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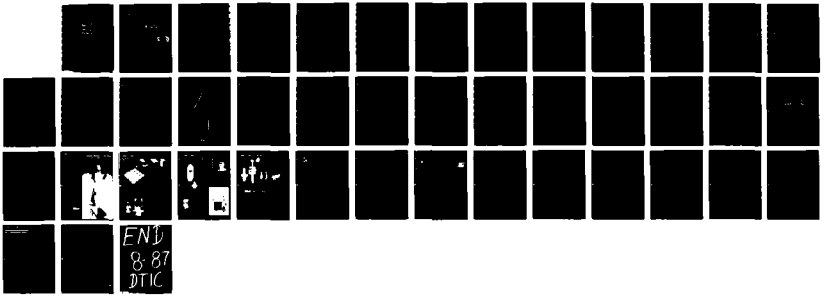

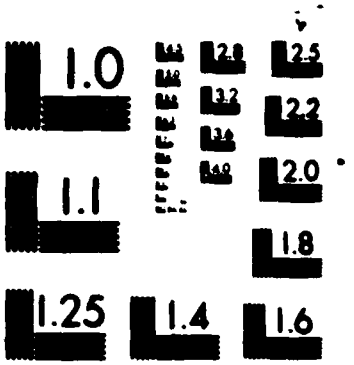

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N62477-76-C-0180

OPERATIONS AND MAINTENANCE MANUAL

FOR THE

EAST COAST AIR COMBAT MANEUVERING RANGE
OFFSHORE KITTY HAWK, NORTH CAROLINA

Prepared By

CREST ENGINEERING, INC.
Tulsa, Oklahoma

January 1977
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SECTION 1

FACILITY DESCRIPTION

1.1 GENERAL

The sea based portion of the East Coast Air Combat Maneuvering Range is comprised of four structures located in the Atlantic Ocean offshore Kitty Hawk, North Carolina at the positions given in the "as-built" drawings. The general configuration and approximate location are shown in Figures Nos. 1 and 2 respectively. The structures were procured under NAVFAC Contract N62477-76-C-0180 in accordance with NAVFAC Specification 21-76-0180 and the NAVFAC Drawings listed as follows:

NAVFAC DRAWING NO.	TITLE
3016261	Title Sheet
3016262	Drawing Index
3016263	Vicinity Plan
3016264	Assembly Drawing - 81 ft MLW Platform
3016265	Jacket-Elevations
3016266	Jacket-Plan at El. (+) 12'-0"
3016267	Jacket-Plan at El. (-) 13'-0" & (-)47'-0"
3016268	Jacket-Plan at El. (-) 81'-0"
3016269	Jacket-Joint Can Details
3016270	Jacket-Pile Shims & Leg Connection
3016271	Jacket-Flooding System
3016272	Jacket-Lift Eye Detail
3016273	Jacket-Anode Details
3016274	Jacket-Boat Landing

3016275	Jacket-Boat Landing Details
3016276	Jacket-Boat Fender Details
3016277	Jacket-Pile Details
3016278	Superstructure-Elevations
3016279	Superstructure-Upper Deck Framing, Deck Plate and H.R. Layouts
3016280	Superstructure-Equipment Deck Framing, Deck Plate and H.R. Layouts
3016281	Superstructure-Details
3016282	Superstructure-Sections & Handrail Details
3016283	Superstructure-Stairway No. 1
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3016287	Superstructure-Details Stairway No. 1
3016288	Superstructure-Miscellaneous Details
3016289	Assembly Drawing - 93 ft MLW Platform
3016290	Jacket-Elevations
3016291	Jacket-Plan at El. (+) 12'-0"
3016292	Jacket-Plan at El. (-) 13'-0" & (-) 39'-0"
3016293	Jacket-Plans at El. (-) 66'-0" & (-) 93'-0"
3016294	Jacket-Joint Can Details
3016295	Jacket-Pile Shims & Leg Connection
3016296	Jacket-Flooding System
3016297	Jacket-Lift Eye Details
3016298	Jacket-Anode Details
3016299	Jacket-Boat Landing

3016300	Jacket-Boat Landing Details
3016301	Jacket-Boat Fender Details
3016302	Jacket-Pile Details
3016303	Superstructure-Elevations
3016304	Superstructure-Upper Deck Framing, Deck Plate & H.R. Layout
3016305	Superstructure-Equipment Deck Framing, Deck Plate & H.R. Layout
3016306	Superstructure-Details
3016307	Superstructure-Sections & Handrail Details
3016308	Superstructure-Stairway No. 1
3016309	Superstructure-Stairway No. 2
3016310	Superstructure-Stairway No. 3
3016311	Superstructure-Stairway No. 4
3016312	Superstructure-Details Stairway No. 1
3016313	Superstructure-Miscellaneous Details
3016314	Assembly Drawing - 105 ft MLW Platform
3016315	Jacket-Elevations
3016316	Jacket-Plan at El. (+) 12'-0"
3016317	Jacket-Plan at El. (-) 13'-0" & (-) 41'-0"
3016318	Jacket-Plans at El. (-) 73'-0" & 105'-0"
3016319	Jacket-Joint Can Details
3016320	Jacket-Pile Shim & Leg Connection
3016321	Jacket-Flooding System
3016322	Jacket-Lift Eye Details

3016323	Jacket-Anode Details
3016324	Jacket-Boat Landing
3016325	Jacket-Boat Landing Details
3016326	Jacket-Boat Fender Details
3016327	Jacket-Pile Details (Platform 3)
3016328	Jacket-Pile Details (Platform 4)
3016329	Superstructure-Elevations
3016330	Superstructure-Upper Deck Framing, Deck Plate & H.R. Layouts
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3016336	Superstructure-Stairway No. 3
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3016345	Superstructure-Aids to Navigation

for p1.01

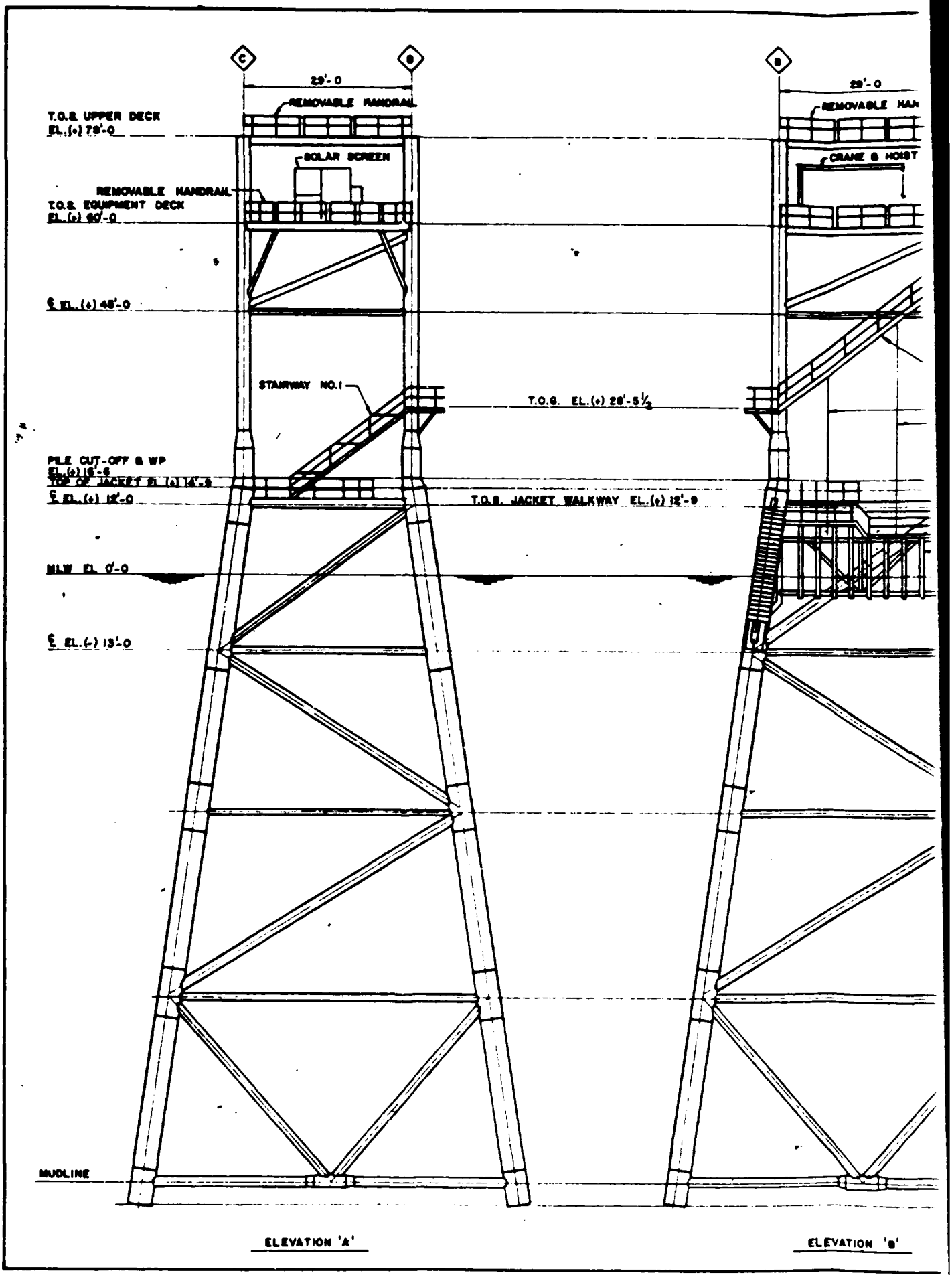
1.2 BASIC STRUCTURE

The four ocean structures are of the same general configuration, triangular in planform but varying in overall height as dictated by the water depths at their respective locations. The structures are of welded steel construction and fabricated in units, each structure consisting of a superstructure, a jacket, piling and appurtenances.

Ferrous material used in the fabrication of the structures is, in general, ordinary carbon steel, ASTM A36 or equivalent having a yield strength of 36 kips per square inch (ksi). The one significant exception is the material used in the construction of tubular members in the vicinity of the connection of intersecting members. The material used in these joint cans is normalized low-alloy steel, ASTM A633 Grade A or API Spec 2H (Fy = 42 ksi).

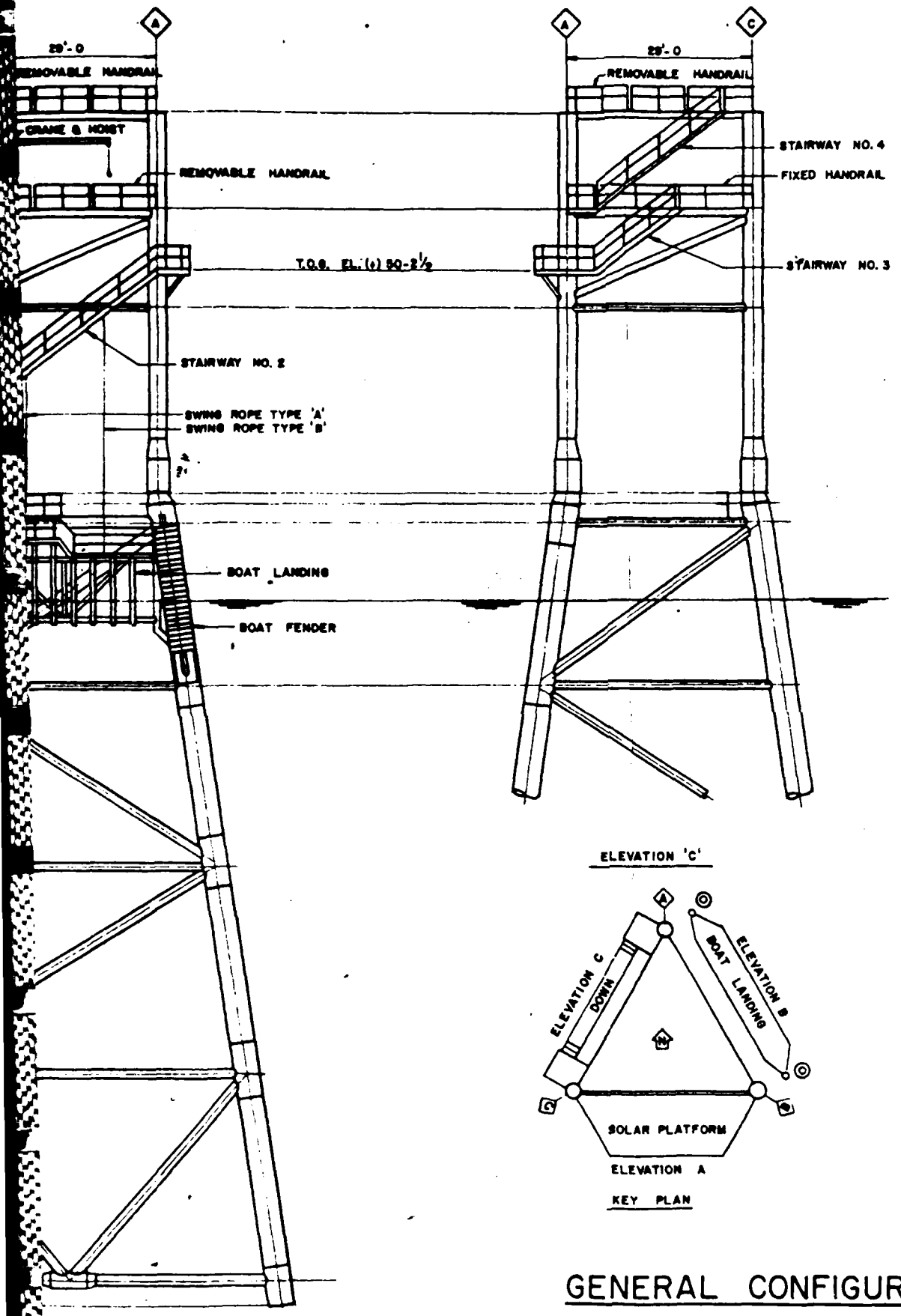
The four superstructures are identical, each being comprised of two decks of beam/plate construction supported by tubular columns. The columns, laced together with Z-braces occurring immediately below the lower deck, extend from the upper deck to the top of the templet and are sufficiently long to place the lower deck well above the crest of the design storm wave. Access to the decks is provided by a stairway from the boat landing level to the upper deck.

The jackets are constructed as trussed space-frames having tubular members and battered faces. Their overall height is such that each exceeds the mean low water depth at their respective sites by a prescribed amount. Each jacket is affixed to the ocean floor by means of piling driven through the jacket columns into the ocean floor and subsequently attached to the top of the jacket by welding.



ELEVATION 'A'

ELEVATION 'B'



ATION 'B'

ELEVATION 'C'

ELEVATION A

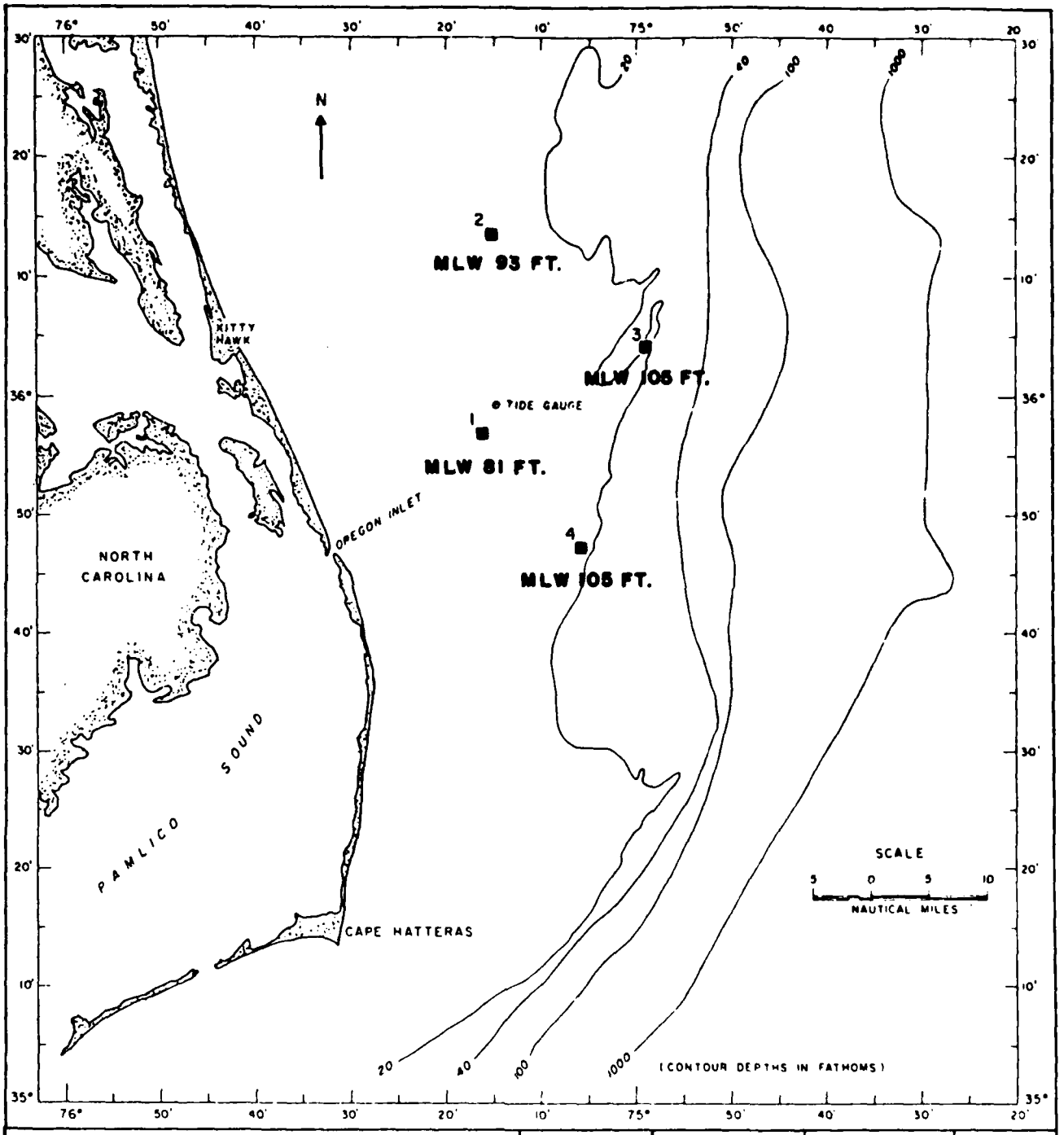
KEY PLAN

GENERAL CONFIGURATION

1.06

FIGURE 1

Figure 2. Index Map Showing Approximate Location of Towers



Structure No.	1	2	3	4
Distance to Shore (Nau. Miles)	16.0	23.5	31.5	20.0
Distance to Cape Henry (Nau. Miles)	70.0	57.0	73.0	83.0

1.3 APPURTENANCES

1.3.1 Construction Material. Ferrous materials used in the construction of appurtenant structures is 36 ksi yield strength carbon steel.

1.3.2 Boat Landing. The boat landing is of welded steel construction fabricated using structural pipe. The vertical pipe members on the seaward face of the boat landing are filled with 3 ksi ultimate strength concrete. To allow for tidal fluctuation in water depth, the landing has been provided with walkways at two elevations to accommodate transfer between structure and boat.

1.3.3 Boat Fenders. The boat fenders are of welded steel construction fabricated using structural pipe. The vertical pipe is filled with 3 ksi ultimate strength concrete and enclosed with replaceable used truck tires (20 X 10).

1.3.4 Decks. The decks are made using 1/4-inch thick checkered floorplate supported by W-shape beams.

1.3.5 Walkways and Stair Thread. Walkways at the top of the templet and stairtreads are made of galvanized steel bar grating (1-inch X 3/16-inch).

1.3.6 Handrails, Ladders and Stairs: These are of welded steel construction and are hot dip galvanized following construction.

1.4 EQUIPMENT

1.4.1 Swing Ropes. Swing ropes are made of 1-inch diameter 3-strand No. 1 water flex manila rope knotted on 2-foot spacing and attached to 3/8-inch galvanized steel cable.

1.4.2 Fall Prevention Device. The fall prevention device consists of a notched steel rail welded to the ladder, a steel slide mechanism

which fastens to the rail, and a safety belt with lanyard and snap ring for attachment to the slide mechanism. A brochure for the device is found in Section 4.

1.4.3 Winch Hoist Assembly. The winch hoist assembly, brochures for which appear in Section 4, consists of the following:

... a two-ton floor-mounted jib crane with a boom swing of 360 degrees controlled by a manually operated gear pivoting mechanism.

... A two-ton hand-operated two-speed winch with a single drum and an automatic brake.

... Galvanized standard improved plow steel cable, 120 feet in length, having an ultimate load rating of ten tons (working load, two tons).

... A two-ton quick-release galvanized steel hook.

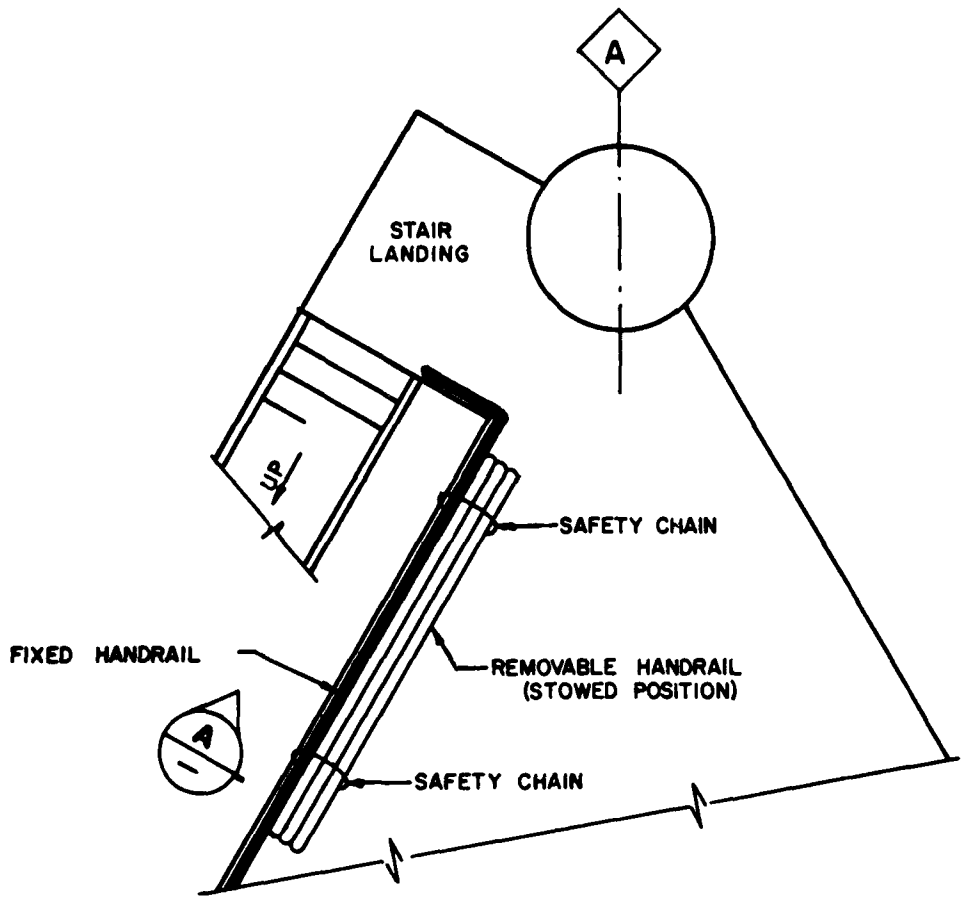
... Two galvanized steel sheave blocks with bronze sleeve bearings having an ultimate load rating of ten tons (working load, two tons).

... A two-ton hand-operated chain hoist trolley mounted on the jib crane boom.

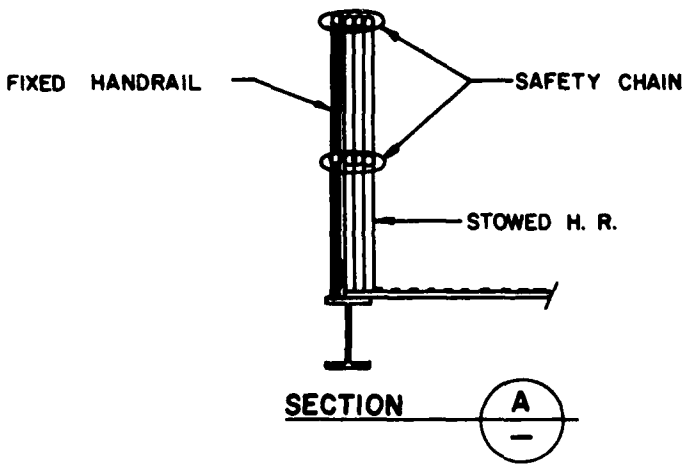
The following items concern the operation of the winch hoist assembly:

... The winch hoist assembly shall be lashed to Column A when not in operation by inserting the hoist hook into the ring provided on Column A and cranking the cable taut.

... The removable rails, Panels B, shall be removed as required and lashed to the fixed handrail between

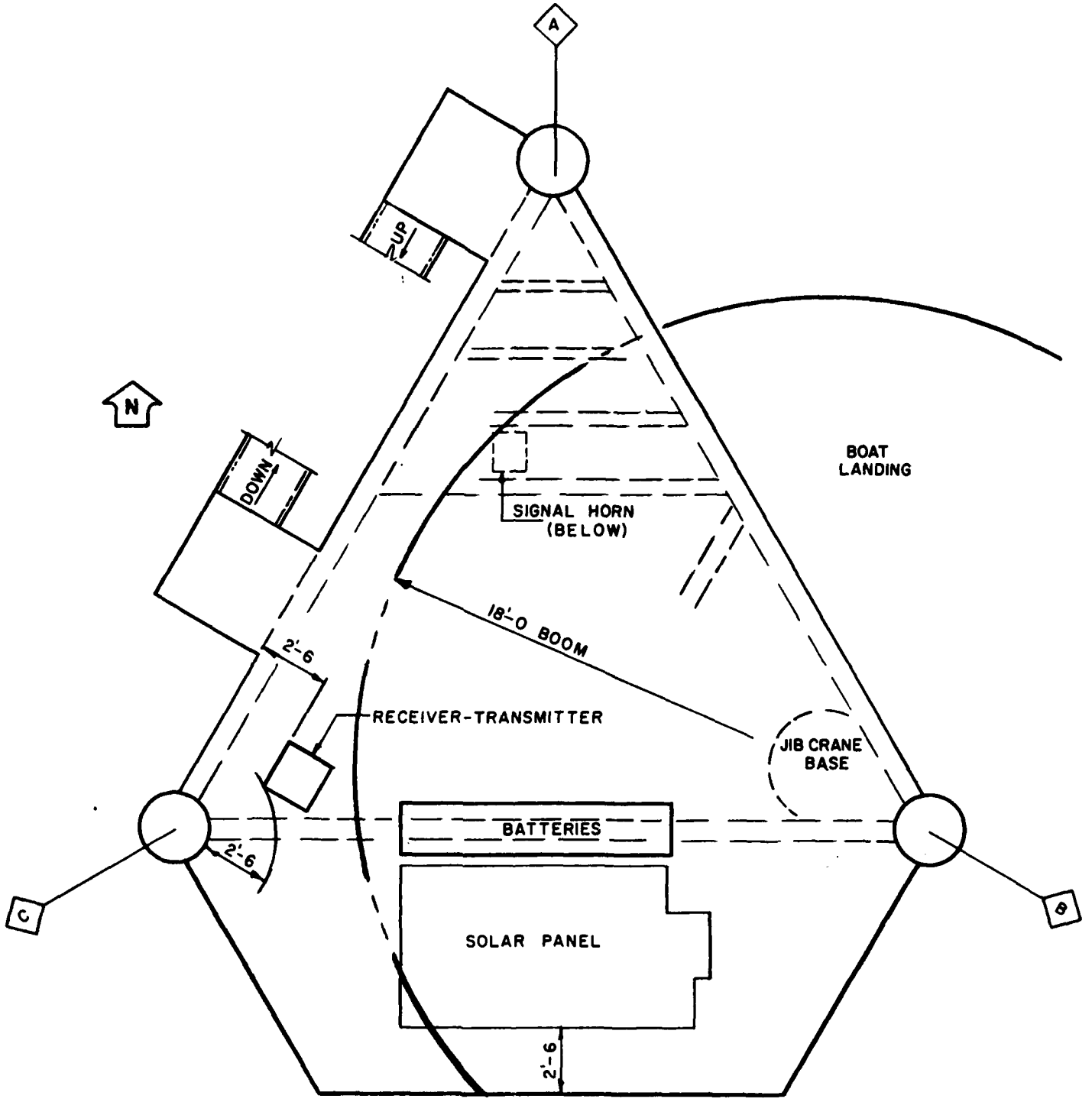


PARTIAL PLAN AT EQUIPMENT DECK



REMOVABLE HANDRAIL LOCATION & STORAGE
EQUIPMENT DECK

FIGURE 3



EQUIPMENT DECK ILLUSTRATING CRANE REACH

FIGURE · 4

Column A and Column C with small-gauge chain as shown in Figure 3.

... The reach of the crane is 18.0 feet and is illustrated in Figure 4.

... An equipment deck loading of 150 psf shall not be exceeded.

1.4.4 Aids to Navigation. The aids to navigation for each structure are Class A systems as per Title 33, Sub-Chapter C, Part 67 and include three marine lanterns and one two-mile sound signal, all battery powered. Brochures are included in Section 4.

1.4.5 Antennas (Description to be provided by others).

1.4.6 Power Equipment (Description of solar panels batteries and battery box to be provided by others).

1.5 CORROSION PROTECTION

1.5.1 Coatings. All free surface areas above a minus 6 feet Mean Low Water (MLW) are sand blasted and coated using the paint system(s) described in Section 4.

1.5.2 Excess Thickness. The wall thickness of jacket columns and diagonal braces between minus 6 feet MLW and plus 11 feet MLW are 1/2 inch thicker than required by design calculations so as to allow for corrosion.

1.5.3 Cathodic Protection. The submerged portion of the structures including the piling are afforded corrosion protection by sacrificial anodes as described in Section 4.

SECTION 2

INSPECTION PLAN

2.1 STRUCTURE-ATMOSPHERIC ZONE

The following items shall be subjected to annual visual inspections:

... Painted surfaces shall be inspected for damage, blistering, and peeling. Areas subject to wear shall be inspected for thickness.

... Galvanized surfaces shall be inspected for breaks in the coating.

... Structural members and appurtenances shall be inspected for damage.

... Swing ropes shall be inspected for broken strands and fraying.

... Boat fender tire columns shall be inspected for cracked, broken, shredded, or tattered tires that would eliminate the energy absorbing capability of the boat fender.

2.2 STRUCTURE-SUBMERGED ZONE

The following shall be subjected to semi-annual visual inspection:

... Sacrificial anodes shall be inspected for material corrosion. A sample anode at each elevation shall be examined for corrosion. If the perimeter of the anode measures twenty inches or less at any location along the anode, it is to be replaced, and the remaining anodes at that elevation inspected.

... Structural members and welds shall be inspected visually for pitting and other damage.

... Soils around the base of the structure shall be examined for scour. Scour in excess of five feet shall be repaired as described in Section 3.

... Structural members of the jacket shall be examined for marine fouling. Marine fouling shall not exceed 0.75 inches in thickness. (See Section 3 for removal.)

2.3 EQUIPMENT

The following shall be subjected to quarterly inspections:

... The three marine lanterns shall be inspected for lamp replacement for their lampchangers.

... The two-mile signal shall be checked for signal emission.

... Batteries shall be examined for corroded terminals and weak cells.

... Winch hoist assembly shall be inspected for visable damage and corrosion.

... Solar panels shall be examined for visable damage and air born deposits which would mask panels thereby reducing efficiency.

2.4 INSPECTION CHECKLIST

Each inspection conducted by the Government shall be recorded and documented. Example checklists for recording each annual, semi-annual, and quarterly inspection are illustrated in Figures 5, 6, and 7, respectively.

INSPECTION CHECKLIST
EAST COAST ACMR OCEAN STRUCTURES
ANNUAL INSPECTION

INSPECTION	ITEM	REPAIR REQUIRED	LOCATION ON STRUCTURE	REPAIR COMPLETED	
PAINTED SURFACE INSPECTION	TOP DECK				
	EQUIPMENT DECK				
	DECK LEGS AND BRACING				
	BOAT LANDING				
	BOAT BUMPERS				
	SPLASH ZONE AREA				
	HANDRAIL AND STAIRWAYS				
GALVANIZED SURFACE INSPECTION	STAIRWAY NO. 1 AND LANDING				
	STAIRWAY NO. 2 AND LANDING				
	STAIRWAY NO. 3				
	STAIRWAY NO 4				
	HANDRAILS & GRATING - EL (+) 12'-9				
	HANDRAILS - EL (+) 60'-0				
	HANDRAILS - EL (+) 75'-0				
ATMOSPHERIC ZONE STRUCTURAL DAMAGE INSPECTION	TOP DECK				
	EQUIPMENT DECK				
	DECK LEGS AND BRACING				
	BOAT LANDING				
	BOAT BUMPERS				
	SPLASH ZONE AREA				
	HANDRAILS AND STAIRWAYS				
SWING ROPE INSPECTION	SWING ROPES				
BOAT FENDER TIRES INSPECTION	BOAT FENDER TIRES				

FIGURE 5

INSPECTION CHECKLIST EAST COAST ACMR OCEAN STRUCTURES SEMI-ANNUAL INSPECTION		REPAIR REQUIRED	LOCATION ON STRUCTURE	REPAIR COMPLETED	
INSPECTION	**ITEM**				
SACRIFICIAL ANODE INSPECTION	ANODES - EL. (-) _____				
	ANODES - EL. (-) _____				
	ANODES - EL. (-) _____				
	ANODES - EL. (-) _____				
	ANODES - EL. (-) _____				
SUBMERGED ZONE STRUCTURAL DAMAGE AND WELD INSPECTION (VISUAL)	STRUCTURE BETWEEN EL.(+) 12'-0 & EL.(-) 13'-0				
	STRUCTURE AT LEVEL 1 - EL.(-) 13'-0				
	STRUCTURE BETWEEN LEVEL 1 & LEVEL 2				
	STRUCTURE AT LEVEL 2 - EL.(-) _____				
	STRUCTURE BETWEEN LEVEL 2 & LEVEL 3				
	STRUCTURE AT LEVEL 3 - EL.(-) _____				
	STRUCTURE BETWEEN LEVEL 3 & LEVEL 4				
	STRUCTURE AT LEVEL 4 - EL.(-) _____				
	JOINTS AT LEVEL 1 - EL.(-) _____				
	JOINTS AT LEVEL 2 - EL.(-) _____				
	JOINTS AT LEVEL 3 - EL.(-) _____				
	JOINTS AT LEVEL 4 - EL.(-) _____				
SOIL SCOUR INSPECTION	SOIL SCOUR AROUND BASE				
MARINE FOULING INSPECTION (VISUAL)	STRUCTURE BETWEEN EL.(+) 12'-0 & EL.(-) 13'-0				
	STRUCTURE AT LEVEL 1 - EL.(-) 13'-0				
	STRUCTURE BETWEEN LEVEL 1 & LEVEL 2				
	STRUCTURE AT LEVEL 2 - EL.(-) _____				
	STRUCTURE BETWEEN LEVEL 2 & LEVEL 3				
	STRUCTURE AT LEVEL 3 - EL.(-) _____				
	STRUCTURE BETWEEN LEVEL 3 & LEVEL 4				
	STRUCTURE AT LEVEL 4 - EL.(-) _____				

2.04

FIGURE 6

INSPECTION CHECKLIST EAST COAST ACMR OCEAN STRUCTURES QUARTERLY INSPECTION		REPAIR REQUIRED	LOCATION ON STRUCTURE	REPAIR COMPLETED	
INSPECTION	ITEM				
MARINE LANTERN INSPECTION	MARINE LANTERN - COLUMN A				
	MARINE LANTERN - COLUMN B				
	MARINE LANTERN - COLUMN C				
SOUND SIGNAL EMISSION INSPECTION	SOUND SIGNAL EMISSION				
BATTERIES					
WINCH HOIST	CABLES				
	WINCH				
	SWING CONTROL				
	CHAIN HOIST				
SOLAR PANEL	SYSTEM 'A' - 24 MODULE				
	SYSTEM 'B' - 11 MODULE				
	SYSTEM 'C' - 3 MODULE				
	NAV. AID - 18 MODULE				

2.05

FIGURE 7

SECTION 3

REPAIRS

3.1 COATINGS

Damaged coatings shall be repaired as follows:

... Painted surfaces.

(a) Final and/or tie coats damaged but base coat undamaged shall be repaired by removing damaged coating by power wirebrushing and reapplying the final and/or tie coats.

(b) Coating damaged to base metal shall be repaired by cleaning damaged area to white metal and applying, base, tie and final coats.

(c) Care shall be taken to avoid damaging the coatings surrounding repaired areas and to assure complete tie-in of the coating with surrounding areas.

(d) All cleaning and painting shall be in accordance with Section 09090 of Specification 21-76-0180 using the paint system given in Section 4.

... Galvanized surfaces.

(a) Zinc-coatings that have been damaged shall be repaired by the application of a galvanizing repair paint conforming to MIL-P-21035.

(b) Areas to be repaired shall be thoroughly cleaned and shall not be heated.

(c) Repaired galvanized surfaces shall be painted in accordance with Section 09090 of Specification 21-76-0180.

3.2 STRUCTURAL DAMAGE

Structural damage must be assessed prior to prescribing repairs.

3.3 SWING ROPES

Swing ropes shall be replaced as necessary.

3.4 SACRIFICIAL ANODES

These shall be replaced as required.

3.5 CORROSION

Corrosion of structural members and welds shall be evaluated and subsequently repairs shall be proposed.

3.6 SOIL SCOUR

Soil scour in excess of five feet shall be repaired with granular material as follows:

... One foot of sand of a gradation normally used for concrete.

... One foot of gravel less than 1/4 inch in diamater.

... One foot of gravel between 1/4 inch and 1 inch in diameter.

... One foot of gravel between 1 and 2 inches in diamater.

... Two or more feet of stones between 3 and 9 inches in diameter.

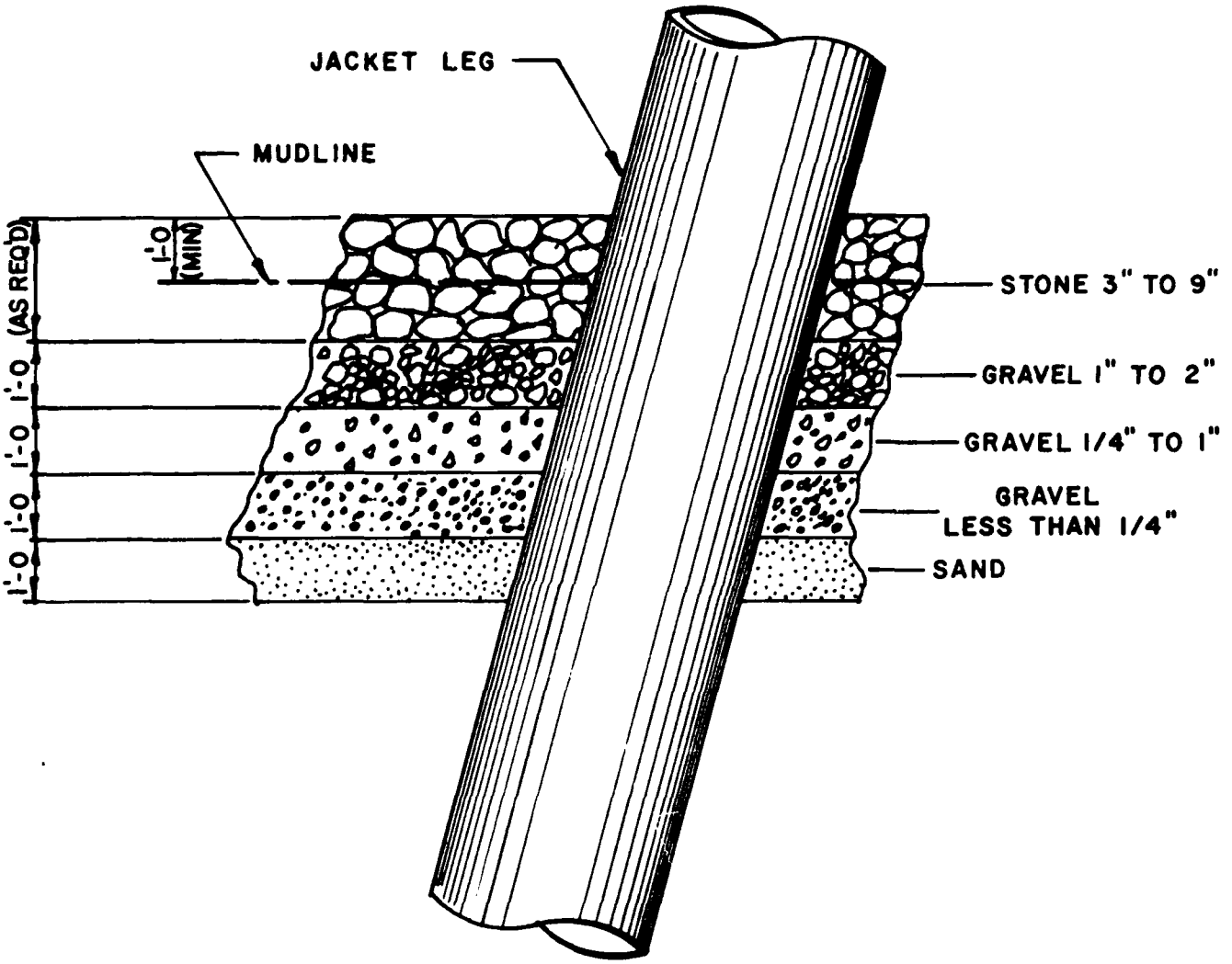
This schedule is illustrated in Figure 8.

3.7 MARINE FOULING

Marine fouling shall be removed from all structural members, including the boat landing, when it exceeds 0.75 inches on the radius.

3.8 BOAT FENDER TIRES

The tires comprising the tire column of the two boat fenders shall be replaced when the tire column no longer provides adequate energy absorption.



SCOUR REPAIR

FIGURE 8

SECTION 4

BROCHURES AND MANUALS

4.1 INTRODUCTION

Included herein are brochures and manuals covering the aids to navigation, sacrificial anodes, coatings and the winch assembly.

VICTOR G. TAYLOR
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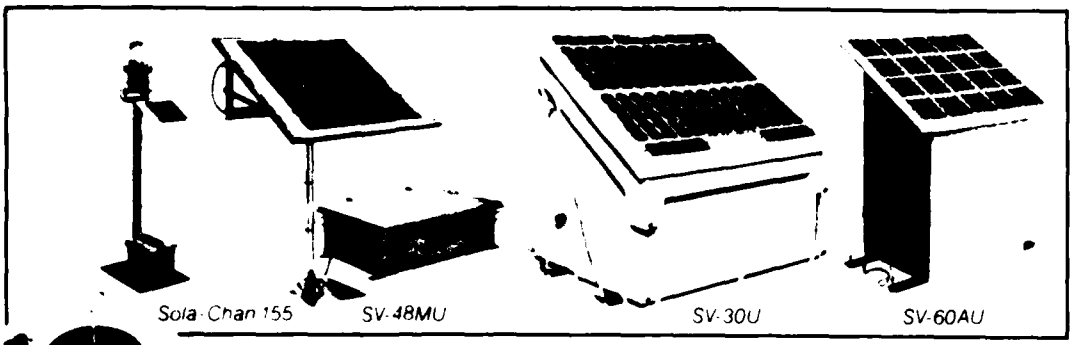
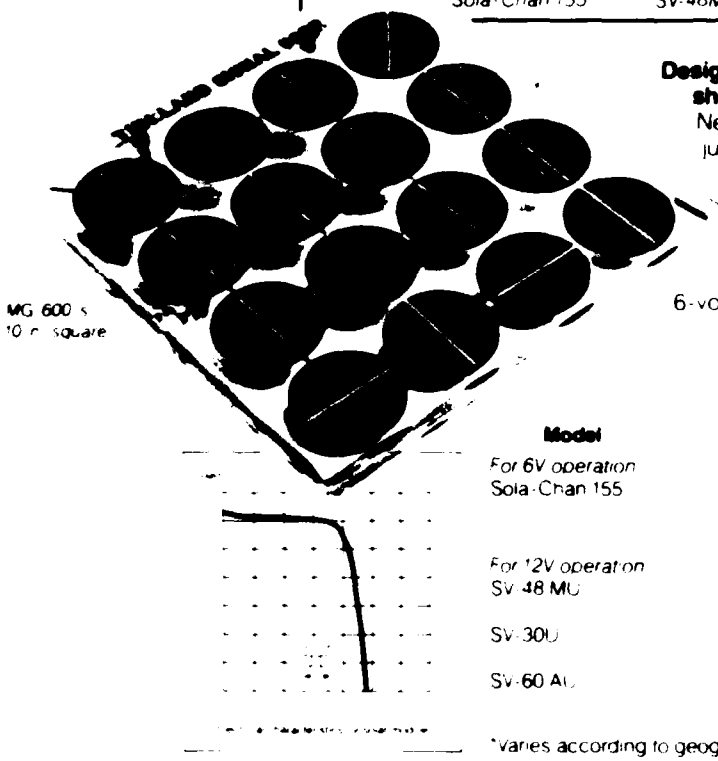




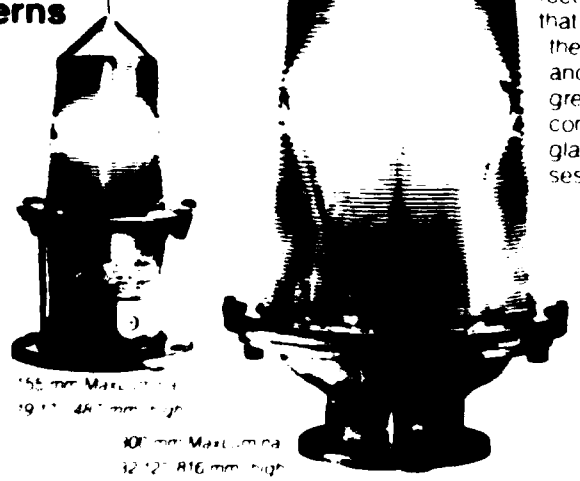
Designed for harsh offshore environments New MG-600 is a 16-junction assembly of silicon photovoltaic cells electrically matched to charge and maintain a 3-cell 6-volt special charge-retaining storage battery. Cells are encapsulated in extra-durable mouldings of Special 255 Borosilicate Crown Glass. Advantages: high transparency, strength, temperature stability, environmental suitability. Tin-plated brass terminals for maximum corrosion resistance. Top performance for all SolaViva stations. Examples above.

SolaViva Solar Energy Stations

Model	Weight	Configuration	Ampere hrs. available* to load
For 6V operation			
Sola-Chan 155	60 kg	MG-600 module on fiberglass pan mounted under ML-155 lantern, battery and box included	2.5 A-h/day
For 12V operation			
SV-48 MU	400 kg	Fiberglass panel in structural 3-position frame. TI-10 box includes batteries	20 A-h/day
SV-30U	225 kg	Single-lift FG-15 fiberglass enclosure comes with batteries	12.5 A-h/day
SV-60 AU	500 kg	Single-lift FG-30 fiberglass enclosure comes with batteries	27.5 A-h/day

*Varies according to geographical location; consult Tideland authority

MaxLumina® Long-Range Marine Signal Lanterns

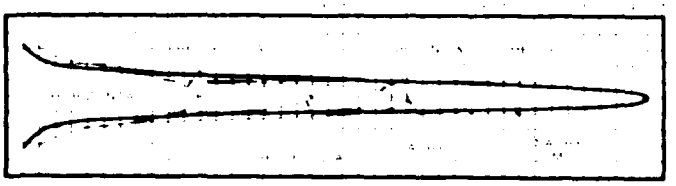


Require less power. Special lens transmits more light. Electrically powered ML-155 and ML-300 offer precision-molded Fresnel omnidirectional acrylic lenses that transmit more light in the horizontal plane and through the 360-degree azimuth than comparable polished glass or other acrylic lenses. (See chart.)

Result: less power needed to meet luminous intensity requirements, lower operating costs.

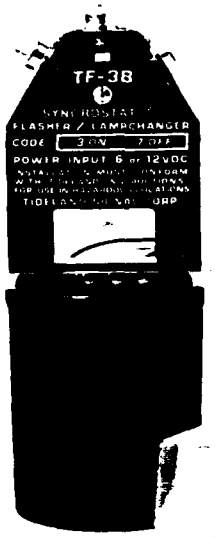
Lenses have an estimated service life of over 20 years, are available in clear, red, green, yellow or in combination. Lantern bases are of durable fiberglass-reinforced polyester plastic, the most durable plastic structure for marine use.

Beam luminous intensity curves in candelas from 12v., 0.77 amp lamp.



Tideland Signal Corporation *Aids to Navigation*

Solid-state TF-3B Syncrostat™ Flasher / Lampchanger

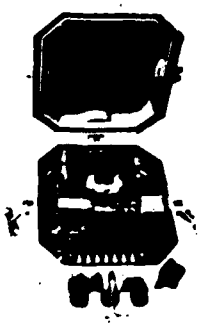


Six place motor-driven automatic operation. Ideal for use in the ML-155 and ML-300 *MaxLumina lanterns*, this 6- or 12-volt flasher / lampchanger will operate as a single unit or synchronize with other TF-3B units.

TF-3B positioned in ML-300 cutaway

A lampout-sensing circuit rotates changer to the next serviceable lamp, discontinues rotation after all six lamps have been exhausted, conserving battery power.

Built-in sunswitch turns lantern on at sunset, off at sunrise. TF-3B is available with either standard or universal timer to produce all navigation flash codes



TBC-10 Automatic Battery Charger

Fully automatic unit maintains the correct charge on secondary storage batteries, from 6 to 30 volts. Input and output fusing prevent overcharging and damage to electronic circuitry. Output current is limited to 10 amps for batteries from 6-15 volts and 5 amps for batteries from 15-30 volts.

TBC-10 in weather resistant box. Weight: 32 lbs (14.7 kg.)

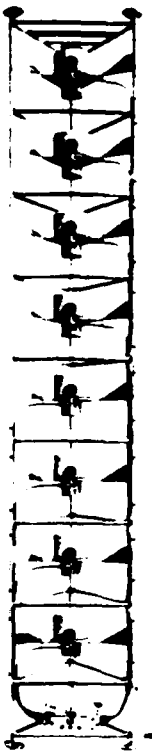
AB-860 AudioBeam® 2-mile signal.

Automatically broadcasts 360° beam of sound in horizontal plane.

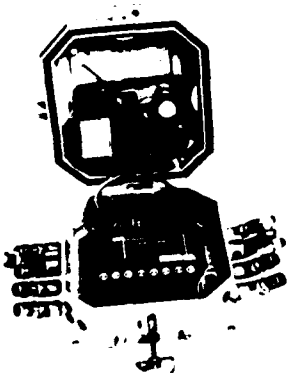
AB-860 is designed for unattended operation from source of 12 volts d.c. Eight heavy-duty, electromagnetic drivers mounted on resonant emitters operate at only 10 percent of rated capacity. This contributes to long service life.

Overall electrical efficiency exceeds 76 percent. AB-860 can be programmed for preselected code. Structure made of hot-dipped galvanized steel to withstand hurricanes.

AB-860 Fog Signal. Weight: 585 lbs. (263.3 kg.) Height: 14'2" (4318 mm)



Electronic Fog Signal Control Unit, ECU-645-A



Unit contains a patented solid state amplifier and unijunction controlled timer to regulate signal input for AB-860. Syncrostat circuitry permits two or more fog signal units to be synchronized. All recognized signal codes are available.

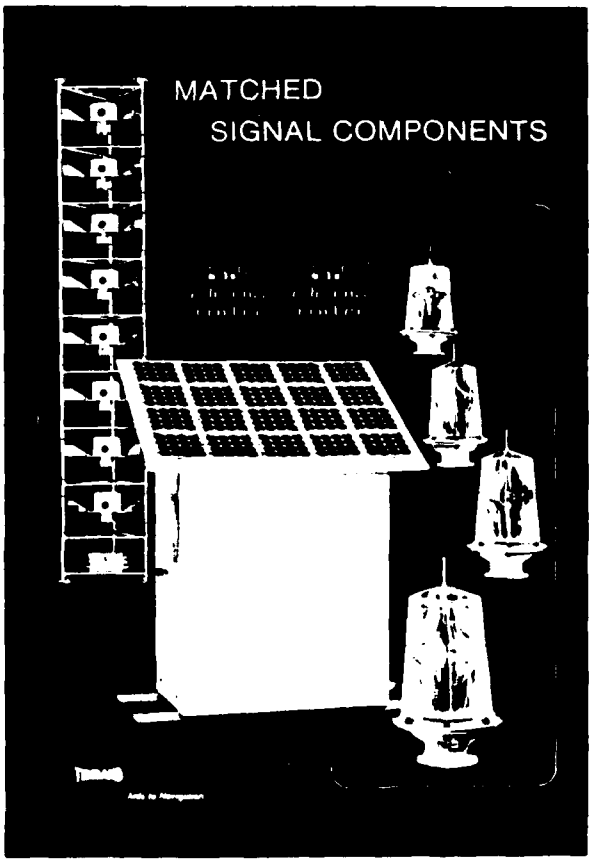
Unit mounted on structure

Matched systems of navigational aids and power sources.

Tideland offers complete matched systems of navigational aids to meet specific requirements. This balance of components helps extend service life of equipment, reduces maintenance.

Note matched signal system at right: (a) four ML-300 MaxLumina five-mile marine signal lantern assemblies. Maximum power demand: 13.5 A-h/day (b) AB-860 Audiobeam two-mile fog signal. Power demand: 13.5 A-h/day. (c) SV-60AU solar station equipped with new MG-600 modules.

Design life: over 10 years. It's a typical Tideland matched system — sized for the job, built to deliver long, trouble-free service unattended with only occasional maintenance



Tideland Signal Corporation *Aids to Navigation*

Durable Seabeacon® fiberglass buoys promote safety at sea

FB-40

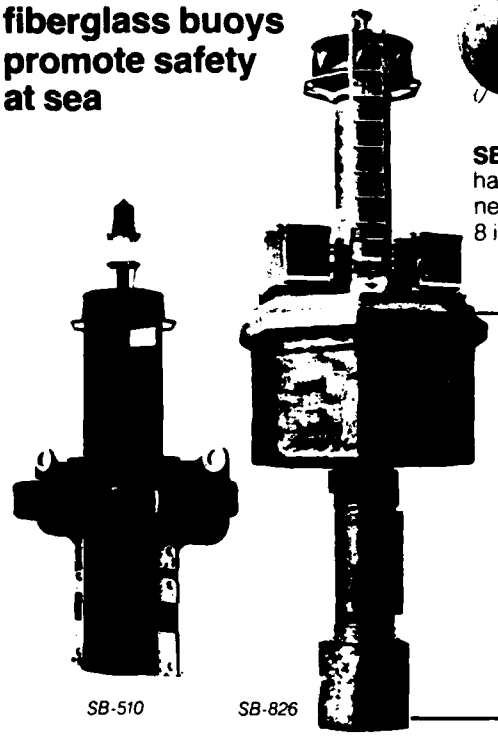
Seabeacon buoys of fiberglass-reinforced polyester resin weigh only half as much as their steel counterparts — resist corrosion, weathering, sunlight to give long service.

SB-510 Seabeacon — a highly visible harbor and river buoy for marking channels, underwater obstructions. Size: 5 ft. 8 in. in diameter, 10 ft. 6½ in. high.

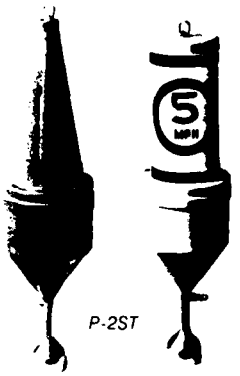
SB-826 Seabeacon — for cardinal marking of obstructions, tanker mooring, fairways, harbor entrances. Size: 8 ft. wide x 21 ft. tall.

FB-40 Float Buoy — This 40-inch diameter sphere supports up to 970 lbs. of umbilical hose systems.

P-2ST marker buoy combines high visibility with stability in choppy water. Used to direct small craft in congested areas. Size: 13⅜ in. wide X 5 ft. 10½ in. high.



SB-510 *SB-826*



P-2ST

RL-125 MaxLumina Range Lantern

Emits a precisely focused beam of light for guidance of vessels through rivers, channels or canals. Size: 22 in. long x 15⅜ in. high

For descriptive folders and further details, call or write.

Tideland Signal Corporation

P. O. Box 52430cc • Houston, Tx 77052
4310 Director's Row • Houston, Tx 77092
Telephone: (713) 681-6101 • Telex: 76-2327

Staff Members

Mr. Harry J. Saenger, Senior Vice President, General Sales Manager
Mr. George F. Vietor, Vice President and Manager of International Sales
Ira L. Krams, Commander, U.S.C.G. (Ret.), Senior Consulting Engineer

Singapore Office

Ronald D. Stenzel
Commander, U.S.C.G. (Ret.)
c/o Pac-Asian Service Pte. Ltd
P.O. Box 496
Maxwell Road Post Office
Singapore 2, Republic of Singapore
Telephone: 668046
Telex: 23365
PAC RS

Bahrain Office (Arabian Gulf)

Mr. David G. Stokes
c/o Mohammed Jalal Trading
P.O. Box 747
Manama, Bahrain
Telephone: 52606
Telex: 8791

London Office

Mr. Ronald S. Burke
Tideland Signal Limited
14 Half Moon Street
London W1Y7RA, England
Telephone (01) 493-9256
Telex 25272
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WASHINGTON, D.C. 20374

IN REPLY REFER TO:
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16 MAY 1978

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From: Commanding Officer, Chesapeake Division
Naval Facilities Engineering Command
To: Commanding Officer, Naval Air Station OCEANA

Subj: Operations and Maintenance Manual for East Coast Air Combat Maneuvering Range (EC/ACMR) Ocean Structures

Ref: (a) CO CHESNAVFACENGCOM ltr ser 11400 of 2 Sep 1977

Encl: (1) Description and Trouble-shooting Procedures for the OCLI Solar Panels
(2) NAPKO Splash Zone Barrier Coating (manufacturer's literature)
(3) SAF-T-CLIMB Fall Prevention Device (manufacturer's literature)
(4) KRANCO Overhead Cranes Service Manual
(5) Survey Report of the EC/ACMR

1. Reference (a) forwarded a suggested Operations and Maintenance Manual for the EC/ACMR Ocean Structures. Additional manufacturers' brochures are forwarded herewith as enclosures (1) through (4) for incorporation into section 4 of this manual.

2. Enclosure (1) includes manufacturer's description and test procedures for the solar panels and electrical hardware used to charge the batteries for the navigational aids and ACMR system electronic instrumentation. A schematic of the electrical layout is included therewith.

3. NAPKO Splash Zone Coating was used to cover underwater surfaces of the jacket where the coating was damaged during installation. Manufacturer's literature on splash zone coating is forwarded as enclosure (2).

4. The construction contractor was required to provide an antenna access ladder and a fall prevention device for each tower. Literature describing the installation and operation of the "SAF-T-CLIMB" fall prevention system is provided as enclosure (3). A ladder with carrier rail was included as an integral part of each tower (on tower leg "C"). Four "SAF-T-LOK" sleeves and safety belts are being forwarded under separate cover. While not stipulated in the literature, a safety (life) line is additionally recommended whenever personnel are working at a stationary position on the ladder.

Description and Trouble-Shooting Procedures

for the OCLI Solar Panels

Enclosure (1)

OCLI
OPTICAL COATING LABORATORY, INC.

formerly

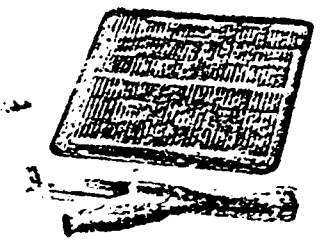
CENTRALAB SEMICONDUCTOR

one watt solar panels

TYPES

CSP 1
CSP 2
CSP 4
CSP 10
CSP 28

are ideal power sources for monitor and control devices such as reservoir level gauges and telephone repeaters. Minimum maintenance requirements make them useful in such marine applications as standby battery charging.



THE PRODUCT

These panels were designed primarily for charging batteries which furnish power for the following applications:

- ✱ Navigational Beacons (Sea and Land)
- ✱ Climatological Data Recording and Transmitting Stations
- ✱ Fire Control Stations
- ✱ Transmission Relay Stations

Due to the remote locations of the above services, these panels had to be designed to operate efficiently under rugged service conditions. These units were designed to endure the severity of *MIL-STD-202* tests in the following environments:

Thermal Shock (—65°to +185° F)
Sand and Dust
Shock (50 g)
Vibration
Moisture Resistance
Humidity (1,344 Hours)
Salt Spray (96 hours)
Temperature Cycling (—67°to +149° F)

Installation is simple. The output terminals featured eliminate the necessity of soldering or using special tools. Installation is accomplished by simply wrapping the wires around each terminal and tightening each nut with a standard wrench or ordinary pliers.

Panels can be mounted individually or side by side and connected in any series parallel configuration to obtain the desired power system. Centralab also constructs large custom made panel arrays.

Consult Centralab's Customer Service Engineers regarding your power requirements.

ELECTRICAL SPECIFICATIONS

OUTPUT

Each unit will produce one watt minimum power output at the voltage specified under 100mW/cm² of sunlight or tungsten equivalent

OPERATING TEMPERATURE

Each unit will operate in a temperature range of —67°F to +149° F.

EFFECTS OF TIME

The output of a panel varies according to the time of day. Panel output increases as the sun rises until, by midday or noon, peak output is attained. Panel output then diminishes from midday until sunset. The variation in output is caused by two factors; angle of incidence and air mass.

The angle of incidence determines the amount of parallel light striking the panel surface. When the angle of incidence is zero (normal incidence), the panel is oriented so that the sun is normal to the panel surface and the maximum amount of parallel light is allowed to strike the panel surface to produce peak output. When the angle of incidence is greater than zero (by the number of degrees that the panel is tilted from normal incidence), then the amount of parallel light striking the panel surface is diminished by an amount approximately equal to the cosine of the angle of incidence.

Air mass between the sun and a given point on earth changes as the earth rotates. The attenuation of solar energy reaching the earth's surface is a function of this air mass. The greatest solar intensity occurs at noon when the air mass is the least.

Fig. 1 shows the amount of variation in output that resulted when a CSP14 panel was maintained at a fixed (noon orientation) position throughout the day. *In this position, a panel will produce an average* of 6 watt-hours per day.

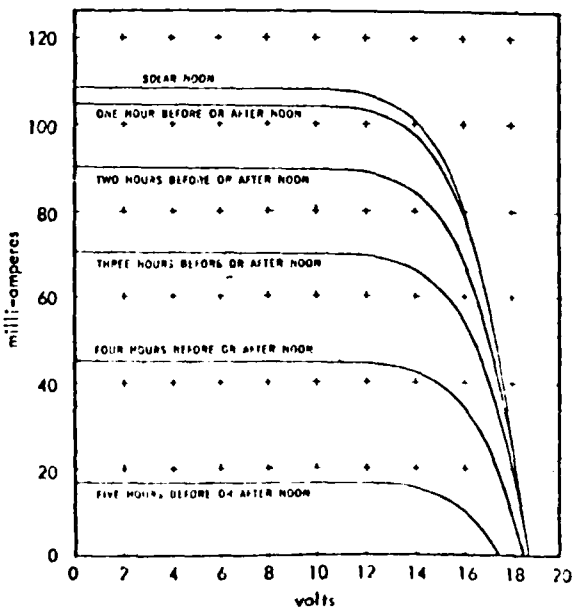


FIG 1 — OUTPUT AS A FUNCTION OF TIME OF DAY

ACMR/ACMI TECHNICAL NOTE

Performance Check & Trouble Shooting Procedures For TIS Remote Station NAVAID Power Source

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INTRODUCTION — The purpose of this note is to provide procedures for checking the performance of the power source for the Tracking Instrumentation Subsystem (TIS) remote station navigational aid (NAVAID) power source. This note also includes procedures for trouble shooting the power source, if performance is substandard.

COMMENT — Values provided in this technical note are based on engineering estimates and may be subject to revision through experience.

PROCEDURE

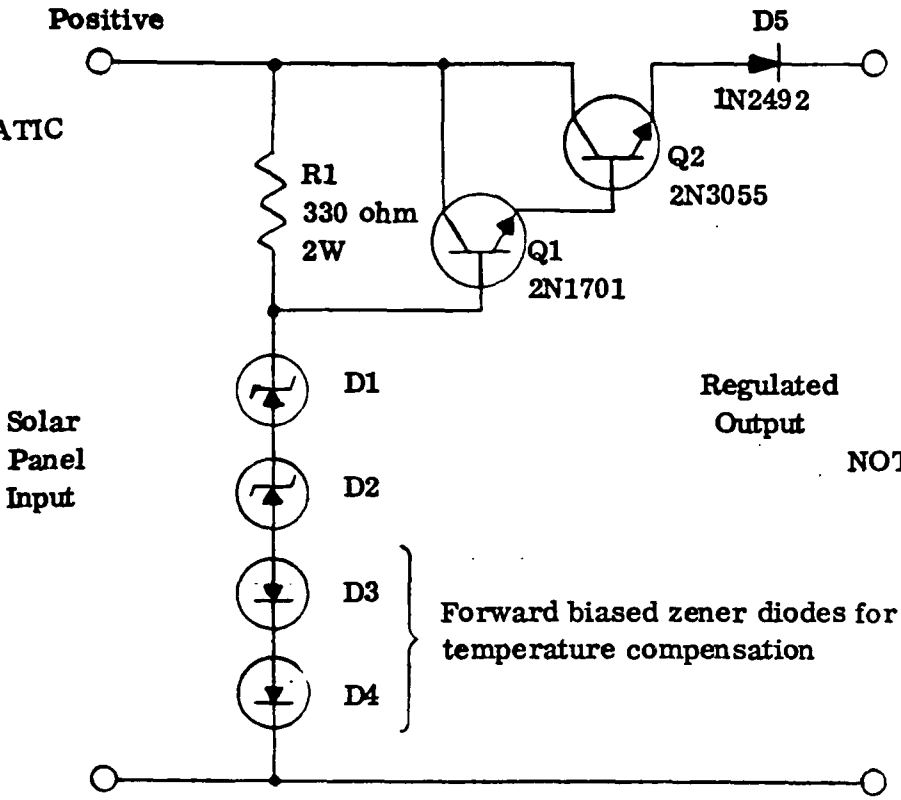
STEP	PROCEDURE	INDICATION
1	Disconnect cable 138302-1 at output side of voltage regulator assembly 129275B	None
2	Connect volt meter to output terminals of voltage regulator assembly	15.5 V to 16.5 Vdc
3	Connect ammeter to output terminals of voltage regulator	10 amp max. for maximum solar intensity
4	Reconnect cable	None

COMMENT

A solar intensity meter, available from Dodge Products, Box 19781, Houston, Tx, can provide a direct relationship measurement between solar intensity and expected solar panel current output. The two solar panels will provide 10 amperes output with 100 mW/cm^2 of solar intensity which equates to standard sun (maximum solar intensity) on the meter. Measurement of solar intensity is linear so that the meter readings can be directly translated into the voltage regulator output current. For example, 50 mW/cm^2 corresponds to 5 amperes output.

Trouble Shooting Voltage Regulator

SCHEMATIC



NOTE: Zener diodes D1 thru D4 selected from 1N4954 thru 1N4964 series or 1N5342 thru 1N5355 series.

Typical voltage regulator
(Optical Coating Laboratory, Inc.)

COMMENT — Trouble shoot voltage regulator with solar panel connected to provide a voltage and current source.

CAUTION — Disconnect battery pack to prevent inadvertent discharge into regulator which may cause part failure within the voltage regulator.

Trouble Shooting Battery Pack

PROCEDURE

STEP	PROCEDURE	INDICATION
1	Measure voltage drop from positive input terminal at battery box to each positive post. Record value for each battery.	Variable - maximum expected 1.25 Vdc

COMMENT The voltage will vary depending on solar intensity and solar panel output and state of battery charge.

2	Average voltage drops. Any battery causing a voltage drop outside the limits specified should be replaced and returned to depot for testing and evaluation.	0.5 Vdc above or below average
3	Disconnect cable 138302-1	None
4	Measure voltage from each battery positive post to any negative point. Record each reading.	12.6 to 14 Vdc

COMMENT A low voltage in comparison to others may indicate a shorted cell. Each shorted cell usually causes the voltage to drop in 2 volt increments. Wait one hour with solar panel disconnected to allow battery voltage to stabilize.

5	Measure battery voltage from positive post to any negative point. Replace battery if voltage is as indicated.	Below 11.5 Vdc
6	Reconnect cable 138302-1	None

NAPKO Splash Zone Barrier Coating

Enclosure (2)

INSTRUCTIONS FOR PREPARATION AND APPLICATION

1. Surfaces should be sandblasted to remove rust, scale, old coating, barnacles, etc. Sandblasting can be done with conventional equipment below the water as well as above.

2. Napko Splash Zone Barrier Coating is supplied as two components. Mix both components together by hand until a uniform olive green color is obtained with no streaks. Avoid over-mixing after the olive green color is obtained as this will shortetn the pot life.

NOTE: The applicator should wear a life jacket and a skin diver's wet suit. Further, the man should be secured to platform with a lifeline. This type of equipment provides for his safety, gives him buoyancy and warmth, and also protects him from abrasions and cuts from barnacles.

3. The barrier coating may be applied by hand, smearing to a thickness of 1/8 to 1/4 inch for long term protection. Best results in manual application can be obtained by applying a ring or doughnut of the material to structural members above the water level and then smearing it down uniformly to and below the water level, making an effort to feather edge the top and bottom to the member. The applicator's hands should be kept wet at all times so that the material can be molded like putty to the structure. A little more effort is needed to keep the material in place as it is applied below the water level; this calls for patience in holding and working the product.

4. An alternate method of application to tubular members consists of carrying the product on to the surface with a membrane such as fiberglass cloth or canvas ducking. This method is preferred where wave action and/or currents make hand smearing impractical. The membrane should be cut in strips 2 inches longer than the pipe circumference. Hand smear the mixed coating to the membrane, wrap, and tie to the surface. The coated membrane should be pressed carefully against the surface to displace water. When coating small diameter pipes, it is recommended that 4 or 6 inch fiberglass tape be used as the membrane. After coating, this can be spiralled on and tied to the surface.

5. To achieve the optimum thickness of 1/8 to 1/4 inch, the coverage per gallon should not exceed 6 to 12 feet. A two-man crew can apply one gallon of mixed material in approximately 30 minutes.

It is sometimes helpful and desirable, especially in rough water, to apply a spiral wrap of polyethylene, glass fiber, burlap, cheese cloth or other similar material over the freshly applied coating to help hold the coating in place during the initial curing operation.

Napko Splash Zone Barrier Coating is 100 percent solids and contains no flammable solvents.

These suggestions and data are based on information we believe to be reliable. They are offered in good faith, but without guarantee, as conditions and methods of use of our products are beyond our control. We recommend that the prospective user determine the suitability of our materials and suggestions before adopting them on a commercial scale. Suggestions for uses of our products should not be understood as recommendations that they be used in violation of any patents.

CORPORATE MEMBER NATIONAL ASSOCIATION OF CORROSION ENGINEERS

INDUSTRIAL/MARINE DIVISION

NAPKO

NAPKO CORPORATION
P.O. Box 14509 / Houston, Texas 77021 / Phone (713) 641-0661
CABLE ADDRESS "NAPKO" HOUSTON TEXAS TELEX 762665
P.O. Box 1910 / Fremont, Calif. 94538 / Phone (415) 651-1010

NAPKO CORPORATION
[illegible] P.O. Box 14509 Houston, Texas 77021 / Phone (713) 641-0661
Branch Office
[illegible] P.O. Box 23158 New Orleans, La. 70183 Phone (504) 733-7085
NAPKO GROUP COMPANIES
[illegible] 40620 Albrae Avenue P.O. Box 1910 Fremont, California 94538
[illegible]
[illegible] South Gate Calif. Portland Oregon
[illegible] Mexico Phone 46-6777
NAPKO LICENSED ASSOCIATES
[illegible] PAINTS JAMAICA LIMITED [illegible]
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[illegible] Newcastle upon Tyne NE2 1BL England
AGENTS
INSPECTION AND MARKETING SERVICES (Pte) LTD
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H & R ASSOCIATES, INC. [illegible] Street Honolulu Hawaii 96813

[illegible] 4-77

SAF-T-CLIMB®

fall prevention device

INSTALLATION INSTRUCTIONS

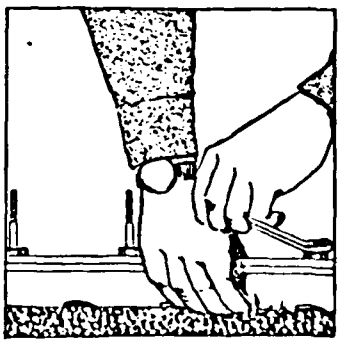
STEP NO. 1
ON-THE-GROUND PRE-INSTALLATION

A. Lay out all equipment.

B. Check cap screws that secure the guide channel to the back of the carrier rail as they can loosen during transit.
TIGHTEN CAP SCREWS IF NECESSARY.

C. **DETERMINE FIRST SECTION OF CARRIER RAIL TO BE INSTALLED** at the bottom of the ladder. If it has been necessary for us to cut a standard 21' section of carrier rail to supply the proper length for your application, this short section will be identified by a yellow band at the end and will be the first section you install at the bottom of the ladder. If no short section is included in your equipment, choose one standard section and mark it for first installation. **The carrier rail must be installed with the sloping part of the notch POINTED UPWARD.**

D. **PRE-DETERMINE SPACING OF LADDER RUNG CLAMPS.** (NOTE: If special brackets are to be used instead of ladder rung clamps, follow the special instructions supplied with the appropriate brackets.) The first section of carrier rail will start approximately two feet above the ground or mounting platform. The first ladder rung clamp should be positioned as near the bottom rung of the ladder as possible, then follow with another ladder rung clamp at 7' intervals. Where the 7' interval occurs at the union of two sections, the ladder rung clamp should be placed on the first rung above or below the union. If a short section is used, a ladder rung clamp must also be placed at the top of the short section.



E. **REMOVE CAP SCREWS AS NECESSARY AND REPLACE THEM WITH STUD BOLTS IN EACH POSITION YOU HAVE SELECTED FOR A LADDER RUNG CLAMP.** Screw the stud snugly against the shoulder nut. **POSITION ALL STUD BOLTS WHILE CARRIER RAIL IS ON THE GROUND.**

F. **LOOSEN THE CAP SCREW HOLDING THE 4" STEEL CONNECTING STRAP AT THE TOP OF EACH SECTION OF CARRIER RAIL.** Insert a 5" **INTERNAL ALIGNMENT GUIDE** into the top of each section of carrier rail, swing the connecting strap into position, and tighten the cap screw again. This cap screw must extend **THROUGH** the hole in the bottom of the internal alignment guide.

STEP NO. 2
INSTALLING THE FIRST SECTION OF CARRIER RAIL
(Remember that if there is a short section with a yellow band this is to be installed first)

A **LOCATE THE CENTER OF EACH RUNG OF THE LADDER WHERE A LADDER RUNG CLAMP WILL BE ATTACHED.** The carrier rail must be installed in the exact center of the ladder in a straight line up the ladder. **THE SLOPING PART OF THE NOTCH MUST POINT UPWARD!** (See Step No. 5 below for special concave and convex installations.)

B. **USING A BLOCK AND TACKLE OR HAND PULLEY, RAISE THE FIRST SECTION OF CARRIER RAIL. RAISE ONLY ONE SECTION AT A TIME.** The internal alignment sleeve can be damaged if two sections are raised while connected.

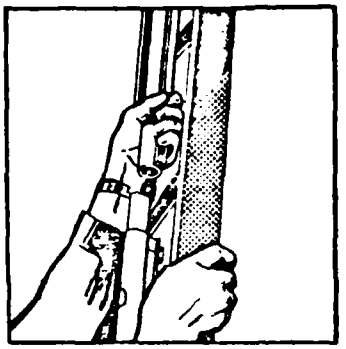
C. **PLACE THE BOTTOM OF THE FIRST SECTION APPROXIMATELY TWO FEET ABOVE THE GROUND** (or mounting platform).

D. **PLACE A SERRATED LADDER RUNG CLAMP BEHIND THE LADDER RUNG AND OVER THE TWO STUDS** that were placed in the carrier rail. Hold the ladder rung clamp parallel to the carrier rail while you hand tighten a square nut over a flat washer evenly on each stud. Finish tightening the square nuts evenly so that the ladder rung clamp remains parallel to the carrier rail as it is drawn up securely against the rung. Finish by tightening a hex locknut against the square nut. **APPLY THE REMAINING LADDER RUNG CLAMPS ON EACH SECTION IN THE SAME MANNER.**

NOTE: **AFTER FIRST SECTION OF CARRIER RAIL IS PROPERLY INSTALLED, THE INSTALLER MAY BUCKLE ON HIS SAFETY BELT, ATTACH HIMSELF TO A SAF-T-LOK SLEEVE, AND CLIMB UP TO INSTALL THE NEXT SECTION. BUT HE MUST EXERCISE EXTREME CAUTION TO SEE THAT HIS SAF-T-LOK SLEEVE DOES NOT RIDE UP OVER THE UNFINISHED END OF THE FIRST SECTION!**

STEP NO. 3
INSTALLING ADDITIONAL SECTIONS OF CARRIER RAIL

A. **BEFORE TIGHTENING CLAMP ON TOP OF INSTALLED SECTION, RAISE NEXT SECTION ABOVE THE PREVIOUS AND SLIP IT DOWN OVER THE INTERNAL ALIGNMENT GUIDE.** In order to do this it is necessary to remove the bottom cap screw of the next section in order to allow the carrier rail to seat over the alignment guide. Secure the new section to the 4" connecting strap on the prior section with the previously removed cap screw. The cap screw must extend through the hole in the top of the internal alignment guide. Tighten the cap screw so that the connecting strap is firmly against the guide channel, and forms a smooth union for the SAF-T-LOK Sleeve to pass over.

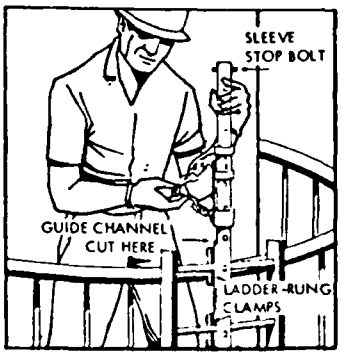


B. **ADD THE LADDER RUNG CLAMPS TO THIS SECTION. NOTE: REPEAT STEP NO. 3 FOR ADDITIONAL SECTIONS TO THE TOP OF THE LADDER.**

STEP NO. 4
COMPLETING THE TOP OF THE INSTALLATION

A. **ATTACH A LADDER RUNG CLAMP TO EACH OF THE TWO TOP RUNGS OF THE LADDER,** or one clamp over two rungs as near the top as possible.

B. **INSTALL THE 5/16" x 2" STOP BOLT THROUGH THE CARRIER RAIL NEAR THE TOP** to prevent the SAF-T-LOK Sleeve from coming off at the top. The bolt and wing nut can be quickly removed to allow the sleeve to be taken off at the top when required.



C. **IF THE LADDER TERMINATES AT A LANDING LEVEL OR PLATFORM,** we recommend that the carrier rail be extended 4'6" above the floor of the landing for protection of the climber while disconnecting or remounting. Cut off the guide channel approximately 2' above the floor of the platform and remove from the back of the carrier rail. This will allow the climber to rotate around the carrier rail, and land safely before unsnapping the SAF-T-LOK Sleeve from his safety belt. **NOTE: CARRIER RAIL SHOULD NOT BE PERMITTED TO EXTEND OVER 4'6" ABOVE THE LANDING. ANYTHING IN EXCESS OF THAT HEIGHT SHOULD BE CUT OFF.**

STEP NO. 5
SPECIAL INSTRUCTIONS

Some ladders extend upwards for a distance at an angle, then continue vertically. When installing carrier rail on this kind of an application, you must pull the carrier rail in at the point of angle by hand and secure it with a ladder rung clamp. This will form a smooth curve that the SAF-T-LOK Sleeve can operate over.

STEP NO. 6
CLIMBING WITH THE SAF-T-CLIMB SYSTEM

Once the carrier rail is installed, no changes or adjustments to any part of the equipment should be necessary. Buckle safety belt TIGHTLY around the waist. Climb normally, leaning back into the safety belt going up and down. Do not allow the locking trigger to drag on the carrier rail.

Saf-T-Climb can help you meet the requirements for ladder safety devices per the Occupational Safety & Health Act.

asd AIR SPACE DEVICES
NORTON COMPANY
SAFETY PRODUCTS DIVISION
PO BOX 197 PARAMOUNT CA 90723
TEL 213 774 4905

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