

Boat Copy

GRUMMAN OCEAN SYSTEMS OPERATIONS MANUAL
BEN FRANKLIN
~~FORM II~~

GRUMMAN OCEAN SYSTEMS OPERATIONS MANUAL

BEN FRANKLIN



Prepared by:



D. Kazimir

Approved by:



W. M. Rand

Operations Manager

Revision 1

12 May 1969

GRUMMAN OCEAN SYSTEMS OPERATIONS MANUAL

BEN FRANKLIN - 

INTRODUCTION

This publication, written for the use of Grumman personnel, provides instructions for operating the BEN FRANKLIN. It supplements Volume I - Systems Descriptions and Operation and contains procedures for operating the vessel as a whole, procedures for combating emergencies, and the various Check-off Sheets used in the routine operation of BEN FRANKLIN.

Revision 1
12 May 1969

Record of Corrections

<u>Change Number</u>	<u>Entered by</u>	<u>Date</u>
+ enata	D. Kayin	14 Nov 69
2	D. Kayin	4 Mar 70
3	D. Kayin	6 Apr. 70

GRUMMAN OCEAN SYSTEMS OPERATIONS MANUAL

BEN FRANKLIN - VOLUME II

1. ORGANIZATION
2. PROCEDURES
 - A. Check Lists
 1. Pre-Launch
 2. Ready for Sea
 3. Rig for Dive
 4. Rig for Surface
 5. Pre-Recovery
 6. In Port Routine
 7. Underway Watch Routine
 8. Operating Day Detail Sheet
 - B. Emergency Procedures
 1. Fire
 2. Collision
 3. Flooding
 4. Emergency Surface
 5. Lost Contact Routine
 6. Emergency Personnel Transfer Plan
 7. Operating Base Emergency Alert
 8. Submerged Grounding
 9. Escape Procedure
 10. Shift to Emergency Power
 11. MARSAP
 - C. Normal Routines
 1. Escort Conduct
 2. Communications
 3. Diver Operations
 4. Record Keeping
 5. Alteration and Improvement
 6. Bottom Proximity Maneuvering
 7. Normal Dive
 8. Normal Surface
 9. Support Ship
 10. Maneuvering
 11. Towing Procedure
 12. Air Charging Procedure
 13. Liquid Oxygen Charging Procedure
 14. Battery Charging Procedure
 15. Shift to Shore Power
 16. Trim Statement
 17. Briefing for Observers
 18. Personnel Certification Requirements
 19. *Operating Limitations*
3. APPENDIX
 - A. Decompression Tables
 - B. Standard Tugboat Commands
 - C. Grumman Safety Bulletin No. 54
 - D. Safety Precautions for Handling Liquid Oxygen
 - E. Copy of FCC Rules Part 83; PX-15 Radio Telephone License; Grumman Rules Concerning Radio Telephones
 - F. Diver Check Sheet
 - G. Forbidden Material
 - H. Recompression Chamber Locations
 - I. Visitor's Policy (underway)

Revision 1
12 May 1969

1. ORGANIZATION

The Operations Group of the Ocean Systems Department is organized to operate submersibles in the best interest of Grumman and their customers. The Operations Group is under the direction of the Operations Manager who is responsible for all phases of submersible operations to the Director, Ocean Systems Department. All underway operations will be under the control of the Operation Director who will be the delegated representative of the Operations Manager.

The Operations Manager shall be solely responsible for the safety of submersibles and their ability to meet operational obligations. The responsibility for the safe conduct of submersibles, their crews and passengers is delegated to the submersible Captain. The Captain shall, where practicable, before the fact but not necessarily before the fact, keep the Operations Manager advised of unusual steps required to discharge his delegated responsibility.

The responsibility for material alteration, adjustments and maintenance is delegated to the Chief Engineer. The Chief Engineer is responsible to ensure that all work conducted on-board the submersible is conducted without undue hazard to the craft or personnel on board. All work undertaken on submersibles must be authorized by the Chief Engineer and conducted under his direction.

The responsibility for diving and swimming operations in support of Ocean Systems Operations activities is assigned to the Diving Operations Supervisor. The Diving Operations Supervisor shall be responsible for ensuring diving and swimmer personnel certificated according to Grumman's standards and the material condition and readiness of all diving and swimming equipment.

Revision 1
12 May 1969

GRUMMAN OCEAN SYSTEMS OPERATIONS

Functional Organization

The Operations Group of the Ocean Systems Department is subdivided into two groups.

- A. The Command Group under the direction of the Captain who is responsible for the safe conduct of the submersible, the crew and observers. In addition, the Captain is responsible for training, operational liaison, mission planning, deficiency reconciliation, provisioning, support functions and diving operations.
- B. The Materiel Group under the direction of the Chief Engineer who is responsible for the materiel condition and readiness of the submersible.

The Command Group will be composed of the submersible operating crew and leading craftsmen in the following categories:

- A. Service Crew
- B. Escort Crew

Each group assigned to the Captain will have materiel responsibility as follows:

Service

Van outfitting, cleanliness and preservation
Escort outfitting, cleanliness, preservation and maintenance
Escort fueling and provisioning
Submersible provisioning, food, clothing, Lox, fresh water and battery water
Battery charging and air charging
Diving equipment and escape equipment
Ship's emergency equipment (OBA and bibs)

Escort

Escort provisioning
Escort operations

The Materiel Group will be comprised of leading craftsmen in the following categories:

- | | |
|---------------|--------------------|
| A. Mechanical | D. Instrumentation |
| B. Electrical | E. Hull |
| C. Electronic | |

The Chief Engineer is responsible for all work assignments to support the materiel readiness of the submersible. In addition, he is responsible for the development of spares provisioning and control. He will develop routine maintenance interval check lists and preventative maintenance interval check lists. Each of the groups assigned to the Chief Engineer will assist with the following functions:

Revision 1
12 May 1969

- A. Cleanliness and Preservation
- B. Conduct of performance and functional testing
- C. Conduct of preventative and corrective maintenance
- D. Provide alteration recommendations
- E. Work record keeping
- F. Documentation
- G. Spares provisioning
- H. Spares control
- I. Certification control

Each group assigned to the Chief Engineer is assigned materiel responsibility as follows:

Electronic Systems

Underwater Telephones	Rolex time standard
Tracking beacon	CTFM
Fathometer	I. C. Inverters
Periscope TV	Escort Tracking System
Bottom TV	Pan and tilt mechanism
Depth Recorder	Shot Ballast Timing System

Mechanical Systems

Sea water systems, valving and indication	All penetrators, electrical, piping and optical
Hydraulic systems, valving and indication	Hatch linkage and sealing
H.P. Air systems, valving and indication	SAS drive and sealing
L.P. Air systems, valving and indication	Battery vent valves and compensating oil system
Shot ballast hydraulic system and linkages	VBT emergency valve operating linkages
Manipulators	Escort power plant, bilge pump and blower
Valving not specifically system associated	

Hull

Interior and exterior including decks and interior furnishings	Keel structure and fairings
Hull attachments and support structures	Sail structure
Shot ballast tanks	Windows and ports
Exterior piping	Variable ballast tanks
Propulsion motors	Main ballast tanks
Ground tackle and signals	Masts and support structures
Exterior lighting fixtures and reflectors	Electrolytic corrosion control

Revision 1
12 May 1969

Electrical Systems

Main power and distribution
A.C. Power and distribution
Main power inverters
Lighting circuits, internal,
external and navigation
Internal communications and
S.P. Phone installations
Shot ballast metering, indication
and operating circuitry

A.H. Metering and ground detection
Thrust control inverters
MBT vent valves
I.C. Inverter distribution
A.C. Rotating equipment
D.C. Rotating equipment
LOX electrical system
Activates replacement cells

Instrumentation

Cameras
Specialized lighting
Video links
Gravimeters
Magnetometers
Nefalometers
Salinity meters
Instrumentation power supplies

Bottom and sub-bottom profilers
Photo interpreting equipment
IR devices
Specialized sonar
Tape and magnetic recorders
Precision navigation equipment
Thermal sensors

2. PROCEDURES

A. Check Lists

2A1 PRELAUNCH

- 1) Ensure crane arrangement made, also crane for brow.
- 2) Rig mooring lines.
- 3) Check operation of emergency shot ballast cylinders. When completed, leave T handle and dribble plugs in place. Rig system for dive.
- 4) Check shot ballast tanks clean. Ensure tanks are free of rusted shot conglomerates.
- 5) Check external air charging connection cap in place.
- 6) Check main ballast tank external blow connection caps in place.
- 7) Remove viewport protection covers. Clean and inspect viewports.
- 8) Check electrolyte levels - fill as necessary.
- 9) Check oil in battery manifold - fill as necessary.
- 10) Check all hull valves shut.
- 11) Check all back-up valves shut - air, hydraulic, variable ballast tank and main ballast tanks.
- 12) Check plankton sampler secured.
- 13) Check guillotine cartridges installed.
- 14) Check all valve hand wheels firmly attached to valve stems.
- 15) Check h.p. air relief valve stop OPEN.
- 16) Ensure SAS outer and inner hatch shut. Ensure valves around SAS shut.
- 17) Ensure battery housing (keel) doors shut and locked in place.
- 18) Check underwater electronic gear properly installed - cameras, lights, TV (check train and elevation). Remove lense cover.
- 19) Check screens in place for sea systems: Variable ballast tanks (4); hull vent; VBT outboard vents (2); SAS flood.
- 20) Conduct thorough inspection of boat exterior. (Look for leaky pipes, equipments and rigging properly secured, etc.).
- 21) Ensure hydrophones clean.
- 22) Inspect all penetrator castings.
- 23) Check all electrical/electronic equipment secured.
- 24) Ensure all preventative maintenance routines completed.
- 25) Ensure fire extinguishers in place.

2A1 PRELAUNCH (Cont.)

- 26) Check panel voltage for each battery group.
- 27) Test operate rudder.
- 28) Conduct vacuum test of boat if hull integrity has been broken (SAS vent should be opened during test).
- 29) Secure forward and after hatches (use strongback on forward hatch).
- 30) Ensure MBT plugs available (24).
- 31) Upon entering water, remove emergency vents one at a time and ensure main vents holding - test by pushing vents open, then replace emergency vents.

One Day Prior to Getting Underway

- 1) Inform Coast Guard of underway plans.
- 2) Ensure that tug arrangements have been made.
- 3) Ensure preventive maintenance checkoffs completed (e.g., electrical system checkout).
- 4) Check spare parts and fuses aboard.
- 5) Pump out waste tanks if necessary.
- 6) Top off fresh water. Heat hot water tanks.
- 7) Check hydraulic oil supply.
- 8) Check LOX tanks and charge as necessary. Ensure both tanks on service with regulator set at .5 liters per minute.
- 9) Ensure electrical and mechanical tool kits aboard.
- 10) Check fire extinguishers fully charged and in place.
- 11) Check the following supplies aboard:

- | | |
|--|--|
| -Linen | -Stationary |
| -Blankets | -Battery Record forms |
| -Foul weather gear | -Dry cells |
| -Food (Operating time plus
2 week reserve) | -Dish cleaning solution and
2 pans |
| -Cooking utensils | -Dish drain |
| -Eating utensils | -Plastic garbage bags |
| -Serving utensils | -Toilet paper |
| -Soap (Operating time plus
2 week reserve) | -Garbage spray |
| -Recorder paper for Fathometer
and Depth Gage | -Kleenex |
| -Germicide (4 standard Weladyne
plus 2 concentrates) | -Halazone tablets |
| -Purafil (4 packs) | -Bath towels |
| -Entertainment equipment | -Measuring cup and pot |
| -Cleaning gear (foxtail, dust pan,
rags, soap, scouring powder,
sponges) | -Bacteria filters |
| -LiOH (about 36/week - ensure
a 2 week reserve) See Test Plan | -Silica Gel (3,000 lbs. for
30 day mission) |

- 12) Trim statement complete and verified with Chief Engineer.

Change No. D

20 Feb. 1970

13) Check the following equipment stowed:

- Wrench for external salvage valve in sail
- Bilge pump
- Oxygen breathing apparatus (6 OBA's plus 12 cannisters)
- Heaving lines (3)
- Damage Control Bag
- Scuba lanterns (3)
- Electric horn and portable light mast
- First aid kit
- Binoculars
- Signal gun and flares
- Safety harness (3)
- Exhaust blower
- Life jackets and lights
- CO₂ gage
- Fyrite CO₂/O₂ gage
- SAS spheres and SAS pry bar
- Suction cup, pry bar, wrench, screwdriver (all in sail) for salvage system
- Wrench for hatch deblock
- Drager escape gear (1 set/man)
- Ocean charts
- Life raft
- Manuals (i.e., Topaz, CTFM, TV, Radio, Straza phone, Fathometer, OPS Manual, Systems Description, AEG books (2))
- Drawings (electrical, life support, pneumatic, hydraulic, fuse charts, penetrator charts)
- Shackle pin for tow bridle
- Divers depth gages
- Simpson, VTVM, Meggar, Oscilloscope - Type 422
- Walkie Talkie
- Air Mattresses
- Teledyne Sensor (oxygen)
- Valve inserts and seals (4)
- AEG Tool Kit
 - Voltmeters (2)
 - Thyristor Checker
 - Test leads
 - Spare Modules (8)
 - 60 KVA Thyristor
 - 3 KVA Thyristor
- Fuses
- Extension cord and 3 adaptors
- Battery discharge curves
- Test plans

May be carried on Support Vessel

14) Check emergency battery - ensure gravity ok; shift to and from emergency battery. Minimum gravity 1.275 (1.300 fully charged).

15) Check operation of:

- Periscope TV
- Fathometer
- Underwater TV
- Underwater Telephone (forward Hydrophone only)
- Hot plate
- CTFM Sonar
- Radio
- Landing and Navigation Lights
- Other installed Electronic Equipment

16) Check magnetic and gyro compass.

17) Test Teledyne Sensor (see if solenoid clicks on and off as set values are past)

18) Test operate toilet, sink and showers.

19) Check out air, variable ballast tanks, and main ballast tanks. (Do before air charge). Do these tests if boat has not operated within a week.

- a- Open hull valve for air flask.
- b- Open back-up valves for air flasks and gage valves.
- c- Open valves to and from reducers. Shut bypass.
- d- Check open air relief valve.
- e- Drain air separator, shut valve.

- f- Open air manifold gage valve. Check reading 90 to 100 kg/cm².
 - g- Check VBT blow line gage valves open (2).
 - h- Open VBT flood/drain hull valves (4).
 - i- Open VBT blow/vent hull valves (2).
 - j- Open VBT outboard vent hull valves (2).
 - k- Test flood and blow each VBT, vent inboard and outboard - then check:
 - Internal vents shut (2).
 - External vents shut - 2 hull valves and 2 vent valves.
 - Flood/drain valves shut - 4 hull valves and 2 back-up valves.
 - Blow/vent valves shut - 2 hull valves and 2 blow valves.
 - l- Open MBT hull valves (4).
 - m- Test blow main ballast tanks - then shut hull valves.
 - n- Test blow air to SAS chamber (ensure vent OPEN). Then shut all SAS valves.
- 20) Secure air flasks.
- 21) Exercise salvage air valves (2 hull and 2 back-up); remove and inspect external plugs if boat has not been operated within a week.
- 22) Open hydraulic return valve at reservoir.
- 23) Check shot tanks full. Ensure that a crust has not formed on top.
- 24) SAS (do these tests if boat has not been operated within one week):
- Set selector valve in pilot's console to SAS.
 - Open SAS hydraulic hull valves (2) and set selector valve to OPEN.
 - Using the pump, open and shut SAS hatch (ensure cover plate on main deck removed).
 - Secure SAS (3 hull valves, blow, vent, flood/drain; set selector valve on pilot's console to emergency shot).
- 25) Check electrical system as follows:
- a- Set propulsion controls on zero and energize pilot's console.
 - b- Check B1 battery switch in 112 volt position.
 - c- Energize all inverters (6).
 - d- Station an observer topside, check motors clear (nose down), and check operation of propulsion and rotation motors. Test in turn mode and cruise mode (use all speeds and twisting combinations). Shift Propulsion Inverter Selector to horizontal and repeat. Rotate motors with Position Inverter Selector in each position.
 - e- Ensure ammeters, tachometers and voltmeters operating.
 - f- Check pilot's console lights.
 - g- Check salt water sensors.
 - h- Secure pilot's console and inverters.
- 26) Test trim system, pump to and from each tank.
- 27) Check bilges dry, pump as necessary.

- 28) Check operation of both hatches.
- 29) Rig towing harness.
- 30) Grease hatch mating surfaces.
- 31) Check hull lifting links removed, salvage links installed.
- 32) Test MBT vents.
- 33) Charge battery - when completed, check penetrator caps in place.
- Ensure AH meters ON and check charge isolation switch in NORMAL.
- 34) Check battery for grounds.
- 35) Charge air. Ensure external charging connection in place.
- 36) Report when completed to Captain.

Just Prior to Getting Underway

- 1) Check each air flask at least 180 Kg/cm².
- 2) Check air distribution line at 90 to 100 kg/cm².
- 3) Inspect interior of boat. Ensure rigged for sea.
- 4) Inspect exterior of boat. Ensure topside clear. Check motors clear.
- 5) Clean viewports, camera lenses, and strobes.
- 6) Test shot ballast system as follows:
 - Check T-handle in place; remove valve plugs.
 - Energize circuit breaker.
 - Check metering coil switch in position 3.
 - Demagnetize holding coil.
 - Station divers.
 - Meter shot for one second from each tank (divers observe).
 - Magnetize holding coil.
 - Release circuit breaker.
 - Divers check shot holding.
 - Rig emergency shot system for dive and pump up accumulator to at least 100 kg/cm².
 - Withdraw hooks holding doors shut by operating emergency shot system.
 - Rig system for dive and divers check hooks in place holding doors shut.
 - Pump up accumulator to 140 kg/cm².
 - Remove T-handles.
- 7) Remove cover on underwater telephone and SAS.
- 8) Remove cover on pinger transponder.
- 9) Check communications between bridge and pilot's console (headset).
- 10) Ensure both keys for pilot's panel on board.
- 11) Emergency/shore power switch in NORMAL.
- 12) Check B1 battery switch in 112 volt position.
- 13) Check mode switch in position 1 or 2.
- 14) Set propulsion controls on zero. Energize pilot's console. Check Propulsion Inverter Selector and Position Inverter Selection in vertical position.

2A2 READY FOR SEA (Cont.)

- 15) Energize inverters.
- 16) Check with observer on bridge to ensure motors clear and nose down. Test propulsion and rotation motors. When completed, set 4 motors in turn mode.
- 17) Test rudder.
- 18) Shift all trim water aft for towing purposes.
- 19) Energize and test TV periscope.
- 20) Ensure:
 - Both LOX tanks on service
 - Valve to oxygen vent and filling vent line secured
 - Valve to oxygen distribution line open
 - Valves to and from regulator open
 - Valves to and from solenoid open
 - Cross connect open
- 21) Calibrate sensor (Teledyne) and set at 21% and 19%.
- 22) Set oxygen regulator at .5 liters per man per minute.
- 23) Secure shore power, remove aft ladder and stow ashore. Check emergency/shore power switch in NORMAL.
- 24) Place emergency lights on the line.
- 25) Test radio.
- 26) Remove yellow polypropelene lines.
- 27) Ensure sail drain scuppers operating freely.
- 28) Shut both hatches.

Support Boat (Escort)

- 1) Fuel topped off.
- 2) Lube oil checked.
- 3) Cell gravities checked above 1250; water ok.
- 4) Installed gear checked:
 - Radio
 - RDF (spare batteries aboard)
 - Pinger (spare batteries aboard)
 - Underwater telephone (batteries checked and spares aboard)
- 5) Diving flag aboard.
- 6) Day signals aboard.
- 7) Diving ladder aboard.
- 8) Food and water aboard.
- 9) Eating utensils and sleeping gear aboard.
- 10) Spare tow bridle aboard.

Change No. 2
20 Feb. 1970

2A2 READY FOR SEA (Cont.)

- 11) Tow line buoy.
- 12) Tow line inspected.
- 13) Basket stretcher aboard.
- 14) First aid kit aboard.
- 15) Tool kit aboard.
- 16) Ball of Marlin and heaving line aboard.
- 17) Smokes and flares aboard.
- 18) Rifle/ammo aboard.
- 19) Scuba tanks and diving gear aboard, diver slates.
- 20) Power heads (2) aboard.
- 21) Sharp probes (2) aboard.
- 22) Suction cup aboard.
- 23) S/P phone for hooking into Franklin sail aboard.
- 24) MBT plugs (24) for Franklin aboard.
- 25) Rubber boat ready, fuel ok.
- 26) Navigation piloting gear and charts.
- 27) Safety Harnesses.
- 28) Life jackets and foul weather gear.
- 29) Binoculars.
- 30) Marker buoy and line.

2A3 RIG FOR DIVE

- 1) Check tow line clear, deploy guide rope (if necessary).
- 2) Cut in emergency power and then shift Emergency/SP switch to NORMAL.
- 3) Check external salvage valve shut, cap in place(2).
- 4) Remove emergency vents.
- 5) Check topside phone disconnected.
- 6) Calibrate Teledyne oxygen gage.
- 7) Check topside clear. Shut sail hatch and open flood ports.
- 8) Check forward hatch, shut and dogged.
- 9) Check aft hatch, shut and dogged.
- 10) Check B1 Battery switch in 112V position.
- 11) Check Battery Isolation switch to NORMAL.
- 12) Test motors in cruise mode (2); set mode switch in position 1 or 2; set Position Inverter Selector Vertical; set Propulsion Inverter Selector vertical.
- 13) Check console lights and activate salt water sensor circuit, temp. sensor breaker, MBT vent circuit breaker, MBT water level circuit, Fathometer circuit, shot alarm circuit.
- 14) Energize Topaz Inverter (1) for life support and AC bus.
- 15) Record ampere hour meter readings.
- 16) Check salt water sensors.
- 17) Check emergency lanterns in place (3).
- 18) Energize pinger.
- 19) Test underwater telephone (forward hydrophone only).
- 20) Test Fathometer - Sounding _____.
- 21) Check surface traffic in the area.
- 22) Ensure LIOH frames installed if long duration dive.
- 23) Check LOX tank valves open (gas withdrawal).
- 24) Check oxygen valve to and from regulator open.
- 25) Check oxygen valve to and from Solenoid Valve open.
- 26) Check oxygen cross connect valve open.
- 27) Check oxygen vent valves shut (2).
- 28) Check oxygen distribution line valve open.
- 29) Set oxygen regulator at .5 liters per man per minute.
- 30) Check depth sensor hull valve open.
- 31) Check depth gages cut-in (3).
- 32) Check hull valve and back-up to hull vent shut.
- 33) Check forward and aft salvage valves shut.
- 34) Check air flask gage valves open (6). Take readings:

Change No. *D*
20 Feb. 1970

2A3 RIG FOR DIVE (Cont.)

Flask 1 _____ Flask 2 _____ Flask 3 _____
Flask 4 _____ Flask 5 _____ Flask 6 _____

- 35) Secure hull valves and backups on all but one air flask (rotate flask on service periodically and secure a flask at 100 kg/cm²).
- 36) Check external air charging hull valve shut.
- 37) Check valves to and from 200 kg/cm² to 100 kg/cm² reducer open; bypass shut.
- 38) Check air relief valve open.
- 39) Check H.P. air₂ distribution line gage valve open and reading 1500 psi (100 kg/cm²).
- 40) Remove horn and cap lines.
- 41) Check SAS outer and inner hatches shut.
- 42) Ensure no pressure in SAS chamber (crack and shut vent).
- 43) Check all SAS valves shut (7)
 - 2 hull valves for motor
 - 1 hull valve for flood/drain and back-up valve
 - 1 blow valve
 - 1 vent valve
 - 1 gage valve
- 44) Open hydraulic return valve.
- 45) Check oxygen valve to hydraulic accumulator.
- 46) Check open hull valves for emergency shot ballast (2).
 - Check open Valve A
 - Check shut Valve B
 - Check open Valve C
 - Check shut Valve D
- 47) Check hydraulic accumulator gage valve open.
- 48) Check hydraulic pressure to Emergency Shot Ballast 140 kg/cm². Test alarm (raise alarm setting with key to over 150 kg/cm² and then set alarm at 130 kg/cm²).
- 49) Check hydraulic selector valve at pilot's console in Emergency Shot Ballast position.
- 50) Check Variable Ballast Tank blow line gage valves open (2).
- 51) Flood one VBT. Then check: internal vents shut (2); external vents shut (2); flood/drain valves shut (2); blow valves shut (2).
- 52) Check Variable Ballast Tank flood/drain, hull valves shut (4).
- 53) Check Variable Ballast Tank blow/vent hull valves shut (2).
- 54) Check Variable Ballast Tank outboard vent hull valves shut (4).
- 55) Open MBT blow hull valves (4).
- 56) Test blow MBT's. Then ensure blow valves shut (2); hull valves shut (4).

Change No. D
20 Feb. 1970

2A3 RIG FOR DIVE (Cont.)

- 57) Check bilges dry.
- 58) Pump water to forward trim so that both tanks are 50% full.
- 59) For automatic MBT blow system:
 - Check air to automatic blow open.
 - Check hydraulic oil to automatic blow open.
- 60) Secure radio.
- 61) Check underwater phones and pingers on normal bus.
- 62) Report when completed to Captain.
- 63) Pump SAS, shut tight.
- 64) Demagnetize shot.

2A4 RIG FOR SURFACE (COMPLETION OF DIVING OPERATIONS)

- 1) Check shot magnetized.
- 2) Shut sail floods.
- 3) Install emergency vents.
- 4) Check all hull valves shut.
- 5) Configure motors for surface operations.
- 6) Secure:
 - Compass
 - Pinger
 - Underwater TV
 - CTFM Sonar
 - Topside Underwater Telephone
- 7) Energize TV periscope as necessary.
- 8) Secure depth gages (3).
- 9) Shut air and hydraulic oil to automatic blow device (2 valves).
- 10) Report when completed to Captain.
- 11) When all Operations Completed:
 - Set Pilot's propulsion controls at Zero.
 - Secure Pilot's console.
 - ~~Set trim water 30 - 50.~~ *Pump 80% trim water fwd.*
 - Secure inverters (6).
 - Secure all circuit breakers on Pilot's panel and circuit breaker panel behind Pilot.
 - Secure TV periscope.
 - Reduce oxygen regulator to .5 liters/minute.
 - Rig shore power.
 - Empty trash cans.
 - Install SAS cover.
 - Shut hull valves and backup valves to air flasks.
 - Disable emergency lights.
 - Rig T-handle wrench and dribble plugs in both shot ballast tanks.
 - Wash down boat with fresh water.
 - Clean/grease hatch surfaces.
 - Clean and grease SAS hatch.
 - Install cover on underwater telephone transducer and pinger transducer.
 - Rig 3 polypropelene lines.
 - Wash foul weather gear, life jackets and harnesses with fresh water.
 - Scrub down and vacuum interior of boat.
 - Clean head (scouring powder and Lysol).
 - Place covers on CTFM, underwater phone, hydrophone and current meter.

2A5 PRE-RECOVERY

- 1) Ensure crane arrangements made.
- 2) Ensure locomotive arrangements made.
- 3) Secure all hull valves and backups.
- 4) Secure all electronic equipment:
 - Fathometer
 - CTFM Sonar
 - Radio
 - Underwater Telephone
 - TV Periscope
 - Underwater TV
- 5) Remove shot ballast.
- 6) Defuse guillotine system.
- 7) Divers clean boat while in water.
- 8) Rig fire hose for hull wash-down.
- 9) Pump out waste tanks if necessary.
- 10) Remove unnecessary weight.
- 11) Shut both hatches and rig forward hatch strongback.
- 12) When recovery completed, install:
 - Viewport covers
 - Hatch protectors
 - Ensure toilet completely pumped out - 10 strokes on pump handle
 - Report completion to Captain

Revision ~~2~~ 1
12 May 1969

2A6 IN-PORT ROUTINE

Chief Engineer - Record the following data each work day in the Engineering Logs:

- Battery voltages and ground currents (Battery Log)
- Ampere hour meter readings (Battery Log)
- Lox levels
- High pressure air in each flask
- Draft readings
- Equipment out of commission
- Work accomplished, failures, etc. (maintenance history)
- Record weight changes

Watch - After working hours, a watch will be assigned to look after the Ben Franklin. This watch is responsible for checking the boat hourly and informing the Captain or other Operations personnel of anything unusual. Specifically, the watch will be on an hourly basis (more often in severe weather):

- Check mooring lines properly secured and free of extreme tension and chafe.
- Check brow (boarding ramp) to ensure that it is pumped up hydraulically so that it does not touch the deck when the boat rolls.
- Check the draft. If it changes three inches, call the Captain (draft marks are three inches apart).
- Check bilges for leaks.

Additionally, the watch will:

- Ensure floodlights on at night.
- Close "dog house" in case of rain, secure loose gear in case of high winds.
- Keep unauthorized persons away from the boat.

2A7 UNDERWAY WATCH ROUTINE

While underway, there will be a pilot on watch at the console at all times. A watch period will normally consist of four hours; however, the interval may be adjusted by the Captain. All watch-standers must be qualified in accordance with the requirements of the Ocean Systems Operations Manager. While on watch, the on-duty pilot is responsible for:

- The safe operation of the boat
- Maintaining ordered depth
- Writing the log
- Ensuring that required inspections are made
- Ensuring that required instrument readings are logged
- For maintaining communications with the support ship
- For following any instructions set forth by the Captain

The Captain is to be informed of any unusual happenings and any changes in the operation of the boat.

If communications are lost for a period exceeding the established interval, the boat is to be surfaced in accordance with the Lost Contact Procedure, and all available means are to be used for regaining communications.

Boat Inspection

During at sea operations, routine boat inspections will be conducted along with taking certain instrument readings. These routines are all specified on the Underway Log Sheet and it is the responsibility of the on-watch pilot to ensure that these inspections and readings are carried out. At 0800 each day, a thorough boat inspection is to be conducted by the Captain on board. This inspection will consist of:

- A check for leaks of all penetrators
- A check of bilge areas to ensure normal conditions
- A check of the hull flange for leaks
- A check of all viewports for leaks
- A check to insure necessary equipment secured
- A check of boat for cleanliness
- A check of fresh water piping for leaks

Revision 1
12 May 1969

Franklin Underway Log Sheet

The on-watch pilot will fill out the Underway Log Sheet - written narrative plus inspection notations. Each log sheet will be on a four hour basis and should include such items as:

- Position and weather
- Times of diving and surfacing
- Large depth changes
- Changes in main power distribution
- Commencement and completion of major evolutions
- Interesting or unusual sightings
- Operation of VBT's (record h.p. air consumption) during sea trials
- Blowing MBT's (record air consumption during sea trials)
- Shifting air flasks
- Casualties to people or equipment

The following is a list of sample entries:

1300 Surfaced
1400 Dived; Dive No. _____
1445 No communication for 30 minutes
1450 Regained communication with escort
1515 Blew starboard VBT dry at 600 feet, used 15 psi (Flask 1)
1550 Commenced terrain following training

W. T. Door

1500 Assumed the watch, conditions normal
Position: 28-24 N, 79-31 W
1630 Secured terrain following training
1700 Surfaced - by blowing MBT's; used 10 psi (Flask 1)
1730 Secured tow line. Commenced transit to W. Palm Beach

S. Schultz

A copy of the Underway Log Sheet is presented as follows:

Franklin Underway Log Sheet

	Time	Routine	Check
Date _____	0000	<ul style="list-style-type: none"> -Check bilges, penetrators and main battery fuse boxes for water -Cycle MBT and VBT hull valves -Check hull valves for proper position -Check LOX tanks for leaks -Vent Main Ballast Tanks -Check emergency ballast hydraulic pressure -Check VBT's for pressure buildup -Record air flask readings: Flask #1 _____; #2 _____; #3 _____; #4 _____; #5 _____; #6 _____ -Check equipment not in use in Off/Standby position -Check F.W. valves shut -Record battery readings -Carbon Dioxide % _____ -Oxygen % _____ -Cabin Temperature _____ -Cabin Pressure _____ -Sea Water Temp _____ -Cabin Humidity _____ 	
00-04			
Position:			
Weather:			
	0100	<ul style="list-style-type: none"> -Check hydraulic pressure -Cycle MBT and VBT hull valves 	
	0200	<ul style="list-style-type: none"> -Oxygen % _____ -Check hydraulic pressure -Cycle MBT and VBT hull valves 	
	0300	<ul style="list-style-type: none"> -Is Shot Magnetized? -Check hydraulic pressure -Cycle MBT and VBT hull valves 	

Franklin Underway Log Sheet

	Time	Routine	Check
Date _____	0400	<ul style="list-style-type: none"> -Check bilges, penetrators and main battery fuse boxes for water. -Cycle MBT and VBT hull valves -Check hull valves for proper position -Check LOX tanks for leaks -Vent Main Ballast Tanks -Check emergency ballast hydraulic pressure -Check VBT's for pressure buildup -Record air flask readings (flasks in service) Flask #1 _____; #2 _____; #3 _____; #4 _____; #5 _____; #6 _____ -Check equipment not in use in Off/Standby position -Record battery readings -Check F.W. valves shut -Carbon Dioxide% _____ -Oxygen % _____ -Cabin Temperature _____ -Sea Water Temp. _____ -Cabin Pressure _____ -Cabin Humidity _____ 	
04-08	0500	<ul style="list-style-type: none"> -Check hydraulic pressure -Cycle MBT and VBT hull valves 	
Position:	0600	<ul style="list-style-type: none"> -Oxygen % _____ -Check hydraulic pressure -Cycle MBT and VBT hull valves 	
Weather:	0700	<ul style="list-style-type: none"> -Is Shot Magnetized? -Check hydraulic pressure -Cycle MBT and VBT hull valves 	

-Change No. *R*
20 Feb. 1970

Franklin Underway Log Sheet

	Time	Routine	Check
Date _____	0800	<ul style="list-style-type: none"> -Replace LiOH panels -Conduct thorough boat inspection -Cycle MBT and VBT hull valves -Check hull valves for proper position -Check LOX tanks for leaks -Vent Main Ballast Tanks -Check emergency ballast hydraulic pressure -Check VBT's for pressure buildup -Air flask readings (flasks in service) Flask #1 _____; #2 _____; #3 _____; #4 _____; #5 _____; #6 _____ -Check equipment not in use in Off/Standby position -Check F.W. valves shut -Record battery readings -Carbon Dioxide % _____ -Oxygen % _____ -Sea Water Temp. _____ -Cabin Humidity _____ -Cabin Pressure _____ -LOX pressure _____ -Fwd _____ Aft _____ -Record F.W. & LOX tank levels 	
08-12			
Position:			
Weather:			
	0900	<ul style="list-style-type: none"> -Check hydraulic pressure -Cycle MBT and VBT hull valves 	
	1000	<ul style="list-style-type: none"> -Oxygen % _____ -Check hydraulic pressure -Cycle MBT and VBT hull valves 	
	1100	<ul style="list-style-type: none"> -Is Shot Magnetized? -Check hydraulic pressure -Cycle MBT and VBT hull valves 	
		<p>NOTE: If motors have been idle, meggar before using.</p>	

Change No. 2
20 February 1970

Franklin Underway Log Sheet

	Time	Routine	Check
Date _____	1200	<ul style="list-style-type: none"> -Check bilges, penetrators and main battery fuse boxes for water -Cycle MBT and VBT hull valves -Check hull valves for proper position -Check LOX tanks for leaks -Check emergency ballast hydraulic pressure -Check VBT's for pressure buildup -Air flask readings (flasks in service) Flask #1 _____; #2 _____; #3 _____; #4 _____; #5 _____; #6 _____ -Test emergency ballast alarm -Check equipment not in use in Off/Standby position -Vent Main Ballast Tanks -Check F.W. valves shut -Record battery readings -Carbon Dioxide % _____ -Oxygen % _____ -Cabin Temperature _____ -Sea water temp. _____ -Cabin Humidity _____ -Cabin Pressure _____ 	
12-16	1300	<ul style="list-style-type: none"> -Check Gyrocompass -Check hydraulic pressure -Cycle MBT and VBT hull valves 	
Position:	1400	<ul style="list-style-type: none"> -Oxygen % _____ -Check hydraulic pressure -Cycle MBT and VBT hull valves 	
Weather:	1500	<ul style="list-style-type: none"> -Is Shot Magnetized? -Check hydraulic pressure -Cycle MBT and VBT hull 	

Franklin Underway Log Sheet

	Time	Routine	Check
<p>Date _____</p> <p>16-20</p> <p>-Position:</p> <p>Weather:</p>	<p>1600</p> <p>1700</p> <p>1800</p> <p>1900</p>	<p>-Check bilges, penetrators and main battery fuse boxes for water</p> <p>-Cycle MBT and VBT hull valves</p> <p>-Check hull valves for proper position</p> <p>-Check LOX tanks for leaks</p> <p>-Vent Main Ballast Tanks</p> <p>-Check emergency ballast hydraulic pressure</p> <p>-Check VBT's for pressure buildup</p> <p>-Air flask readings (flasks in service)</p> <p>Flask #1 _____; #2 _____</p> <p>#3 _____; #4 _____</p> <p>#5 _____; #6 _____</p> <p>-Check equipment not in use in Off/Standby position</p> <p>-Check F.W. valves shut</p> <p>-Record battery readings</p> <p>-Carbon Dioxide % _____</p> <p>-Oxygen % _____</p> <p>-Cabin Temperature _____</p> <p>-Sea water temp. _____</p> <p>-Cabin Humidity _____</p> <p>-Cabin Pressure _____</p> <p>-Check hydraulic pressure</p> <p>-Cycle MBT and VBT hull valves</p> <p>-Oxygen % _____</p> <p>-Check hydraulic pressure</p> <p>-Cycle MBT and VBT hull valves</p> <p>-Is Shot Magnetized?</p> <p>-Check hydraulic pressure</p> <p>-Cycle MBT and VBT hull valves</p>	

Franklin Underway Log Sheet

	Time	Routine	Check
Date _____	2000	<ul style="list-style-type: none"> -Check bilges, penetrators and main battery fuse boxes for water -Cycle MBT and VBT hull valves -Check hull valves for proper position -Check LOX tanks for leaks -Vent Main Ballast Tanks -Check emergency ballast hydraulic pressure -Check VBT's for pressure buildup -Air Flask readings (flasks in service) Flask #1 _____; #2 _____; #3 _____; #4 _____; #5 _____; #6 _____ -Check equipment not in use in Off/Standby position -Check F.W. valves shut -Record battery readings -Carbon Dioxide % _____ -Oxygen % _____ -Cabin Temperature _____ -Sea water temp. _____ -Cabin Humidity _____ -Cabin Pressure _____ -Conduct contaminant checks _____ 	
20-24	2100	<ul style="list-style-type: none"> -Check hydraulic pressure -Cycle MBT and VBT hull valves 	
Position:	2200	<ul style="list-style-type: none"> -Oxygen % _____ -Check hydraulic pressure -Cycle MBT and VBT hull valves 	
Weather:	2300	<ul style="list-style-type: none"> Is Shot Magnetized? -Check hydraulic pressure -Cycle MBT and VBT hull valves 	

Change No. D
20 Feb. 1970

2A8 OPERATING DAY DETAIL SHEET

Serial No. _____

Date: _____

Released _____

Operations Manager

1. Franklin will get underway at _____
2. Franklin will moor at _____
3. Franklin trim shall be as follows:

Forward trim	_____	% Full
Aft trim	_____	% Full
VBT 1 (stbd)	_____	% Full
VBT 2 (port)	_____	% Full
Shot 1 (stbd)	_____	% Full
Shot 2 (port)	_____	% Full
4. Tank levels are required to be as follows:

Lox tank forward	_____
Lox tank aft	_____
Fresh water 1	_____
Fresh water 2	_____
Fresh water 3	_____
Fresh water 4	_____
Hot water 1	_____ (heated - yes/no)
Hot water 2	_____ (heated - yes/no)
Hot water 3	_____ (heated - yes/no)
Hot water 4	_____ (heated - yes/no)
Wast tanks	_____
5. Ready for Sea Check-Off completed up to "just prior to getting underway".

Signature

Revision 1.
12 May 1969

2A8 OPERATING DAY DETAIL SHEET (Cont.)

Exceptions:

6. Escort

- Fuel Topped off _____
- Lube oil on mark _____
- Cell gravities checked _____
- Above 1.250 - water ok _____
- Para anchor _____
- Diving Ladder installed
and housed _____
- Diving Flag _____
- Day Signals _____
- Food/water _____
- Spare tow bridle _____
- Stretcher _____
- RDF Checked _____
- Radio Checked _____
- Tracking gear checked _____
- Underwater telephone checked _____
- First Aid Kit _____
- Tool Kit _____
- 20 day smokes _____
- Night flares _____
- Rifle/ammo _____
- Scuba gear _____
- Shark probes _____
- Rubber boat _____
- Outboard Runup Fuel Topped _____
- Plotting Gear _____

Signature

7. The objective of this operating interval is:

Revision 1
12 May 1969

2A8 OPERATING DAY DETAIL SHEET (Cont.)

8. Special instructions/equipment:

9. Ben Franklin Crew

Observers -

10. Support Boat Crew -

Passengers -

Revision 1
12 May 1969

2B EMERGENCY PROCEDURES

2B1 Fire Underway

- 1) Fight fire.
- 2) If an electrical, secure all power
 - a - hit AEG emergency shut down switch
 - b - secure load on Topaz inverter and then secure inverter
 - c - shift emergency/shore power switch to OFF
 - d - switch mode switch to OFF
- 3) Don oxygen breathing apparatus and secure LOX tanks.
- 4) If 28 VDC bus OK, shift to emergency power and inform support ship.
- 5) Surface the boat
- 6) Exhaust smoke with portable blower
- 7) Open LOX tanks when fire out

Fire in Port

- 1) Fight fire
- 2) If an electrical, secure all power
 - a - hit AEG emergency shut down switch
 - b - secure load on Topaz inverter and then secure inverter
 - c - shift emergency/shore power switch to OFF
 - d - switch mode switch to OFF
- 3) Don oxygen breathing apparatus and secure LOX tanks
- 4) Exhaust smoke with portable blower
- 5) Open LOX tanks when fire out

2B2 Collision

In any collision it is important that the impact occur on the side of the vessel. If a collision occurs at the bow or stern, it is possible that a viewport may be damaged enough to allow the boat to become flooded. Therefore, if possible, maneuver to take the impact broadside. If due to an MBT rupture, a severe list occurs, drop shot ballast on the appropriate side (dribble) to level the boat. Inform the escort, take the necessary damage control action and surface if submerged.

NOTE:

- 1) If B1 battery switch is in the 28 volt position, the 28 volt bus has power even though the mode switch may be off.
- 2) If the 28 volt bus is damaged, power is available to the pinger and underwater telephone directly from the emergency battery - transfer switch is on the pilots console.

Revision 1
12 May 1969

2B3 FLOODING

Surfaced

- 1) Shut hull valves of affected systems (be careful of water hammer).
If affected system is unknown, shut all hull valves, except for emergency shot ballast.
- 2) Shut hatches - do not fully tighten hatch dogs.
- 3) Shift mode switch to off.
- 4) Repair damage.
- 5) If absolutely necessary, carefully pressurize boat to stop flooding.
- 6) Shift to emergency power and inform Support Ship.

Submerged

- 1) Shut hull valves of affected system (be careful of water hammer).
If affected system is unknown, shut all hull valves except emergency shot ballast.
- 2) Emergency surface.
- 3) Shift mode switch to zero mode.
- 4) Repair damage.
- 5) If absolutely necessary, carefully pressurize boat to stop flooding.
As boat approaches the surface, internal pressure could blow out a viewport. Since hatches are not dogged tightly, they may vent, however, the hull vent must be opened to prevent a high pressure buildup.
- 6) Shift to emergency power and inform Support Ship.

Revision 1
12 May 1969

EMERGENCY SURFACE

In the event that it is necessary to surface immediately, the below procedure will be followed. Keep in mind that if an emergency surface is carried out, it may result in serious battery damage. Therefore, it should only be used in extreme situations--uncontrollable flooding, serious fire, or en extremis.

- 1) Release emergency shot ballast.
- 2) If electrical system intact, rotate forward motors nose up and apply full power.
- 3) Inform support ship.

Submersible

If the submersible command, for whatever reason, suspects that contact may be lost he should immediately institute an attempt to communicate by Gertrude. If he can neither communicate by voice nor get a CW range response he should:

- 1) Change depth to 200 feet and continue calling on underwater telephone at approximately two minute intervals (vary slightly) while ascending. Listen on underwater telephone for surface contacts.
- 2) If no contact at 200 feet after 15 minutes, surface (with navigation ON lights on at night).
- 3) When securely surfaced, use all means possible to regain communications -- whistle, radio, flares, underwater telephone, and signal light. Use electric power sparingly.
- 4) Call the Coast Guard via radio on command option.

If during submerged operations, the submersible hears two consecutive blasting caps fired he shall undertake 1 through 4 above.

Escort

Normal tracking is considered to exist when the tracker is able to acquire a range and bearing to the submersible at will. Frequently, the tracker is unable to acquire a range and may continue tracking by bearing only for intervals as long as thirty minutes. On occasions when the tracker is proceeding on bearing only, he should be mentally prepared for the loss of signal altogether. Consequently, when tracking by bearing only in advance of loss of contact, good practice requires periodic underwater telephone (Gertrude) range checks.

Gertrude ranges are obtained by switching the 504 to CW and sending a series of at least three letter victors followed by a long dash and then a steady rhythm series of six (6) dots about one second apart. Simultaneously with the sixth dot start a stop watch. When a CW dot is received from the submersible, stop the watch and multiply the number of seconds of elapsed time by 2400 to establish feet of start range. Frequent range checks will operate to decrease the possibility of complete contact loss.

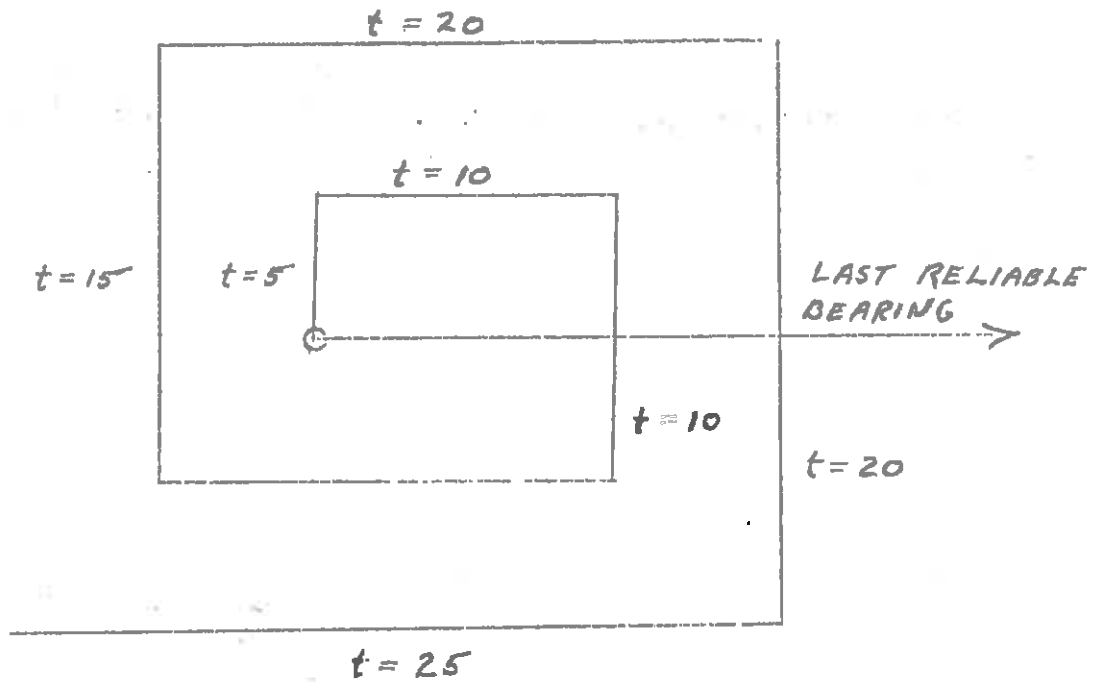
Upon the commencement of submerged operations the tracker should immediately determine the magnitude and direction of predominant force. Predominant force is that force tending to separate the tracking ship from the submersible and is caused by wind and current. The tracker must be constantly alert to changes of predominant force which will occur when the submersible changes depth (current shear) the wind changes or the current changes. A tracker should never alter course to a direction within 90 degrees of the predominant force unless he is doing so with solid tracking information. In a lost contact situation ALWAYS maneuver against the predominant force until tracking information (Gertrude ranges or system acquisition) reveals that the contact is indeed down force.

Lost contact requires that the Operations Director be notified immediately. Concurrently commence logging Gertrude ranges every two minutes and all ships heading changes. Maneuver to close the range with course changes.

When a course change has produced an increase in range, immediately reverse course and increase speed. Before increasing speed, however, on a reciprocal course be absolutely certain that the range is being closed. Proceed on the course which is closing range until range commences to open. At this point, the submersible is 90 degrees to the course being steered, either to the right or to the left. The trackers mental situation picture may provide a cue as to which direction the submersible is in. If not, turn 90 degrees to the right or left and continue checking range. If the range opens, reverse course and continue to establish contact.

Trackers should constantly bear in mind the necessity to let a clear trend develop before making a decision. In panic situations, the wish for a particular trend is no substitute for a clear trend. Take immediate action to re-establish contact but do not reverse the initial action until there is a clear indication or trend which indicates that the initial action was incorrect. Having made the judgement that the initial action was incorrect, reverse course and stick with it until an abeam condition develops.

LOST CONTACT ESCORT PATTERN



NOTE: - Time in minutes
- Speed about 8 Kts.

Revision 1
12 May 1969

EMERGENCY PERSONNEL TRANSFER PLAN

General - In the event that a personnel casualty occurs at sea, rapid steps must be taken to ensure that the injured person is returned to shore and given prompt medical attention. For this reason, Grumman personnel must be prepared in advance to act quickly and in coordination.

Specific - When a casualty occurs:

At Sea

1. Operation Director determine method of transportation to home base. Consider:

- (a) Nature of casualty (burn, broken bone, bleeding, bends, air embolism, etc.)
- (b) Distance to land
- (c) Weather
- (d) Need for an escort to remain with Franklin

A Coast Guard helicopter/cutter, support boat or nearby vessel can be used. Under some circumstances the rubber boat may be beached on FRANKLIN for transfer purposes.

2. Report casualty, method of transportation, position and weather to home base via radio (3281 Kcs). If contact cannot be made, the Coast Guard or a nearby vessel can be called.

In Port - Home Base

1. Senior Grumman man takes charge and coordinates the transfer.
2. Request Coast Guard assistance if necessary (phone: 844-5030).
3. Call an ambulance (phone: 833-4588).
4. Prepare an area in Slip No. 2 along Grumman property for personnel transfer if a boat is used. Ensure linehandlers are standing by a camel and a ladder is handy. If a Coast Guard Cutter is to be used, check with the Coast Guard to ensure that the landing will be made in Slip No. 2.
5. If a recompression chamber is necessary, call Perry Submarine Builders (phone: 848-9678).
6. If the oil barrier is in place, call the Port of Palm Beach to open it (phone: 842-4201).

Revision 1
12 May 1969

When FRANKLIN is conducting surfaced or submerged operations within range of the operating base, a continuous radio watch will be maintained on 3281Khz. Upon receipt of a radio alert from the FRANKLIN or the escort, the radio watch will immediately advise the senior Grumman employee present of the alert and provide the emergency local instructions to him. Every precaution is to be taken to insure that only the senior Grumman employee or his delegate takes action. The senior Grumman employee will proceed to the radio installation and stand-by for further instructions. Do not take action other than advise the FRANKLIN or escort that you are on standby alert. Stop outgoing local phone calls, terminate incoming calls graciously but non-committably. Do not solicit information, unless some question arises concerning an instruction. Control of the emergency is with the Operations Director.

Emergency Local Instructions for West Palm Beach

The nearest hospital is St. Mary's Hospital (Phone 844-6311). Proceed north inside the port area to Port Road. Proceed west on Port Road to the second traffic light and turn left or south. About 1/4 mile on the west side of the road turn west at the sign marking the emergency entrance.

Police (Riviera Beach) 844-3515 (State) 683-4455

Ambulance - 833-4588

Physician - 848-3434 - Dr. Marchetto and Dr. O'Brien
2755 Broadway, Riviera Beach

Fire Department - 848-1434

Coast Guard District Commander - 350-5621 (Miami)

Coast Guard Search and Rescue (SAR) - 844-5030 (Local - Peanut Island)

Perry Submarine (Decompression Chamber) - 848-9678

Port Director - 842-4201

Heavy Lift Services - Day - 848-2576
Night - 746-3200

In the event the MARSAP plan is activated, the base radio watch will take steps to place the Coast Guard SAR operation in direct contact with the Grumman Operations Manager.

Revision 1

12 May 1969

SUBMERGED GROUNDING

In the event the BEN FRANKLIN is unable to lift off the ocean bottom, the following procedure will be used:

- 1) Inform support ship.
- 2) Blow variable ballast tanks dry.
- 3) Rock the boat by shifting personnel and water back and forth. When all weight forward, use maximum power on motors 3 and 4. Do same for motors 1 and 2 when weight is aft. Try all four motors together.
- 4) Partially blow main ballast tanks. Repeat step three. Reflood main ballast tanks when free. If no success, blow tanks dry and repeat step three.
- 5) If still no success, dribble out shot ballast to the 50% level and repeat step three. Rock boat by alternately applying power to port and starboard motors.
- 6) If still no success, go to full power on motors and release emergency shot ballast. When free, reflood main ballast tanks, rotate motors 180° and use them to slow ascent (to protect batteries).
- 7) Release buoy. Secure necessary equipment and conserve air, food, and water.

Revision 1

12 May 1969

The conduct of a submerged escape from BEN FRANKLIN is a final evolution in the life of the craft. There are conceivable circumstances where the need to conduct an escape is an obvious matter. There are, on the other hand, circumstances where the decision to abandon the craft can only be reached by the process of elimination of alternatives. In any case, where the need to conduct an escape can be envisioned as an alternative, whether real or possible, steps shall be taken to provision for such an eventuality.

This escape procedure assumes that any escape will involve depths where decompression times will extend beyond the endurance of the Draeger FGG III. This procedure further assumes that a Personnel Transfer Capsule (PTC) will be ready to accept escaping personnel in the immediate vicinity of the after hatch.

1. Rig hatch skirt.
2. Make decision on use of life raft.
3. Turn on all battery powered lanterns.
4. Conduct final surface communications.
5. Place mode switch in zero mode (OFF).
6. All hands don life vests.
7. All hands don breathing rigs.
8. Remove all main power fuses.
9. Short exterior fuse clips to blow exterior fuses.
10. Undog after hatch.
11. Flood boat as fast as possible via variable ballast tank inboard vents and SAS vent. Secure flooding when water level is just above skirt lip. All hands must be on breathing rig at the start of flooding. Use of Plankton Sampler can vastly speed flooding.
12. Release guide line.
13. Await signal from PTC before attempting to exit.
14. Upon signal from PTC, exit and swim or follow line to the PTC. Be prepared to ditch gear before entering PTC if requested by the PTC escort.

In the event that the signal under item 13 may not be readily communicated by the PTC escort, he may elect to make a series of taps for the exit instruction. In this case, a series of three taps in quick succession repeated at intervals as necessary to assure receipt will constitute an exit instruction.

Revision 1

12 May 1969

2B10 SHIFT TO EMERGENCY POWER

- 1 - Secure all circuits on 28 VDC bus.
- 2 - Shift emergency/shore power switch to emergency position.
- 3 - Energize circuits as necessary.

Revision 1
12 May 1969

2B11 MARSAP

MARSAP is an acronym for Mutual Assistance Rescue and Salvage Plan. Grumman is a participating member of an industry group of submersible operators who have joined for the purpose of rendering assistance in the event of a distressed submersible.

The activation of the MARSAP plan is the option of the cognizant U. S. Coast Guard District Commander. Grumman may be requested to provide assistance at the scene of an incident which may involve providing a submersible as well as personnel and equipment. Should such a request for an assistance be received, the Operations Director is authorized to utilize every reasonable means to respond expeditiously to U. S. Coast Guard requests for assistance under the MARSAP plan activation.

In the event that a Grumman submersible is deemed by the Operations Manager to be an extremis he shall immediately advise the Coast Guard and request MARSAP activation.

Revision 1
12 May 1969

2C NORMAL ROUTINES

2C1 ESCORT CONDUCT

All submersible operations will be conducted in the presence of an escort craft. The escort craft will serve as a control center for submerged operations and as source of assistance to the Captain of the submersible. The escort may serve as a tug under certain circumstances. The escort will usually tow the rubber boat to the operating site for use as a transfer vehicle. The escort will be brought alongside the submersible only in extreme emergencies.

Normally, the escorts will get underway before the submersible and conduct the initial tow clear of the basic. When the submersible casts the tow and picks up another towing craft, the escort should trail the submersible to provide emergency maneuvering power in the event the tow parts and assistance is required.

Upon commencement of the diving exercise, the escort will always place itself in a position of drift to open. Under conditions of personnel transfer by streaming the rubber boat, the escort may station so as to drift to close.

The escort craft will maintain no formal logs. The original record in lieu of a log will be the operation plot. The operation plot will show the time submerged operations commenced and the best known position. Each ten minutes the tracked position of the submersible will be plotted and the time and depth recorded on the plot. The best known position of the escort will be plotted hourly.

At least every thirty minutes from the commencement of submerged operations, voice communication shall be established. If at the required communication interval, the two preceding transponder signals have been missed and voice communication is not established, the LOST CONTACT ROUTINE 2B5 will be initiated. FRANKLIN is required to surface if two consecutive communication periods are missed.

All time will be measured to the nearest minute commencing with the word DIVE from the submersible

Revision 1
12 May 1969

2C2 COMMUNICATIONS

Normally, communications between the escort and FRANKLIN will be by underwater telephone. Radio will only be used when FRANKLIN is surfaced and beyond the range of the underwater phone. Excerpts from the FCC Rules, Part 83, FRANKLIN radio license, and copies of Grumman regulations concerning radiotelephone are included in the appendix.

The following frequencies are set up in FRANKLIN:

<u>Intership</u>	<u>Ship to Shore</u>	<u>Distress</u>	<u>Coast Guard</u>	<u>Special</u>
2638	2118	2182	2670	3281
2738	2126			
	2198			
<u>CALL SIGN</u>	-	WR8429.		

Revision 1
12 May 1969

Communications Procedures

All who have used the radio-telephone and underwater phone have had exposure to a new variety of poor communications. Beyond some technical improvements which can and will be made to our systems, there is an additional contribution which all those involved in the use of these equipments can make. Standardization of phraseology can make a large contribution to confusion reduction in information transfers. If the receiver of information knows approximately what he will hear before he hears it, the chances that he will make a complete receipt of all the information is significantly enhanced. In order to improve our communicating ability, by training, all transmissions on both the underwater telephone and the radio telephone should conform with the following standard phraseology:

Always use a call up. It allows the receiver to discontinue what he is doing and re-orient to receiving your information transfer. Do not respond to a call up until you are thoroughly ready to listen, record and understand.

Sender: "BEN FRANKLIN this is GRIFON. Over".

"Over" means the sender expects to say more or expects a response. "Over" is in contrast to "Out" which means this is the end of my transmission, I do not expect a response.

Receiver: "GRIFON this is BEN FRANKLIN. Go ahead. Over".

This means the receiver is aware he is being called and is in all respects ready to receive and copy an information transfer. A typical exchange in proper format follows. Please notice the use of "Roger". Roger may be thought of in terms of a receipt for information. The expression Roger should be made explicitly for that portion of the information transferred AND UNDERSTOOD.

Sender: "BEN FRANKLIN this is GRIFON, this is my two zero zero zero (2000) radio (Gertrude) check. The surface conditions are 50 percent overcast and the wind is north northwest ten knots. The seas are five to eight feet from west northwest. Contact Charlie bears zero eight five range seven thousand and will pass well clear east. Contact delta bears one eight five range four five zero zero and will pass well clear east. Over".

Receiver: "GRIFON this is BEN FRANKLIN. I read you weak but clear. Roger your surface conditions and delta contact. Say again Charlie contact. Over".

Sender: "BEN FRANKLIN this is GRIFON. I read you loud and clear. I say again - contact Charlie bears zero eight five range seven thousand and will pass well clear east. Over".

Receiver: "GRIFON this is BEN FRANKLIN. Roger out".

Revision 1

12 May 1969

Communications Procedure (Cont.)

Special Signals - for use when underwater telephone inoperative

Is everything O.K.	●
Everything O.K.	●●
Ready to surface (or we must surface)	●●●
You are cleared to surface (or you must surface)	●●●●
Minor problem	●●●●●
Send divers	●●●●●●
Divers enroute	●● ●
Stuck on bottom	●● ●●
Send PTC	●● ●●●
PTC being lowered	●● ●●●●
PTC ready for escapes	●● ●●●●●
We will swim up to surface	●● ●●●●●●
Escape when ready	●● ●● ●
Commencing escape sequence	●● ●● ●●
→ Shift to morse code	●● ●● ●● ●●

INTERNATIONAL MORSE CODE

A ●-	J ●---	S ●●●
B -●●●	K -●-	T -
C -●-●	L ●-●●	U ●●-
D -●●	M --	V ●●●-
E ●	N -●	W ●--
F ●●-●	O ---	X -●●-
G --●	P ●--●	Y -●--
H ●●●●	Q --●-	Z --●●
I ●●	R ●-●	
1 ●----	6 -●●●●	
2 ●●----	7 --●●●	
3 ●●●--	8 ---●●	
4 ●●●●-	9 ----●	
5 ●●●●●	0 -----	

Revision 1
12 May 1969

2C3 DIVER OPERATIONS

All diver operations associated with submersible operations or Ocean Systems activities will be conducted by pairs of certified divers. A singular exception to this rule is those occasions where training is being conducted in connection with certification.

The Diving Operations Supervisor is assigned the responsibility of ensuring that all diving operations conducted are in accordance with the provisions of the Grumman Ocean Systems Operations Manual.

Diver training leading to certification is the responsibility of the individual. Grumman diving equipment may be borrowed from the Diving Operations Supervisor, however, consumed air and replacement of damaged or lost equipment will be borne by the borrower. All prospective divers are encouraged to study, "The New Science of Skin and Scuba Diving" (NEW REVISED EDITION), published by Association Press, New York, before undertaking training of any kind.

Ocean Systems divers will be certified in two categories; compressed air and mixed gas. A compressed gas certification is a prerequisite to mixed gas certification. Candidates for certification will be designated by the Operations Manager, Ocean Systems.

Designated candidates for certification will have physical examinations arranged by the Diving Operations Supervisor through the Grumman Medical Department. Upon satisfactory completion of the physical examination, the Diving Operations Supervisor will conduct a pool check of the candidate in accordance with Appendix F of the Ocean Systems Operations Manual. Upon satisfactory completion of the pool check, the candidate will be given a written test to verify his basic knowledge of diving. Upon completion of the written test, the candidate will make an open sea dive of at least 40 feet with the Diving Operations Supervisor and two other certified divers. If upon completion of the open sea dive, the Diving Operations Supervisor and the two certified divers concur in recommending the certification of the candidate, then the Operations Manager will certify the diver for compressed air diving for one year.

In order to maintain certificates current, divers will submit to an annual physical examination by the Grumman Medical Department. Based upon the diving activity of the diver, the Diving Operations Supervisor may or may not recommend that the diver be recertified by the Ocean Systems Operations Manager.

Candidates for mixed-gas diving will be designated by the Operations manager. The Diving Operations Supervisor will arrange for a physical examination by the Grumman Medical Department. Mixed-gas training will be provided by an independent sub-contractor qualified to teach mixed-gas techniques.

Revision 1

12 May 1969

2C3 DIVER OPERATIONS (Continued)

Candidates for diver certification may conform with any or all of the below categories.

1. Compressed Air

a. Working Diver (Shallow) (to 30 ft.)

- Physical examination - local Doctor
- Pool check
- Written examination
- Complete working dives (to 30 ft.) with certified divers

b. Working Diver - compressed air

- Must complete (a) above
- Open ocean dive to at least forty (40) feet
- Minimum of five (5) hours as a working diver-shallow water
- Recommendation for certification by two certified divers including Chief Diver or designate.
- Certification approval by Diving Supervisor and Operations Manager

2. Mixed Gas Training

- Designation by Operations Manager
- Physical examination - Grumman medical for mixed gas
- Certified working diver - compressed air
- Mixed gas training including safety, medical aspects, hazards in handling, pool dives.
- Recommended by Chief Diver
- Certification approval by Operations Manager and Diving Supervisor

Revision 1

12 May 1969

1. All work accomplished on the BEN FRANKLIN, while in an operational status, shall be done under close supervision and through the strict coordination of one individual. The Chief Engineer, or in his absence a designated representative, must be cognizant of all work being undertaken on the ship at all times.

Work will not be started on the BEN FRANKLIN without the express approval and knowledge of the above individual. This includes all authorized changes and Engineering Orders.

A design change to any system or component shall not be made unless authorized by an Engineering Order and drawing and then issued on a Work Order.

In order to accomplish the work required on BEN FRANKLIN, the following procedure is hereby promulgated:

- a. Identifying Work - Whenever a deficiency becomes known or when a repair or maintenance action is required, the item will be submitted in writing to the Chief Engineer stating the specific work required and who has knowledge of what is needed. The item will then be entered on a "deficiency" list that will be maintained by the Chief Engineer.

Each item will be consecutively numbered and will carry the item number and deficiency list number for identification. (Only 5 items will be carried on any one list).

- b. Assigning Work - Each item on the deficiency list will be transferred to a Work Order form and will be assigned to the person who is responsible for the performance of the work. The work order will carry the same deficiency list number and consecutive number as the item on the deficiency list. Test requirements if applicable will be designated on the Work Order. When the Work Order is written, it will be placed on the deficiency status list. This status will be kept current by the Crew Chief or his assistant. *Quality Control Shall review all work orders!*

- c. Accomplishing Work - When the person responsible for accomplishing the work is ready to undertake the work, clearance is obtained to disable the system or component from the Chief Engineer or his representative. At this time, tags will be obtained from the Crew Chief or his representative and the system(s) affected will be tagged out in a logical and conspicuous location. Each tag will contain the date and reason tagged and the signature of the person working on that system. No part of that system will be operated while a tag is on it without the knowledge of the person who has signed the tag. An equipment status log will be maintained listing all current equipment that is not operable or is not in a normal condition as designed. The information posted in this log will be used for the condition reports regarding ready for sea and ready to dive.

Revision 1
12 May 1969

- d. Clearing Discrepancies - When the work has been completed, the description of the work that was accomplished shall be written in the space provided on the Work Order form and shall be signed by the person who accomplished the work. The Work Order form will then be returned to the Chief Engineer. If a test is required, Quality Assurance will be notified when the test is set up and ready for proof. The Work Order will be signed by Quality Assurance when tested satisfactorily. It will then be inspected by the Chief Engineer or the Crew Chief.

The Work Order will then be noted as completed and will be signed by the Chief Engineer and filed. The status board and equipment status book will reflect the completion of the item. Tags are to be removed and returned to the Chief Engineer with the completed Work Order.

NOTE: A discrepancy that requires an Engineering decision may be cleared by simply issuing an E.O., however, this must be so stated on the Work Order and returned to the Chief Engineer. The E.O. must be identified by the E.O. number on the Work Order. When the work is to be accomplished on the "Ben Franklin", a new Work Order will be issued to accomplish the E.O.

- e. Special Cases - When an operational period is completed and the time for the next operational period is short, a special list of discrepancies that will require repair before resuming operations, may be submitted to the Chief Engineer or his representative for immediate accomplishment. This list will constitute authorization as approved for repairs only, however, Work Orders must be filled out in accordance with this procedure as soon as possible thereafter.
 - f. Ready for Sea and Ready for Dive - One hour prior to getting underway, the Chief Engineer will examine the Equipment Status Book for any item that will prevent the "Ben Franklin" from getting underway or diving. If no item exists, 15 minutes prior to getting underway, he will report to the Operations Manager and "Ben Franklin's" Captain that the "Ben Franklin" is ready to get underway and ready to dive, and provide a list of all equipment not operable along with a trim statement. This list will be written and signed at the bottom of the respective check-off list.
2. Record Keeping - In addition to the record requirements in connection with established routines, the Chief Engineer will maintain a Material Log. The Material Log will record all work undertaken on the craft by any person.

The log entry will date and describe the work undertaken and identify the person responsible for the work conduct. All reference data (E.O., drawings, memoranda, etc.) will be recorded. No work will be undertaken without a work authorization released by the Chief Engineer. When the work authorized is completed, the responsible person for the work conduct will sign the work authorization and it will be maintained in the completed work file. A log entry in the Material Log will be made. Battery charges, air charges and LOX charges will be treated as work items.

CAUTION

There will be no welding, drilling, tapping, prying, or any work on the main hull or any items that are part of the main hull - (tabs - brackets, etc.). If you receive a drawing or E.O. that calls for any of the above type work, check with Operations (Chief Engineer or Crew Chief) before proceeding.

All items removed shall have the hardware attached to the item removed in cloth bags that are available in the stock room.

There will be no lines (hyd. - pneumatic - sea water) disconnected or loosened without approval of Operations (Chief Engineer or Crew Chief). This restriction applies even if drawing or E.O. requires this type work.

There will be no smoking in or on the boat.

Soda bottles will not be carried on the boat.

No M.E.K. or trichlorethane in boat. Freon TF may be used.

No steel wool to be used on or in boat.

Clean up after every job as it is done. Any drilling around electrical equipment requires a protective cover over the electrical equipment. No blind drilling until a check is made to determine what is hidden - use drill stops as necessary. Chips make shorts!

The crew's lives depend on you. If you see anything that you think is being missed or is unsafe, please let someone in Operations know about it. They will get an answer for you. All parts installed or removed must be weighed and recorded.

Approved cleaning materials are as follows:

- a) Cleaning of decks, bulkheads, etc.
Spic and Span, water solution.
- b) Remove scuff marks, grease spots, etc.
 - 1) Isopropyl alcohol
 - 2) If isopropyl alcohol does not work use Freon TF
- c) Preparation of Electrical Wires for soldering:
 - 1) Isopropyl alcohol

Revision 1
12 May 1969

2C5 ALTERATIONS AND IMPROVEMENTS

Any work which utilizes repair techniques not authorized by engineering drawing or alters the configuration or function of any submersible part or parts not described by existing approved engineering drawing is considered to be an alteration.

Alterations proposed for submersibles will be fully described as a proposed alteration prior to being undertaken. Proposed alterations will be approved by the Chief Engineer, the submersible Captain and submitted to the Operations Manager for approval and programming within operating fund limitations, the availability of engineering manpower and scheduling constraints.

The Chief Engineer will maintain a list of deferred alterations by priority of desirability. Prior to each overhaul or lay up period, the deferred alterations will be recapitulated for consideration as authorized work during that availability period.

Revision 1
12 May 1969

206 BOTTOM PROXIMITY MANEUVERING

Operating the Franklin near the bottom or in the vicinity of wrecks or other large objects requires fine control and good visibility. For this reason, the following procedure will be followed:

- 1) Configure motors 1 and 2 vertically to operate from the port throttle. (depth control).
- 2) Configure motors 3 and 4 horizontally to operate from the starboard throttle.
- 3) Rig the boat for a 5° down angle.
- 4) Station pilot at an appropriate viewport and rig portable control set. This pilot will handle propulsion, steering and fine depth control. He is in complete control of the boat and will issue appropriate orders (use of VBT's, rudder etc.) to co-pilot.
- 5) Station co-pilot at console. His responsibility is coarse depth control (variable ballast tanks), the rudder and log.
- 6) Station a watch on the CTFM sonar and underwater TV. He will keep the pilot aware of all sonar contacts and any unusual or dangerous conditions observed.
- 7) Approach the bottom under power in a light condition.
- 8) When approaching underwater objects, do so against the current.

Revision 1
12 May 1969

2C7 NORMAL DIVE

- 1) Configure propulsion motors vertically. All stop.
- 2) Set pilot's console in cruising mode (1).
- 3) Open flood ports in sail.
- 4) Open MBT vents until tanks fill.
- 5) When fully submerged, back off slightly on hatches and shut main vents.
- 6) As ordered depth is approached, use motors to slow descent and adjust variable ballast using the sound velocity profile as a guide.

NOTE: Do not dive until at least six hours after a battery charge.

Revision 1
12 May 1969

2C8 NORMAL SURFACE

When surfacing, it is imperative to stop the ascent periodically to allow the battery gas (hydrogen) to vent off gradually. How often and at what depths to level off at depends on what depths the boat has been operating at and how long the battery has been on discharge. For short dives, gradual surfacing will probably not be necessary. However, if submerged for several hundred hours, do not surface at a rate greater than 5 meters per minute for the last 50 meters. Procedure for surfacing is as follows:

- 1) Inform support vessel that FRANKLIN is ready to surface and check main vents shut.
- 2) Configure forward motors in vertical position, cruising mode.
- 3) When support ship reports all clear, ascent may begin. If support ship is out of contact, listen for ships in the vicinity with omnidirectional hydrophone. When surface appears clear begin ascend utilizing CTFM sonar continuously.
- 4) Begin ascent by blowing variable ballast tanks dry.
- 5) When close to surface (within 25 ft.) blow main ballast tanks - tighten hatch dogs (100 ft.).
- 6) Energize periscope TV.
- 7) Check cabin pressure and equalize if necessary.
- 8) Clear sail and open forward hatch.
- 9) Shut flood ports in sail.

Revision 1
12 May 1969

2C9 SUPPORT SHIP

It is the responsibility of the support ship to track the FRANKLIN at all times using the pinger -- minimum horizontal range is 200 yards. If contact is lost for more than the prescribed period, FRANKLIN will surface.

2C10 MANEUVERING

Surface Maneuvering (in and out of port)

When operating in this condition, the following procedure will be used:

- 1) Configure all motors horizontally.
- 2) Set pilot's console in turn mode (port throttle for port motors, starboard throttle for starboard motors).
- 3) Captain stationed in sail with phone talker to main pilot's console.
- 4) Other crew members stationed on deck to handle lines.
- 5) Vessel will be controlled from the sail. Orders for maneuvering will originate from the senior pilot and be sent to the co-pilot via phones. Standard U.S. Navy maneuvering terminology will be used. Speeds to be utilized are:

- Stop - 0 r.p.m.
- Slow - 180 r.p.m.
- 1/2 - 360 r.p.m.
- Standard - 540 r.p.m.
- Full - 720 r.p.m.

Only full or amidships rudder positions will be used.

For steering with motors, it is best to hold one side at a steady r.p.m. and vary the other side to hold straight course.

- 6) Below are some sample orders that may be used for maneuvering:
 - All ahead 1/2
 - All stop
 - Port back 1/2, starboard ahead 1/2
 - Right full rudder
 - Rudder amidships
 - All back full
- 7) If one inverter becomes inoperable, notify bridge and shift to single inverter operation - cruise mode - one inverter for forward pair or aft pair of motors. Turns will be accomplished by using motor reversing switches. Motors will be ordered to all stop before a turn command is issued.

Mooring

Due to the FRANKLIN's delicate structure (fiberglass MB tanks, motors, viewports), she shall be moored in a way such that no part of the boat touches the docking area. The mooring must be simple enough to provide for a minimum amount of maneuvering thereby saving the battery.

While in the Port of Palm Beach, the FRANKLIN will be moored parallel to the west wall with her bow heading south. Mooring lines are numbered clockwise 1-6 with No. 1 line forward starboard. The boat will approach the mooring close to the south wall with heaving lines aboard and lines 5 and 6 will be passed to her when passing the appropriate bollard. The eye for these lines will be secured to the bollard and both lines shall be passed to the boat with one heaving line. Soon after lines 5 and 6 are secured, the boat shall be turned so that she is parallel with the west wall heading south. At this point, lines 1 and 4 shall be passed over via heaving lines. Lines 2 and 3 shall be passed over soon thereafter. All four of these lines shall have their eyes secured to the boat. At this point, the boat will be hauled in using lines 2 and 3. Lines 1 and 4 will be used to keep her lined up and lines 5 and 6 will keep her off the concrete wall. Lines 5 and 6 shall be slacked just enough to allow the boat to be hauled into position.

All line handling orders shall be originated from the pilot conning the FRANKLIN. The following are typical line handling orders that may be used:

- Get line 3 over - pass line from pier to FRANKLIN via heaving line.
- Heave around on line 3 - pull the line by hand in order to move the boat.
- Slack line 2
- Hold line 1 - secure it firmly, do not let it slip.
- Check line 1 - secure it but do not let it part (release it carefully if necessary).
- Take in line 4 - release it from the boat.

When getting underway, the chase boat will make up a tow line to the FRANKLIN at the stern and tow her out into the turning basin. At this point, a commercial tug will normally take up the tow.

Personnel - Mooring

Shore - Lines 5 and 6 - one man
 - Line 4 - 2 men
 - Lines 1, 2, 3 - 1 man each

Franklin - One man for each line

NOTE: A chase boat will normally stand by with a tow line.

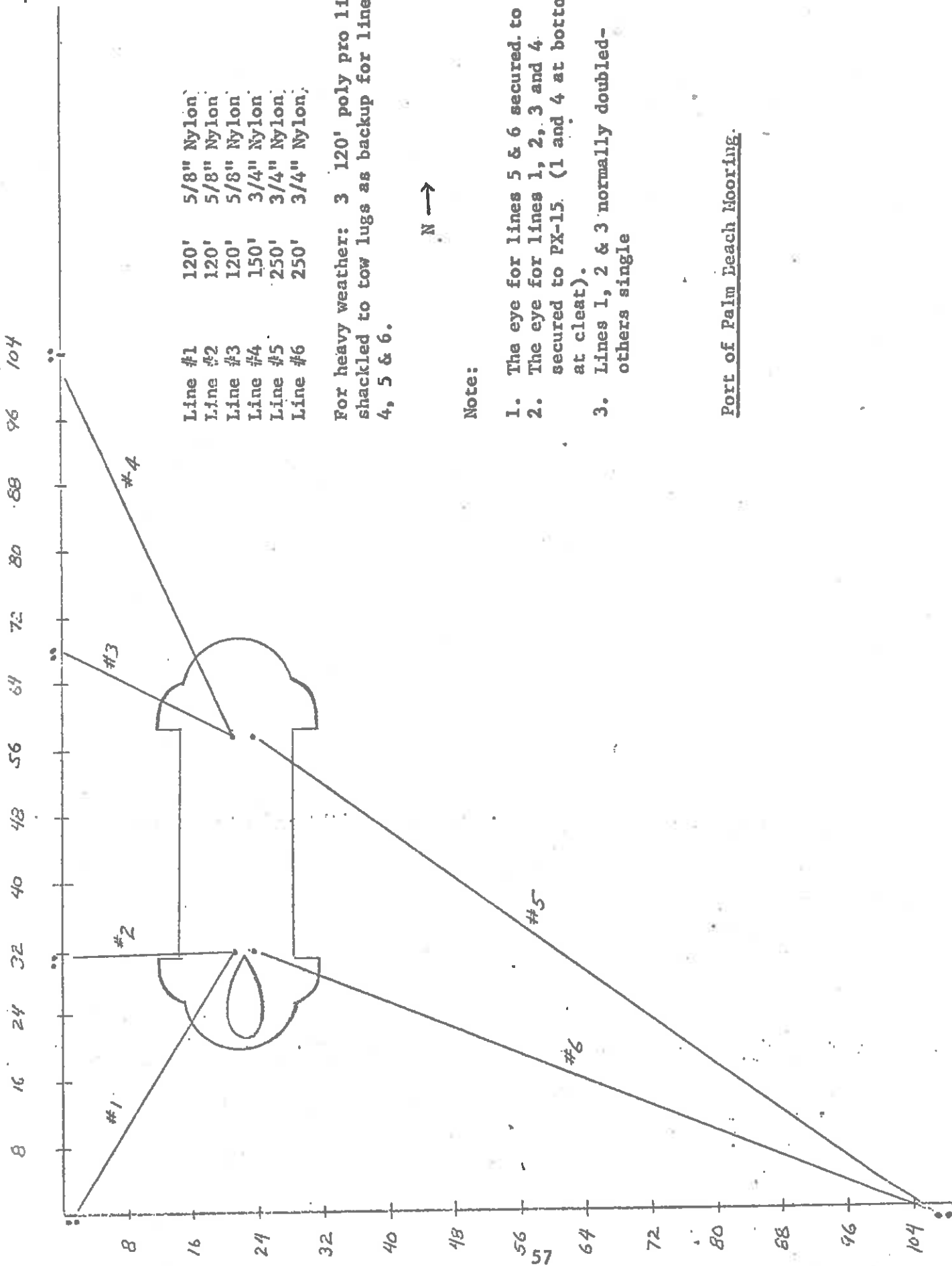
2C10 MOORING (Continued)

Getting Underway

- Shore - Lines 5 and 6 - one man each
- Lines 1, 2, 3, 4 - two men total
- FRANKLIN - Lines 3, 4 and 6 - one man
- Lines 1 and - one man
- Line 5 - one man

For heavy weather, all lines should be doubled. Additionally, extra one inch polypro lines are always attached at tow points as a backup for lines 4, 5, and 6. Line 2, 3, 5, and 6 should be particularly slack to allow for heavy rolling.

Revision 1
12 May 1969



Port of Palm Beach Mooring.

2C11 TOWING PROCEDURE

Attaching Tow Line

- 1 - Towing vessel pass by upwind and toss over leaving line.
- 2 - Tow made up on deck behind sail.
- 3 - When ready to commence tow, one man stationed in front of sail with tending line to ring. Second man on deck with tending line to tow connection. This man signals tow vessel to commence tow - signal is a simulated underhand pitch of a softball.
- 4 - As tow line is placed under strain, tending lines are slacked as necessary. Both tending lines must be handled to prevent the tow shackle and ring from hitting a viewport. If any difficulty is encountered, a signal (raise hand above head) will cause the towing vessel to slack off.
- 5 - When FRANKLIN under tow, secure tending lines.

Casting Off Tow Line

- 1 - If sea state 3 or greater, tow such that seas are on the starboard beam.
- 2 - Station one man forward of sail to control tending line to rig, second man on deck with tending line to tow connection.
- 3 - Signal towing vessel to slack tow line.
- 4 - Twist FRANKLIN such that seas on the stern. This will place tow line on starboard beam away from forward viewport.
- 5 - As line is slacked, operate forward tending line to clear rig of viewport. Then rig tow line over cleat and secure tending line. Second man heave in on tending line quickly to bring tow connection on deck.
- 6 - Disconnect tow and rig bridle around sail.

Revision 1
12 May 1969

2C12 AIR CHARGING

Using On-board Compressor

- 1) Check water separator dry.
- 2) Shut valve to 3000/15000 pound reducer.
- 3) Shut reducer bypass.
- 4) Open backup, gage valve, and hull valve to flask (s) being charged.
- 5) Light off compressor - turn switch to on and turn hand wheel.
When pressure reaches manifold pressure, check valve opens
and compressed air is fed to the flask (s) on charge.
- 6) When completed:
 - secure compressor (ensure hand wheel returns
to original position)
 - return valves to original position
 - bleed off compressor

External Charging

- 1) Check water separator dry.
- 2) Remove external charging connection cap and connect charging line.
- 3) Shut valve to 3000/1500 pound reducer.
- 4) Shut reducer bypass.
- 5) Open hull valve and gage line to flask (s) being charged.
- 6) Start compressors. Allow line to boat to come up to approximately
10% of boats manifold pressure. Open back-up valve to flask (s).
- 7) When charge completed, secure air supply and then return valves to
normal. Bleed off charging line and compressor.

Revision 1

12 May 1969

OPERATING SUPPORT VAN COMPRESSORS

Equipment Check

Ensure:	Drain valves on compressors No. 1 & No. 2	Shut
	Check relief valves on compressors No. 1 & 2	For Operation
	H.V. No. 1 and No. 2	Open
	H.V. No. 3	Shut
	H.V. No. 4 & No. 5	Shut
	H.V. (No. 7 & No. 9) or (No. 6 or No. 8 depending on Lectro Dryer selection	Open/Shut
	H.V. No. 10	Open
	H.V. No. 11	Shut
	Water H.V. No. 1	Open
	Water H.V. No. 2 thru No. 5	Shut
	Water Drain H.V. on after cooler	Shut
	Vent valves No. 1 thru No. 7	Shut
	All other valves	Shut

Electrical Check

Ensure:	No. 1 compressor switch	On
	No. 2 compressor switch	On
	No. 1 compressor control switch	On
	No. 2 compressor control switch	On
	Selector switch	Off

When all air charging lines are connected and properly secured:

- Open pneumatic system downstream of H.V. No. 11
- Turn selector switch to ON starting compressors No. 1 and No. 2 and charge system upstream of H.V. No. 11 to about 10 percent of downstream pressure
- Open H.V. No. 11

Revision 1
12 May 1969

OPERATING SUPPORT VAN COMPRESSORS (Continued)

To Secure Equipment

H.V. No. 10	Shut
Selector switch	OFF
Compressor Drains	Open
Vent Valves	Crack Open
Vent Valves No. 3 thru No. 6	Open
Vent System downstream H.V. No. 11 to 0 psi	
H.V. No. 11	Shut
H.V. No. 10	Open
Ensure: Vent Valves No. 3 thru No. 6	Open
Vent System to 0 psi	

Revision 1
12 May 1969

2C13 LIQUID OXYGEN FILL PROCEDURE

General

The liquid oxygen tanks are to be filled by qualified personnel and under conditions that are safe for delivery of liquid oxygen. Present recommended procedure is to have the local supplier of liquid O₂ make up all connections for filling and actually perform the fill while a Grumman supervisor witnesses the operation. During this procedure, no other personnel or operation shall be conducted on the vehicle. After the tanks are filled, it is anticipated that extreme care will be afforded to prevent an accident. Hopefully no further activity will be necessary once the O₂ is brought on board and the boat will be ready for operations.

Description

- 1) Arrangements are to be made with the local liquid oxygen supplier. He must be informed that we want to pressure fill two Linde LC3 GL tanks, and have a fill line that terminates in a flange that usually connects to a Linde AT-10.
- 1) Get O₂ fill and vent lines ready -
 - a) Fill line - stainless steel braided hose terminating in a brass flange at one end and a brass vent adapter (Y) at the other with 40 feet of hose.
 - b) Vent line - 20 feet of braided hose terminating in a 1/2 flare connection.
- 3) When O₂ delivery truck arrives:
 - a) Connect flanged end of fill line to AT-10, leave other end disconnected.
 - b) Connect one end of vent line to fill vent valve on instrument panel, the other end shall be brought out of the boat and placed in a position so it can vent cold O₂ gas freely.
 - c) Wearing protective gloves, pick up free end of fill line and have the valve on the AT10 opened so that cold gas and or liquid flows through fill line and dumps overboard thus cooling down line.
 - d) Shut AT-10 valve and connect fill line adapter to first LG3 GL tank. Make sure tank gas withdrawal valves on first tank is wide open and liquid withdrawal valve is closed. Make sure gas withdrawal valve on second tank is closed.
 - e) Open O₂ panel valves (1, 2, 3) such that O₂ gas can be vented overboard.
 - f) Open valve on AT-10 and commence filling of tank.
 - g) Once tank is cooled down, close vent valve. Watch pressure gage for buildup. Open vent valve when pressure starts to buildup to about 100 psi.
 - h) The filling of dry warm tanks will take time and will require a technique that develops with practice. Partially filled cold tanks will be easier to fill.

Revision 1

12 May 1969

2C13 LIQUID OXYGEN FILL PROCEDURE (Continue)

- i) The tank is supposed to be completely filled when the liquid level gage indicates so, however, the only way this can be confirmed is to fill until liquid O₂ spills out of the vent line.
- j) When the tank is filled, open O₂ panel valves so that four and a half pounds of O₂ per day does flow from the tank.
- k) Disconnect fill line from first tank, by first breaking connection at AT-10 side. Then disconnect LC3GL side shutting adapter valve immediately after disconnecting line.
- l) Hook up fill system to second tank and repeat steps a) thru k).

Revision 1
12 May 1969

2C14

BATTERY CHARGING PROCEDURE

(To be written)

Revision 1
12 May 1969

2C15 SHIFT TO SHORE POWER

- 1 - Ensure emergency switch in off position.
- 2 - Secure equipment on 28 V.D.C. bus - Topaz inverters must be off.
- 3 - Connect shore power cables topside.
- 4 - Energize shore power on the pier.
- 5 - Shift emergency switch to "shore power" position.

To shift back to ships power

- 1 - Secure equipment on 28 V.D.C. bus.
- 2 - Shift emergency switch to normal position.
- 3 - Secure shore power on the pier.
- 4 - Disconnect shore power cables.
- 5 - Energize 28 V.D.C. bus circuits as desired.

Revision 1
12 May 1969

2G16 TRIM STATEMENT

The Chief Engineer is responsible for maintaining the weight records for the submersible. Prior to conducting submerged operations, the Chief Engineer will prepare a statement of trim, not more than twenty four hours before underway time. The Chief Engineer will make the trim statement available to the craft Captain at the time of checking the Ready for Sea Check List (2A2).

The trim statement will reconcile all weight changes by item and center of gravity location from the last known displacement condition at a known water specific gravity condition. The projected ready-for-sea lading items will be identified by weight and center of gravity for calculation of the departure trim. Should the departure trim require the addition or removal of ballast, the trim statement will include a recommended method for accomplishing the ballasting.

Upon approval of the trim statement by the Captain, the Chief Engineer will enter the data from the trim statement in the Operating Day Detail Sheet part 3 and part 4. If ballasting is required, the Chief Engineer will record the approved procedure in part 8 of the Operating Day Detail Sheet.

Revision 1
12 May 1969

2C17 BRIEFING FOR OBSERVERS

Prior to diving aboard BEN FRANKLIN, observers will be briefed on the operations of the boat by the Captain. The briefing will include the following:

- 1 - BEN FRANKLIN General Characteristics
- 2 - Procedures in case of fire, flooding and collision
- 3 - Location of emergency equipment
- 4 - Use of the oxygen breathing apparatus
- 5 - Procedure for Escape and use of the Dragger Mixed Gas Scuba System

Revision 1
12 May 1969

2C18 PERSONNEL CERTIFICATION REQUIREMENTS

Crew members of Grumman submersibles will be certified in two categories -- Certification for command and certification for crew. Candidates for certification will be considered according to experience in military submarines, experience in submersibles, experience in the marine environment, related experience, physical condition and psychological stability.

Certification for command will normally require serving as a qualified crew member for a period sufficient such that the Captain BEN FRANKLIN and the Grumman Ocean Systems Manager jointly are confident that the candidate is capable of assuming the responsibility for the safe conduct of the submersible crews and observers.

CREW MEMBER CERTIFICATION

The following skills are desirable attributes for crew member candidates assuming they ultimately wish to be candidates for command:

- Military submarine experience (Gold or Silver Dolphins)
- Grumman certified diver (compressed air and mixed gas)
- Small boat handling experience
- Deep sea experience in small craft

Each candidate will be expected to prepare a notebook dealing with the systems and sub systems on the submersible and the function of components in those systems or sub-systems. He will include discussions on the following topics utilizing Ocean Systems Operations Manual Volume II as a guide:

1. Submersible principles, ballasting, thrust control, environmental control.
2. Submersible construction, mechanical and electrical systems, hull and structural materials, buoyancy materials and instrumentation.
3. Submersible characteristics such as control, speed, payload, etc.
4. Operational and emergency procedures.
5. Physiological parameters and safety considerations required for living in the closed environment of a submersible cabin.
6. Test procedures and principles.
7. Maintenance and overhaul procedures.
8. Support ship and handling procedures.
9. Small boat piloting procedures and U.S. Coast Guard rules and regulations pertaining to them.
10. The ocean environment in which the submersible will operate.
11. First aid.
12. Candidates for crew member shall hold a current mixed-gas diving certificate.

Upon satisfactory completion of the notebook work, the candidate will be subjected to an oral examination of not less than two hours by the Captain of the submersible followed by a similar oral examination by the Operations Manager. Successful candidates will be so designated by the Operations Manager, Ocean Systems.

Revision 1

12 May 1969

2C18 PERSONNEL CERTIFICATION REQUIREMENTS (Cont.)

COMMAND CERTIFICATION

Candidates for certification to command will be selected for designation from crew members by the Captain BEN FRANKLIN. Prior to designation as a candidate, prospective candidates shall have fulfilled the following requirements:

1. Prepare an original work or technical paper on some phase of deep submersible operation or ocean science. The topic of this paper will be approved by the Ocean Systems Operation Manager prior to undertaking the work. This paper shall conform with accepted standards for the submission of papers to technical societies.
2. Demonstrate a proficient knowledge of submersible certification standards and their maintenance.
3. Demonstrate a proficient knowledge of rules of the road for both inland and international rules.
4. Demonstrate a proficient knowledge of applicable Rules and Regulations for the Operations of Submersibles as may be promulgated by the U.S. Coast Guard.
5. Demonstrate a proficient knowledge of piloting and a working knowledge of electronic navigation.
6. Send and receive four random five letter code groups per minute by flashing light.
7. Hold a current mixed-gas diving certificate.

Candidates having conformed with the foregoing will be required to embark with the Captain BEN FRANKLIN and the Operations Manager for at least one qualification operation in command status. During this operation, the candidate will be expected to be prepared for any exigency which may be outlined by the embarked certifying observers. Candidates recommended for command certification by both observers will be so designated by the Operations Manager, Ocean Systems.

Revision 1
12 May 1969

2C19

OPERATING LIMITATIONS

1. BEN FRANKLIN shall not be operated below 2,000 feet.
2. The SAS shall not be operated below 600 feet.
3. Maximum descent speed while approaching the bottom is .5 ft/second.
4. If the CO₂ percentage remains at 1.5 percent for four hours, surface and ventilate the boat.
5. If the CO₂ percentage ever reaches 3 percent, surface and ventilate the boat.
6. The maximum allowable carbon monoxide (CO) is 50 ppm.
7. If the oxygen percentage reaches 25 percent, surface and ventilate the boat.
8. The minimum amount of shot to be carried is 9,000 pounds.

Change 1
12 November 1969

BEN FRANKLIN - OPERATIONS MANUAL

GRUMMAN OCEAN SYSTEMS

3. APPENDIX

- A. Decompression Tables**
- B. Standard Tugboat Commands**
- C. Grumman Safety Bulletin No. 54**
- D. Safety Precautions for Handling Liquid Oxygen**
- E. Copy of FCC Rules Part 83; BEN FRANKLIN Radiotelephone License; Grumman Rules Concerning Radiotelephones**
- F. Grumman Aircraft Diver Check List**
- G. Forbidden Materials**
- H. Recompression Chamber Locations**
- I. Memo and Form concerning "Visitors on Board the BEN FRANKLIN"**

Revised
12 May 1969

U. S. NAVY DIVING MANUAL

DEPTH (f)	BOTTOM TIME (mins)	TIME TO FIRST STOP	DECOMPRESSION STOPS					TOTAL ASCENT TIME	REPET. GROUP
			80	40	30	20	10		
40	300					0	0.7	*	
	310	0.5				2	2.5	N	
	320	0.5				7	7.5	N	
	350	0.5				11	11.5	O	
	370	0.5				15	15.5	O	
	390	0.5				19	19.5	Z	
50	100					0	0.5	*	
	110	0.7				3	3.7	L	
	120	0.7				5	5.7	M	
	140	0.7				10	10.7	M	
	160	0.7				21	21.7	N	
	180	0.7				29	29.7	O	
	200	0.7				35	35.7	O	
	220	0.7				40	40.7	Z	
240	0.7				47	47.7	Z		
60	60					0	1.0	*	
	70	0.5				3	3.5	K	
	80	0.5				7	7.5	L	
	100	0.5				14	14.5	M	
	120	0.5				26	26.5	N	
	140	0.5				39	39.5	O	
	160	0.5				48	48.5	Z	
	180	0.5				55	55.5	Z	
	200	0.5		1	89	70.5	Z		
70	50	1.0				0	1.2	*	
	60	1.0				8	8.0	K	
	70	1.0				14	15.0	L	
	80	1.0				18	19.0	M	
	90	1.0				23	24.0	N	
	100	1.0				33	34.0	N	
	110	0.8				2	41	43.8	O
	120	0.8				4	47	51.8	O
	130	0.8				6	53	59.8	O
	140	0.8				8	59	64.8	Z
	150	0.8				9	61	70.8	Z
160	0.8				15	72	85.8	Z	
170	0.8				19	79	98.8	Z	
80	40	1.3				0	1.3	*	
	50	1.3				10	11.3	K	
	60	1.3				17	18.3	L	
	70	1.3				23	24.3	M	
	80	1.0				3	31	34.0	N
	90	1.0				7	39	47.0	N
	100	1.0				11	46	53.0	O
	110	1.0				13	53	67.0	O
	120	1.0				17	59	74.0	Z
	130	1.0				19	65	83.0	Z
	140	1.0				25	69	94.0	Z
	150	1.0				33	77	110.0	Z
	90	30	1.5				0	1.5	*
40		1.5				7	8.5	J	
50		1.5				15	19.5	L	
60		1.5				25	26.5	M	
70		1.5				7	30	33.5	N
80		1.5				13	40	44.5	N
90		1.5				18	45	67.5	O
100		1.5				21	54	76.5	Z
110		1.5				24	61	86.5	Z
120		1.5				32	68	101.5	Z
130		1.0			5	36	74	116.0	Z
100	20	1.7				0	1.7	*	
	30	1.7				3	4.5	I	
	40	1.7				15	16.5	K	
	50	1.7				2	24	27.5	L
	60	1.7				8	32	38.5	N
	70	1.7				17	39	57.5	O
	80	1.7				22	48	72.5	O
	90	1.7				3	53	67	Z
	100	1.7				7	59	97.5	Z
	110	1.7				10	64	117.5	Z
	120	1.7				13	71	132.5	Z
110	30	1.7				0	1.8	*	
	25	1.7				3	4.7	H	
	30	1.7				7	5.7	J	
	40	1.5				2	21	24.5	L
	50	1.5				8	26	35.5	M
	60	1.5				18	35	55.5	N
	70	1.5				1	45	73.5	O
	80	1.5				7	57	85.5	Z
	90	1.5				12	64	107.5	Z
	100	1.5				15	77	125.5	Z
120	15	1.9				0	1.9	*	
	20	1.9				2	4.8	I	
	30	1.9				16	16.8	K	
	40	1.9				2	24	27.8	L
	50	1.9				8	32	38.8	N
	60	1.9				17	39	57.8	O
	70	1.9				22	48	72.8	O
	80	1.9				3	53	67.8	Z
	90	1.9				7	59	97.8	Z
	100	1.9				10	64	117.8	Z
	110	1.9				13	71	132.8	Z
130	10	2.1				0	2.1	*	
	15	2.1				1	5.0	I	
	20	2.1				17	17.0	K	
	30	2.1				2	25	28.0	L
	40	2.1				9	34	39.0	N
	50	2.1				18	43	58.0	O
	60	2.1				2	53	64.0	Z
	70	2.1				7	61	83.0	Z
	80	2.1				11	69	102.0	Z
	90	2.1				14	74	121.0	Z
	100	2.1				18	83	140.0	Z
140	5	2.3				0	2.3	*	
	10	2.3				1	5.2	I	
	15	2.3				18	18.0	K	
	20	2.3				2	26	27.0	L
	30	2.3				10	36	36.0	N
	40	2.3				2	44	45.0	O
	50	2.3				8	52	64.0	Z
	60	2.3				10	59	83.0	Z
	70	2.3				14	67	102.0	Z
	80	2.3				18	76	121.0	Z
	90	2.3				23	85	140.0	Z
150	5	2.5				0	2.5	*	
	10	2.5				1	5.4	I	
	15	2.5				19	19.0	K	
	20	2.5				2	28	28.0	L
	30	2.5				11	38	37.0	N
	40	2.5				2	46	46.0	O
	50	2.5				9	56	65.0	Z
	60	2.5				11	63	84.0	Z
	70	2.5				15	71	103.0	Z
	80	2.5				19	80	122.0	Z
	90	2.5				24	89	141.0	Z
160	5	2.7				0	2.7	D	
	10	2.7				1	5.6	F	
	15	2.7				20	20.0	H	
	20	2.7				2	29	28.0	J
	30	2.7				12	39	37.0	K
	40	2.7				2	48	46.0	L
	50	2.7				10	58	65.0	M
	60	2.7				12	65	84.0	N
	70	2.7				16	73	103.0	Z
	80	2.7				20	82	122.0	Z
	90	2.7				25	91	141.0	Z
170	5	2.9				0	2.9	D	
	10	2.9				1	5.8	F	
	15	2.9				21	21.0	H	
	20	2.9				2	30	29.0	J
	30	2.9				13	40	38.0	K
	40	2.9				2	49	47.0	L
	50	2.9				11	59	66.0	M
	60	2.9				13	66	85.0	N
	70	2.9				17	74	104.0	Z
	80	2.9				21	83	123.0	Z
	90	2.9				26	92	142.0	Z
180	5	3.1				0	3.1	D	
	10	3.1				1	6.0	F	
	15	3.1				22	22.0	H	
	20	3.1				2	31	29.0	J
	30	3.1				14	41	38.0	K
	40	3.1				2	50	47.0	L
	50	3.1				12	60	66.0	M
	60	3.1				14	67	85.0	N
	70	3.1				18	75	104.0	Z
	80	3.1				22	84	123.0	Z
	90	3.1				27	93	142.0	Z
190	5	3.3				0	3.3	D	
	10	3.3				1	6.2	F	
	15	3.3				23	23.0	H	
	20	3.3				2	32	29.0	J
	30	3.3				15	42	38.0	K
	40	3.3				2	51	47.0	L
	50	3.3				13	61	66.0	M
	60	3.3				15	68	85.0	N
	70	3.3				19	76	104.0	Z
	80	3.3				23	85	123.0	Z
	90	3.3				28	94	142.0	Z
200	5	3.5				0	3.5	D	
	10	3.5				1	6.4	F	
	15	3.5				24	24.0	H	
	20	3.5				2	33	29.0	J
	30	3.5				16	43	38.0	K
	40	3.5				2	52	47.0	L
	50								

GENERAL PRINCIPLES OF DIVING

DEPTH (ft.)	NO DECOM- PRESSION LIMITS (Min.)	REPETTIVE GROUPS														
		A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
10	—	60	120	210	300											
15	—	35	70	110	160	225	350									
20	—	25	50	75	100	135	180	240	325							
25	—	20	35	55	75	100	125	160	195	245	315					
30	—	15	30	45	60	75	95	120	145	170	205	250	310			
35	310	5	15	25	40	50	60	80	100	120	140	160	190	220	270	310
40	200	5	15	25	30	40	50	70	80	100	110	130	150	170	200	
50	100	—	10	15	25	30	40	50	60	70	80	90	100			
60	60	—	10	15	20	25	30	40	50	55	60					
70	50	—	5	10	15	20	30	35	40	45	50					
80	40	—	5	10	15	20	25	30	35	40						
90	30	—	5	10	12	15	20	25	30							
100	25	—	5	7	10	15	20	22	25							
110	20	—	—	5	10	13	15	20								
120	15	—	—	5	10	12	15									
130	10	—	—	5	8	10										
140	10	—	—	5	7	10										
150	5	—	—	5												
160	5	—	—	—	5											
170	5	—	—	—	5											
180	5	—	—	—	5											
190	5	—	—	—	5											

(Rev. 1958)

INSTRUCTIONS FOR USE

I. "No decompression" limits

This column shows at various depths greater than 30 feet the allowable diving times (in minutes) which permit surfacing directly at 60 ft. a minute with no decompression stops. Longer exposure times require the use of the Standard Air Decompression Table (Table 1-5).

II. Repetitive group designation table

The tabulated exposure times (or bottom times) are in minutes. The times at the various depths in each vertical column are the maximum exposures during which a diver will remain within the group listed at the head of the column.

To find the repetitive group designation at surfacing for dives involving exposures up to and including the "no decompression limits": Enter the table on the exact or next greater depth than that to which exposed and select the listed exposure time exact or next greater than the actual exposure time. The repetitive group designation is indicated by the letter at the head of the vertical column where the selected exposure time is listed.

For example: A dive was to 32 feet for 45 minutes. Enter the table along the 35 ft. depth line since it is next greater than 32 ft. The table shows that since group "D" is left after 40 minutes exposure and group "E" after 50 minutes, group "E" (at the head of the column where the 50 min. exposure is listed) is the proper selection.

Exposure times for depths less than 40 ft. are listed only up to approximately five hours since this is considered to be beyond field requirements for this table.

TABLE 1-6.—"No decompression" limits and repetitive group designation table for "no decompression" dives.

APPENDIX B

STANDARD TUG BOAT COMMANDS

The following tug boat whistle and hand signals are used throughout the Navy:

Hand Whistle (Police Type)

From stop to half speed ahead-----1 blast
From half speed-ahead to stop-----1 blast
From half speed ahead to full speed ahead---4 short blasts
From full speed ahead to half speed ahead---1 blast
From stop to half speed astern-----2 blasts
From half speed astern to full speed astern-4 short blasts
From half or full speed astern to stop-----1 blast
Cast off, stand clear-----1 prolonged 2 short

NOTES:

1. A blast is 2 to 3 seconds duration.
A prolonged blast is 4 to 5 seconds duration.
A short blast is about one second duration.
2. In using whistle signals to direct more than one tug, care must be exercised to ensure that the signal is directed to and received by the desired tug. Whistles of a different, distinct tone have been used successfully to handle more than one tug.
3. These signals may be transmitted to the tug by flashing light. However, flashing light signals should be restricted to use only when hand whistle or hand signals cannot be used.
4. Normally these whistle signals will be augmented by the hand signals given on page B-2.

STANDARD COMMANDS

HAND SIGNALS

HALF SPEED AHEAD
OR ASTERN - Arm
pointed in direc-
tion desired.



FULL SPEED (either)
--Fist describing
arc (as in "bounc-
ing" an engine tele-
graph).



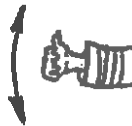
DEAD SLOW (either)
--Undulating
movement of open
hand (palm down).



STOP (either)--
Open palm held
aloft facing tug.



CAST OFF, STAND
CLEAR--Closed fist
with thumb ex-
tended, swung up
and down.



TUG TO USE RIGHT
RUDDER--Hand de-
scribing circle as
if turning wheel to
right (clockwise)
facing in the same
direction as tug.



TUG TO USE LEFT
RUDDER-- Hand de-
scribing circle as if
turning wheel to
left (counterclock-
wise) facing in
same direction as
tug.



TUG TO RUDDER
AMIDSHIP--Arm at
side of body with
hand extended,
swung back and
forth.



NOTE: Tug shall acknowledge all of the above signals with one short toot (one second or less) from her whistle, with the exception of the backing signal, which shall be acknowledged with two short toots, and the cast-off signal, which shall be acknowledged by one prolonged and two short toots.

OXYGEN, ITS PROPERTIES AND SAFE HANDLING

Oxygen is furnished to G.A.E.C. in steel cylinders, usually under a pressure of 2200 P.S.I. at 70^oF., or as a liquid to be gasified on the premises.

The outstanding properties of oxygen are its ability to sustain life and its ability to support combustion. Normal air contains about 21% oxygen at atmospheric pressure. Oxygen itself is non-flammable.

Pure oxygen will not burn or explode. It supports combustion; that is, it causes other substances to burn when they are raised to a kindling temperature. Combustible materials burn more readily in oxygen than in air. Oxygen forms explosive mixtures in certain proportions with acetylene, hydrogen and other combustible gases.

Gaseous oxygen is about 1.1 times as heavy as air and quickly diffuses in the air when released from a container. Oxygen may be lowered in temperature until it becomes a blue liquid which boils at - 297.4 F. at atmospheric pressure.

Storage

I.C.C. cylinders are not generally designed for temperatures in excess of 130^oF. Therefore, they should not be stored near sources of heat, such as radiators and furnaces or near potential sources of heat, such as highly flammable substances like gasoline, oil and waste. Stored cylinders should be secured against falling over and valve cover caps should be in place.

Handling

1. Never use oxygen as a substitute for air, as a source of pressure, as a means of starting an engine or as a means of ventilation or enrichment of the air - because fire or explosion may occur when oxygen is in contact with combustible materials.
2. Oil and grease should never be permitted to come in contact with oxygen cylinder valves, regulators, hoses, or associated equipment. Combustible substances should never be used to lubricate oxygen valves, regulators, gauges or fittings. Only anti-friction compounds approved for oxygen service may be applied to the regulator pressure adjusting screw. Operators should make sure they have no oil or grease on their hands when handling oxygen equipment.
3. Regulators and pressure gauges used for other gases must not be used for oxygen. Valve wheels should never be hammered in an attempt to open or close the valve. All connections should be tested with soapy water to make sure they are gas tight.
4. No smoking is permitted where oxygen is being used or stored.
5. All oxygen bottles shall be secured and capped when not in use.

6. Employees coming out of oxygen-rich atmospheres should allow a waiting period of 5-10 minutes to allow diffusion of oxygen saturated clothing before smoking. Woolen clothing especially entraps and holds oxygen for longer periods than cottons or synthetics. Woolens easily burst into flame after oxygen saturation. Blowing dust from clothing with an oxygen hose is an extremely dangerous practice.

Additional information on oxygen properties may be obtained by calling the Safety Department.

Robert S. Moore
Safety Director

JG:sj

KEEP ALL COMBUSTIBLE MATERIALS ESPECIALLY OIL OR GREASE, AWAY FROM OXYGEN. DO NOT PERMIT SMOKING OR OPEN FLAMES IN ANY AREA WHERE OXYGEN IS STORED OR USED. These precautions apply to oxygen in gaseous or liquid form, including mixtures of liquefied gases containing liquid oxygen. Many substances which do not normally burn in air require only a slight spark or moderate heat to set them aflame in the presence of oxygen. Other substances which are only moderately combustible in air can burn violently when oxygen is present.

IN ADDITION to the general precautions for handling all liquefied atmospheric gases, the following precautions must be observed when handling liquid oxygen:

A. HANDLING THE LIQUID

1. Prevent All Fire Hazards

Do not smoke, or permit smoking or open flames in any area where liquid oxygen is stored, handled, or used, or where it is loaded or unloaded. Post "NO SMOKING" signs conspicuously in all such areas.

Do not permit organic material or flammable substances of any kind to come in contact with liquid oxygen. Some of the materials that can react violently with oxygen under certain conditions of pressure and temperature are oil, grease, asphalt, kerosene, cloth, wood, paint, tar, and dirt which may contain oil or grease. Under certain conditions, mixtures of powdered organic materials with liquid oxygen can detonate.

CAUTION: When organic materials, such as those listed above, are exposed to liquid oxygen, they will burn violently if ignited, even several minutes after they have been in contact with the liquid. Any clothing that has been splashed or soaked with liquid oxygen should be removed immediately and aired away from sources of ignition for at least an hour until it is completely free of oxygen.

Select storage areas for liquid oxygen carefully. The important factors to consider are the quantity of liquid to be stored and the type of storage container. When more than about 110 gallons of liquid (13,000 cubic feet NPT) is to be stored, the storage site should conform to the recommendations in NFPA Pamphlet No. 566, "Bulk Oxygen Systems at Consumer Sites". Amounts less than 110 gallons in cylinders or containers may be stored inside buildings, but the storage area should be made of non-combustible materials and should be well ventilated.

2. Always Call Oxygen and Its Mixtures by Their Correct Names

Never call oxygen "air", or oxygen under pressure "compressed air", or liquid oxygen "liquid air". There is a tendency for the careless use of terms to be extended to the careless use of the products they refer to. In the case of oxygen, this is extremely dangerous.

Liquid oxygen is most commonly used in the form of a high-purity product. However, it may also be available in mixtures with other liquefied gases, usually nitrogen. Never call such a mixture "liquid air"; call it MEDIUM PURITY LIQUID OXYGEN, since it requires the same safety precautions and care in handling as high-purity liquid oxygen.

APPENDIX D (continued)

B. USING LIQUID OXYGEN EQUIPMENT

1. Use no oil or grease on any oxygen equipment. Oil and grease become highly flammable in the presence of oxygen.
2. Purge all oxygen equipment before making repairs. Remove all traces of the product oxygen from the equipment, using oil-free dry nitrogen or oil-free dry air for purging.
3. Post warning signs at oxygen storage tanks. All oxygen storage areas should be marked with "CAUTION - NO SMOKING" signs.

C. FIGHTING FIRES INVOLVING LIQUID OXYGEN

Since oxygen itself does not burn, there can be no fire unless combustible material is also present. In any fire involving liquid oxygen, the oxygen plays the same part as oxygen from the air in an ordinary fire. However, the presence of additional oxygen will make any fire burn much faster and more violently. The following fire-fighting procedures should be observed:

1. Remove everyone not actively engaged in fighting the fire.
2. If possible, shut off the flow of oxygen.
3. Use large quantities of water, preferably in the form of a spray, to cool the burning material below the ignition point. If electrical equipment is involved in the fire, use carbon dioxide, dry chemical, or vaporizing liquid extinguishers; do not use water.

F I R S T - A I D N O T I C E

FOR COLD LIQUID BURNS

If any of the liquefied atmospheric gases contact the skin or eyes, immediately flood that area of the body with large quantities of unheated water and then apply cold compresses. If the skin is blistered or there is any chance that the eyes have been affected, get the patient immediately to a physician for treatment.

SHIP RADIOTELEPHONE STATION LICENSE

LICENSE NOT TRANSFERABLE

GRUMMAN AIRCRAFT ENGRG CORP
SOUTH OYSTER BAY RD
BETHPAGE N Y
11714

VESSEL NAME SUBMERSIBLE PX-15	
CALL SIGN WR8429	CUSTOM BUREAU OFFICIAL NUMBER
ISSUE DATE 01-18-68	EXPIRATION DATE 01-18-73

The frequencies within the designated bands are authorized for use in accordance with Parts 83 and 85 of the Commission's Rules.

FREQUENCY BANDS	AUTHORIZED TRANSMITTERS
1600-4000 KC	<p>ANY TRANSMITTER TYPE ACCEPTED OR TYPE APPROVED FOR USE UNDER PART 83 OF THE COMMISSION'S RULES TO OPERATE IN THE BANDS SPECIFIED ON THIS LICENSE</p> <p>ANY TRANSMITTER TYPE ACCEPTED FOR USE UNDER PART 83 OF THE COMMISSION'S RULES TO OPERATE IN THE BANDS SPECIFIED ON THIS LICENSE</p>

FOR COMMISSION USE ONLY

Ben F. Waple
SECRETARY



THIS AUTHORIZATION IS SUBJECT TO FURTHER CONDITIONS AS SET FORTH ON THE REVERSE SIDE.

SEPTEMBER 1966

SHIP RADIOTELEPHONE AND RADAR

This is a summary of some of the more important requirements, affecting vessels not required by law to be equipped with radiotelephone installations, contained in Part 83 of the Commission's Rules. Rule 83.367 requires that Part 83 be provided aboard the vessel or retained in a suitable place on shore.

All radio stations aboard ships must be licensed by the Federal Communications Commission. The licensee is responsible at all times for the lawful and proper operation of his station. Licenses are not granted to aliens except where the radio installation is required by law or treaty. Ship stations are licensed primarily for safety of life and property, therefore distress and safety communications must have absolute priority. Secondly, however, certain frequencies which are not reserved for calling, distress or other safety purposes may be used for radiotelephone calls to coast stations or between ships. The local telephone company or radiotelephone coast station can furnish information as to frequencies and charges for radiotelephone service.

SHIP STATION LICENSE. Application for a ship radiotelephone and/or radionavigation station (radar) license is made on FCC Form 502, except that FCC Form 501 shall be used for radiotelephone stations required by Title III Part II of the Communications Act of 1934, as amended, or the Safety of Life at Sea Convention, or where the applicant is also the licensee of radiotelegraph equipment aboard the vessel.

RENEWAL OF SHIP STATION LICENSE. An application for renewal of ship radiotelephone and/or ship radionavigation (radar) station license shall be filed on FCC Form 405-B, except that FCC Form 405-A shall be filed for renewal of ship station licenses where there is radiotelegraph equipment licensed aboard the vessel.

INTERIM SHIP STATION LICENSE FOR RADIOTELEPHONE AND RADAR. An interim license authorizing the operation of a ship radio station for a 6 month period may be obtained at any Commission field engineering office by the presentation (by the applicant or any person who informs the office that he has been authorized to act in behalf of the applicant in securing an interim ship station license) of a properly completed application and an informal request for an interim license.

In Alaska only, an interim ship station license may be obtained by mailing a properly completed application and a written request for an interim ship station license to the Commission's field engineering office at Anchorage.

The regular term license will be mailed to the licensee prior to the expiration of the interim license.

The interim license procedure does not apply to renewal applications.

OPERATOR LICENSE. The radiotelephone transmitter in a ship station operating on frequencies below 30 Mc/s may be operated only by a licensed radio operator. The licensed operator may permit others to speak over the microphone if he starts, supervises and ends the operation, makes the necessary log entries, and gives the necessary identification. The license usually held by radio operators aboard small vessels not required to carry a radio installation for safety purposes is the Restricted Radiotelephone Operator Permit. This permit does not authorize transmitter adjustments that may affect the proper operation of the station. Any needed adjustments must be made only by the holder of a first or second class radiotelegraph or radiotelephone license. It is not necessary to post the Restricted Radiotelephone Operator Permit if it is kept on the operator's person; however, other classes of licenses must be conspicuously posted at the principal location at which the station is operated. (Rule 83.156).

APPLICATION FOR OPERATOR PERMIT. Field offices will accept applications filed on FCC Form 753 for Restricted Radiotelephone Operator Permit if the applicant makes a satisfactory showing of immediate need for a permit for safety and if the application is presented in person by the applicant or his agent. However, this lifetime permit is usually obtained by mailing an FCC Form 753 to the Federal Communications Commission at Gettysburg, Pennsylvania 17325. No oral or written examination is required. An application for a Restricted Radiotelephone Operator Permit must be accompanied by a filing fee of \$2.00.

FEES. Enclose \$10.00 fee with the application Form 501 or Form 502; \$4.00 with Form 405-A or Form 405-B. DO NOT SEND CASH. Make check or money order payable to Federal Communications Commission. In general the fee will not be refunded even if the application is not granted. Also, fee overpayments of \$2.00 or less will not be refunded. (No fee is required for an application filed by a Governmental Entity or for a special temporary authority.)

TRANSMITTERS. Each ship radiotelephone transmitter on a new or renewed license must be type accepted under Part 83 of the Commission's Rules. Except for transmitting equipment required to comply with Title III, Part II of the Communications Act, no application for modification of license is required for the deletion, addition, or replacement of radiotelephone and radar transmitters which operate in the frequency bands specified on the license. The additional or replacement transmitters must be type accepted or type approved, as appropriate.

2182 KC/S. This is the calling and distress frequency. Ship radiotelephone stations in the 1600 - 3500 kc/s band must maintain an efficient listening watch on 2182 kc/s while the station is open and not transmitting on other frequencies. (Rule 83.223). All shipboard transmitters in this band must be capable of transmitting on 2182 kc/s and, if used for other than safety communication shall be capable also of transmitting on at least two working frequencies. (Rule 83.106(a)).

INTERSHIP FREQUENCIES. There are five intership frequencies provided in the 1600 - 3500 kc/s band: 2003 kc/s - Great Lakes Area only; 2638 kc/s - all areas; 2738 kc/s - all areas except Great Lakes area and Gulf of Mexico; 2830 kc/s - Gulf of Mexico only; 2142 kc/s - Pacific Coast area south of latitude 42 degrees north, on a day only basis. Use of these intership frequencies is limited to safety and operational communications, except that commercial transport vessels may use them also for business communications. (Rule 83.358(a)).

GOVERNMENT AND FOREIGN FREQUENCIES. A ship may transmit on frequencies not included on the ship station license when directed to do so by U. S. Government stations or foreign coast stations. (Rules 83.357 and 83.363).

PREVENTION OF INTERFERENCE. Always listen on the channel to be used before transmitting so that you will not interfere with others already using the channel. (Rule 83.181 (b)).

OPERATING PROCEDURES. You must give your call sign whenever you call another vessel or coast station and when you finish the conversation. Except when talking on the above-listed intership frequencies where the maximum time limit for a conversation is 3 minutes, you must break and announce your call sign if your ship-shore conversation lasts longer than 15 minutes. (Rules 83.364 and 83.366(g)). Make your calls short (not more than 30 seconds) and do not call that station again for 2 minutes. (Rule 83.366(f)). If a call sign has not been assigned, identify station by announcement of the vessel name of licensee.

SAFETY AND DISTRESS. Never forget that SAFETY is the primary reason for having shipboard radio. DISTRESS AND SAFETY must have ABSOLUTE PRIORITY. That is why you must listen, and be able to transmit, on 2182 kc/s. The distress call is "MAYDAY". Read Rule 83.233(b) and the other rules in Subpart J of Part 83 for complete information about distress calls and messages.

RADIO CONVERSATIONS ARE PRIVATE. If you hear a radio conversation not intended for you, you cannot lawfully use the information in any way. (Rule 83.174).

VIOLATION NOTICES. If you receive an Official Notice of Violation from the FCC, you must reply to it within 10 days of receiving it. If you cannot give a full answer that soon, you should acknowledge it and say that you will make a full answer as soon as possible. (If you are away from your permanent mailing address, it is suggested that you make arrangements to have mail from the FCC opened, acknowledged, and forwarded.)

LOGS. A radio log is required; each page must be numbered, must have the name of the vessel, call sign, and must be signed by the operator. Entries shall be made showing the time of beginning and ending each watch on 2182 kc/s. All distress and alarm signals and related communications transmitted or intercepted, and all urgency and safety signals and related communications transmitted, shall be recorded in the log as completely as possible. A record of all installations, service, or maintenance work performed, which may affect the proper operation of the station, must also be entered by the licensed operator doing the work, including his signature, address, and the class, serial number, and expiration date of his license. The 24 hour system is used in a radio log; that is 8:45 a.m. is written as 0845 and 1:00 p.m. becomes 1300. (Rule 83.368)

Radio logs must be retained for at least a year; for three years if they contain entries concerning distress or disaster; and longer periods if they concern communications being investigated by the FCC, or against which claims or complaints have been filed. (Rule 83.115).

Any FCC Field Engineering Office will be glad to help you and give you any further information.

COMMISSION FIELD ENGINEERING OFFICES

Addresses of Commission Field Engineering Offices are listed below. All communications with Field Offices should be addressed to the Engineer in Charge, Federal Communications Commission.

ALABAMA, MOBILE 36602 439 U.S. Court & Customs House	MARYLAND, BALTIMORE 21202 415 U.S. Custom House Gay & Water Streets
ALASKA, ANCHORAGE 99501 53 U.S. Post Office Bldg. and Court House	MASSACHUSETTS, BOSTON 02109 1600 Custom House
CALIFORNIA, LOS ANGELES 90014 Mezzanine 50 849 South Broadway	MICHIGAN, DETROIT 48226 1029 New Federal Building
CALIFORNIA, SAN DIEGO 92101 Fox Theatre Bldg. 1245 - 7th Avenue	MINNESOTA, ST. PAUL 55102 208 Federal Courts Bldg. 6th & Market Streets
CALIFORNIA, SAN FRANCISCO 94111 323 E. A, Custom House 555 Battery Street	MISSOURI, KANSAS CITY 64106 1703 Federal Bldg. 601 East 12th St.
CALIFORNIA, SAN PEDRO 90731 1300 Beacon Street	NEW YORK, BUFFALO 14203 328 Federal Bldg. Ellicott & Swan Streets
COLORADO, DENVER 80202 5024 New Custom House 19th between California & Stout Sts.	NEW YORK, NEW YORK 10014 748 Federal Bldg. 641 Washington Street
DISTRICT OF COLUMBIA, WASH. 20555 Room 204 521-12th Street, N.W.	OREGON, PORTLAND 97205 441 U.S. Court House 620 S.W. Main St.
FLORIDA, MIAMI 33130 PHONE 350-5541 51 S. First Aven.	PENNSYLVANIA, PHILADELPHIA 19106 1005 New U.S. Custom House
FLORIDA, TAMPA 33602 738 Federal Office Bldg. 500 Zack Street	PUERTO RICO, SAN JUAN 00903 322 - 323 Federal Bldg.
GEORGIA, ATLANTA 30303 2010 Atlanta Merchandise Mart 240 Peachtree Street, N.E.	TEXAS, BEAUMONT 77704 301 Post Office Bldg. 300 Willow Street
GEORGIA, SAVANNAH 31402 238 Post Office Bldg.	TEXAS, DALLAS 75202 1314 Wood Street
HAWAII, HONOLULU 96808 502 Federal Building	TEXAS, HOUSTON 77002 New Federal Office Bldg. Room 5636 515 Rusk Avenue
ILLINOIS, CHICAGO 60604 1872 New U.S. Court House & Fed. Office Bldg.	VIRGINIA, NORFOLK 23510 405 Federal Building
LOUISIANA, NEW ORLEANS 70130 829 Federal Office Bldg. 600 South Street	WASHINGTON, SEATTLE 98104 806 Federal Office Bldg. 1st Ave. & Marion St.

S H I P R A D I O T E L E P H O N E

R U L E R E M I N D E R S

1. Post Station License. Section 83.102
 2. Have Operator License Available. Section 83.156
 3. Listen on 2182 kc/s. Section 83.223
 4. Use 2182 kc/s Only for Calling, Distress, Urgency or Safety. Sections 83.233, 83.353 and 83.366
 5. Listen Before Transmitting. Avoid Interference With Distress or Other Communications in Progress. Section 83.181
 6. When You Hear MAYDAY - Listen. Don't Talk Unless You Can Help Sections 83.176, 83.235, 83.236, 83.238, 83.239, 83.240, 83.241 and 83.242
 7. No Ragchewing. Sections 83.178 and 83.358
 8. Talk 3 - Wait 10. Section 83.366(g)
 9. Give Your Call Sign. Section 83.364
 10. Keep A Log. Section 83.368
 11. Answer Violation Notices. Section 83.601
 12. Use Of Indecent Language Or Profanity On The Air Is A Criminal Offense.
 13. FALSE OR FRAUDULENT DISTRESS SIGNALS ARE PROHIBITED.
-

I F Y O U A R E I N D I S T R E S S

1. SEND radiotelephone alarm signal, if possible, to attract attention of other ships.
2. SAY slowly and distinctly on the distress frequency 2182 kc/s:
 - a. MAYDAY, MAYDAY, MAYDAY
THIS IS (Call Sign, repeated 3 times)
 - b. GIVE the name of your ship.
 - c. GIVE your geographical position.
 - d. TELL the nature of the distress.
 - e. EXPLAIN what kind of assistance you need.
 - f. GIVE any information that will help you to be rescued.
For Example, color of ship, type of ship, length of ship, etc.
3. REPEAT distress call and distress message at intervals until you get an answer.
4. Try any other available frequency to get help, if you get no answer to your distress call sent on 2182 kc/s.
5. GIVE priority to DISTRESS, URGENCY, AND SAFETY messages in that order.

INTEROFFICE MEMORANDUMDATE 8 May 1963

From: George F. Titterton
To: Distribution List
SUBJECT: Intra-Departmental Procedures to be Used for Requesting and Coordinating New Licenses and Modification of Present Licenses Issued by the Federal Communications Commission.

All Departments involved in Avionics will adhere to the following program:

- (1) Electronic Engineering personnel will discuss the necessity for a new radio frequency and/or station with George Klaus, Engineering Manager of Electronics Systems Center, Plant 14.
- (2) Any requirements for FCC radio licenses by Electronics Production personnel should be discussed with Augie Walsky, Production Manager of Electronics System Center, Plant 14.
- (3) Mr. Klaus, representing Electronics Engineering, and Mr. Walsky, Manager of Electronics Production, will combine the requests originating in these electronics activities.
- (4) Mr. Klaus, now representing Engineering and Production, will discuss their requirements with Lou Salvante, Head of Communications, and the final decision on applying for a new station or modifying an existing license will then be made.
- (5) Procedures now in effect for Equipment and Process Engineering, Flight Test, Flight Operations, Commercial Flight, Security and Maintenance will continue to be cleared directly with Mr. Salvante as in the past.

IMPORTANT NOTICE

The Federal Communications Commission in Washington requests a three month working period for a new or modified license. This means from the time they receive the submitted application, signed by an officer of our company, to the issuance date of the new radio frequency station license. Pressure cannot be used to expedite this time limit. To satisfy contracts on time, it is the responsibility of the applicant to supply George Klaus with all necessary technical data needed prior to the three month period needed for processing.

Signed George F. Titterton
Vice President

LES/JSE:es

INTER-OFFICE MEMORANDUM

From: E. Clinton Towl Date June 16, 1960

TO: All Department Heads
Avionics Personnel
Electronic Laboratory Personnel

SUBJECT: Control and Co-ordination of Radiating Devices Subject to Federal Communications Commission Licensing.

Within the Grumman organization, radiating devices such as radio transmitters, radar transmitters, etc., will be more extensively used for experimental and production purposes. Therefore, closer co-ordination between departments is required; and the following procedures should be followed:

1. All programs involving the use of electronic equipment which falls in the category of a radiating device as defined by the F. C. C. will be co-ordinated with L. E. Salvanto, Head of Communications. Under no circumstances will any equipment be operated prior to such co-ordination.
2. The F. C. C. requires that any operator who is to adjust or alter the emission of a licensed radiating device be under the direct supervision of the holder of a valid commercial radio operator's license of the proper class. Compliance with F. C. C. rules and regulations will be the responsibility of the cognizant Foreman or Department Head.
3. Responsibility for proper licensing, when required, and all contacts and dealings with the F.C.C. remains with R. W. Kahn.
4. All applications for F. C. C. permits and licenses for the use of radiating devices will be prepared by L. E. Salvante, forwarded to R. W. Kahn for approval and subsequent signature by an Officer of the Company.
5. All inquiries and requests for new F. C. C. licenses, or modification of existing licenses, will be submitted to L.E.Salvante.

Signed by E. Clinton Towl
Administrative Vice President

NJS:rmg

GRUMMAN AIRCRAFT DIVER CHECK LIST

PHASE I

Basic Swimming Evaluation

Start Date

Name _____

Comp.
Date

Instructor

Inspector

Requirement

Remarks

Medical Examination

Tread water for 10 min.

Tread water 5 min., feet only

Stay afloat 15 min., no accessories

Swim 75' under water

Surface dive to 10' to recover object

- Swim on surface:
- a) 150' backstroke
 - b) 150' breaststroke
 - c) 150' sidestroke
 - d) 300' free style

Tow inert swimmer 50'

Demo artificial respiration:

- a) laying position
- b) sitting position

GRUMMAN AIRCRAFT DIVER CHECK LIST

PHASE II

Basic Diving Evaluation

Name	Requirement	Comp. Date	Instructor	Start Date	Remarks	Inspector
	Swim 150' with fins only					
	Swim 150' with mask and fins					
	Swim 150' with mask, fins & snorkel					
	Swim 150' with snorkel only					
	Demo de-fogging of mask					
	Demo removal, replacement and clearing of mask in 4' or deeper of water					
	Demo water entry with fins, faceplate and snorkel - 3 ways - a) back roll					
	b) feet first entry					
	c) forward roll and twist					
	Proper donning and use of equipment					
	Water entry with SCUBA gear - 3 positions					
	Demo life vest (floatation equipment)					
	Demo use of SCUBA equip. in pool					
	Demo hand signals					
	Demo clearing of mask with SCUBA gear					
	Demo of val salva maneuver					
	Demo buddy breathing techniques					
	Demo ditching and donning of equipment					
	Swim on surface with equip. (SCUBA) 150'					

GRUMMAN AIRCRAFT DIVER CHECK LIST

RECORD SHEET

PHASE III

SCUBA Diving Evaluation

Name _____

Start Date _____

The student must have thorough knowledge of the following procedures for successful completion of course

Requirement	Comp. Date	Instructor	Remarks	Inspector
-------------	------------	------------	---------	-----------

Watermanship

Use of skin diving gear

Use of SCUBA equipment

Decompression tables

Repetitive diving tables

Ascent and descent procedures

General diving safety rules

Storing of gear (care & maintenance)

Diving physics and physiology

Diving diseases

Fundamentals of compressed gases

APPENDIX G

FORBIDDEN MATERIAL

The following items will not be used on board BEN FRANKLIN:

- o Aerosol Cans
- o Luminous Dial watches (on dives exceeding 24 hours).
Tridium luminous material is acceptable.
- o Mercury (including mercury thermometers)
- o Trichloroethylene or M.E.K.
- o Carbon tetrachloride
- o Steel Wool
- o After shave or pre-shave lotion
- o Body deodorants
- o Smoking material (cigarettes, etc.)

RECOMPRESSION CHAMBER LOCATIONS

Key West Area

1. U.S. Naval Station
Key West, Fla. 33040
Building #107
Operating Hours: 24 hrs.
Physician is available (Submarine and diving trained medical officer)
Base Telephone: 305-296-2511
Extension 564; Emergency 563
2. U. S. S. Penguin (ASR-14)
U. S. Naval Station
Key West, Florida
Base Telephone: 305-296-3511
Ask for Ship Extension
3. U.S.S. Bushnell (AS-15)
U. S. Naval Station
Key West, Florida
Base Telephone: 305-296-3511
Ask for Ship Extension

Miami Area

1. U. S. Navy Ordinance Laboratory
and Test Facility
1650 S.W. 40th Street
Ft. Lauderdale, Florida
Building Location: Brevard County Airport
Physician available, however, advisable to bring your own.
Base Telephone: 305-525-5722
Emergency: 305-522-5188 (Airport Tower)
2. Divers Training Academy
1915 N.E. 15th Avenue
Ft. Lauderdale, Florida
Telephone: Office: 305-566-4343
Res. Bill Foy (Pres) 305-587-2207
Res. Ski (Partner) 305-566-2176
Fly to Ft. Lauderdale - Hollywood International Airport; phone ahead for someone to meet you.

Jacksonville Area

1. Mayport Naval Air Station
Base Telephone: 904-249-9071
Extension: U.S.S. Yellowstone Ext 456
call Officer of the Deck

Panama City Area

1. U. S. Mine Defense Laboratory
Panama City, Florida
Operating Hours: 24 hours
Base Telephone: 904-234-2281

South Carolina Area

1. U. S. Naval Base
U.S.S. Gilmore or U.S.S. Petrel
Usually one ship always in port - call first - ask for Ship Extension
Base Telephone: 803-743-2000

INTER-OFFICE MEMORANDUM

18 December 1968

From: William M. Zarkowsky
 To: Walter Muench
 Subject: VISITORS ON BOARD THE BEN FRANKLIN

Enclosure: (1) Memo from Ray Mur to W. M. Zarkowsky, "Ben Franklin Release from Liability for Underway Visitors," dated 6 December 1968
 (2) Release from Liability Forms

Effective immediately, only those Grumman personnel and Bureau Jacques Piccard personnel who are presently on the Ben Franklin Program are permitted on board during any underway operations prior to the Gulfstream Drift Mission.

Persons other than Program personnel who are necessary to be aboard the Ben Franklin during any underway operations must have the express written approval of Walter Muench or William M. Zarkowsky in his absence. All non-Grumman visitors must sign the Release from Liability Form, copies of which are attached, prior to boarding the Ben Franklin - or they are to be refused admission to participate in any underway operations.

Signed by William M. Zarkowsky
 Vice President

TJL/ear

cc: E. C. Towl	J. B. Rettaliata
L. J. Evans	A. J. Zusi
Wm. T. Schwendler	J. F. Carr
G. F. Titterton	P. J. Cherry
R. Hutton	R. W. Bradshaw
T. P. Cheatham	J. M. Conners
J. G. Gavin	E. Dalva
R. L. Hall	F. G. Edwards
I. G. Hedrick	R. J. Fitzpatrick
C. H. Meyer	J. O'Brien
E. C. Nezbeda	W. H. Scott
G. H. Ochenrider	E. G. Siebert

RELEASE FROM LIABILITY

Know all men by these presents that in consideration of the permission extended to me by Grumman Aircraft Engineering Corporation and Dr. Jacques Piccard and their agents and employees to take passage in an experimental submersible vessel "BEN FRANKLIN"; I am doing so upon my own initiative, risk, and responsibility; I fully understand that the vessel is an experimental submarine and that therefore there are unknown risks of failure of equipment and possible prolonged confinement, injury, death, and property damage; I do expressly agree on behalf of myself, my heirs, executors, administrators, and assigns that Dr. Piccard and Grumman Aircraft Engineering Corporation, their officers, personnel, agents and employees, the said vessel, its officers and crew, or any of them, the employees of or personnel assigned to the vessel, shall not be liable under any circumstances whatsoever for my death, personal injury, prolonged confinement, or loss or damage to my property whether occasioned by negligence of said officers, personnel, agents, employees, vessel, its officers or crew or otherwise, occurring from any cause during said passage and all operations incident thereto.

_____ Name

Dated this _____ day of _____ 19_____,
at _____.

WITNESS: _____
Name Address

WITNESS: _____
Name Address