes that an international, collaborative solution is the right one.

"We can see GNSS being funded in the same way as the air navigation infrastructure currently provided by the world's civil aviation authorities." Lundberg also sees a role for contributions in kind from individual nations or groups of nations that possess the relevant capabilities. "One country or regional grouping might undertake to supply some or all of the spacecraft, another the payloads, a third the launch services. The aim would be to spread the work as widely as possible to broaden the ownership base."

Lundberg believes that the leading industrial nations should be ready to shoulder the running costs. He is also realistic enough to acknowledge that few national governments act solely out of philanthropy. Any investor would be looking for a pay-back. But, Lundberg points out, the countries with the necessary technology also have the types of economy that would react most readily to the benefits of a guaranteed, long-term navigation capability.

Nevertheless, Lundberg does not rule out the possibility of recovering the cost directly from the user community. "It is difficult to see a manageable, equitable way to levy charges for a navigation service," he concedes, "but maybe we haven't thought hard enough."

GMDSS CRITICS SILENCED

Distress system provides key links in two dramatic rescues

The value of the Global Maritime Distress and Safety System (GMDSS) as a saver of life was dramatically proven in two incidents at the end of 1994.

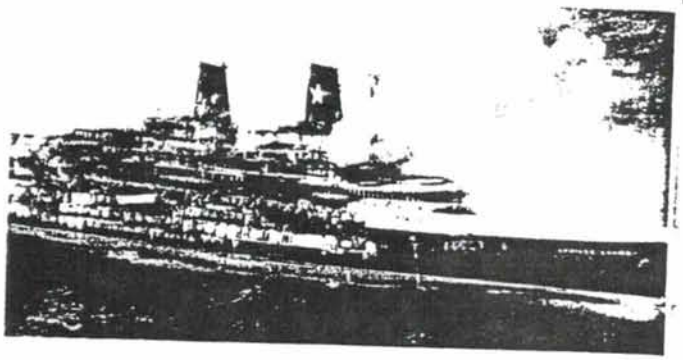
In the first, a solo yachtsman was plucked from the sea after his boat struck an unknown object. And, just weeks later, the lives of around 1,000 people were saved in a near copy-book rescue from the blazing cruise vessel *Achille Lauro*. Although vastly different in scale, the responses to both incidents were co-ordinated using facilities and equipment enshrined in the GMDSS.

On December 1st 1994, world newspaper headlines were dominated by the fire that swept the Italian cruise liner *Achille Lauro* as she sailed around the Horn of Africa en route to the Seychelles. The story was of a major international rescue to which hundreds of people now owe their lives.

First news of the drama came when the Norwegian maritime rescue co-ordination centre (MRCC) at Stavanger received an Inmarsat-A call from the Dutch livestock carrier *Corriedale Express*. The Dutch ship had received a report on 500kHz from another vessel (call sign HSDL) that the *Achille Lauro* was on fire and needing assistance.

Controller Tarje Langaas was on duty at Stavanger MRCC when the alarm was raised. He told *Ocean Voice*, "The first thing we did was notify all vessels in the area through broadcasts on all the Inmarsat systems." Several vessels responded immediately and Stavanger appointed the Shell tanker *Lima* as surface search co-ordinator. "She had the best all-round communication with other vessels in the area," explained Langaas.

In the absence of MRCC facilities on the east coast of Africa, it was left to Stavanger to co-ordinate the operation from shore. "We plotted the positions and courses of the vessels in the area," explained Langaas. First at the scene was the tanker *Hawaiian King*. She established VHF communication with the *Achille Lauro* and reported to Stavanger that all passengers and most crew had been evacuated into lifeboats or liferafts.



The "Achille Lauro" fire (above) prompted a major rescue operation (below)

"It became a question of capacity," said Langaas. "There was no imminent danger for the evacuated people with several vessels steaming for the distress position."

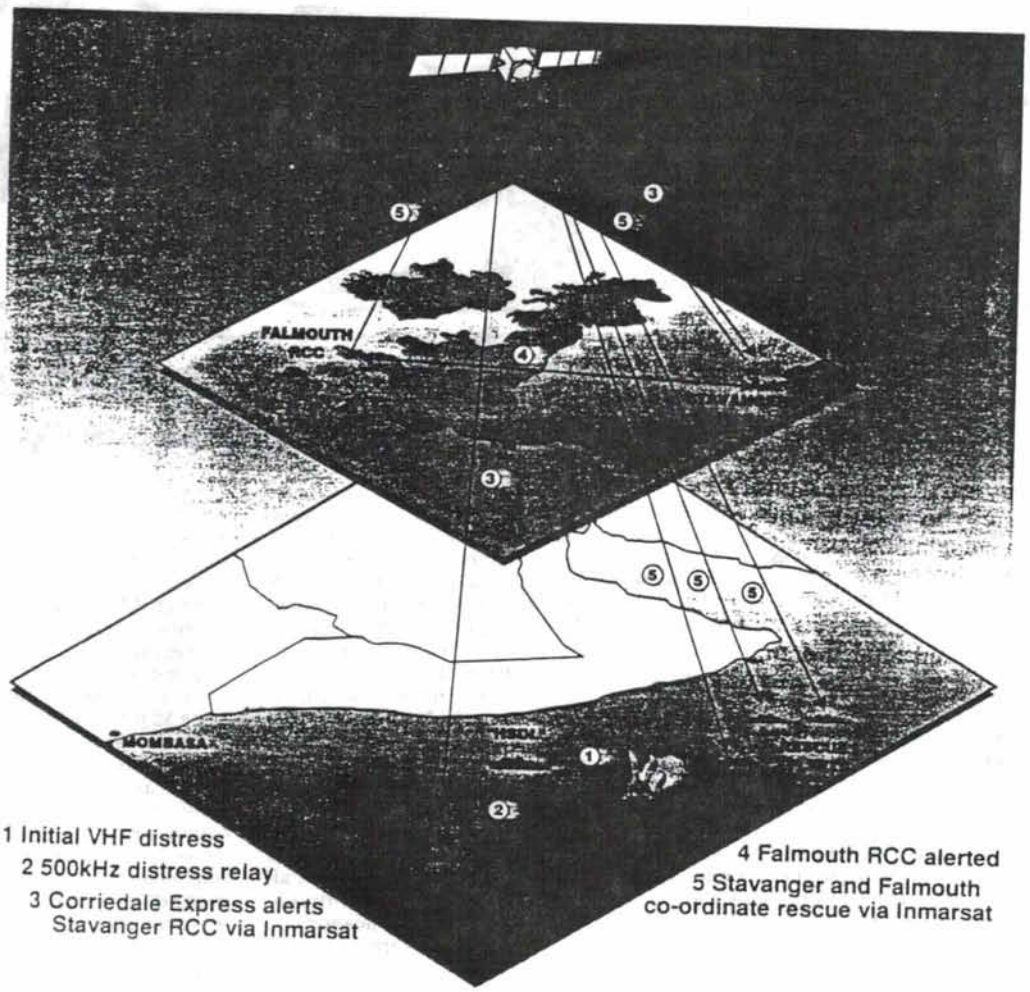
The weather was calm but visibility became an important consideration. "With low clouds and visibility down to one or two nautical miles, we didn't want to risk a collision by sending too many vessels into the area," said Langaas, "so we asked all but eight to stand down."

Hawaiian King took most of the people from the boars and the bulk carrier *Bardu* took the rest from the stricken ship.

Throughout the operation Stavanger kept in contact with the rescuing vessels through Inmarsat-A and C. Ironically, the quality and accessibility of communication with ships on-scene posed a new problem.

Langaas explained: "The main job of co-ordination became confirming the number of people rescued." He and his colleagues lost contact with the rescuing vessels for two hours, as calls from media and other authorities occupied Inmarsat lines. "We had to use the distress priority in broadcast mode more than we should. Eventually we set up an exclusive telex link with *Lima* and *Hawaiian King* through Telenor's Inmarsat coast earth station at Eik."

Nearly 1,000 people were evacuated from the burning ship. Two lost their lives. The co-ordination task, for Stavanger, extended well beyond the rescue itself. The MRCC dealt with all involved parties, including ship owners, insurers, authorities



Graphics: Geoff Dann, Doug Edwards

Ted Bates

05.20 *Corriedale Express* relays distress call to Stavanger

05.30 Stavanger begins contacting vessels in area

07.00 *Lima* appointed co-ordinator, surface search

07.30 *Hawaiian King* arrives on scene

07.55 About 900 evacuated from *Achille Lauro*

09.00 *Hawaiian King, Bardu* and third vessel on scene and picking up survivors

11.20 *Achille Lauro* fully evacuated: 3-400 people aboard *Hawaiian King*

13.50 All passengers and crew from *Achille Lauro* safely aboard three vessels

the survivors' home countries, and the US Navy, which dispatched cruisers to the scene of the incident. "It was quite a busy day," said Langaas.

After the incident, Jim Houston, GMDSS operations officer at Falmouth MRCC in the UK, paid tribute to the role played by the Inmarsat system.

"Every ship on scene was Inmarsat-fitted but some just had one system. So, we rebroadcast Inmarsat-A messages via Inmarsat-C. With Inmarsat-A from Stavanger and Inmarsat-C from us, they were getting the whole picture. It worked extremely well," said Houston.

He stressed the value of the shore-based co-ordination that GMDSS offers. "The Masters of these ships do a fantastic job," he said, "but there are times when they need help and advice. Then GMDSS, and Inmarsat, come into their own. Without Inmarsat this could not have gone so smoothly. Some ships would have responded, got on scene and tried to help, but then what would they do? Two American warships were organised to steam to the area, take on survivors, provide food, water and shelter and get the survivors to safety. All that was done via Inmarsat. It made the difference between first aid and proper medical treatment."

One question to be answered in the aftermath of the incident was why the *Achille Lauro*, equipped with Inmarsat-A, did not send a distress call via satellite. One theory was that rapid flooding of the engine room, in an attempt to put out the fire, may have caused the ship to lose power before the decision to abandon the vessel was taken. Such a loss could have prevented an Inmarsat-A call.

Inmarsat's Andy Fuller praised the Italian master, Guiseppe Orsi. "He did just about everything right. He got passengers and crew on deck, ready to evacuate, while attempting to fight the fire with his own resources. He decided to abandon in good time and got everybody – bar two – off safely. The vessel's list, a loss of power, the loss of the terminal itself in the fire, could all have prevented use of Inmarsat to place the initial distress call."

Apart from the fatalities, the only unfortunate factor was the media's hunger for a story impeding communications with the rescue vessels. "Modern communication gives the media the chance to become involved in a way never before possible," said Fuller. "The press has a valuable job to do but I urge them to act with restraint and common sense. Saving lives has to be the top priority, and there is no way a communications entity such as Inmarsat can control media use of the system. But in the end," said Fuller, "the outcome was a good one, and I'm delighted that the Inmarsat system was able to play a key role."

In the earlier GMDSS incident, a British yachtsman was saved thanks to Inmarsat satellite communication and the selflessness of his fellow competitors.

Josh Hall was competing in the round-the-world BOC Challenge when his boat, *Gartmore Investment Managers*, hit an object in the water. It was about 19.50 GMT, dark, and Hall was 500 miles from the Brazilian coast.

Despite the yatch's massive hull damage, Hall was able to send an instant distress via the Trimble Galaxy Inmarsat-C transceiver. Rescue authorities in England were alerted and, moments later, race headquarters at Charleston, USA, learned of his plight.

Race officials polled, through Comsat's C-Link Inmarsat-C service, all competing yachts to determine their positions. Within minutes, it was determined that Australian skipper Alan Neubauer, some 90 miles to the north west, was closest to Hall. Meanwhile, Hall had reported, via Magnavox Inmarsat-M satellite telephone, that his engine and electric pumps were fighting the influx of water.

Communications co-ordinator Larry Brumbach plotted an intercept point for the yachts and established an Inmarsat-C connection with Neubauer. As the Australian altered course, Comsat remotely modified both yachts' pre-set position reporting interval so that their progress could be monitored on Comsat's Sail Track fleet management computer. This gave up-to-the-minute status reports on the rescue and allowed updates on Hall's position to be relayed to Neubauer via Inmarsat-C. Neubauer rescued the stricken Brit at about 03.30 GMT – just under eight hours after the collision. "I'm scared, tired and dazed, but OK," said Hall in a message to race headquarters.

Under BOC race rules, all competitors had to fit Inmarsat-C terminals, using communication services provided by Comsat. Race director Mark Schrader confirmed the critical part played by the system. "We needed reliable, real-time communication – not only with Josh and Alan but also with the other skippers – that wasn't affected by the weather. Comsat's Inmarsat services provided that."

Josh Hall, (below) tests his Inm-M. In the race, it helped save his life

SATCOM GIANT CONFIRMS HANDHELD PLANS

Inmarsat affiliate to develop global phone system

Inmarsat is to invest up to $150 million in a new company that will develop and implement a hand-held global mobile satellite telephone service.

Terminals will be available for personal phones, vehicular, aeronautical, maritime, remote and other specialised uses. User charges should average around $2 per minute and be as low as $1 per minute in some cases.

Inmarsat Director General Olof Lundberg welcomed the decision to form the new company as a major step forward in the Inmarsat programme begun more than four years ago under the "Project 21" banner.

"Inmarsat has spent more than $50 million on this programme," he said. "Part of this has gone into extensive market research to determine exactly what the world's roaming communicators will want and expect in the next decade. Extensive effort has also been invested in finding the right technical solutions."

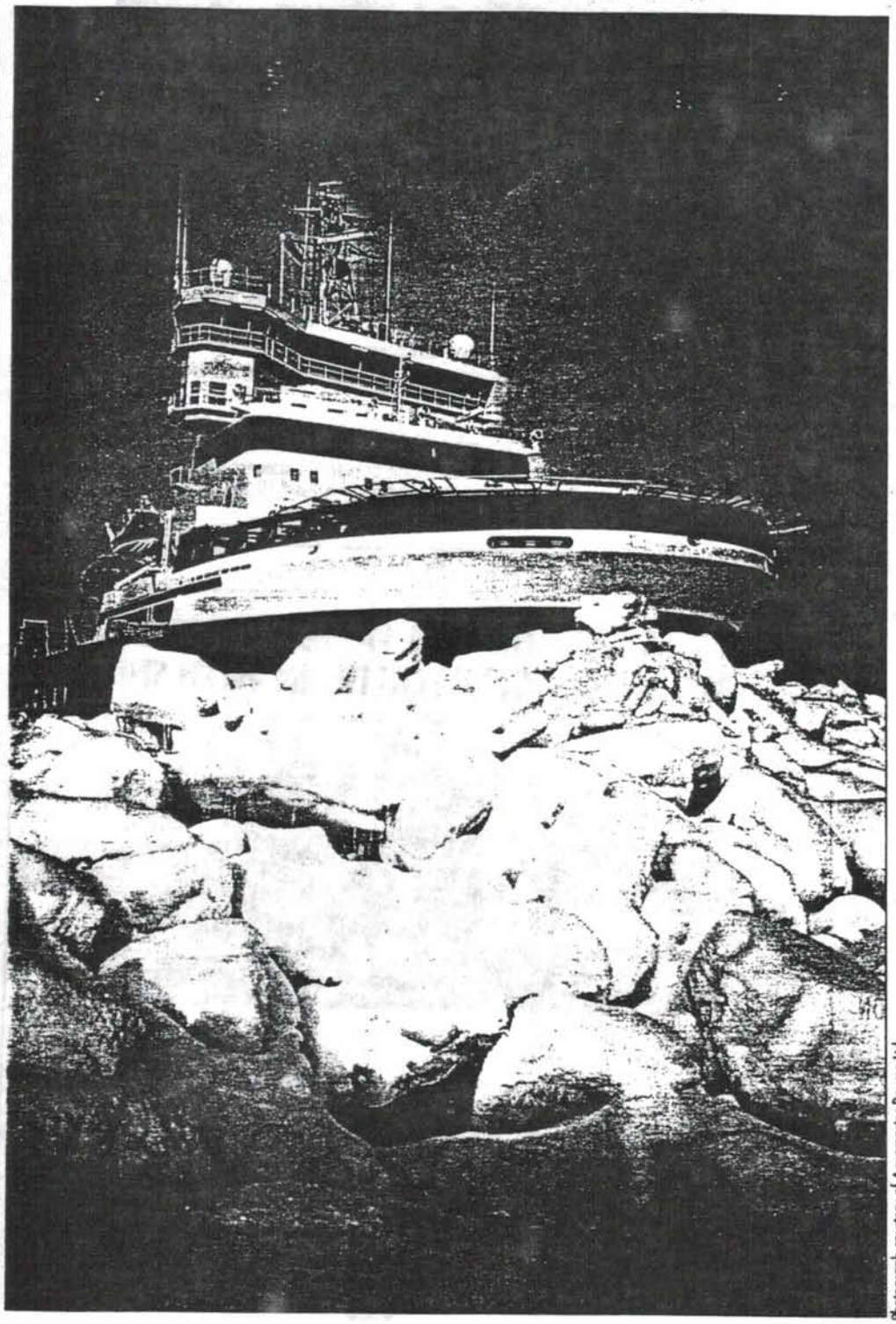
The new company's system will comprise 12 satellites (10 operational and two spare) orbiting the earth at 10,000km. Unlike existing Inmarsat satellites, which remain above a fixed point on the earth, the new company's satellites will drift across the sky. At least two will be in view at all times to ensure continuous, unobstructed communication.

The hand-held terminals will operate as cellular telephones, where cellular service is available, and switch to the satellite system automatically where there is none. Links to land lines will be through 12 world-wide ground stations. The system is expected to begin service in 1999 and to be fully operational by 2000.

Overall system cost will be some $2.6 billion. The new company, as yet unnamed, will be affiliated to Inmarsat and established as an English limited company. Inmarsat will invest cash in return for 15 per cent of the ordinary shares and receive additional equity in return for its in-kind contribution, which includes all the development work to date in the Inmarsat-P hand-held telephone project.

Out in the Cold

BY CHARLES SUMMERS, CORRESPONDENT



Photograph courtesy of Aquamaster-Rauma Ltd.

The *Fennica*, one of the first icebreakers equipped with azimuthing Z-drive propellers.

Designing and building an icebreaker seems fairly simple — just fashion a floating battering ram that's big and powerful enough to bust through whatever ice lies in its way. But developing a vessel to break ice effectively and safely is probably one of a naval architect's most daunting challenges.

First, there usually is the need to combine ice breaking with other vessel duties, such as research, supporting other boats and a variety of off-season functions. The design of the icebreaker must also facilitate open-sea transit. Maneuverability and navigation astern need to be considered, too, along with different ice conditions and thicknesses, and various ice-breaking mission requirements. These range from cutting miles of straight-ahead channels to escorting ships to clearing local harbors. Furthermore, an icebreaker has to displace broken pieces of ice without damaging its hull and be able to make continuous headway, typically at a steady reference speed of 3 knots.

Many advancements have occurred during the last 100 years with respect to ice-breaking hull shapes and propulsion systems. Recent designs include the 354' *Oden*, built in 1989, the first non-nuclear ship to reach the North Pole; the 308' *Nathaniel B. Palmer*, constructed in 1992 for the National Science Foundation (NSF); and the 380' sisterships *Fennica* and *Nordica*, the first icebreakers equipped with azimuthing Z-peller propulsion.

The above boats normally would

Two new designs reveal the complex nature of constructing vessels for breaking ice.

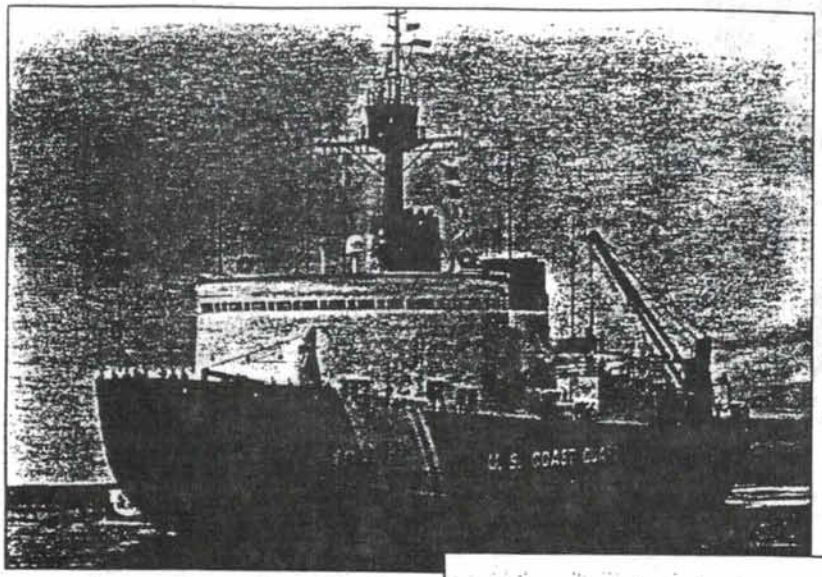
be included in any complete survey of modern icebreaker design and construction. But two U.S. projects still on their respective drawing boards provide a more limited and manageable framework for illustrating at least some of the major design considerations for this special class of working vessel.

The U.S. Coast Guard's 420'×82'×28' *Michael A. Healy* (WAGB 20) will be built by Avondale Industries Inc., New Orleans, for about $225 million. It's part of the joint U.S. Navy-Coast Guard Naval Sea Systems Command acquisition program.

The *Healy*'s mission calls for extended, unescorted scientific research operations in both the Arctic Circle and Antarctic. It must support itself in those locations for up to six months. At the same time, performance specifications stipulate open-water transit for as much as four days for every day spent in the ice. And, as a military vessel, it will be used to escort and provide support for other ships, perform law-enforcement tasks and conduct search and rescue operations.

The second icebreaker project is the 340'×76'×30' Arctic Research Vessel (ARV) designed by The Glosten Associates Inc. for the University National Oceanographic Laboratory System. UNOLS is awaiting an anticipated $120 million to $130 million in construction funding from NSF.

In contrast to the *Healy*, the ARV is expected to spend most of its time



Photograph courtesy of the USCG, 13th District.

The design of the USCG's new 420' icebreaker, the *Michael A. Healy*, is based on the Polar Class of vessels. (Shown is the *Polar Star*.) Unlike its predecessors, though, the *Healy* will stick to proven technologies. For instance, instead of turbine engines and controllable-pitch propellers, like the Polar Class vessels, Healy's propulsion package will consist of diesel-driven generators and fixed-pitch props.

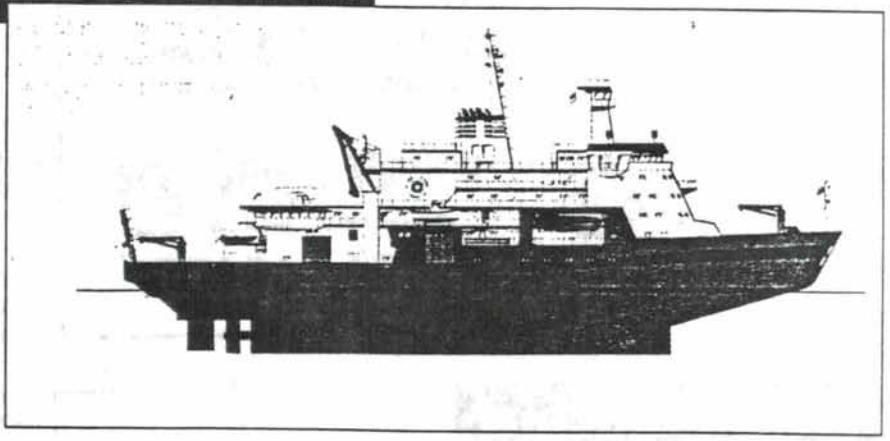
in ice. Dirk Kristensen of Glosten Associates, Seattle, estimated the ARV would spend 80 percent to 85 percent of its life ice-bound.

Hull similarities, differences

Although the hull profiles of the two icebreakers differ dramatically, they share a similar approach to breaking ice. Primarily, they bend rather than crush it.

Traditional icebreakers push their bows directly against the ice edge to force lateral cracks. But ice is very resistant to such compressive pressure in a horizontal plane. So, most modern designs increase leverage with a flatter stem angle. This allows the bow to extend over the top of the ice, exerting bending pressure downward until the ice breaks off in pieces.

The ARV's bow angles back at only 17°, but it has a distinguishable centerline with a slight (13°) deadrise out to the sides. Model tests of these broad bow lines reveal how they serve to break ice into four main pieces. A centerline crack in the ice is first created by the deadrise in the center of the bow. Secondary cracks develop at the shoulders, where the bow plate curves around to another flat surface that intersects the sides of the ship at 45°. The four pieces break across the entire width of this configuration, slide down toward the bottom and are pushed outboard of the hull.



Artist's rendering of the Arctic Research Vessel designed by Glosten Associates. Its entry angle is not as sharp as the *Healy*'s, because the ARV will spend less time transiting open waters.

The *Healy*'s bow specifications, based on the Coast Guard vessels

Polar Sea and *Polar Star*, also call for a shallow stem angle — no more than 20° — plus an entrance angle that does not exceed 35°. This will provide a sharper entry than the ARV's bow, which is necessary because of the *Healy*'s open-water requirements. The trade-off is that less bow surface will be brought to bear for bending and breaking ice.

The designs of both vessels incorporate vertical, sharp-edged "wedges" between the bottom of the angled stem and the bottom of the vessel.

"That's what we call an ice knife," said the *Healy*'s project engineer, Lt. Cmdr. John Tuttle. "It prevents the ship from riding up on really thick ice, and it also moves the broken ice out toward the sides of the ship."

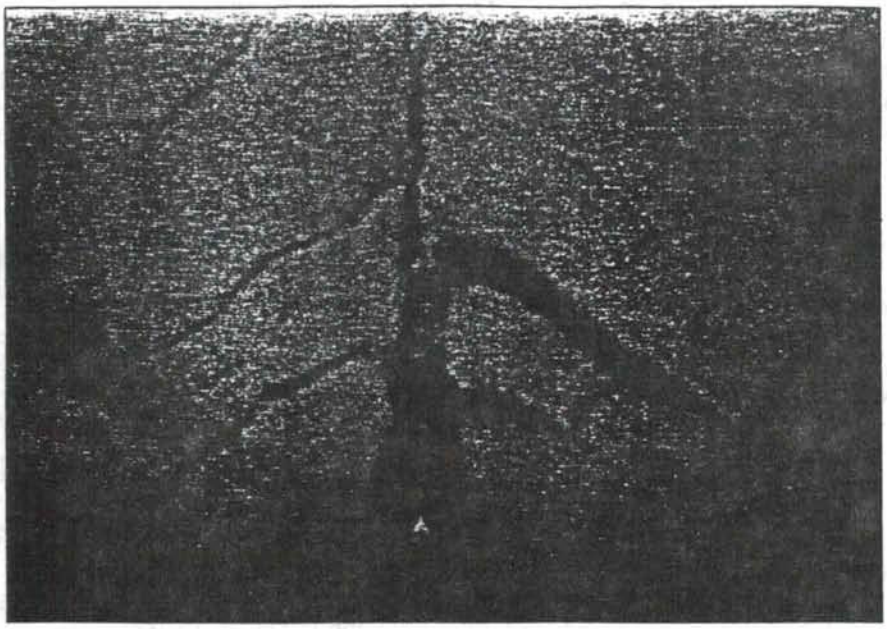
The ARV also has reamers (protrusions or sponsons) that flare out from the bow approximately 6'6" on both sides. They extend above and below the waterline, and taper back in just forward of amidships. Although not included on the *Healy*, because they would detract too much from her open-water capability, reamers will improve the ARV's maneuverability in the ice.

"The reamers leave a path behind the ship that's wider than the afterbody," explained Kristensen, "which means you can swing the stern further outboard. That decreases your turning radius."

Unlike the relatively long, straight bottom profile of the *Healy*, the ARV's bottom is short, flat and slopes up at both ends. This configuration decreases the distance between the widest point of the beam (at the reamers) and the point where the waterline moves in toward the centerline, aft of the propellers.

"The shorter that distance is," said Kristensen, "the tighter you're going to be able to turn in the ice. The shallow-slope buttocks also come into play when breaking ice while going astern, so you end up with a vessel that looks like a bowl." He added that "it's critical to get your weight and volume centers correct, because [an icebreaker is] much more sensitive to loading deadweight than typical vessels."

Since ice breaking is not always a straight-ahead operation, both vessels were designed to back down in ice. On the *Healy*, the stern extends much further aft of the propellers and slopes down at a flatter angle than on conventional ships. The boat will also be

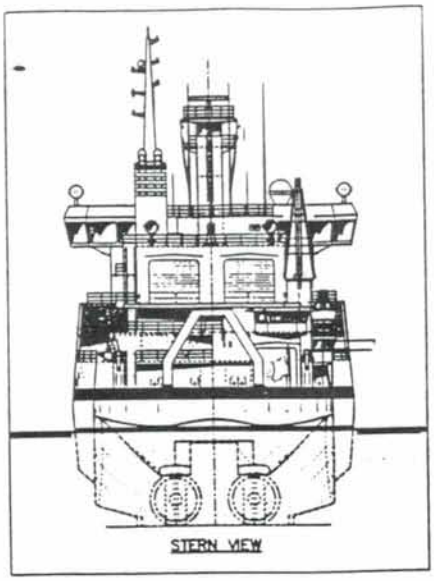


Older icebreakers push their bows directly against the ice edge to force lateral cracks. Ice is very resistant to such compressive pressure. Most modern designs increase leverage with a flatter stem angle. This allows the bow to extend over the top of the ice, exerting bending pressure downward until the ice breaks into four main pieces. Shown is a photo taken from model tests. A centerline crack in the ice is first created by the deadrise in the center of the bow. Secondary cracks develop at the shoulders, where the bow plate curves around to another flat surface that intersects the sides of the ship at 45°. The four pieces then are pushed downward and outboard of the hull.

equipped with ice horns and ice knives, both to break ice while going astern and to help deflect the pieces away from the rudders and propellers.

The ARV is configured for even more aggressive ice breaking astern. Kristensen explained the vessel's complex geometry: "The aft end of the hull is something like a catamaran, with a slot down the center that intersects the bottom of the ship forward of the propellers. As ice is broken at the centerline of the stern, it goes on either side of the catamaran pod. Any that goes inboard gets flushed forward through the slot, over the propellers and out underneath" the hull.

Both vessels, of course, will be built heavily. The *Healy*'s primary frame spacing is 15", according to Darryl Poulin, Avondale's chief engineer. Bow and stern plating is about 1-1/2" thick, and 1-1/4" plate is specified for the midbody region. Although detailed structural analysis will come in the next design phase, Kristensen anticipates the ARV's bow and stern



Stern view of the ARV. The aft end of the hull resembles a catamaran. A slot down the center intersects the bottom of the ship forward of the propellers. When going astern, ice is broken at the centerline and travels on either side of the catamaran pod. Any ice that goes inboard is flushed forward through the slot, over the propellers and beneath the hull.

plating will also be in the 1-1/4" to 1-1/2" range.

Different propulsion approaches

The Coast Guard's *Polar Sea* and *Polar Star* pioneered controllable-pitch propeller technology in the late 1970s. They were powered by gas turbine engines and had their share of problems.

The *Healy* will be equipped with a proven combination: diesel-driven, 7,200kw generators; two 15,000-hp AC electric motors with a cycloconverter control system; and twin fixed-pitch propellers without nozzles.

The major advantage of diesel-electric power, according to the head of the *Healy* project, Capt. Richard Gupman, is the high torque available at low rpm's. "If you were to grab an electric fan blade and stop it," he explained, "the electric motor would still try to turn. You don't get any torque when an internal combustion engine stops running. Also, being able to reverse the direction of rotation on the electric motors while in a backing down and ramming mode gives you a great deal of flexibility and maneuverability which you don't have in a geared diesel installation."

The ARV, however, will follow the *Nathaniel Palmer*'s example and be powered by diesels and direct-drive, controllable-pitch propellers in nozzles. Kristensen said simplicity, lower initial cost and fuel consumption drove the decision.

"We have a very critical fuel consumption issue with this vessel," he said, "since the 90-day endurance requirement is higher than for most other vessels. We get more bang for our buck with that arrangement — lower fuel consumption for the same thrust." The ARV's propulsion engines will deliver 20,000 hp.

Glosten and the ARV design committee considered, but rejected, the use of Z-drives. This was despite the recent success of the azimuthing units on the *Fennica* and *Nordica*.

"I think it's an interesting possibility," said Kristensen, "but I'd like to see it proven in hard, arctic conditions over a number of years. It's like a new-model car. You hesitate to be the first one to buy it. However, in comparison with the Coast Guard, I think we have been more willing to try newer hull features and systems — at least new to the U.S."

Tuttle said that the *Healy*'s mission and construction timeline dictated building a more conventional vessel. "We tried very hard not to be on the cutting edge of technology," he said. "If somebody hadn't used it before, we stayed away from it. Had our mission been different, we may have used a more nontraditional hull form."

Some may see sticking to proven designs and systems as a failure to keep up with the latest icebreaker technology unfolding in other countries. Others argue that given the limited opportunities to build such a vessel, it's more important to stick with known technologies, learn from the mistakes of others and make sure the vessel will successfully serve the needs of the operator.

"If this ship has a strong suit," concluded Tuttle, "it's that we took a lot of time to talk to the scientific community to find out what they wanted. We tried very hard to have them participate so they would have what we'd like to think would be a world-class, high-latitude research vessel for them to use." WB

CIRCLE 345 (AVONDALE INDUSTRIES INC.) AND 346 (THE GLOSTEN ASSOCIATES INC.) ON READER SERVICE CARD

Wedge socket attachments – A technical overview

By Donald Sayenga

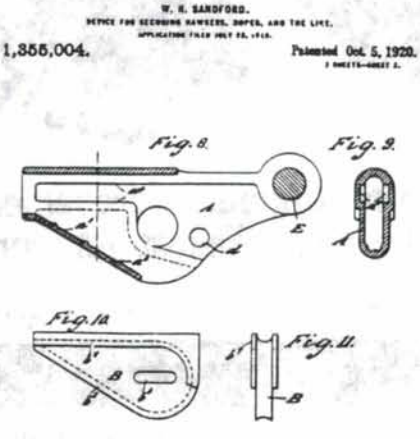
In 1990, the Construction Safety Association of Ontario opened discussions of an unusual phenomenon known as "punching out" of a wedge socket. Apparently under certain conditions, the wedging element somehow can loosen inside the socket during service. One specific solution for the problem was the idea of making an inhibiting attachment to the wire rope on the dead side of the socket that would prevent the rope from pulling back through if the wedge was loose. The Technical Committee of the Associated Wire Rope Fabricators instituted an "Alpha Project" to engage in a dialog with CSAO officials seeking additional clarification and better understanding of the problem. During the summer of 1994, a series of mutual conclusions were reached by the two groups. The following summary should be of interest for anyone involved with making quick field attachments of wedge sockets.

Background

The modern wedge socket appears to have been invented during World War One by William Herbert Sandford of Armaugh, Ireland. He applied for a US patent in July 1918 describing an improvement in earlier cable clamps of the kind that applied a wedging pressure against the outer periphery of a rope by means of a sliding grip that tightened under tension. Sandford's new device, for which he received U S Patent 1355004 on October 5, 1920, was constructed in such a way that the grip could apply pressure only to the rope on the "dead" or "lazy" side of the wedge.

Sandford's patent covered several differing ways of achieving the same basic results, all of which depended upon an internally tapered sheath combined with a sliding wedge capable of moving within channels without rotating, inside the sheath. All parts were specially adapted "for the reception of the lazy end of a rope-like member rove about the wedge piece". At the time of Sandford's patent, his device fell into a category of wire rope fittings known as Cable Clamps. The inventor did not call his invention a Wedge Socket, a term which came into use in North America at a later time, but the drawings affixed to the 1920 Sandford patent very closely resemble all wedge sockets currently available worldwide. In Japan, for example, the device is called *"kuranpu shinpuru"* which derives from an English term "clamp thimble".

During the decades between World Wars the wedge socket gained wide acceptance in North America as a way to make quick attachments to the end of a wire rope. Several variations and improvements appeared. A French patent was issued in 1925, followed by numerous British and American modifications. The old Roebling Sons Company was famous for its special "No Pinch" version of wedge sockets, marketed first in the 1930's, recently revived. (See WRN&ST August 1983 p.23). The most recent improvement seems to have been the invention of Arlen McBride of Lewisville, Indiana.



(U S Patent 4602891 July 29, 1986.)

The ability to make a quick, durable, easily-removed connection on the end of a wire rope was a great advance in technology. In the USA, the wedge socket was rapidly adopted by several industries, particularly by surface miners using the dragline excavator method pioneered by the Page Company of Chicago. In the case of mining, it has become a notable characteristic associated with these sockets that the wedges get seated so deeply during service they can't be dislodged without great effort. Some manufacturers' designs may have been modified to ease the task of wedge removal. As a result, some manufacturer's wedge sockets today are sold specifically for mining use only.

The mystery of loosened wedges

Wedge sockets provide important benefits because of the quickness of their attachments, but they don't provide a perfect connection. Even when attached correctly, estimates of wedge socket efficiency are usually as low as 80% or lower. The low efficiencies are due to the sharp reverse bending of the rope and lack of a perfect fit between the rope and its channel with the socket and its wedge, where the actual wedging action occurs. Also, it is possible to attach a wedge socket backwards, creating an even more severe threat to the wire rope and therefore causing a hazard to the user.

Donald Dickie of CSAO advises that the tendency for a wedge to exhibit "punching out" or loosening inside the socket during service was first observed in England during the 1970's. Published descriptions of the subject are scanty. Only one actual accident caused by this has been noted on the record, but the matter came to the attention of safety review panels such as the ASME B30 Safety Standards Committee who were concerned because of the tendency to use wedge sockets on various kinds of cranes for overhead lifting, where field dislodgement could be hazardous.

All wedge socket manufacturers have emphasized continually that proper seating of the wedge at the time of attachment is crucial for the successful use of the device. There are several theories explaining how a wedge could become loose in service, but the importance of having the wedge properly seated first cannot be understated. For example, the old Roebling "Blue Cover" advisory book (1967) warned:

"Secure ears of socket to a sturdy support and carefully take a strain on the live side of the rope. Pull wedge and rope loop into position tight enough to hold wedge in place during handling. Final wedge positioning takes place under full operations loads. After final pin connections are made, gradually increase loads until wedge is seated. Avoid applying any sudden shock loads before wedge is in final position".

The clipping remedy

When operators at jobsites first became concerned about the possibility of a loose, unwedged, wire rope backing out of a wedge socket, the quick and easy solution was to clip the rope in place. Although the addition of a clip or other inhibiting device is no real remedy for failure to get the wedge seated into the socket correctly in the first place, nevertheless the practice of adding a clip after making a wedge socket attachment has become very common. Clipping, in some ways, provides an illusory appearance of safety against loosened wedges because there are several negative side-effects caused by the action of a U-bolt around a rope.

Most conventional wire rope clips are specifically designed to secure two diameters of wire rope tightly against each other. The action of clipping distorts a wire rope, creating a focal point for stress. As a result, many concerns were raised against the most obvious clipping method, i.e. clipping the dead end back to the live end, with the wedge socket in the bight of the loop. As far back as the 1970's, the Wire Rope Technical Board strongly advised against the practice. The current 3rd Edition of the WRTB's Wire Rope Users Manual (Woodstock, MD 1993) warns in bold print on Page 43 "DO NOT ATTACH DEAD END TO LIVE END".

After review, the ASME B30 Committee agreed with the Wire Rope Technical Board. The various ASME B30 volumes were augmented with illustrations showing a proper way to attach a U-bolt style wire rope clip to the dead end of the rope so as to prevent the rope from backing out when the wedge was loosened. At the present time, ASME B30.5 (and several other B30 volumes) contain a mandatory directive: *"Wire rope clips used in conjunction with wedge sockets shall be attached to the unloaded dead end of the rope only".*

The ASME B30 warning is accompanied by illustrations showing only two ways to accomplish this: (a) with the dead-end looped and clipped back to itself; (b) with a short extra piece of rope clipped against the dead end out side the socket. Formerly there was a third illustration in ASME B30 volumes showing a special clip designed for only one diameter of rope but this was deleted because such a clip could not be found in the marketplace.

Literature now published by the

American Petroleum Institute includes variations on the loop-back technique, showing the dead end retained by being looped freely around the live side, and also showing an example of a loose keeper or retainer linking the loop to the live side. The aim of the retainer is to prevent the wire rope loop from flopping around or snagging on an obstruction. There is also a draft standard by ISO in Europe (ISO/TC 96/SC 3) containing elaborate instructions under Section 6.6.2.

Clipping vs. loosening

The WRTB and API literature goes beyond ASME B30 by advocating specific distances away from the socket for attachment of any clips. The length of a recommended "tail" on the dead end for different kinds of rope is also emphasized by WRTB. Rotation resistance ropes with eight or more strands require longer tails. Welding, brazing or seizing of the wire rope ends to sustain the rope balance is recommended practice for those ropes.

All of the WRTB warnings attempt to address the danger of clipping on the live side of the socket. If this improper procedure should cause the full load to be transferred away from the socket to the point of clipping, a premature failure might result. Tests of sockets clipped in such fashion almost always fail at the point of live side clip, not at the socket.

When the CSAO began its review of the subject, one of the theories they tested was the hypothesis that the dangers associated with clipping to the live side possibly posed a lesser hazard than the phenomenon of "punching out". After investigating several accidents, CSAO uncovered many variant situations related to the matter. Tests were performed in 1990 and the results were published the following year. Meanwhile, the AWRF Technical Committee was engaged in a project to improve the illustrations published in the B30 documents. The "ALPHA Project" dialog between the two associations was initiated in 1991 following an illuminating presentation by Donald Dickie at the Fall 1989 AWRF General Meeting in Toronto.

While the dialog was in progress, CSAO began to publicize a new technique devised by Tim Galarnyk (See WRN&ST February 1994 p.34) for using a special double-saddle clip clamped on the dead side which loosely retains position against the live side. This devise is now being marketed by Columbus-McKinnon under the trade name "Piggy Back". Perhaps the most important revelation arising from the CSAO-AWRF dialog was the danger of using the wrong wedge. The dimensions of wedges and sockets vary from one manufacturer to the next. They are not interchangeable.

Meanwhile, crane safety consultant Bob De Benedictis (New Smyrna Beach, Florida) wrote to ASME B30 in August 1993 urging adoption of the double-saddle clip method. His letter was reviewed at the September 1993 meeting of B30 Committee. No one present at the time was able to provide any definitive statement about the merits of the method, so B30 asked AWRF to investigate and make a report.

The AWRF Technical Committee, chaired by Frank Becker (American Wire Rope & Sling, Ft. Wayne, Indiana) reviewed the method at great length in February 1994. During the meeting an appraisal was made of all available test data, and known methods of attaching wedge sockets and clipping to prevent "punching out".

Conclusions of the AWRF-TC Subcommittee

AWRF has adopted a clear policy which preludes the establishments of standards, but a modification of this policy encourages the AWRF Technical Committee to bring forth improved practices and guidelines intended for presentation to standards-writing organizations. Becker's committee delegated the various wedge socket

questions to a new Blocks, Tackle, And Other Fittings subcommittee headed by Ken Sellers (Gunnebo-Johnson, Tulsa OK) which met in Rosemont IL, June 28, 1994.

The AWRF-TC-BTOF subcommittee (which included representatives from OSHA, CSAO, WRTB, CIMA, and the wedge socket manufacturers) reached some preliminary conclusions regarding field dislodging. Most important was unanimous agreement that existing advisories such as those published in the USA by ASME and in Canada by CSAO ought to be augmented to read as follows:

"When a wedge socket-type fastening is used, the dead or short end of the wire rope shall be clipped with a U-bolt or otherwise made secure. Wire rope clips used in conjunction with wedge sockets shall be attached only to the unloaded dead end of the wire rope. When a wire rope clip or other device is attached to the dead end of the wire rope, the spacing between the wedge socket and other device shall be in accordance with the recommendation of the wedge socket manufacturer or a qualified person. Where it is desirable to restrain the dead end of the wire rope, it is allowable to have a loop, keeper, or other device around the live end of the wire rope provided it neither restrains nor constrains the live end."

Also, the subcommittee found it desirable to include additional illustrations in support of the advisory because of their consensus view, originally voiced by Tony Brown of OSHA, that pictures illustrating proper procedures are particularly useful for field inspectors. The subcommittee decided upon an expansion of the graphic views to include five illustrations of possible clipping and restraining techniques. These were:

1. The dual-saddle-clip method suggested by DeBenedictis
2. The short-extra-piece method (now pictured in B30)
3. The loop-back-upon-itself method (now pictured in B30)
4. The loop-back with loose restraint on the live end as shown by API
5. The loop-around-the-live-end method as shown by API

Furthermore, the subcommittee suggested that each drawing could be modified to include a dimension line, drawing attention to the spacing or separation of the clip from the socket in support of the minimum tail lengths recommended by the WRTB for various kinds of wire rope. Also, each drawing ought to depict the conventional wire rope clips attached in such a way that the nuts are tightened toward the dead side. In its summation the subcommittee emphasized that these five methods are not the only techniques which may be encountered in the field, but they are the only ones which have been brought to the attention of the subcommittee that seem to fulfill the criteria established by various standards-writing bodies.

In August 1994, the AWRF Technical Committee endorsed the views of the BTOF subcommittee, causing them to be passed forward to ASME B30 for consideration. The B30.5 subcommittee, (chaired by Carson Huneycutt, Jones Group, Inc., Concord, North Carolina) is making the initial appraisal. Meanwhile, the Construction Safety Association of Ontario is proceeding with adoption of an identical stance, and the Construction Industry Manufacturers Association will be looking into the matter.

A presentation to the general membership of AWRF was made in September 1994 at Annapolis, Maryland. A set of generic drawings depicting the five methods is now under development. At the next meeting of Sellers' subcommittee there will be a review of other problems, such as mismatching of wedges and improper seating of wedges. □

until this study is completed.

- In addition, at NSF's request, the Ocean Studies Board and Polar Research Board of the National Research Council are considering jointly undertaking a study to evaluate the need for a research vessel to support arctic marine research.

Investment in sustained investigation of the Arctic Ocean has been discouraged by the lack of a coherent national logistic program to support such research. Consequently, the Arctic Ocean remains the least understood of the world's oceans. While Coast Guard and foreign icebreakers and research ships have provided limited access, the growing need moved the University-National Oceanographic

Brass is New Director of ARC

On 1 September 1994, Dr. Garrett Brass of the University of Miami's Rosenstiel School of Marine and Atmospheric Sciences became the Executive Director of the Arctic Research Commission. Dr. Brass comes to the Commission with more than 30 years of arctic research experience, including recent sedimentology and inorganic geochemistry research aboard the icebreakers *Polarstern* and *Resolution*.

Dr. Brass has served as a member of the ARCUS Board of Directors (1991-1994), Program Director of the Ocean Drilling Program at NSF (1984-86), and Chair of the University-National Oceanographic Laboratory System (UNOLS) (1990-present) which is advising federal agencies on the operation of the university-based fleet of research vessels. Under Brass' leadership, UNOLS has conducted a major design study for a new arctic research vessel (see article this page) and completed planning for SCICEX '93, the first unclassified use of a US Navy nuclear submarine for research under the ice in the Arctic Ocean (see *Witness*, Summer 1993). ■

NSF Office of Polar Programs Plans Arctic Division

In August 1994, NSF Director Neal Lane approved the reorganization of the Office of Polar Programs (OPP), including establishment of an Arctic Division. The Arctic Division, planned under the leadership of OPP Director Neil Sullivan, will further the development of arctic research programs by bringing into one place planning, science, logistics, and coordination with other agencies. The proposal for reorganization is presently being reviewed at several different levels.

The reorganized structure of OPP will include three divisions: Polar Research Support, Antarctic Sciences, and Arctic Sciences. Within each division, activities will be organized into clusters. The Division of Arctic Sciences will include a Science Cluster, Planning Cluster, Logistics Cluster, and Affiliates Cluster. The Affiliates Cluster will provide a mechanism for program officers outside of OPP who handle arctic proposals to coordinate closely with the Arctic Division.

Programs included under the Arctic Science Cluster will be Arctic System Science headed by Patrick Webber, Arctic Social Sciences headed by Noel Broadbent, and Arctic Natural Sciences.

As now envisioned, the new Arctic Division will:

- integrate arctic support currently provided by the Polar Sciences Section into the new division;
- focus greater attention on arctic issues;
- create a viable entity separate from the Antarctic Program; and
- add staff to the Arctic programs.

A nation-wide search for an Arctic Division Director will commence when the reorganization is implemented, probably in early 1995. ■

Update

Volume I, Issue 5

When Should An Injured or Ill Seaman Be Returned To Duty?

An Adjuster's Perspective

BY ERIK J. FISKE

The short answer to the above question is: When they are ready! The trick is to know when that time comes. There are several factors which play into finding this out. These include the type of injury or illness, the doctor, the seaman himself and the status of his claim.

TYPE OF INJURY OR ILLNESS

We all know that certain types of injuries and illnesses require a certain length of time from which to recover. For example, the typical recovery period after a hernia operation is six to eight weeks; arthroscopic knee surgery 10 to 12 weeks; colds and infections, a few days to a few weeks. We acquire this kind of basic knowledge through experience.

There are published general medical guidelines for the population at large from which we can draw. While a useful tool, general guidelines may not apply to your specific operation. Only you as the adjuster can know what the demands are for positions on your vessels. It would therefore be a good idea to know as much as possible about the general operation of your company's vessels, or in the case of an insurance company, in the operation of your assured's vessels.

THE DOCTOR

Of second importance is the doctor. What is his orientation? Is he conservative, middle of the road or liberal? Will he work with the company to get a man back to work, or will he give the patient as long as the patient wants to get well? How do you find out?

This is fairly easy to determine when you have had previous experience with the doctor. In certain areas, you will see the same doctors over and over. If you do not know the doctor, or his reputation, you may wish to call him to discuss the case. You

(Continued on page two)

When Should An Injured or Ill Seaman Be Returned To Duty?

(Continued from page one)

should check with your colleagues in his area of practice, or with attorneys you know in that area. If you do not know anyone in the area, check with the large independent adjusting companies to see if they have had any experience with the doctor.

A conservative doctor will not be so quick to operate, or to perform excessive testing. The total course of treatment might take a little longer, but there is a higher probability that at the end of the treatment, the seaman will be ready to return to his full duties. Often by his conservatism, unnecessary surgery will be avoided. Care should be taken to ensure that his conservatism is medically based.

The liberal doctor requires close monitoring. Once he has arrived at a primary diagnosis, there will be a peripheral, or secondary diagnosis which could take longer to treat than the primary diagnosis. He will keep a patient longer if he is oriented towards surgery and opposed to more conservative courses of treatment. Once surgery is completed, he will order extensive physical therapy, work hardening and pain management. He will almost always keep the patient out until the patient cannot afford to stay on the beach, or until the patient is completely asymptomatic.

The middle-of-the-roader is the most difficult to deal with. It is hard to get a read on how he practices medicine. He goes case by case and usually responds to the stimulus of the patient to determine how much treatment to render. Since his treatment is case by case, so must your evaluation be case by case.

THE SEAMAN

What about the seaman himself? Who is he? What is his background and education? Has he ever been off work with an injury or illness in the past? Have you had him as a claimant before?

We all know the various types of personalities that seamen have. His personality will set the tone for his recovery. If he is strong and assertive, and motivated, he will get back to work the quickest. He does not have time to waste sitting on the beach. If he is strong and assertive and has a chip on his shoulder, he may stay out the longest. He will "play the claim game" with you. If he is weaker and more compliant, he will listen to his brother seamen, probably wind up with an attorney and have a less than conservative doctor. He will give his total faith to the doctor who will be able to treat the patient as he pleases. In between are the seamen you have to talk to, sometimes counsel, and who usually get themselves back to work in a normal span of time.

Department of Labor wants records made public

The U.S. Department of Labor has drafted a plan that would require employers to submit employee injury and illness records directly to OSHA to be made public. If enacted by Congress, this plan will go into effect beginning in 1995, and be phased in over the next two or three years. The Department of Labor's goal is to enable OSHA to gather data on industries and work processes that have the highest rates of injury and illness. The information may also be used to rank individual workplaces by their job safety records.

New deadlines on final standards

The Labor Department has drafted a new regulatory review policy that would require final standards to be published within 18 months of introduction. Each rule under development must be given one of three priority classifications: priority one rules must be published as final rulings within 18 months; priority two rules have 30 months to reach publication; and priority three must be finished in 37 months. The new policy also establishes interim deadlines for internal clearances, and allows for a period of review by the White House Office of Management and Budget of final rules where appropriate.

Continues on page 12 ▪

Setting the standards for wire rope aboard research vessels

By Barbara McGrath

While Henri Berteaux's group of engineers were busy testing ropes that would outlast tough ocean environments and outsmart the fish in mooring applications, Don Moller was working on a different set of rope-related problems at Woods Hole Oceanographic Institution.*

As marine operations coordinator at Woods Hole Oceanographic Institution, Don Moller purchases large quantities of rope used for short-duration underwater experiments.

As with mooring applications*, scientists and engineers attach "sampling instruments" to cables and lower them overboard. But unlike mooring systems, "the sampling instruments are deployed from a ship in a very dynamic environment," Don explains.

"In this business [underwater research], the only two applications for wire rope or electro-mechanical cable are mooring applications and lowering instruments over the side.

"Lowered instruments are left in the water for an average of three hours at a time. Our wire rope comes in 10,000 meter lengths. And the vast majority of [scientists'] work is done deploying maybe 5,000 meters of wire rope at a time over the side with instrumentation attached.

Ships of opportunity

"For lowering instruments over the side of the ship, a group of scientists basically can use a rope and winch system on, say, a 4-week cruise, for 12 hours a day in multiple casts (that is, multiple lowerings). In that 3 to 4 week time period, they may run, say, 200 lowerings, or cyclings of the instruments. Then they'll come back, change scientific programs, and then not use the cable again for another four to six months.

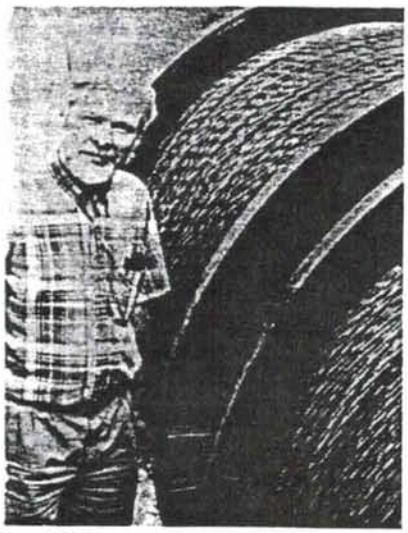
"In the salt water environment, corrosion is the biggest problem we have. But when you're lowering instruments from the ship, cycling the ropes in and out of the water, you have the option of basically inspecting it continually when you're using it. If it's degrading, you just cut it off. And when the wire gets too short, you just get another one."

Don's job includes purchasing oceanographic cables and related equipment for the "academic community".

"Within the U.S. there are a number of university systems that operate research vessels," he says. Until the mid-80's, every institution had its own operating style for running and selecting wire ropes.

"Most scientists began using 'ships of opportunity'," he explains—ships that were going to be in certain parts of the world when and where the scientist had an interest in doing research.

The problem was that if, for instance, a scientist from the University of Alaska needed to do research on a WHOI vessel, he needed to know what instruments and related equipment he would find on board, and how to use it. The solution: "about 20 years ago, through a coordinating organization, UNOLS (University National Oceanographic Laboratory Systems), efforts were made to standardize the winch and cable systems aboard ship."



Don Moller, marine operations coordinator at WHOI, stands beside two reels of 3x19 Torque Balanced wire rope from MacWhyte.

Good-bye, U.S. Steel

"Basically, in the mid-80's we attacked the problem of 'standardizing' oceanographic cables," Don says. "We had meetings—sometimes very informal, sometimes very formal—where senior technicians and scientists/engineers basically outlined the set of performance specifications that they needed for wire ropes and electro-mechanical cables.

"With this information, we devised a set of specifications in very general, non-engineering terms. The rope had to:

- be corrosive- and abrasive-resistant
- have a minimum three-year useful life
- tolerate a certain number of cycles, both in loading and flexure.

"But we tried to keep it as general as possible. In the oceanographic business, we were very happy with a product put out by U.S. Steel. But they went out of business—shut down—just like that," Don says, snapping his fingers.

"We didn't tell them how to design or build the rope—we just told them to give it their best shot.

"We bought all the stockpiles we could, and then we took that as the impetus to face the problem. We asked ourselves, 'What is it that we really want?'." So we produced a set of specifications and went out to 3 or 4 manufacturers. One of them was MacWhyte, who basically bought the technology from U.S. Steel for the type of rope [we needed]. And they were 'hands down' leaders in performance based on our specifications.

"So we locked in on that particular product, to which MacWhyte gave the name 'Torque Balanced'. And that is, for practical purposes, the only 3x19 wire rope that we've bought for the academic fleet since 1986."

Because of the lower safety factor, Don says, "and because the weight of the wire is generally equal to or greater than the payload weight, we can and do repeatedly load our wire ropes up to 50% of their ultimate breaking strength."

While the concern with mooring applications is mainly environmental, Don says rope wear on deck is caused most frequently by misuse in handling—"and then only in rare instances."

Future fiber-optics

Today, with more instrumentation on ships requiring signal transmission, cable needs are changing.

"The most common cable for lowering instruments is becoming a triple conductor well logging cable," Don explains. "It was designed for lowering monitoring equipment in oil wells to gain environmental data about the characteristics of the well. My prediction is that in the near future, fiber-optic cable will probably displace the electro-mechanical cable on ships."

**See article "Solving a mooring mystery" in this issue.*

WHAT IS THE TRUTH ABOUT MARINE CASUALTIES?

It would seem a mystery is emerging in shipping that could baffle even the genius of one of the great detectives – Sherlock Holmes, Maigret, Kojak but not, we hope, Inspector Clouseau, for this is no laughing matter!

How safe is shipping today? That is the question. On the one hand we have a general sense felt throughout the maritime industries, and far beyond that to the so-called "man in the street", that there is something fundamentally wrong with ship design, construction and operation today. That shipping is an industry in rapid decline, that the world's oceans are filled with rust buckets waiting to fall apart at the first puff of wind, that unscrupulous owners deliberately flaunt every national and international law promoting maritime safety in the single-minded desire to make money. Yet when one looks analytically at the casualty statistics, a completely different picture emerges.

Taking the Institute of London Underwriters* casualty figures over the last three years, we see a totally altered perspective of the situation – a steady decline in both the number and tonnage of vessels lost annually. (See table)

Although we know that the 1993 figures may be revised upwards later, they show such progress that it is obvious there is an inconsistency between the perception and the apparent statistics – so what is really happening to our ships today?

The simple answer is we don't know – to produce any sort of feasible explanation for the inconsistencies is difficult in the extreme. However we believe there are some rational reasons why the perception and the reality of maritime safety are so diverse.

Firstly, the true picture of maritime safety is one of steady progress as can be seen from the accompanying graphs which show the numbers of vessels and the gross tonnage lost between 1977 and 1993 as recorded by the London Underwriters. These show the steady decline in both parameters, although with occasional "blips" as in 1991. They also demonstrate that 1993 had the fewest ships and the lowest gross tonnage of losses over the 17-year period!

Secondly, over the last few years the communications industry has so improved that we are continually bombarded with up-to-the-minute news of disasters as they happen, around the world. Even shipping is not immune to this exposure despite many of the losses occurring far from the eyes of the media, sometimes without any knowledge at all other than when the vessel fails to report in by radio or is overdue at its destination.

Thirdly, it is clear that at least one type of vessel – the bulk carrier – has been experiencing a spate of accidents which have focussed attention on this sector of shipping and highlighted many of the ills that do beset the industry.

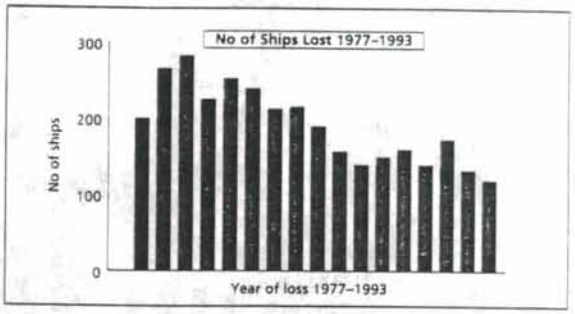
Fourthly, the level of world trade, and thereby shipping activity, has to be taken into consideration, for example the recent recession in the industrialised world will have affected the level of trade/marine activity. However, we have looked at a 17-year period which includes the peak of the last world recession and the general depressed nature of shipping over many years.

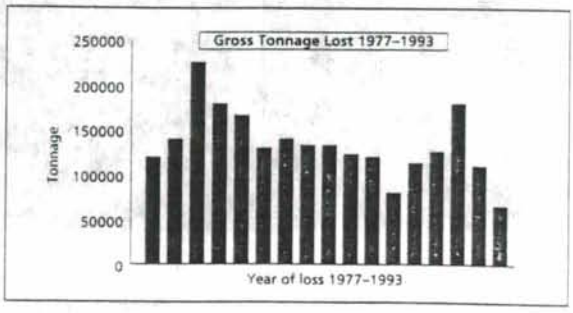
Finally, it has to be said that the statistics analysed are for total losses and do not represent accidents where ships have been saved but lives may have been lost. Nevertheless, the total loss approach, analysed over a 17-year period, is an excellent comparative study of what is happening.

The result of these diverse influences is to create the dilemma we have referred to and whilst the progress made in recent years is, in truth, impressive, we must NOT "let our guard drop". Sub-standard ships must still be eliminated, port states and flags must continue their campaigns to improve conditions, owners must be persuaded that safety pays, and the industry must seek to improve its image in the eyes of the layman. Only then will perception and reality merge.

* As published monthly in "Lloyds List".

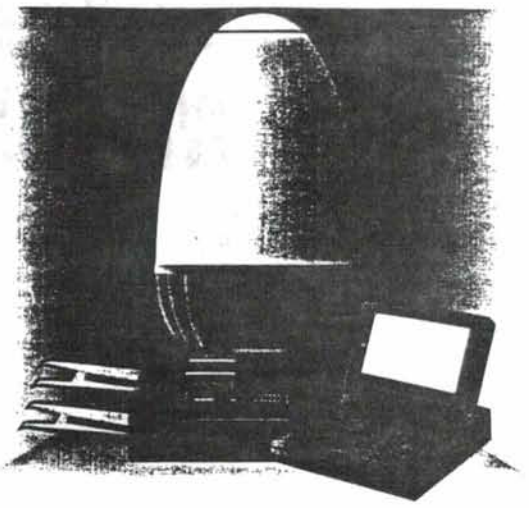
	No of ships lost	% reduction	Gross tonnage lost	% reduction
1991	173	–	1,752,438	–
1992	134	22.5	1,097,496	37.4
1993	121	9.7	652,351	40.6





COMSAT Mobile's Satellite Message Service Offers New Communications Options

New Options Connect Inmarsat-C to E-Mail Networks, Fax Machines & Pagers



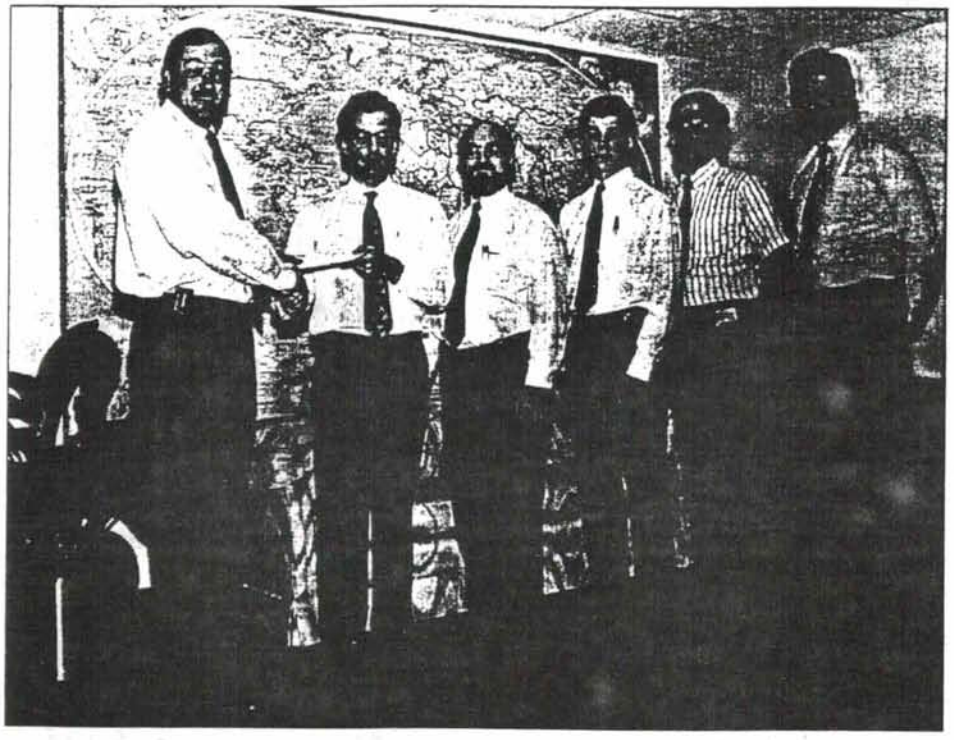
New wireless communications options are now available for users of COMSAT Mobile Communications' C-Link℠ Gateway service. Users can now send messages to a fax machine from their portable Inmarsat-C terminal. In addition, new message-forwarding capabilities allow the mobile C-Link℠ user to divert incoming messages to a pager, E-mail system or a fax machine.

COMSAT's C-Link℠ Gateway is a global wireless service that allows Inmarsat-C users to access over 60 electronic mail systems in 30 countries worldwide including, MCI Mail, CompuServe, ATT Easy Link, cc:Mail and the worldwide Internet.

Gateway Service Increases User Mobility

The service uses portable Inmarsat-C terminals for store-and-forward data messaging via the global Inmarsat satellite system.

The new fax delivery service allows C-Link℠ Gateway users to type a message from a laptop computer and send the message for delivery to a fax machine anywhere in the world. Messages also can be sent to personal computers, telex machines and (through COMSAT's land earth stations) to a U.S. mail destination.



Ed Ryznar, COMSAT Mobile Vice President and General Manager, congratulates CMC's C-Link℠ development team members for their extraordinary efforts during Phase I of C-Link℠. (L to R) Ed Ryznar, Chris Davis, Andy Gallant, Cary Orange, Dave Bulk and Keith Regan. (Not pictured: Dave Crotty from the Southbury earth station).

Another new C-Link℠ Gateway feature is message forwarding, which gives customers three new options for delivery of incoming messages when their Inmarsat-C terminal is turned off. Messages can be routed to a pager, an E-mail system or a fax machine.

"The new C-Link Gateway message forwarding services are particularly important to boaters who are on a power budget and don't want to leave their terminals on at all times," said Ed Ryznar, Vice President and General Manager of COMSAT Maritime Services. "It also allows boaters to go ashore and still receive urgent or important messages."

According to Ryznar, the C-Link℠ Gateway service will be popular among boaters who want to keep in touch with their office or family while using their boat. The above-deck equipment weighs less then 5 lbs (2 kg) and measures approximately 9.5 inches (240 mm), with below-deck equipment that is about the size of a laptop computer.

C-Link℠ Gateway service is available in the Atlantic Ocean Regions (East and West) and the Pacific Ocean Region, covering more than three-fourths of the globe.

Customers can subscribe to the service for U.S. $9.95 per month, with satellite time billed at U.S. $0.28 per 32 bytes, or approximately a penny per character. To subscribe, contact COMSAT Mobile Communications at 1-800-424-9152 or 1-301-428-2400. ■

RULES OF THE ROAD

Michael Savasuk, an attorney in Portland, Maine, reported in an article in the December 1993 issue of National Fisherman, that an anchored fishing boat had been held partly at fault in a collision. The 38' wood and fiberglass gillnetter longliner LESLIE ELLEN was anchored on the fishing grounds showing an all-around white anchor light approximately 12 feet about the water line and side lights, but no other deck lights. Although the radar reflector which she carried was not properly aligned, it was determined that the LESLIE ELLEN could be seen on radar at eight miles and therefore was not required to have radar reflectors under 46 CFR 28.235(b).

The other vessel, a 58' steel longliner named the PANTHER, left Portland, Maine on the night of November 11, 1992 and proceeded at seven knots toward her fishing grounds 60 miles southeast. The weather was clear with 25-30 knot winds and accompanying seas of 10-15'. The temperature was below freezing and spray froze on the PANTHER. One of her two radars was in operation. The raised bow obstructed vision dead ahead. Several large targets were showing up on the radar.

Prior to relieving the wheel at 4:30 a.m. the oncoming watch stepped outside the wheelhouse and took a quick look around the horizon and saw the vessels reported on radar but did not see the LESLIE ELLEN anchored ahead which had not appeared on radar. It is doubtful that the offgoing watch had left the wheelhouse during his two hour watch.

Ten minutes later, the PANTHER collided with the anchored LESLIE ELLEN.

The court recognizing the strong presumption against the underway vessel, found the PANTHER at fault for the wheel watch not periodically leaving the wheelhouse and looking around the horizon (rule 5), and for not periodically adjusting the radar to reduce the sea return.

However, the court also found the LESLIE ELLEN at fault stating:

> The LESLIE ELLEN was also at fault. Her anchor light was only 12 feet above the water. Since the seas were 10 to 15 feet high, her crew should have known that the anchor light would often be invisible to other vessels. Its visibility was further impaired by icing conditions [although still visible at two miles]. The crew should also have known that the LESLIE ELLEN was not a good radar target.
>
> The experts at the trial disagreed over the obligation of the LESLIE ELLEN to post a watch. I find that it is not the practice in the fishing industry for vessels of her size to maintain a watch at anchor and that it is ordinarily not negligent to fail to do so. Given the seas, the icing conditions and the nature of her radar image, however, and given the fact that she was anchored in a location that, although not a channel of navigation, was an area frequently trafficked by other fishing vessels, the LESLIE ELLEN should have taken further precautions, either by providing additional lights, such as her deck lights, or by turning on her own radar with an alarm setting to alert the crew as vessels approached.

The LESLIE ELLEN was found 20% at fault.

Mr. Savasuk points out the importance of this ruling. It holds that vessels must go beyond the minimal requirements of the basic rules of the road. Rule 2, Responsibility, which was earlier known as the rule of good seamanship, holds vessels and the crews which navigate them responsible for actions required by good seamanship or special circumstances not specifically otherwise covered by the rules.

It is important that smaller vessels make their presence known since often they do not present a good radar target because of their size. In heavy seas, they can be lost in the sea return. This is doubly so when the vessel is constructed of

(Continued on page 8)

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the EXPERT newsletter
FALL 1994

RULES OF THE ROAD Con't from page 6)

wood or fiberglass and thus presents an even poorer radar target. Bad weather makes them particularly difficult to see visually, also.

The rules and fault aside, many vessels disappear each year which were seaworthy when they left port. Knowledgeable investigators believe a number disappear because they are run down by other vessels which don't see them. Several fishing vessels which were struck have survived although the other vessel has proceeded on, unaware that they have struck a smaller vessel. Failure to take adequate precautions under special circumstances could "ruin your entire day". TAN-TAR-A, Inc v F/V PANTHER and Stephanie Jane, Civil Action 92-258-P-H, U.S. District Court of Maine.

RTCM Newsletter

VOLUME 13, NUMBER 7 SEPTEMBER 1994

INMARSAT OPENS THE DOOR TO CIVIL USE OF THE GLOBAL POSITIONING SYSTEM (GPS)

Inmarsat has initiated the process of allocating the navigation transponders on its Inmarsat-3 satellites for use by service providers, either national or regional civil aviation or other transportation authorities. As part of this process Inmarsat has issued a call to signatories, who will make transponders available to service providers in their countries, for applications to use one or more of the navigation transponders for periods of three, five or ten years.

Inmarsat-3 will be the first satellite system in orbit capable of both providing navigation signals and relaying, on a timely basis, independently-monitored integrity information on navigation signals that are generated by the U.S. GPS and the Russian GLONASS satellite navigation systems.

Bidders for access to the navigation transponders must provide at a minimum an accurate ranging signal for the entire areas covered by the satellite together with GPS/GLONASS integrity warning messages. Ranging signals are transmitted in the same frequency band as, and are virtually identical to, those transmitted by GPS, in effect providing an additional navigation satellite.

Service providers could also make use of the Inmarsat-3 navigation transponders to offer wide area differential corrections, though this is not mandatory.

GMDSS INFORMATION AVAILABLE ON INTERNET

The U.S. Coast Guard (USCG) has made GMDSS information, including international NAVTEX and Inmarsat SafetyNET broadcast schedules, available over Internet. Also available are U.S. local notices to mariners; information concerning GPS satellite navigation, differential GPS, and other radionavigation systems; U.S. input papers to the IMO Subcommittee on Radiocommunications; U.S. maritime broadcast and distress watchkeeping schedules; and other maritime communications information.

This information can be accessed through Internet by entering "telnet fedworld.gov", loging on, and entering 'DD54' at the first menu. The USCG plans to expand this service in 1995, allowing access to such Internet services as gopher, anonymous ftp, and world wide web.

Further information concerning maritime radiocommunications can be requested by Internet electronic mail at the address cgcomms/g-t07@cgsmtp.comdt.uscg.mil. Information concerning radionavigation can be requested by Internet electronic mail at the address gpsws/navcen01@cgsmtp.comdt.uscg.mil.

EVENTS EVENTS EVENTS EVENTS

INMARSAT SETS AGENDA FOR CIVIL SATNAV SYSTEM

Organisation formalises plans for non-military satellite positioning service

The first-ever civil global satellite navigation system could be in place as early as 1996 following a landmark announcement from satellite communication pioneer Inmarsat.

The organisation has formalised its intention to provide a global satellite navigation service on its third-generation satellites, due to enter service in 1996. Inmarsat signatories have been invited to bid for use of the navigation transponders that are to be incorporated on each of the five satellites. The successful bidders will then make the service capabilities of the transponders available through non-military service providers.

The move comes against a background of growing concern in the maritime, aviation and other communities over continued reliance on military satellite navigation systems. GPS and Glonass, the two systems currently in operation, are run by the US and Russian defence authorities respectively.

GPS, the most widely used, offers two levels of service. The "Precise" or "P" code offers accuracy to within a metre and is available to approved military users. But the "Course Acquisition" (CA) mode, available to civil users, has been downgraded by the US Department of Defence's implementation of a "selected availability" policy. It offers civil users accuracy to within 100m, only 95 per cent of the time. While adequate for ocean passages, this does not meet the maritime and aviation communities' requirements for precise navigation.

"Civil overlay" to GPS

The proposed Inmarsat system will offer an enhancement to GPS and Glonass, dubbed by Inmarsat a "civil overlay". It will have the potential to offer both increased accuracy and greater reliability, depending on the range of services included in the successful bidders' packages.

The overlay will provide three distinct services. An integrity channel will warn GPS and Glonass users of faulty satellites that may be sending inaccurate information.

Additional ranging signals will supplement the existing systems and remove holes in their coverage. And wide-area differential corrections will greatly increase the accuracy of the GPS signals currently available to civil users.

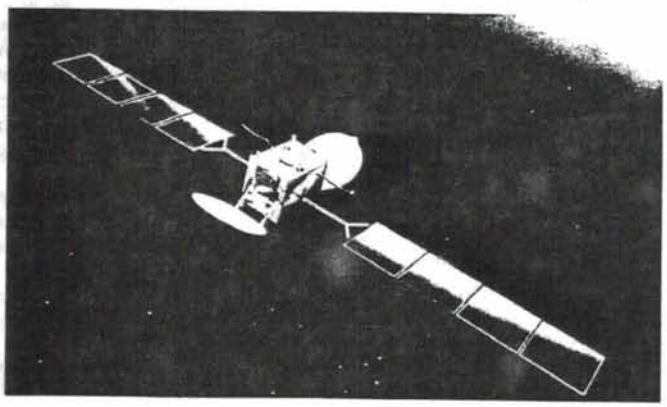
Integrity warning

Inmarsat will require bidders for the service to provide, as a minimum, accurate ranging signals for the entire area covered by the satellite and GPS/Glonass integrity warning messages. The organisation will judge bids against several criteria, including compliance with technical requirements, the competence of the parties involved, their proposed schedule for service introduction and geographical coverage area.

Speaking at a press conference at the organisation's London headquarters, Inmarsat's Jim Fear said implementation of a civil overlay was likely to hasten the IMO's acceptance of GPS as an approved positioning system.

This, in turn, he believed, was likely to give fresh impetus to long-running efforts to establish global standards for electronic chart systems. "If you know your position, within 10 metres, 100 per cent of the time, you can build an electronic chart system that can be relied upon," he told *Ocean Voice*.

Inmarsat has invited signatories to bid for use of the navigation transponders for periods of three, five or ten years. Bids are due by October 7th and allocations will be made by the Inmarsat council at its meeting from 15-18 November.



Inmarsat has requested bids for use of the navigation transponders in the Inmarsat-3 satellites (left)

SATCOM CHARGES FALL TO RECORD LOWS

Several more leading Inmarsat service providers have slashed call charges, this time with the introduction of Inmarsat-B services.

In Australia, Telstra has launched the new digital service under the brand name Satcom-B with a per-minute tariff of just 2.50 SDRs (special drawing rights) for off-peak calls to Australia and New Zealand. And Singapore Telecom has weighed-in with a tariff of just 0.29 SDRs (off peak) for a six-second block.

Meanwhile, in Europe, Norwegian Telecom (NT) has set charges for its new Inmarsat-B service at 30 per cent below its rates for Inmarsat-A.

unique combination of improved service and lower costs that Inmarsat-B brings. Telstra's mobile satellite and radio services' general manager, Daryll Smith, said, "The development of Satcom-B concentrated on reducing per-channel satellite power and bandwidth requirements to retain quality and enhance efficiency. As a result, we have been able to introduce these low usage prices."

NT points out that, in addition to the lower call charges, the on-board operator terminals will be smaller and cost less than today's Inmarsat-A terminals.

Telstra's Smith says the lower costs associated with Inmarsat-B

fishing and passenger craft, offshore and oil-rig operations.

Flexible structure

As well as implementing Inmarsat-B services in the Indian and Pacific ocean regions, Singapore Telecom has extended its Inmarsat-M coverage to the IOR. Its flexible pricing structure, charging customers in six-second blocks, is typical of the innovative measures now being employed by Inmarsat service providers to reduce the cost of ship-shore communication.

The latest price-cutting measures come against a background of lower charges for

Voice reported that several Inmarsat service providers had cut call charges for Inmarsat-A and Inmarsat-C services by as much as 30 per cent.

● Latest in a growing list of operators to announce reduced charges for Inmarsat-M and B calls is Hongkong Telecom. On September 1st, all ship-to-shore Inmarsat-M and B calls routed via HKT's CES were cut by 10 per cent. The tariff for calls from the Pacific and Indian ocean Regions to Hong Kong now stands at SDR3.33 (standard rate) and SDR2.66 (off-peak).

HKT's mobile satellite communications manager, Chris Gretton, said, "Increasing use

DATABASE ...

COLUMNIST *PAUL ASHTON* EXPLAINS THE MOST IMPORTANT SATCOMS ANNOUNCEMENT OF THE YEAR ... AND GOES SHOPPING

A few months ago, Inmarsat announced developments that would make it possible to send email over Inmarsat-C.

This breakthrough will become possible by giving software writers access to certain development tools. These will make it easier to address messages and data so that they can be communicated via Inmarsat-C to users of email systems that use Microsoft Exchange.

It's possible you missed news of the announcement. If you did, take notice now. I believe this to be one of the most important and exciting news events this year in the world of satellite communications.

Does this sound like an overstatement, salesman's hyperbole or a simply a programmer's enthusiasm for a new gizmo? At first glance, you may think it doesn't offer anything new. Inmarsat-C can already send messages and data between ship and shore.

But the real significance of giving applications engineers access to the same development tools is that it makes available two vital commodities in the search for user-friendliness – standardisation and simplicity.

From the ship, messages and data would be created by Microsoft Exchange "aware" programs that once communicated over the satellite. They are routed to your computer and networked into similarly Microsoft Exchange-enabled applications and email programs in the office.

But Inmarsat's announcement had further implications concerning standardisation of importance both to software programmers and equipment manufacturers. The development involves an API (Application Programming Interface) which, when applied, means that software and hardware become independent of each other. This means that, as far as applications are concerned, terminal type and manufacturer become irrelevent. The system supporting the API takes over the relationship between them.

The programmers write the software, manufacturers make the boxes – the users mix and match.

The API specification allows industry-standard software to be integrated and, because the marine industry is not a standard industry, it enables marine specialist softwares to sit seamlessly side by side. The mystique is removed and – for ship and office staff – the process should be so much easier.

This is the theory. Of course, the results will not be seen for some time yet. But let us examine one possible practical example of how the API could work in practice.

Suppose a maintenance system on board the ship has work reported that requires spares from the inventory. The inventory part of the program generates a requisition for the spare parts as a data report addressed to the office. This data report, containing the requisition, is communicated via the Inmarsat-C. In the office, the Microsoft Exchange-enabled purchasing system receives the requisition and allows the superintendent or purchasing department to approve and process the order – having first obtained the best prices, of course. Once the order has been placed, a record of the transaction is sent back to the ship as a data report so that, on board, they will be able to make the necessary subtractions from their budgets and know when and where they can expect delivery.

Some suppliers are not waiting for the API to become standard. This is understandable, as any development of a similar kind now means being a step ahead.

As a programmer myself, for instance, I have developed an email gateway for Inmarsat-C that implements the current standards being used by Thrane & Thrane Coast Earth Stations for dial-up modem access by land-based users. This supports a proprietory email standard that, ultimately, is MHS compatible and therefore optionally interlinks with other products supporting MHS gateways, such as cc:Mail.

Thrane & Thrane themselves have recently announced the TT-3636A Capsat LES Gateway for Microsoft Mail, (see Industry Monitor, this issue) which supports use over the same T&T-built CESs (Blaavand, Sentosa, Burum, Goonhilly, Tangua and Sintra). Connection to the LES is via X.25 or via PSTN dialup modem.

While the X.25 connection is faster between office and the CES, I am pleased to see that PSTN dial-up is implemented. This is a method that can be employed from virtually any office because it uses an ordinary telephone line and a standard modem.

The system is installed in the customer's network and allows users to see ships' messages using Microsoft Mail, just as if they had been sent from a user sitting at the next desk. All of which marks another major step forward in bringing the ship into the office network.

Choosing the cheapest route to send a message over Inmarsat can be a complex undertaking.

As a result, some ships just use the same coast earth station every time. While this does simplify billing and may lead to volume discounts, the plummeting call charges reported in *Ocean Voice* mean it pays to shop around.

It also pays to look at the different Inmarsat systems. I recently prepared a table to compare the cost of sending messages and documents of differing sizes, between 100 and 500,000 characters. It compared Inmarsat-C telex data and compressed data, Inmarsat-A telex, data and comressed data. The purpose was to identify a "default" transmission method to be used depending on the size of the file.

I will leave you in suspense as far as the specific results were concerned. But, generally, it revealed that messages of less that 500 characters can be sent as cheaply non-compressed as compressed and, for short messages, Inmarsat-C was the most economical route. However, when it comes to sending larger messages and especially large files the figures are a little different.

One ship manager to whom I showed this table immediately saw a use. Many of his ships are fitted with both Inmarsat-A and Inmarsat-C. By giving them this information, they can decide which is the cheapest method to employ for any given communication.

INDUSTRY MONITOR

A PC-based weather forecasting software system designed specifically for professional mariners has been launched by Canadian firm Global Meteorological Technologies.

Called Weatherwise for Windows, it receives weather information broadcast through the Inmarsat-C Fleetnet service. The information can then be viewed and manipulated on screen through an intuitive graphical user interface. Features include the ability to draw weather maps worldwide, zoom in on particular areas, interpret and display fronts and cloud formations, select and view stored reports for trend analysis, and to plot weather analyses directly on to on-screen maps.

GMT says the product enables mariners to make better navigation decisions, save time and money and improve safety.

Scientific Atlanta has unveiled an impressive array of enhancements for its Marisat and Terrastar Inmarsat-M terminals.

For security-conscious users, an upgrade to "secure terminal unit" encryption compatibility is now available. This is achieved through a hardware upgrade and built-in software.

A conference network calling option provides users with group call facilities, allowing a single satellite channel to be shared among multiple users. Callers use a "push-to-talk" button built into the telephone handset. Scientific Atlanta says the conference option is ideal for groups, such as emergency response teams, that need constant communications.

For simplified billing, a customised credit card swipe reader can now be attached to either terminal, allowing callers to have charges billed automatically to their credit cards. this option is being aimed at applications such as charter yachts and passenger ships, where third-party billing can be eliminated.

The final two enhancements are aimed at companies leasing terminals. One allows the user to purchase a number of pre-paid transmission units. When the limit is reached, the lessor can either stop further use of the terminal or pay an additional charge to have the terminal unlocked for extra time.

The final enhancement is a fixed CES assignment capability that allows leasing organisations to programme all their terminals to route traffic through one CES, to take best advantage of bulk discounts and other special deals.

A new method of transferring data from paper charts to electronic formats has been developed by Italian firm C-Map.

The new technique enables charts to be scanned directly into a computer, creating a "raster" image. The lines marking coastlines, contours and other features are then created by "digitising" the raster image.

C-Map claim a number of advantages for the new method, not least the ability it offers to produce charts more quickly. The company also claims the end result is more accurate and requires less disc storage space.

The system has been installed at C-map's production facilities in Italy, Poland and the USA.

BT has unveiled Deckphone, a new "cashless" satellite telephone system based on Inmarsat-C.

Deckphone allows passengers to dial directly to more than 200 countries worldwide. The calls are paid for simply by swiping a credit card through an attached reader. David Stone, general manager of BT's maritime service sdivision, said, "The introduction of Deckphone is an important addition to our range of products and services and we are continually looking for ways to enhance our portfolio."

Access to the Inmarsat-C network from the popular Microsoft Mail email system is now possible thanks to new gateway software developed by Thrane&Thrane.

The T&T gateway allows quick and easy access to and from any Microsoft mail PC network and T&T Capsat Inmarsat-C transceivers via the Inmarsat-C network.

Operating through T&T coast-earth stations, the T&T gateway is a software package that allows shore-based Microsoft Mail users to exchange email messages via Inmarsat-C as easily as with users connected directly to their own LAN. Exactly the same procedure is used. In the ship-to-shore direction, the Inmarsat-C user simply includes an address field in the message header in which the network name of the user he wishes to contact is entered. The message will then appear directly at the addressed PC ashore.

As standard, the gateway comes installed on a Compaq Prolinea 1/25S PC. It includes a LAN interface and a Hayes-compatible serial line for connection to the CES. It can also be installed on an existing PC, in which case a network interface card is required.

Inventory Locator Service (ILS) is now providing direct, point-to-point communications capabilities for users of its worldwide marine parts database.

The new service, named ILS Direct, allows ILS customers around the world to communicate with each other using private electronic mailboxes residing on the ILS mainframe computer. In addition, users can gain access to a powerful fax server from their PCs to send messages to almost any fax machine in the world or multiple faxes simultaneously.

ILS is essentially an electronic market place. Subscribers gain access to the system, via a PC and modem. A user requiring a certain part enters via the PC, an identifying number for the part. The system searches its databases for that number and a report, listing suppliers that have the part in stock, is transmitted back to the user's PC. The report shows the quantity and condition of items avaliable from each of the suppliers that have the required part.

What ILS Direct does is enable the subscriber to contact directly any or all of the suppliers holding the part he needs. The software alerts the suppliers when an incoming ILS message is received.

MMS, which this year celebrates its 25th anniversary, has released new versions of its Fleet Manager series of software products and announced name changes to reflect the expanded capabilites of the range.

The communications package, formerly known as Maritime Workstation Manager, is now Fleetlink. It offers low-cost, global message and file handling, together with worldwide data management functions. It includes a "paperless forms" system to streamline information processing.

Fleetworks, formerly Maintenance Manager, is the inventory and maintenance package. It now includes modules for requisitioning, purchase orders, budgeting, ordering consumables, planned and predictive maintenance.

Finally Fleetwatch, formerly Operations Manager, has been expanded to include all shipboard administration tasks, including cargo loading, position reporting and tracking.

According to MMS President Gene Story, one of the major benefits of the Fleet Manager approach is that the systems can be seamlessly integrated. "For example," he said, "requisitions can be passed from Fleetworks to Fleetlink for transmission ashore. The file exchanges are automatic and do not require user intervention."

ELECTRONIC INNOVATION FOR BETTER VESSEL MANAGEMENT

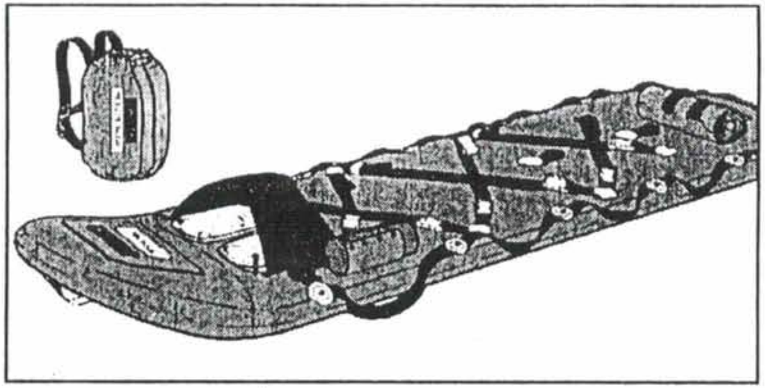
Buoyant rescue sled is portable and adaptable

By Eric Swenson

Since 1920 and for three generations, the Switlik family has designed and manufactured life rafts and vests, harnesses and other safety and survival equipment. The newest addition to the Switlik Parachute Co. product line is a series of rescue sleds in three configurations that work on all types of surfaces. Indeed, the equipment has its origins in a request from Allentown, N.J., rescue personnel who sought a device that could be used to rescue people who had broken through the ice on ponds during the winter.

Gary Switlik, vice-president of the New Jersey-based company, describes the product as revolutionary, unlike anything else on the market. All units are constructed from a special patented inflatable fabric and ballistic nylon and come with a manual inflation valve and a CO_2 inflation system. They are medically sound with six cross-body restraint straps, a head restraint, two inflatable pillows and a thermal blanket.

The Switlik sled is 90" long, 26" wide, 3" high and provides 225 lbs. of buoyancy. It folds into a backpack 20" high and 1' in diameter and weighs 19.5 lbs. The sled floats horizontally on water, snow or ice and can be towed, slid, paddled and lifted. Switlik calls it "an oddball item that almost needs to be seen to be appreciated. Most people can't believe an inflatable can be so rigid."



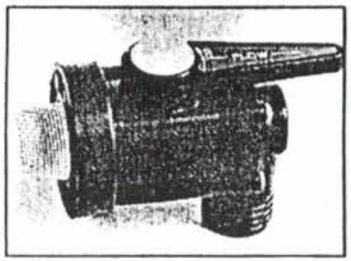
Switlik's rescue sled, made from a special fabric, becomes buoyant and rigid once inflated. Weighing 19.5 lbs., the device folds into a backpack 20" high and 1' in diameter.

Craig Dunham has seen the sled in operation and is impressed. He is vice-president of the Mark Lavin Memorial Safety Foundation, which deals exclusively with water-related safety issues.

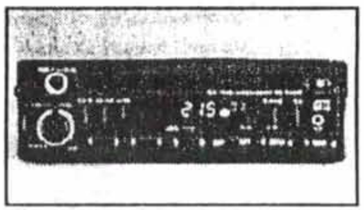
Dunham began using the Switlik sled in its prototype form in 1987. He notes the device's tremendous buoyancy, its absolute rigidity once it is inflated and its light weight and compactness. "We use it a lot. It's standard gear in most of our boats and all of our rescue helicopters where space and weight is an even more critical factor." Dunham believes the Switlik sled is to a boat rescue what the jaws of life are to an automobile rescue.

The Switlik sled comes in three configurations with the MK I listing at $895, the MK II at $995 and the MK III at $1,250. For more information, contact Switlik Parachute Co., P.O. Box 1328, Trenton, NJ 08607, tel. (609) 587-3300, fax (609) 586-6647. Circle Reader Inquiry No. 2. □

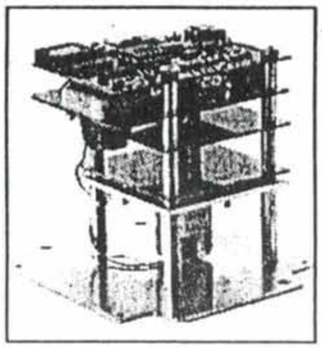
AT A GLANCE



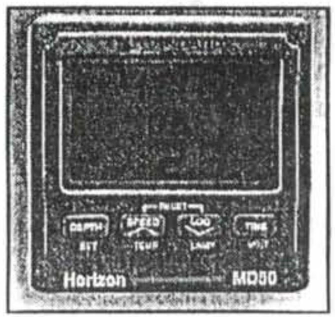
FORESPAR PRODUCTS CORP. suggests its Marelon valves and sea cocks as replacements for similar bronze fittings. Marelon is a glass-reinforced nylon designed for marine use. It will withstand temperatures from



MAXXIMA MARINE introduces its CSC727CD single CD/stereo radio player for on-board applications. The unit is equipped with a slide-out housing for theft prevention which accepts a variety of Maxxima marine stereos. The CSC727CD produces 50



KVH INDUSTRIES, INC. aims to extend its line of directional



STANDARD COMMUNICATIONS offers its MD50 which

INDUSTRY MONITOR

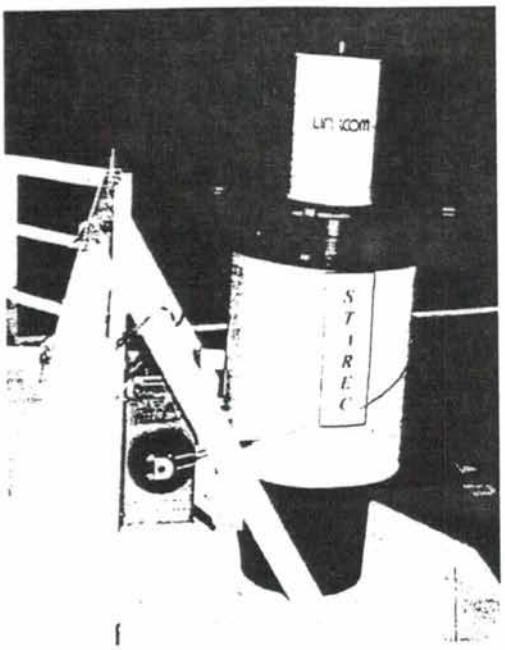
ELECTRONIC INNOVATION FOR BETTER VESSEL MANAGEMENT

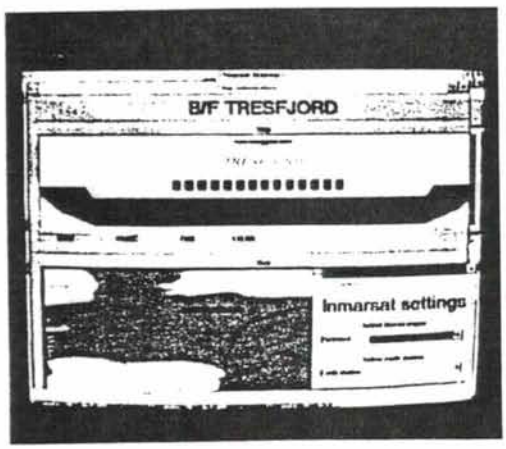
Inmarsat has thrown its weight behind a new device designed to record and transmit the status of certain crucial conditions aboard a ship at sea.

Starec consists of a data logger, a range of sensors and status monitors and an Inmarsat-C transceiver. These are incorporated in a buoy, which will float free should the vessel sink.

The status monitors will record basic voyage details such as position, course, speed and depth of water. They can also record parameters such as hull stresses and ship movements, the opening/closing of hull doors, wheel movements and engine orders. The logging device stores data generated during a period of up to 24 hours. It can transmit reports, based on that data, at regular intervals, via the devices's Inmarsat-C terminal.

The system was developed by Inmarsat, in co-operation with Norwegian firm Linkom and





The Starec buoy, (above) contains a data logger and a transmitter that can relay vital status information to a PC ashore (right)

Japan Radio Company (JRC). It could be used by flag and port states, and by shipping companies, to monitor the vessels under their jurisdiction.

In the event of a disaster, the buoy will float free from the vessel and broadcast a distress message automatically. Whoever is monitoring the vessel can then poll the buoy and down-load the latest data, thereby obtaining immediate information about what might have happened.

Two new reference stations have been added to the differential GPS (DGPS) network operated by European consortium Veripos.

The new stations, at Lofoten and Trondheim in Norway, boost a network of existing stations at Aberdeen, Den Helder, Utsira and Wick. The stations are used to calculate GPS corrections. The resulting data is relayed to the BT Inmarsat coast-earth station at Goonhilly and uplinked to the Inmarsat Atlantic East satellite. Subscribers, fitted with specially adapted terminals, can receive the corrections via the Inmarsat satellite and boost GPS accuracy to around 5m.

Veripos complements the Sercel HF-based DGPS network to offer multi-referencing. Customers come mainly from the offshore and port development industries, where pin-point accuracy is a pre-requisite.

With a slip of the word-processor, October's Industry Monitor suggested that BT's new credit card satellite telephone system – Deckphone – operated via Inmarsat-C.

Not so. Inmarsat-C is, of course, a text and data service only. Deckphone works through the new digital voice system, Inmarsat-M. BT say cruise lines installing Deckphone will offer their passengers and crew the chance to dial directly to over 200 countries worldwide simply by swiping a credit card through a reader. They will also be providing themselves with a substantial new revenue stream.

Deckphone is currently on trial aboard two Paradise Lines vessels in the Mediterranean.

Magnavox can now offer fax capability via Inmarsat-M following fax type-approval of its MX 3030 Magnaphone M terminal.

The unit is now available with a factory-installed 2400 bit/sec fax interface option in both briefcase (land portable) and maritime versions. Magnavox say the fax capability can easily be added to existing voice-only terminals. "It's a simple software upgrade," said Magnavox spokesman Mario Cid Fernandez, "that can be performed by Magnavox dealers on site, using a laptop computer."

According to Fernandez, Magnavox is working on other developments, including 2400 bit/sec data transfer via Inmarsat-M, which it expects to bring to the marketplace in the near future.

The product dimensions quoted in the October *Ocean Voice* Inmarsat terminal buyers' guide for the Scientific Atlanta's Inmarsat-M terminal were incorrect.

The correct dimensions are as follows:

Below decks equipment: 12.1 x 43.2 x 35.6cm, weight, 9.1 kg. Above decks equipment: 58.4 x 67.3 cm, weight 23.2 kg

Apologies to all concerned for the error.

Update....

Bennex, the Norwegian company that sells Toshiba Inmarsat-C terminals, is now called Bennex Transmark Norge A/S...

...and the STN Atlas Elektronik contacts for Inmarsat products are now Wolfgang Meyer, (SP 1600-M) and Rainer Mau (Debeg Inm-A,C and M).

The Royal

SHIP

'Sub-standard' ships that visit Bermuda to be inspected

By Marina Esplin-Jones

Foreign ships which visit Bermuda from now on will leave our waters in a more seaworthy and environmentally-friendly condition.

Government has signed an international pact to ensure sub-standard ships which call are better inspected, while sound ships are spared unnecessary boardings by local Marine and Ports surveyors.

The pact requires Marine and Ports to share the information with other signatories, which include Canada, EC countries, Finland, Norway, Sweden and Poland.

Government made the announcement yesterday, noting that in the past surveyors conducted inspections only at random.

In a year, they were required to randomly board just 25 percent of all visiting ships to ensure the vessels complied with International Maritime Organisation Conventions on: Safety at sea, pollution prevention, training standards, watch keeping, collision prevention, living conditions. Ships in violation of the regulation were liable for detention until the deficiencies were corrected.

Now that Bermuda has signed the Paris Memorandum of Understanding (MOU) on Port State Control, it has access to a broad database on "good ships and bad ships".

"Ships which are due to visit Bermuda can be checked against that database to see if they warrant inspection on arrival," a Government spokesman said.

"If a ship is inspected and found to have deficiencies which require further visits to ensure it is safe to sail, the ship will be charged for the surveyors time on the second and subsequent visits. Bermuda's affiliation to the Paris MOU will ensure that sub-standard ships visiting Bermuda will be properly checked to ensure that they will not cause pollution or put at risk the lives of seafarers."

The Paris MOU was adopted in 1980 expressly so countries around the world could share information on ships which have been inspected to enable closer monitoring of sub-standard ships.

Principal marine surveyor Mr. David Wright said the UK had also signed, though Bermuda became affiliated on its own initiative.

"It will enable us to concentrate our inspections on the ships that require inspection rather than just picking ships at random," he said.

"And if we find things wrong, we can pass that information on to other countries. That way, we can build up a history on good ships and bad ships."

Owners seek sweeter deals from responders

Five years after OPA, shipowners are starting to question what their retainer fees are buying

Five years after OPA '90, shipowners are taking a harder look at what they're getting from the Oil Spill Removal Organizations (OSROs) they are obliged to nominate in their vessel spill response plans. The costs of such services are more negotiable now than in the first hectic months after OPA, when shipowners—some on the verge of panic—often paid top dollar for responder protection simply to get response plans filed and approved. In 1995, cooler heads are definitely shopping around for less expensive coverage. And more options are available.

The two largest OSROs, the Marine Spill Response Corporation (MSRC) and the National Response Corporation (NRC), were last year joined in the Coast Guard's top "Category E" of removal organizations by the American Marine Corporation (AMC). The list of smaller responders and of companies offering various oil spill management services is also growing.

HIGH RETAINER FEES

The spill response industry, according to Joseph Cafasso, a specialist in offshore and sub-sea recovery, "never made money from retainer fees before OPA. You were paid for what you did, which was to clean up oil." Now, responders are paid retainer fees for work they may never have to do. "Is it any surprise that those fees have soared out of control?" asks Cafasso. "The cost of oil spill recovery since OPA has gone up 300%. We should stop and ask why, since all of us are still doing pretty much the same things that we were before 1990."

Another industry insider believes "people are becoming too greedy and image-conscious, because a 'better image' allegedly brings in more money."

"I'm sorry to say it," he adds "but we in this relatively small industry have never given ourselves such airs before. Cleaning up oil is a dirty business, and you can't glamorize it. I see alarming signs that we're forgetting a basic truth: No one comes out of an oil spill looking good. You may be lucky in containing the damage, but there are no winners when you go up against Mother Nature. All the work put into the design of a skimmer, let's say, goes for nothing if you don't know wind and water, and if you assume that equipment alone is going to bail you out. We have too many contractors out there who court shipowners by saying, 'pay us this amount annually and you're covered.' They should say 'the law says you have to have a responder in place, and we'll cover you to the extent of showing up with competent personnel and reliable equipment when we're needed. What we can do for you then depends on luck and God.' "

"THE COST OF OIL SPILL RECOVERY SINCE OPA HAS GONE UP 300%. WE SHOULD ASK WHY, SINCE ALL OF US ARE STILL DOING PRETTY MUCH THE SAME THINGS THAT WE WERE BEFORE 1990."

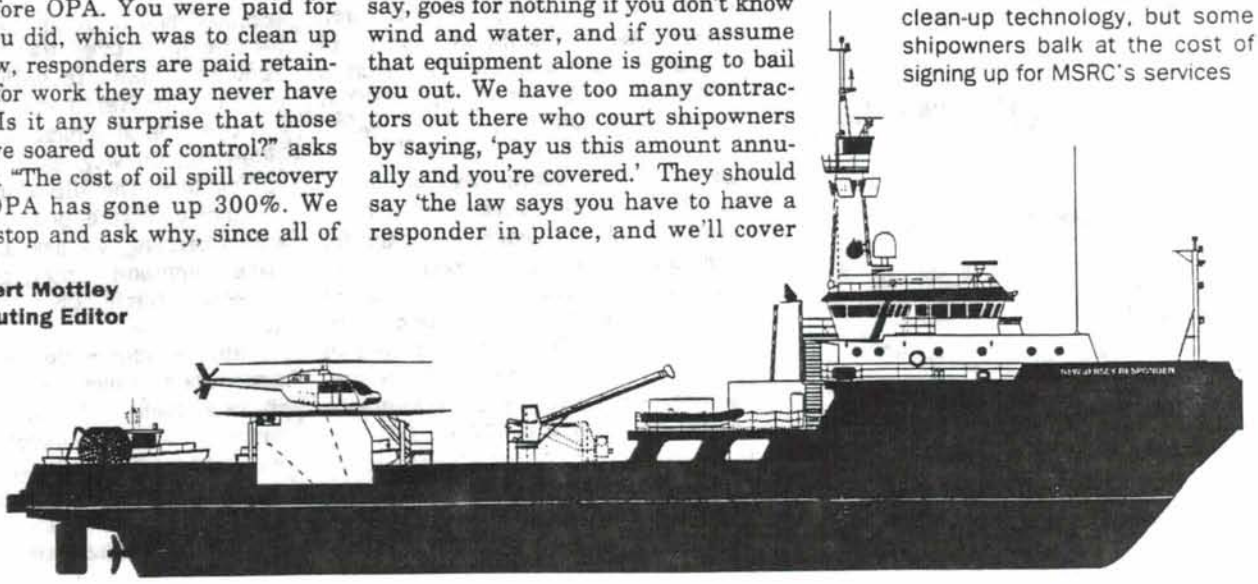
A very large proportion of U.S. spill response capacity is controlled by independent contractors. And when it comes to a real-life spill, "each contractor is on its own," says Michael Gallagher of Gallagher Marine Systems, a well-regarded spill response management company in Alexandria, Va. "As a rule, there are no exclusive contracts. You can work for the MSRC, for the NRC, for the AMC, or for all three, while you network for yourself. The market is wide open. Like anything else, an outfit with some proven experience has more going for it than one that only 'talks the talk.' "

RETHINKING OSRO COVERAGE

Meanwhile, some shipowners are starting to reappraise what MSRC, NRC and now AMC have to offer.

Set up originally by the oil industry, MSRC is the largest OSRO. It

Deployed around the U.S. coast, MSRC's purpose-built response vessels offer state-of-the art clean-up technology, but some shipowners balk at the cost of signing up for MSRC's services



By Robert Mottley
Contributing Editor

has set up 23 pre-positioned response sites, and built its own fleet of purpose-built oil spill response boats. This network, always in place, always staffed, is a hedge against the next Big One. A MSRC brochure notes that "over the years, ... regional and local responders have compiled a solid record of handling smaller, inshore spills—which account for the vast majority of all spills. MSRC is designed to complement this existing capability—that is, to make a 'best effort' response to infrequent major releases. Generally, MSRC will respond only to small spills that require capability determined to be beyond that of local spill respons resources."

To be covered by MSRC services, shipowner has to be a member of th Marine Preservation Association, separate, independent organizatio that funds MSRC operations. Th "wall" between the two exists as legal protection in case of an unlimi ed-liability scenario arising that coul threaten the oil companies who set u MSRC/MPA. This separation of churc and state is not seen by all involved a particularly conducive to effectiv management. Nonetheless, there wa still considerable astonishment whe

Spill clean-up products and systems

Oil Mop, Inc., Lafayette, La., has a new heat-treated version of its well-known rope mop used for oil recovery in both environmental and industrial applications. Oil Mop Response, an 18-month-old division of Oil Mop, Inc., recently expanded its oil spill response operations to nine locations in the Gulf region, and began hazardous material spill response in New Orleans and in Baton Rouge, La. Oil Mop Response has also started offering automated spill and financial management services. **Circle 100**

Hyde Products, Inc., Cleveland, has received a number of orders in Canada for its LORI stiff brush recovery systems. Two shipsets of LORI side collectors are going to PIMEC, and COPIM, in Quebec City, has ordered a LORI free floating skimmer, a high capacity device with six brush chains. **Circle 101**

Oil-Dri Corporation of America, Chicago, is marketing new Oil-Dri sweeps that offer greater mobility for small craft towing and deployment. Each sweep has an absorption capacity of 30 gallons, and measures 3/8 inch in thickness, x 19 in width, x 100 ft length. **Circle 102**

Zoilco Environmental Services, Inc., Larose, La., has developed a free-standing oil and water separator for industrial, oil field and shipboard applications called the Tankko Separation System, based on the principle of gravity separation. The system is said to achieve a high volume of oil/water separation even if used on a recovery vessel in very rough seas. **Circle 103**

Frank Mohn Houston, Inc., LaPorte, Texas, is American agent for FRAMO's innovative Remote Operated Vehicle (ROV), developed as part of the Remote Offloading System (ROLS) element of the Norwegian State Pollution Control Agency's program to empty sunken ships of oil. The ROV unit is a diverless tool that can penetrate vessel tanks and recover fuel oil. Lowered into the sea by crane, the unit attaches itself to the side of a ship by using its pump as a drill. It comes with two built-in video cameras and a navigation system. The U.S. Coast Guard is said to be interested in the system as a means of removing oil from warships sunk at Pearl Harbor. **Circle 104**

Parker Systems Inc. (PSI), Chesapeake, Va., is marketing a new Super Flex Permanent Boom, made of 100% PTMEG urethane-coated polyester belting fabric. The boom's float has a foam-filled shell that will not sink if punctured. The Super Flex Boom is available in 18 in, 24 in, or 36 in fabric heights, in section lengths of 50 ft. **Circle 105**

Marine Industries Northwest Inc., Tacoma, Wash., recently designed, built and delivered several portable modular ship structures for use in the Tidewater, Crowley, and Foss Alaskan oil spill fleet. The ABS-certified, marine modular configurations included spill worker berthing, a galley, a communications command center, and a utility power unit. **Circle 106**

Slickbar Products Corporation, Seymour, Conn., which delivered the first oil boom made for Standard Oil of New Jersey in 1960, is celebrating 35 years of supplying oil companies, engineering firms, and federal agencies with oil booms, skimmers, and dispersant spray systems. **Circle 107**

Sun Company sent a letter, dated December 1, 1994, to Bob Aldag, president of the MPA, announcing Sun's intention to resign from MPA on December 31. It said, in part: "It is Sun's opinion that the finances and the operations of both MPA and MSRC are not been effectively managed. MSRC has no accountability to MPA for funds expended or for the way it operates its business. Likewise, MPA has no accountability to individual members in how it proceeds with its operations. Sun has voiced this concern on numerous occasions, but is unable to effectuate any meaningful changes due to the structure of both MPA and MSRC."

Bob Aldag has subsequently told *MARINE LOG* that MPA responded to Sun, but would not make its reply public. There is some sympathy for Aldag and the MPA around the industry. "I don't think they are *that* badly managed," said one source. " but they don't operate like a for-profit company." In any event, Sun moved on to the NRC at year's end. Another shipowner, the Maritrans barge fleet, also left MPA/MSRC for the NRC.

NRC represents the overwhelming majority of foreign shipowners serving the U.S. and has expanded its network of independent contractors. It now also offers services overseas. Resources include eleven OSRVs and OSRBs (offshore spill response vessels and barges), converted from existing equipment, plus an OSRB on time charter in Puerto Rico. Its focus has been to supplement independent contractors' resources with additional capability to handle the relatively small, number of spills that could not be handled by existing pre-OPA resources. NRC's success may well have influenced a decision by MPA to reduce its retainer fees last year.

COMPETITION GROWS

NRC itself faces new competition—from American Marine Corporation (AMC) which, an inside source tells *MARINE LOG*, is attempting "a frontal assault" on NRC and its customer base of some 1,600-odd ships. In going head-to-head with NRC, AMC appears to have taken a leaf out of NRC's book. When NRC came on the scene it did not make a massive investment in new vessels like the MSRC had done. Instead it made use of existing resources, including thos of founding partner Seacor Marine an by creating a network of existing, inde pendent responders. Now AMC, too, i offering access to a network of contracted independents, some of them also on the NRC's grid. But it claims its fees are significantly below those charged by NRC. "The owner of a VLCC would pay the NRC approximately $18,000 in annual fees," claims an AMC source. "Our annual fee would be $5,000 for that same ship."

An AMC briefing notes that "the formation of [our] contractor network and the extensive use of existing commercially employed resources has eliminated the need for a costly response fleet ... and tens/hundreds of millions of dollars worth of redundant equipment." One "existing commercially employed" resource is the 130-vessel response and support fleet already operated by Weeks Marine, of Cranford, N.J. These vessels "are out there and working all the time," says AMC's Gerry Smith, vice president of marketing, who until recently had been NRC's vice president of marketing. Another AMC, recruit is John Ives, formerly NRC's logistics manager.

All these moves may suggest that there's a major price war in the offing in the OSRO world, but at the moment NRC declares that renewals by shipowners are "going along nicely." Its position is that it offers the "most cost-effective solution available to provide the level of compliance, price, clean-up capability and organizational structure needed to meet OPA-mandated requirements."

SPILL RESPONSE MANAGEMENT

Another creation of OPA '90 is the QI—or qualified individual. This is the person nominated by the shipowner in the vessel response plan to be fully responsible for acting on his behalf at the scene of a spill cleanup/recovery operation. An inviolate rule of oil spill response management is that the QI must be totally independent from the responders being used.

"As a QI, you can't have any company connections to the contractors being used," says Joseph Cafasso. "There's always the unlikely chance that some unscrupulous person would delay containment so his crew could make money by prolonging the spill." Thus shipowners turn to particular companies that can provide OPA '90-required spill management support at arm's length from cleanup responders.

Gallagher Marine Systems provides such support for more than 300 vessels calling at U.S. ports. In 1994, the owners of many of these ships selected NRC as their cleanup contractor. GMS's QIs complemented but did not compete directly with NRC's personnel. One of the hats worn by GMS founder, John J. Gallagher, is that of director of the Center for Marine Environmental Protection at Massachusetts Maritime Academy, which is training spill response managers for, among others, ABS Marine Services, Inc., an affiliate of the American Bureau of Shipping. "A QI has to be like the tactician on a sailing racer," says one GMS source, "sea-savvy, with a hands-on knowledge of all the equipment being used, and an ability to manage people under pressure. The QI also needs a third eye, for the elements."

Jamestown Marine Services, Inc. (JMS), which has home offices in Jamestown, R.I., provides personnel to direct marine salvage and oil spill response operations. JMS has worked with the National Science Foundation since 1990 to develop regional and site-specific oil spill response contingency plans for all Antarctic areas and vessels within the U.S. Antarctic Program. The company has also begun a cooperative agreement for marine salvage and firefighting services with Weeks Marine Inc., in another adroit Weeks affiliation.

Compliance Systems, Inc. (CSI), of Savannah, Ga., is an oil spill response training and management group that evolved from the technical department of a ship management company. It is known for its environmental "Total Compliance Program" and for courses that help shipowners with the statutory training requirements of OPA '90. According to CSI, not one vessel enrolled in its compliance program has incurred a single monetary penalty.

SERVICE RESPONDERS

Besides nominating spill-responders, tanker operators whose vessels call at U.S. ports must also contract a qualified organization to supply lightering of cargo, fire-fighting, and salvage in the event of an emergency. Single companies and associations of

allied contractors offer service i: these areas [For specific listings, con sult The International Oil Spill Con trol Directory, available from Cutte Information Corp., (617) 641-5125].

MRA OFFERS "ONE-STOP SHOPPING"

The Marine Response Alliance (MRA), Seattle, offers "one stop shopping" to shipowners, who can call one telephone number [(206) 443-7900, 24 hours] for all types of marine emergencies. The MRA offers its clients such services as lightering, using pumps, fenders, hoses and tank barges kept in major U.S. ports; salvage—everything from refloating grounded vessels to underwater repairs and demolition—including damage surveys and computerized ship stability calculations; professional firefighting personnel with custom-engineered equipment, and emergency towing should a loss of power or steering occur. These services are possible through an alliance of Crowley Maritime Services, Marine Pollution Control, Moran Services Corporation, and Williams Fire and Hazard Control.

Crowley Maritime Services maintains a fleet exceeding 100 ocean-going tugs and 60 brown water tugs, 40 ocean oil barges, and 63 ocean tug barges. It operates the *American Salvor*, a well-known salvage vessel based on the West Coast.

Marine Pollution Control is an international spill control company specializing in portable, high-capacity emergency off-loading pumps, fendering, and firefighting equipment.

Moran Services Corporation provides shoreside expertise in towing, training personnel in pollution prevention, and spill response. It is a wholly-owned subsidiary of Moran Towing Corp., with 54 tugs performing worldwide ocean towing, rescue work off the Atlantic and Gulf coasts, and ship handling tug services in prominent ports on those coasts.

Williams Fire and Hazard Control is known globally for its fast, effective response to emergencies involving fire or hazardous materials, having developed firefighting equipment specifically designed for shipboard use.

The Marine Response Alliance makes P & I club-approved time and materials contracts available to clients in advance of an incident, so that shipowners may review them in a calmer mood than might prevail afterwards. **ML**

UNITED STATES COAST GUARD

CASUALTY REPORTING REQUIREMENTS

We are very grateful to Mr. Geoffrey S. Tobias of Ober Kaler Grimes and Shriver in Baltimore for this interesting article on US Coast Guard reporting regulations.

There are many instances where a vessel operator is required by law to contact the U.S. Coast Guard following a "marine casualty". Precisely what constitutes a "marine casualty" for these purposes is important. Certainly, it includes collisions, oil spills, personal injury, steering and/or engineering failures, groundings and other events affecting seaworthiness.

Unfortunately, however, there is no official definition of the phrase "marine casualty", no comprehensive listing of such events and no coherent set of rules specifying when and how such incidents must be reported. The following rudimentary guidelines might therefore assist Members through some of the maze!

After a marine casualty, a report must be made to the nearest US Coast Guard Marine Safety Office/Marine Inspection Office ("MSO/MIO") immediately; it must be followed, within five days of the incident, with a written report to the Coast Guard on Form 2692.

A review of the Code of Federal Regulations (C.F.R.) (Titles 33 and 46) provides basic guidance with regard to what type of marine casualties should be reported.

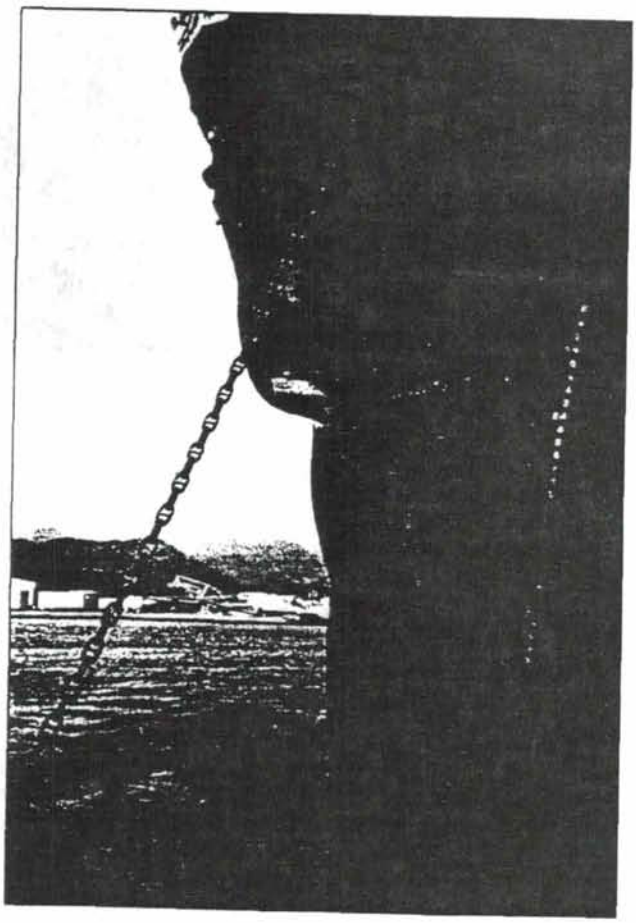
For example, the following list is found at 46 C.F.R. 4.05-1:

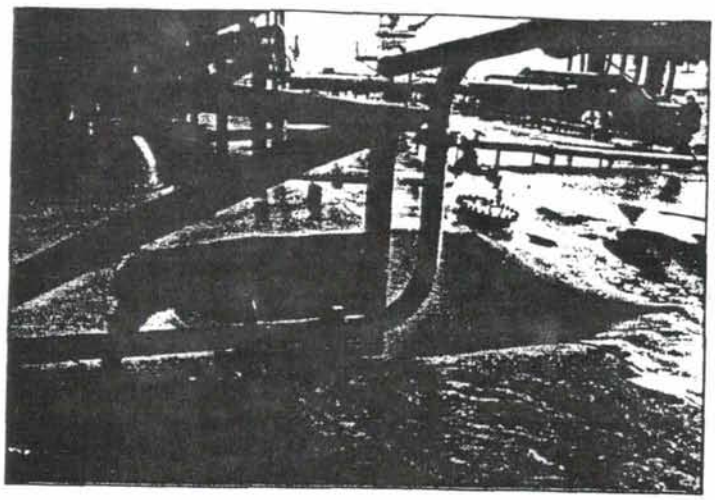
(a) accidental or intentional groundings;
(b) loss of propulsion or steering or any other loss which covers a reduction in manoeuverability;
(c) an occurrence materially and adversely affecting the vessel's seaworthiness;
(d) loss of life;
(e) any injury which requires professional medical treatment;
(f) Any occurrence not meeting the above criteria but resulting in damage (to vessels or shore structures)in excess of $25,000.

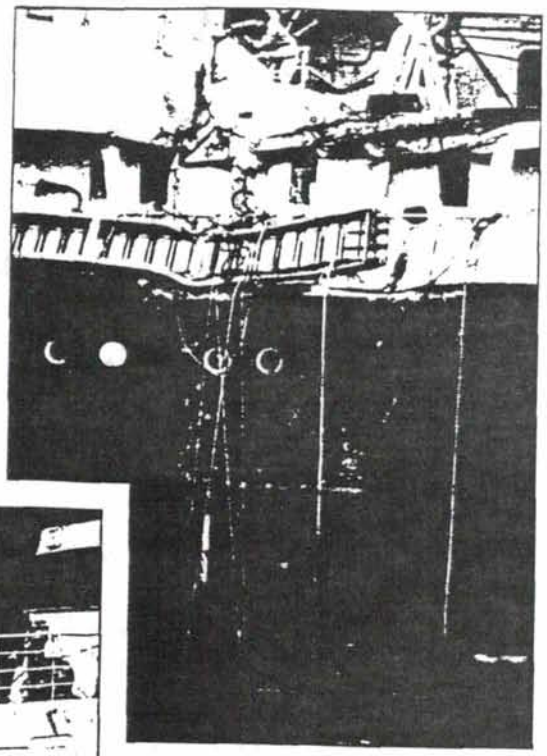
If Form 2692 is completed in a "timely" fashion, the oral notification requirement is considered satisfied (see 46 C.F.R. - 4.05-10(b)). This rule applies to all vessels - whether foreign or United States Flag - regardless of size.

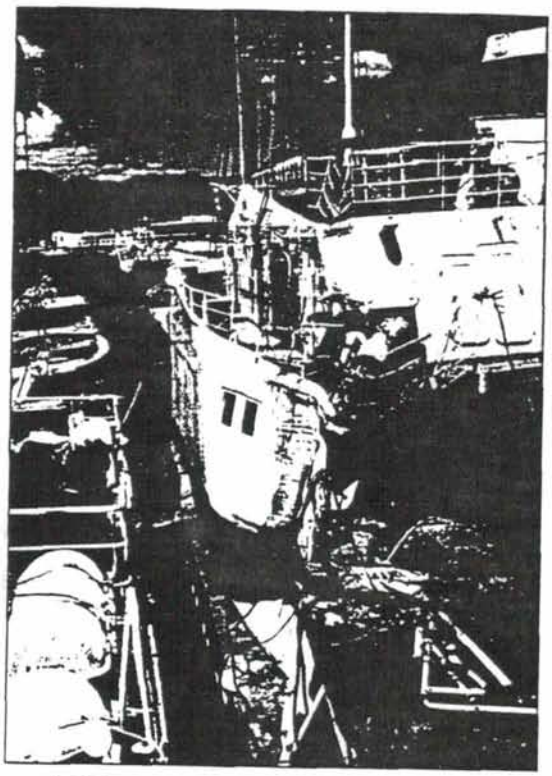
The above list, however, is not all-inclusive. For example, 33 C.F.R. - 160.215 provides additional guidance where "hazardous conditions exist on board". The relevant section of the Regulation states that whenever a hazardous condition exists on board a vessel, the owner or master is required to report the existence of such a condition to the nearest MSO/MIO "as soon as possible."

The owner's/master's report must be made regardless of how the hazardous condition came to









exist - ie: accident, mechanical failure, crew error or whatever.

When it is determined that a hazardous material (as defined in the Regulations) is involved in a marine casualty, the Secretary of Transportation must immediately be notified by phone, fax or telex. This must be followed up by a written report.

The Secretary of Transportation provides a toll free number, 800- 424-8802, to expedite the initial response. This number is a direct line to the National Response Centre located at Coast Guard Headquarters in Washington, D.C.

OTHER REQUIREMENTS

When a marine employer learns of a serious marine casualty, he is responsible for ensuring that everyone on board the vessel who was directly involved in the incident is tested for evidence of drug or alcohol use (46 C.F.R. - 4.06-1(b)). Personnel directly involved in a marine casualty are required to provide blood, breath and urine samples when directed to do so by a marine employer or a law enforcement officer.

If an individual refuses to submit to clinical tests, it should be recorded in the ship's log and noted on Form 2692B (Report of Required Chemical Drug And Alcohol Testing Following A Serious Marine Incident). Although no individual may be forcibly compelled to provide specimens, refusal is considered a serious violation and could subject that individual to a suspension or loss of his licence or seaman's papers.

All reports regarding individuals directly involved in a serious marine incident must be submitted on Form 2692B. The issue of drug and alcohol testing is complex and will be the subject of future articles in Britannia News.

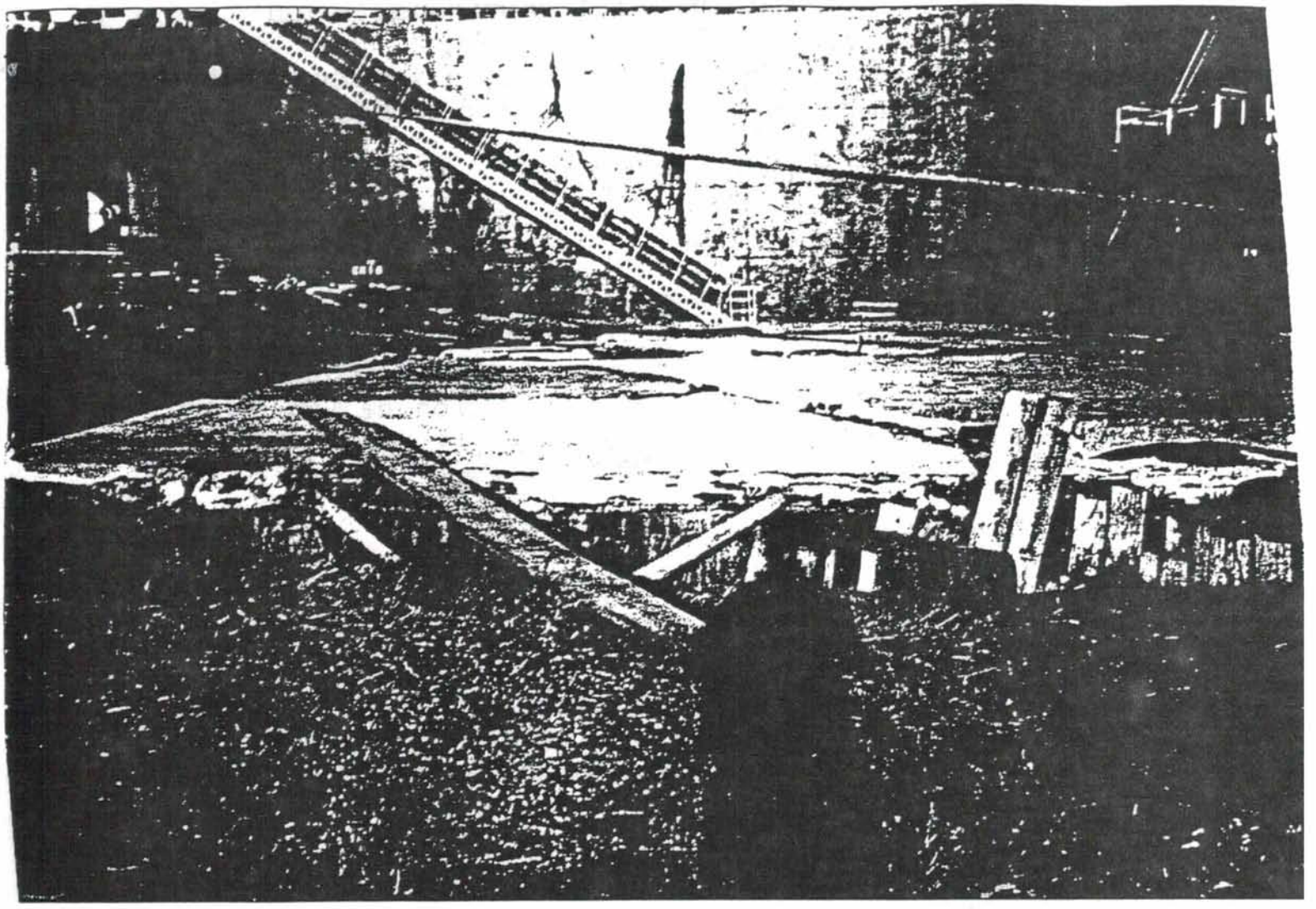
CONCLUSION

Once a marine casualty report has been made, the appropriate Coast Guard Office in receipt of the information will analyze the extent and nature of the casualty and determine whether other agencies or authorities must be informed.

It is the responsibility of the Coast Guard to notify other agencies of the incident - the mariner's reporting requirements are satisfied when the Coast Guard MSO/MIO is informed.

Often, Coast Guard personnel "on scene" may be impatient to have the Form 2692 prepared. Despite their insistence, it is often the best course to seek counsel before anything is provided to the authority in writing: a report, hastily prepared, could become an embarrassment.

Members should remember that reports to the Coast Guard are public records, available to anyone. If litigation should ensue from a casualty, the opposition is sure to examine the Coast Guard report (Form 2692) carefully.



ALL ASHORE!

We are grateful to Robert Brindle of ShipSafe International, Merseyside for this photograph showing the difficulties he recently faced in gaining access to a bulk carrier at Lake Charles.

The surveyor's shadow in the foreground points to a plank (on the left of the photograph) which provides access to a pontoon. The perspective of the photograph makes it hard to appreciate that there is about a four feet gap between solid land and the pontoon!

The pontoon surface is breaking up and it is littered with obstacles. A mooring line dips across the path of anyone attempting the crossing. Imagine trying to negotiate that route on a dark night!

Members will be well aware of the rigorously enforced International and Flag State regulations which require them to provide safe access to their vessels at all times. It is therefore very frustrating for them frequently to witness examples such as this where the same standards do not seem to apply to the shoreside facility.

Crewmembers going to and from the ship might easily be injured, giving rise to a possible claim against the shipowner for compensation! The only option for the shipowner is for him to instruct his masters to refuse shore-leave for all crewmembers where it appears that access routes are unsafe.

This is good advice, of course, but unlikely to be followed in practice. We can only hope that the relevant authorities apply the regulations to ship and shore with equal vigour. What is good for the goose ought to be good for the gander!*

(*An English expression meaning that the same "rules" should apply equally to everyone.)

Date: Thu, 9 Mar 1995 13:38:30 -0800 (PST) From: Robert Hinton <hinton@ocean.washington.edu> To: Paul Ljunggren <marsupt@lamont.ldgo.columbia.edu>, Dick Pittenger <rpittenger@whoi.edu> Cc: Robert Hinton <hinton@ocean.washington.edu> Subject: H.R. 411 - Radio Officers
Mime-Version: 1.0
Content-Type: TEXT/PLAIN; charset=US-ASCII

Paul--

You asked for items that might be of interest for the newsletter. If you go into the World Wide Web under HOUSE.GOV, you will find that there's the following bill which pertains to radio officers. It's rather lengthy, so if somebody wants to read the whole thing they should probably call it up on the Web. But the following are the pertinent aspects.

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H.R. 411

BILL TITLE:

To supersede the Modification of Final Judgment entered August 24, 1982, in the antitrust action styled United States v. Western Electric, Civil Action No. 83-0192, United States District Court for the District of Columbia; to amend the Communications Act of 1934 to regulate the manufacturing of Bell operating companies, and for other purposes.

IN THE HOUSE OF REPRESENTATIVES
JANUARY 4, 1995

Mr Dingell (for himself, Mr Markey, and Mr Conyers) introduced the following bill; which was referred to the Committee on Comerce and, in addition, to the Committee on the Judiciary, for a period to be subsequently determined by the Speaker, in each case for consideration of such provisions as flal within the jurisdiction of the committee concerned.

Sec. 408. AUTOMATED SHIP DISTRESS AND SAFETY SYSTEMS Notwithstanding any provision of the Communications Act of 1934, a ship documented under the laws of the United States operating in accordance with the Global Maritime Distress and Safety System provisions of the Safety of Life at Sea Convention shall not be required to be equipped with a radio station operated by one or more radio officers or operators.

Standardized Vessel Inspections: A 'Win-Win' Situation

Legislative, Regulatory Activities Driving Need for Higher Level of Inspections

By Joseph A. Keefe
Gulf Coast Regional Office Manager
International Marine Consultants Inc.
Houston

Once again, the maritime industry has placed the spotlight on vessel inspections. This is largely due to the heightened emphasis on quality assurance, further precipitated by a wave of legislative and regulatory activities from various industry sectors. There is continuous refinement of the Oil Pollution Act of 1990 and the U.S. Coast Guard—for its part in assuring safer, more environmentally sound transportation—has stepped up its marshalling for substandard vessels.

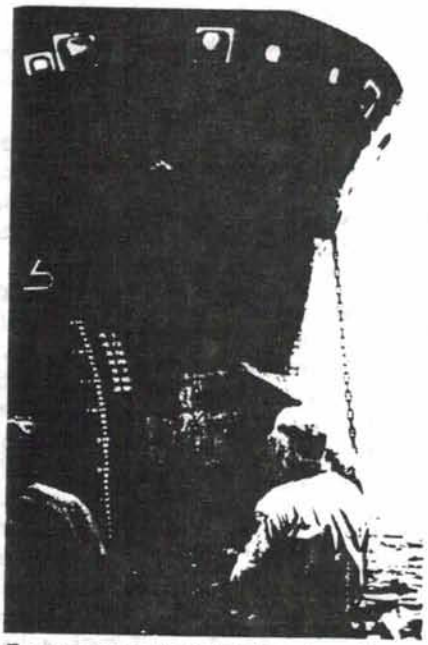
New vessel compliance initiatives announced by Secretary of Transportation Federico Peña, coupled with recent "safety of life at sea" amendments by the International Maritime Organization's Maritime Safety Committee, are also causing many ship owners, operators, and charterers to reconsider the nature of their vessel vetting policies and procedures.

One conclusion almost universally drawn is that what may have been adequate in the past no longer suffices.

Not only are there more substantial penalties being levied but the consequences of a poorly maintained and operated vessel are constituting graver, long-term economic impacts. Today, more than ever before, it is essential that a new and higher level of vessel inspections be instituted.

Demanding New Inspection Criteria

There is not a major maritime organization, classification society, or P&I club that has not touted the need for quality assurance certification. As a result, many vessel operators are scrambling to meet the certification qualifications of the International Standards Organizations (ISO 9000), International Ship Managers Association (CSS), International Maritime Organization (IMO 680), or other quasi-regulatory bodies. They recognize that certification will become a prerequisite for staying competitive and remaining in business. The underwriters are beginning to demand certification and the marketplace is becoming increasingly more sensitive to this criterion when selecting a vessel owner/operator.



Four eyes can be better than two. Here a team of inspectors examines a vessel's hull for corrosion and coating fatigue or failure.

In the past, inspections were conducted on an infrequent to non-existent basis depending upon the company. Now, most of the major players are having their vessels inspected on an average of once annually. While this may be an improvement, it still falls well short of the real considerations that must be given to an effective vessel inspection program. For starters, the inspection process for any given fleet must be regarded as evolving with changing criteria based on various factors ranging from material condition, repair history, and vessel service, to personnel, transportation routes, and past exposures. This said, there still should be a move toward standardizing the vessel inspection process with more attention paid to quality of inspections versus the quantity.

As things stand now, inspections are subject to many different criteria and subjective, arbitrary analysis, all of which encumber fair and effective vessel surveys. Within the oil industry alone—which to its credit is giving more than mere lip serve to better quality vessel surveys—many different inspection parameters are in use. Five different oil concerns might utilize a similar number of inspection formats for their inspection parameters.

Weighing Condition, Human Factors

With regard to older vessels, now comprising a large percentage of the world's fleet, there should be strong consideration to age, but the main emphasis should be on detecting bad tonnage. A vessel's age is generally considered to be a factor at 15 years. For older vessels that have changed class, a red flag should go up, signaling the need to assess material composition, hull structure, repairs and reinforcements, and the vessels' previous service and operating environment.

Relating to the material condition of a vessel, inspections are typically performed by one individual covering

the entire vessel, above deck, on deck, its cargo aspects, and engine room. A better alternative would be to use a team approach with different individuals inspecting those areas of the vessel for which they have the experience, appropriate degrees, and licenses. Depending upon the caliber of the inspecting personnel, two individuals may be more than adequate.

The optimum vessel inspection program will carefully survey the strength and fatigue of the hull and presence of coating corrosion and consider these characteristics in terms of the vessel's intended service (e.g., in salt or fresh water, parcel shipments, dry cargo or crude products, discharging requirements, etc.). Areas on the vessel sighted to have experienced excessive and/or obvious coating failure or fatigue might warrant more close scrutinization with other methods.

Pertaining to the vessel's equipment, it should be reviewed both in terms of its function as well as the design/build specifications of the classification societies and marine architects. Additionally, all equipment from the cargo piping to inert gas, mechanical, safety, and communications systems should be evaluated in accordance with manufacturers' performance specifications.

Recent years have seen a growing number of vessels crewed by as many as eight different nationalities. This absence of a common language among crew members at best causes communications problems and, in worst case scenarios, could create potentially dangerous situations placing human life, vessels, and their cargoes in jeopardy. A sound vessel inspection program will assess this communications factor as well as the crew's overall competency, its handling of routine functions, and emergency skills.

When scrutinizing the vessel's crew, the inspection should be looking for minimum, "benchmark" qualifications in terms of licenses, seaman's ratings on vessels, and overall experience. Specific questions should be asked of crew members in an effort to assess their knowledge and compliance of proper protocol as well as their response to various contingencies and emergency situations. While the inspection should strive to query as many members of the crew as possible, the time allotted for it will be a function of both budgetary and scheduling factors.

If truly serious, however, about raising the level of vessel inspections, there will have to higher value placed on them—both figuratively and literally.

Key Procedures

To promote the maximum quality vessel inspection, a recognized and standardized method should be established. Then, operating under the assumption that it will be used, there are several other steps to assure improved inspections.

- Alert the ship that an inspection will be conducted and that full protocol should be followed, setting up a climate for cooperation
- Send the right individual(s), ideally a team, to conduct the inspection
- Using an integrated approach, make certain that all areas of the vessel are evaluated by the best qualified individual(s)
- Photographs and video can and should be used to document the inspection's findings and to help facilitate optimum repairs and corrective measures, when needed
- Bring any deficiencies noted to the immediate attention of the vessel master and the party contracting the inspection (i.e., vessel owner, ship manager, operator, and charterer)
- Provide the report in an easy-to-follow format such as a checklist, which is expanded upon with narratives to provide further clarification where required
- The report should be forthcoming in a timely fashion so that its findings can be acted upon promptly.

All of the focus on vessel inspections should not be regarded as evidence that no one is currently following an effective inspection program. There are many ship owners and operators whose inspection programs exceed what have previously been considered acceptable practice. One market segment in particular, which has elevated vessel inspections to a higher level, is the oil industry. An example can be cited in the CITGO Petroleum Corp. (Tulsa, Oklahoma) vessel inspection initiative.

As a major player in the oil transportation industry, CITGO utilizes qualified in-house personnel—as well as carefully selected professionals from International Marine Consultants on a consultancy basis—pursuing an aggressive vessel inspection program. The ultimate goal of the program is to ensure that every vessel that calls at a CITGO facility, whether or not chartered by CITGO, is fully inspected and approved prior to berthing.

Already in place and paying dividends in the small tank barge trades

the program is being formalized for larger tank vessels and crude carriers.

Additionally, CITGO currently requires competent marine technical attendance on a 24-hour, around-the-clock basis on all sea-going tank vessels that call at its berth. This attendance is provided by professionals possessing a minimum of a master mariner's license as well as sailing experience on tank vessels. Effectively, this program provides oversight and inspection of all vessels, some of which call at CITGO facilities on a regular basis.

According to first quarter 1994 statistics recently released by the Institute of London Underwriters (ILU), merchant ship casualties were up over the same period in 1993. Specifically, the ILU figures, which pertained to ships in excess of 500 gross tons, recorded 24 ship losses (either as total losses or constructive total losses). Cited in the report were expensive hull total losses, fires and explosions, and groundings—with a total of 179 people killed or reported missing as a result of the casualties during the cited period.

The ILU report certainly isn't the whole picture.

But the industry isn't focusing on quality assurance issues because every vessel out there is meeting high standards of safety. There is a need. Furthermore, there are quantifiable benefits to be gained by all providers and users of marine transportation services. In addition to reducing accidents and casualties, standardized, high quality vessel inspections will help the maritime and shipping industry contain vessel-operating, maintenance, repair, and insurance costs. Quality vessel inspections are rewarded by direct insurance premium reductions. The most compelling incentive, however, is probably that which says: if your vessel is not being inspected to the right standards, it probably won't be used. /st/

Joseph A. Keefe holds a Coast Guard license as chief mate of ocean-going steam and motor vessels. With a bachelor of science degree in marine transportation from Massachusetts Maritime Academy, he gained more than 15 years of experience at sea and in marine operations and surveying. Keefe has conducted evaluations and audits of marine terminals and shipboard procedures, developed operations manuals, and conceived oil spill control countermeasures plans.

Comparing

Design, Performan Electronically Bean

By Dr. Chester D. Loggins
Senior Acoustics Analyst
Sonatech Inc.
Santa Barbara, California

Many ships and nearly all unde water vehicles, whether mann or ummanned, are equipped with ahead-look sonar (ALS). The mo common application is obstacle av dance, although in some manned und water vehicles the ahead-look son also provides mine-detection and re dezvous and docking capabilities. T ALS is also used to provide termin guidance in some specialized und water vehicles.

Several types of ahead-look sona with a range of performance capab ties are commercially available. The sonars may be grouped into two gene categories: electronically beamform and multiple preformed beam.

The mechanically scanned ALS co prises a third category. These sona which consist of a single preform beam mechanically swept over t coverage sector, will not be discuss since they seldom meet the ima update rate requirements for applic tions of interest.

Both electronically beamformed a multiple preformed beam ahead-lo sonars share two common design fe tures. First, the hydrophone verti beam width is greater than that of t projector or projectors. Second, a s gle projector insonifies the entire ho zontal field-of-view (FOV) or covera sector.

ALS performance is determined sonar parameter values and not by t technique used to form the beams. discussed below, electronically bea formed designs are better suited