REPORT ON THE DEVELOPMENT OF
THE MANNED ORBITAL RESEARCH LABORATORY (MORL)
SYSTEM UTILIZATION POTENTIAL

TASK AREA II
INTEGRATED MISSION DEVELOPMENT PLAN

BOOK 2

SM-48811
OCTOBER 1965

MISSILE & SPACE SYSTEMS DIVISION
DOUGLAS AIRCRAFT COMPANY, INC.
SANTA MONICA/CALIFORNIA

[redacted]

DOUGLAS

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Integrated Mission Development Plan

BOOK 2

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OCTOBER 1965

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DOUGLAS MISSILE & SPACE SYSTEMS DIVISION

The Manned Orbital Research Laboratory (MORL) is a versatile facility for experimental research which provides for:

- Simultaneous development of space flight technology and man's capability to function effectively under the combined stresses of the space environment for long periods of time.
- Intelligent selectivity in the mode of acquisition, collation, and transmission of data for subsequent detailed scientific analyses.
- Continual celestial and terrestrial observations.

Future application potential includes use of the MORL as a basic, independent module, which, in combination with the Saturn Launch Vehicles currently planned for the NASA inventory, is responsive to a broad range of advanced mission requirements.

The laboratory module includes two independently pressurized compartments connected by an airlock. The larger compartment comprises the following functional spaces:

- A Control Deck from which laboratory operations and a major portion of the experiment program will be conducted.
- An Internal Centrifuge in which members of the flight crew will perform re-entry simulation, undergo physical condition testing, and which may be useful for therapy, if required.
- The Flight Crew Quarters, which include sleeping, eating, recreation, hygiene, and liquids laboratory facilities.

The smaller compartment is a Hangar/Test Area which is used for logistics spacecraft maintenance, cargo transfer, experimentation, satellite checkout, and flight crew habitation in a deferred-emergency mode of operation.

The logistics vehicle is composed of the following elements:

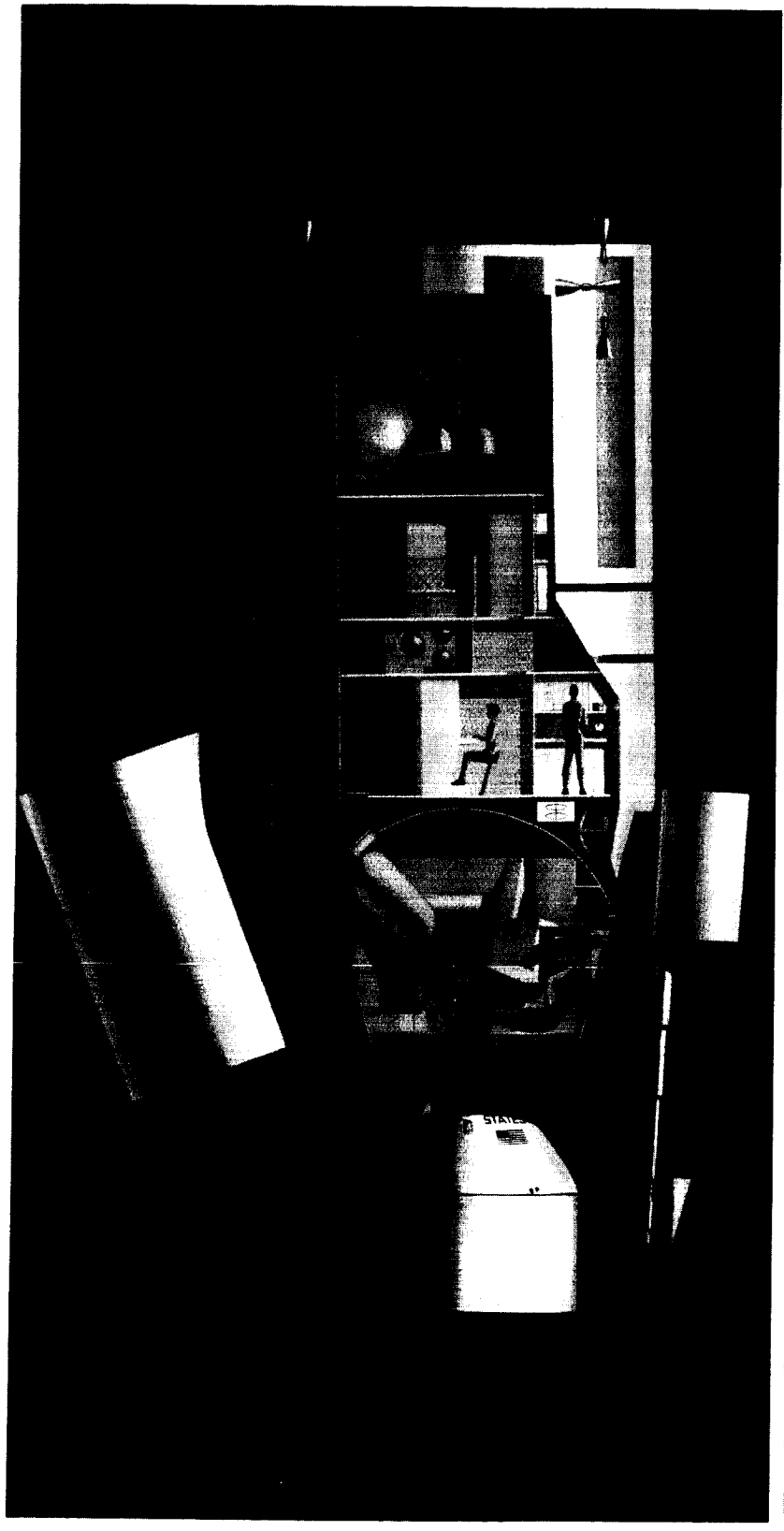
- A Logistics Spacecraft which generally corresponds to the geometric envelope of the Apollo Command and Service Modules and which includes an Apollo Spacecraft with launch escape system and a service pack for rendezvous and re-entry maneuver propulsion; and a Multi-Mission Module for either cargo, experiments, laboratory facility modifications, or a spacecraft excursion propulsion system.
- A Saturn IB Launch Vehicle.

Integration of this Logistics System with MORL ensures the flexibility and growth potential required for continued utility of the laboratory during a dynamic experiment program.

In addition to the requirements imposed by the experiment program, system design parameters must reflect operational requirements for each phase of the mission to ensure:

- Functional adequacy of the laboratory.
- Maximum utilization of available facilities.
- Identification of important parameters for consideration in future planning of operations support.

For this reason, a concept of operations was developed simultaneously with development of the MORL system.



CONTENTS

INTRODUCTION

This document presents Application Plan Task Descriptions No. 1 through 673. The remainder of the descriptions is presented in Book 3.

Douglas Aircraft Company, Inc., Report No. MORL 65-1, MORL Applications Plan for Oceanography and Meteorology, dated August 1965, identifies tasks to be accomplished on board a manned orbiting research laboratory. Each task shown on the plan is coded by reference number to Task Description Sheets contained in these documents. A copy of this plan may be obtained upon request from the MORL Studies Office at NASA, Langley Research Center.

APPLICATION PLAN TASK DESCRIPTION SHEETS

Each task description includes the following:

- A brief description of the task to be accomplished on board a manned orbiting research laboratory.
- A brief justification for the task.
- Task parameter sheets listing the time-dependent resources required to perform the task and other data pertinent to a computerized experiment scheduling program. (Task parameter definitions are given below.)

Some tasks have two parameter sheets--one describing the experiment and the other the installation of the task's experimental equipment or instruments. These setup tasks are identified by a three- or four-digit number beginning with 1; e.g., Task No. 101 is the setup for Task No. 1.

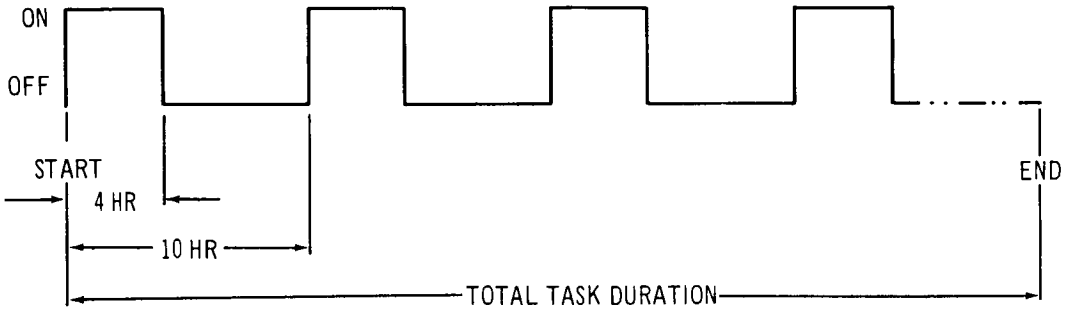
Experiment parameters for Application Plan tasks are defined as follows:

1. Task Number--Identifies the Application Plan task for which the following data are required as an input to a laboratory simulation program (which includes experiment scheduling).
2. Interruptible--If a task is interrupted because of a failure, this input defines whether the task must be started all over again or whether it can be resumed from the point at which it was stopped.

3. Duration (On-time/cycle)--States the time required to complete the active portion of the task (see following example).

4. Cycle Period--Gives the time from the beginning of one cycle to the start of the next (see following example). Cycle Period equals Duration for noncyclic tasks.

5. Number of Cycles Required--States the total number of cycles required to complete the task (see the following example).



DURATION = 4 HR
CYCLE PERIOD = 10 HR
NUMBER OF CYCLES = 4

6. Predecessor Task Number--Identifies the task whose completion leads directly to the subject experiment.

7. Successor Task Number and Initial Lag Time--Identifies those tasks that are immediate successors to the task being defined and lists the minimum required time delay between the end of the subject task and the first attempt to start its immediate successors.

8. Manpower--States the average manpower required during each cycle duration. Increments of whole men are used; that is, 1 man for 0.1 hour, rather than 0.1 man for 1 hour (a situation that could arise from only partial attention being required by a test over a long period).

   The total hours that men are required for each cycle must be less than, or equal to, cycle duration. If the hours required per man each cycle are less than the cycle's duration, time is given from the

start of the cycle to when men are first required. This is explained in the following example:

Duration = 4 hours

Manpower = 2 men--2.5 hours

1.5 hours from start of cycle

This input says that two men are required for the last 2 1/2 hours of each 4-hour cycle.

9. Electrical Power--States the average electrical power required for each cycle duration.

   If electrical power is required for less than the cycle's duration, then the time is given from the start of the cycle to when power is first required.

10. Shipping Weight--Lists the equipment weight (including a crating allowance) for the task.

11. Shipping Volume--Lists the equipment volume in its "as shipped" condition. The external dimensions of the shipping crates are used.

The following briefly describe tasks to be accomplished on board a manned orbiting research laboratory.

TASK NO. 1 TITLE Lubrication of Bearings

LEVEL Applied Research for Design Data

DESCRIPTION

Representative bearing designs, typical of those to be employed, and pretested lubricants will be installed in the external environment and operated with appropriate loads. The bearings will be periodically inspected and tested for torque changes caused by unsatisfactory lubrication. The exposure time should be equivalent to the expected operating time ; bearing life should be determined.

JUSTIFICATION

Many instrument systems will require external, movable components (radar antennas, television and camera zoom lenses, etc.). Therefore, the problems of lubricating bearings in the orbital environment should be evaluated.

TASK PARAMETERS

NO. 101 TITLE Install Experiment Package

INTERRUPTIBLE Yes DURATION (HR) 4 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 4 NO. OF CYCLES 2

PREDECESSOR TASK NO. None

SUCCESSOR TASK NO. AND INITIAL LAG TIME 1, 0 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	66	4	0
1	72	4	0

ELECTRICAL POWER 0 W 0 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 25 LB SHIPPING VOLUME 0.5 FT^3

EQUIPMENT REQUIRED

ID	NAME
-	Sample Bearing Package

NO. 1 TITLE Lubrication of Bearings

INTERRUPTIBLE Yes DURATION (HR) 96 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 96 NO. OF CYCLES 30

PREDECESSOR TASK NO. 101

SUCCESSOR TASK NO. AND INITIAL LAG TIME 201, 0 hr; 202, 0 hr; 18, 0 hr; 237, 0 hr; 1604, 0 hr; 1659, 0 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	66	4	0
1	72	4	0

ELECTRICAL POWER 5 W 92 HR/CYCLE

4 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3 (See 101)

EQUIPMENT REQUIRED

ID	NAME
-	Miscellaneous Test Equipment

TASK NO. 3 TITLE Antenna-MORL Dynamic Interaction in Zero g

LEVEL Applied Research for Design Data

DESCRIPTION

An external antenna will be operated after installation on the laboratory. Angles between the antenna boresight and the laboratory stable platform will be continuously measured while the antenna is operated in all scan modes, both automatic and manual. Data will be compared to determine effects of the antenna-MORL interaction on antenna pointing accuracy.

Because reaction torques will be inducted in the laboratory as a result of the antenna slewing requirements, it will be necessary to evaluate requirements for maintaining the dynamic equilibrium of the laboratory.

JUSTIFICATION

Sea state and tsunami data require the measurement of range from the laboratory to the ocean surface. The accuracy of these measurements is influenced by the stability of the laboratory, which is in turn influenced by induced torques caused by slewed antennas. A task is therefore required to evaluate the dynamic interaction of the antenna with the vehicle in a zero-g environment.

TASK PARAMETERS

NO. 103 TITLE Install Radar Antenna

INTERRUPTIBLE Yes DURATION (HR) 4 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 4 NO. OF CYCLES 3

PREDECESSOR TASK NO. 201

SUCCESSOR TASK NO. AND INITIAL LAG TIME 3, 0 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	60	4	0
1	66	4	0
1	71	4	0

ELECTRICAL POWER 0 W 0 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 50 LB SHIPPING VOLUME 1 FT^3

EQUIPMENT REQUIRED

ID	NAME
-	External Antenna Kit

NO. 3 TITLE Antenna-MORL Dynamic Interaction in Zero g

INTERRUPTIBLE Yes DURATION (HR) 0.5 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 0.5 NO. OF CYCLES 6

PREDECESSOR TASK NO. 103

SUCCESSOR TASK NO. AND INITIAL LAG TIME 18, 0 hr; 36, 0 hr; 237, 0 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	67	0.5	0

ELECTRICAL POWER 50 W 0.5 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3 (See 103)

EQUIPMENT REQUIRED

ID	NAME
-	Miscellaneous Test Equipment

TASK NO. 4 TITLE Plastic Materials Ultraviolet Sensitivity

LEVEL Applied Research for Design Data

DESCRIPTION

Candidate plastic materials employed as part of the radar radiation subsystem will be exposed to ultraviolet radiation encountered during MORL operation. These materials will be periodically inspected, and the performance of the component will be measured to determine deterioration under conditions of prolonged exposure.

JUSTIFICATION

Since the antenna system will be located outside the laboratory, the influence of the ultraviolet radiation from the sun on the performance of the antenna feed system should be evaluated.

TASK PARAMETERS

NO. 104 TITLE Install Plastic Samples

INTERRUPTIBLE Yes DURATION (HR) 4 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 4 NO. OF CYCLES 1

PREDECESSOR TASK NO. None

SUCCESSOR TASK NO. AND INITIAL LAG TIME 4, 0 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	66	4	0
1	72	4	0

ELECTRICAL POWER 0 W 0 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 20 LB SHIPPING VOLUME 0.3 FT^3

EQUIPMENT REQUIRED

ID	NAME
-	Plastic Samples Kit

NO. 4 TITLE Plastic Materials UV Sensitivity

INTERRUPTIBLE Yes DURATION (HR) 3 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 720 NO. OF CYCLES 12

PREDECESSOR TASK NO. 104

SUCCESSOR TASK NO. AND INITIAL LAG TIME 201, 0 hr; 202, 0 hr; 18, 0 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	66	3	0
1	72	3	0

ELECTRICAL POWER 10 W 1 HR/CYCLE

2 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3 (See 104)

EQUIPMENT REQUIRED

ID	NAME
-	Miscellaneous Test Equipment and Samples

TASK NO. 5 TITLE Special Tools for Assembly of External Components in Zero g

LEVEL Applied Research for Design Data

DESCRIPTION

Special tools will be evaluated by operational use aboard MORL. Sample tools will be employed for each application and their utility will be evaluated. Prototype tools for which potential needs exist will be used to assemble, install, and replace parts, and to disassemble and repair antenna subsystems in the external environment.

JUSTIFICATION

This task is associated with the problems which occur in the use of tools in a zero g environment. It is anticipated that platform alignment and possible antenna system repair and adjustment by laboratory personnel will be required. Therefore, a task has been specified for evaluating the special tools required for accomplishing these functions.

TASK PARAMETERS

NO. 5 TITLE Special Tools for Assembly of External Components

INTERRUPTIBLE Yes DURATION (HR) 4 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 4 NO. OF CYCLES 6

PREDECESSOR TASK NO. None

SUCCESSOR TASK NO. AND INITIAL LAG TIME 201, 0 hr; 202, 0 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	60	4	0
1	72	4	0

ELECTRICAL POWER 50 W 4 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 10 LB SHIPPING VOLUME 0.25 FT^3

EQUIPMENT REQUIRED

ID	NAME
-	Special Tools
-	Tape Recorder and Movie Camera

TASK NO. 6 TITLE Particulate Impingement on Lenses

LEVEL Applied Research for Design Data

DESCRIPTION

Sample lenses will be exposed to impingement by particulate matter in MORL's external environment. The lenses will be examined periodically for reduced resolution by exposing a film to a standard test target through the lenses being tested.

JUSTIFICATION

Optical lenses will be used in a wide variety of instruments, such as cameras; television systems; IR, optical, and UV radiometers; optical driftmeters; and so on. Since these instruments will be used to make precise measurements, lens degradation caused by impingement will be critical and may seriously affect instrument sensitivity and resolution. Therefore, the level of degradation must be predictable.

TASK PARAMETERS

NO. 106 TITLE Install Lenses

INTERRUPTIBLE Yes DURATION (HR) 4 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 4 NO. OF CYCLES 1

PREDECESSOR TASK NO. None

SUCCESSOR TASK NO. AND INITIAL LAG TIME 6, 0 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	60	4	0
1	71	4	0

ELECTRICAL POWER 0 W 0 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 20 LB SHIPPING VOLUME 0.25 FT^3

EQUIPMENT REQUIRED

ID	NAME
-	Sample Lenses

NO. 6 TITLE Particulate Impingement on Lenses

INTERRUPTIBLE Yes DURATION (HR) 3 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 40 NO. OF CYCLES 10

PREDECESSOR TASK NO. 106

SUCCESSOR TASK NO. AND INITIAL LAG TIME 71, 340 hr; 72, 340 hr; 123, 0 hr; 138, 0 hr; 1603, 0 hr; 1608, 0 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	60	3	0
1	71	3	0

ELECTRICAL POWER 0 W 0 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3

(See 106)

EQUIPMENT REQUIRED

ID	NAME
-	Special Test Equipment and Samples

TASK NO. 15 TITLE Film Stability in MORL Environment

LEVEL Applied Research for Design Data

DESCRIPTION

Black and white and color film packs will be exposed under various use conditions to the MORL environment for typical operational periods. Film will be processed after exposure to standard resolution targets periodically, and film degradation will be recorded.

JUSTIFICATION

Film stability in the environment of the orbital laboratory is essential to the success of this measurement procedure; therefore this task has been specified to evaluate any special problems which may occur as a result of film degradation in the radiation and atmospheric environment of the laboratory.

TASK PARAMETERS

NO. 115 TITLE Install Experiment Package

INTERRUPTIBLE Yes DURATION (HR) 3 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 3 NO. OF CYCLES 1

PREDECESSOR TASK NO. None

SUCCESSOR TASK NO. AND INITIAL LAG TIME 15, 0 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	60	3	0
1	72	3	0

ELECTRICAL POWER 0 W 0 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 15 LB SHIPPING VOLUME 0.5 FT^3

EQUIPMENT REQUIRED

ID	NAME
-	Film Exposure Experiment Kit

NO. 15 TITLE Film Stability in MORL Environment

INTERRUPTIBLE Yes DURATION (HR) 2 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 168 NO. OF CYCLES 12

PREDECESSOR TASK NO. 115

SUCCESSOR TASK NO. AND INITIAL LAG TIME 16, 0 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	60	2	0
1	72	2	0

ELECTRICAL POWER 0 W 0 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3 (See 115)

EQUIPMENT REQUIRED

ID	NAME
19	Camera
-	Miscellaneous Test Equipment and Film Packs

TASK NO. 16 TITLE Picture Resolution

LEVEL Development Test

DESCRIPTION

Pictures will be taken of known surface targets, and the film will be developed and processed aboard MORL. Measurements will be made to determine the resolution limitations under laboratory and equipment limitations. This task will be performed on the color and black and white film and associated equipment. Photographs will be made of test targets under controlled conditions.

JUSTIFICATION

Photography will be used in a wide variety of applications, for instance, in the following areas:

1. Weather Forecasting
   - A. Current boundaries and mass transport of sea water can be monitored by analyzing successive color photographs of dye markers placed in the current streams.
   - B. The concentration and distribution of sea surface plant life can be analyzed by monitoring photographs of the color distribution of the sea surface.
   - C. Plankton concentration and distribution can be monitored by photographing the bioluminescence of the sea surface.
   - D. The distribution of fish stocks possibly can be monitored by comparing successive photographs of schooling species on the surface.
2. Waste Disposal and Pollution
   - A. Shallow water bottom contours in both the littoral and neritic zone can be analyzed by photogrammetric analysis of successive photographs.
   - B. The sedimentation rate and characteristics of the sea bottom can be analyzed by the use of dyed sand and the analysis of successive photographs.
   - C. The character of the interface between fresh water and sea water can be analyzed by comparing successive color photographs.
3. Shipping and Navigation
   - A. The characteristics of surface currents that contribute to sea-state determination can be analyzed by monitoring photographs at the position and motion of surface floats acting as current tags.
   - B. Submerged objects in shallow water can be photographed with polarized filters for the detection of subsurface hazards to shipping and navigation.

The actual resolution achievable with the equipment available in orbit must be determined because it will be critical to the performance of these tasks.

TASK PARAMETERS

NO: 16 TITLE Picture Resolution

INTERRUPTIBLE Yes DURATION (HR) 4 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 168 NO. OF CYCLES 12

PREDECESSOR TASK NO. 15

SUCCESSOR TASK NO. AND INITIAL LAG TIME 1234, 0 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	60	2	0
1	71	2	0

ELECTRICAL POWER 100 W 2 HR/CYCLE

2 HR FROM START OF CYCLE

SHIPPING WEIGHT 15 LB SHIPPING VOLUME 0.5 FT^3

EQUIPMENT REQUIRED

ID	NAME
19	Camera
-	Miscellaneous Test Equipment and Film Packs

TASK NO. 18 TITLE Assembly, Maintenance, and Alignment Methods for Microwave Radiometer Antenna

LEVEL Development Tests

DESCRIPTION

This task requires that the equipment operator conduct experiments to determine the effectiveness with which the receiving antenna of the microwave radiometer can be aligned with respect to the MORL platform.

It requires testing of previously developed techniques for attaching or mounting the antenna system external to the laboratory, testing prescribed techniques for repairing or replacing components of the antenna system, and evaluating the performance of the lubrication methods employed. The task would be performed in accordance with pre-established procedures and for several installation, repair, and evaluation cycles to detect limitations or possible improvements to procedures and/or techniques.

The antenna system will be set up and assembled prior to operation, in accordance with established procedures, which will be evaluated by having trained personnel perform the setup, installation, and checkout aboard MORL.

JUSTIFICATION

The accuracy of the relative range measurement is critically dependent on the accuracy with which the antenna subsystem can be aligned relative to the MORL, and, therefore, a task has been identified to measure the accuracy achievable within constraints imposed by the laboratory environment.

TASK PARAMETERS

NO. 18 TITLE Assembly, Maintenance, and Alignment Methods for Microwave Radiometer Antenna

INTERRUPTIBLE Yes DURATION (HR) 4 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 4 NO. OF CYCLES 6

PREDECESSOR TASK NO. 1, 3, 4, 21, 502

SUCCESSOR TASK NO. AND INITIAL LAG TIME 1236, 0 hr; 1623, 0 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	67	4	0
1	72	4	0

ELECTRICAL POWER 20 W 4 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 15 LB SHIPPING VOLUME 0.2 FT^3

EQUIPMENT REQUIRED

ID	NAME
-	Special Test Equipment
12	Microwave Radiometer
-	Assembly Kit

TASK NO. 21 TITLE Microwave and Infrared Radiometer Stability in Orbit Environment

LEVEL Applied Research for Design Data

DESCRIPTION

This task is to be performed on the microwave and infrared radiometers to determine their long-term stability in orbit. The radiometers will be checked periodically against surface targets of known characteristics. A calibration source of known characteristic will be used, and data will be recorded to determine stability over long periods.

JUSTIFICATION

Since the passive IR and microwave radiation from the ocean's surface is useful for collecting data for several applications, a task has been specified for monitoring this radiation. Nimbus and Tiros have experienced problems with the long-term stability of the radiometer equipment. Therefore, a special task has been proposed for evaluating the long-term performance degradation of the proposed radiometers.

TASK PARAMETERS

NO. 121 TITLE Install Microwave and IR Radiometers

INTERRUPTIBLE Yes DURATION (HR) 4 (ON TIME CYCLE)

CYCLE PERIOD (HR) 4 NO. OF CYCLES 1

PREDECESSOR TASK NO. None

SUCCESSOR TASK NO. AND INITIAL LAG TIME 21, 0 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	67	4	0
1	72	4	0

ELECTRICAL POWER 0 W 0 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 40 LB SHIPPING VOLUME 1 FT^3

EQUIPMENT REQUIRED

ID	NAME
11	IR Radiometer
12	Microwave Radiometer
-	Installation Kit

NO. 21 TITLE Microwave and IR Radiometer Stability

INTERRUPTIBLE Yes DURATION (HR) 0.25 (ON TIME CYCLE)

CYCLE PERIOD (HR) 1.5 NO. OF CYCLES 200

PREDECESSOR TASK NO. 121

SUCCESSOR TASK NO. AND INITIAL LAG TIME 18, 0 hr; 125, 0 hr; 237, 0 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	67	0.25	0

ELECTRICAL POWER 20 W 0.25 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3 (See 121)

EQUIPMENT REQUIRED

ID	NAME
12	Microwave Radiometer
11	IR Radiometer
-	Calibration Source
-	Special Test Equipment

TASK NO. 23 TITLE Bandwidth and Characteristics of Infrared Radiometer Filters

LEVEL Development Tests

DESCRIPTION

This task will be performed on various filters for use on IR radiometers. The task will consist of evaluating filtering characteristics tested against known surface-based test targets. Data acquired will be used to determine the filters' performance in the radiometer system.

JUSTIFICATION

IR radiometers will be used for several important surface temperature measurements in oceanography and meteorology. The filters used in this instrument should be evaluated in the operational environment against known targets.

TASK PARAMETERS

NO. 123 TITLE Install IR Radiometer Filter Test Kit

INTERRUPTIBLE Yes DURATION (HR) 4 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 4 NO. OF CYCLES 1

PREDECESSOR TASK NO. 6

SUCCESSOR TASK NO. AND INITIAL LAG TIME 23, 0 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	67	4	0
1	71	4	0

ELECTRICAL POWER 0 W 0 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 15 LB SHIPPING VOLUME 0.2 FT^3

EQUIPMENT REQUIRED

ID	NAME
-	Filter Test Kit

NO. 23 TITLE Bandwidth and Characteristics of IR Radiometer Filters

INTERRUPTIBLE Yes DURATION (HR) 0.25 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 1.5 NO. OF CYCLES 10

PREDECESSOR TASK NO. 123

SUCCESSOR TASK NO. AND INITIAL LAG TIME 1239, 0 hr

NO. OF MEN	SKILL ID	HR CYCLE	HR FROM START OF CYCLE
1	67	0.25	0
1	71	0.25	0

ELECTRICAL POWER 20 W 0.25 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3 (See 123)

EQUIPMENT REQUIRED

ID	NAME
-	Assorted Filters
-	Special Test Equipment
11	IR Radiometer

TASK NO. 25 TITLE Infrared Calibration Reference — Absolute Accuracy Tests

LEVEL Development Tests

DESCRIPTION

This task will be performed on a calibration reference for the IR radiometers. A radiometer requires that a calibrating device be part of the equipment. The stability and associated variations will be measured in the MORL environment. Stability of a calibration source will be determined by periodically measuring the temperature of a known surface target of known temperature. When the measured value is compared to the known value under similar conditions, variations in calibration reference can be determined.

JUSTIFICATION

Since the passive IR and microwave radiation from the ocean's surface is useful for collecting data for several applications, a task has been specified for monitoring this radiation. An implied task is the development and testing of a calibration device for reference in making radiometer measurements.

TASK PARAMETERS

NO. 125 TITLE Install IR Calibration Reference

INTERRUPTIBLE Yes DURATION (HR) 4 (ON TIME / CYCLE)

CYCLE PERIOD (HR) 4 NO. OF CYCLES 1

PREDECESSOR TASK NO. 21

SUCCESSOR TASK NO. AND INITIAL LAG TIME 25, 0 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	67	4	0
1	71	4	0

ELECTRICAL POWER 0 W 0 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 15 LB SHIPPING VOLUME 0.2 FT^3

EQUIPMENT REQUIRED

ID	NAME
-	IR Calibration Reference Kit

NO. 25 TITLE IR Calibration Reference – Absolute Accuracy Test

INTERRUPTIBLE Yes DURATION (HR) 0.3 (ON TIME CYCLE)

CYCLE PERIOD (HR) 168 NO. OF CYCLES 24

PREDECESSOR TASK NO. 125

SUCCESSOR TASK NO. AND INITIAL LAG TIME 1239, 0 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	67	0.3	0

ELECTRICAL POWER 20 W 0.3 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3 (See 125)

EQUIPMENT REQUIRED

ID	NAME
-	Calibration Reference Device
-	Special Test Equipment
11	IR Radiometer

TASK NO. 31 TITLE Environmental Effects and Heat Dissipation — Transponder Satellite

LEVEL Applied Research for Design Data

DESCRIPTION

This task is to be performed on the cooperative satellite system involved in the polarimetric measurements. The transponder and its mounting bracket will be taken through the air lock and mounted by a crew member externally but in such position that it will be exposed to direct sunlight and can be viewed from within the MORL.

Thermistors within the transponder will modulate the reradiated signal from the transponder to provide temperature data over a sufficient operational time period. A small S-band signal generator and tuner-receiver will be used from within the laboratory to activate the transponder and to analyze the received signals to evaluate the environmental effects. The output of the receiver will be viewed on an oscilloscope.

When tests are completed, the crew member will re-exit the MORL, demount the transponder and bracket, and return them to the MORL. The transponder will be disassembled and examined for any defects uncovered during testing or any other evidence of progressive failure.

JUSTIFICATION

Because ocean surface salinity is a useful parameter in oceanographic applications, monitoring surface salinity by examining the rotation in the plane of polarization of an S-band signal reflected from the ocean's surface has been identified as a requirement. This implies a task principally concerned with resolving orbital environmental effects and evaluating heat dissipation requirements associated with the transponder satellite used in the polarimeter system.

TASK PARAMETERS

NO. 31 TITLE Environmental Effects and Heat Dissipation — Transponder Satellite

INTERRUPTIBLE Yes DURATION (HR) 4 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 4 NO. OF CYCLES 3

PREDECESSOR TASK NO. None

SUCCESSOR TASK NO. AND INITIAL LAG TIME 140, 0 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	60	4	0
1	72	4	0

ELECTRICAL POWER 200 W 4 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 600 LB SHIPPING VOLUME 10 FT^3

EQUIPMENT REQUIRED

ID	NAME
-	Transponder Satellite
-	Miscellaneous Test Equipment

TASK NO. 36 TITLE Boresight and Alignment, Manual as Opposed to Automatic Target Acquisition — Laser System

LEVEL Development Tests

DESCRIPTION

This task is performed on laser controls and transmitter radiation optics of monostatic laser; it requires the equipment operator to conduct experiments to determine the effectiveness with which a laser radiation system can be aligned with respect to the MORL platform.

Ease, speed, and stability of the alignment procedure will be evaluated to support the accuracy of measurements and the extent to which hardware design changes may be required.

Laser radiation system adjustments will require that procedures and methods be established, evaluated by having trained personnel make the adjustments under operational conditions. Measurements of the time required to accomplish each step will be recorded.

JUSTIFICATION

Since sea state is a parameter of interest in several applications, a measurement of relative range to the ocean surface from the laboratory has been identified as a requirement for evaluating ocean dynamics. Therefore, a task has been specified for evaluating the interaction of the MORL with the optical subsystem of the monostatic laser radar to establish the accuracy limitations resulting from effects such as mechanical vibration or other unpredictable laboratory motion.

TASK PARAMETERS

NO. 36 TITLE Boresight and Alignment, Manual as Opposed to Automatic Target Acquisition Techniques

INTERRUPTIBLE Yes DURATION (HR) 4 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 4 NO. OF CYCLES 2

PREDECESSOR TASK NO. 3

SUCCESSOR TASK NO. AND INITIAL LAG TIME 246, 0 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	66	4	0
1	72	4	0

ELECTRICAL POWER 50 W 2 HR/CYCLE

2 HR FROM START OF CYCLE

SHIPPING WEIGHT 30 LB SHIPPING VOLUME 0.5 FT^3

EQUIPMENT REQUIRED

ID	NAME
-	Movie Camera and Lights
-	Laser Radiation System and Controls Components

TASK NO. 38 TITLE Optimum Baseline — Remote Satellite

LEVEL Development Tests

DESCRIPTION

This task will be performed on the remote satellite for the bistatic laser system, which will be set up and operated against surface targets of known characteristics. Since the bistatic system baseline influences accuracy and resolution, measurements of relative range to the surface target will be conducted for various baseline separations between the laboratory and its transponder (transmitter). Data will be analyzed to select the optimum baseline.

JUSTIFICATION

Since sea state is of interest in several applications, a measurement of relative range to the ocean surface from the laboratory has been identified as a requirement for the derivation of ocean dynamics. A bistatic laser radar may be a means of making these measurements. This requires the determination of baseline for optimizing measurement accuracy.

TASK PARAMETERS

NO. 138 TITLE Assemble Remote Satellite for Bistatic Laser System (Lidar)

INTERRUPTIBLE Yes DURATION (HR) 4 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 4 NO. OF CYCLES 3

PREDECESSOR TASK NO. 6, 40

SUCCESSOR TASK NO. AND INITIAL LAG TIME 38, 0 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	60	4	0
1	66	4	0
1	67	4	0

ELECTRICAL POWER 0 W 0 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 60 LB SHIPPING VOLUME 1.5 FT^3

EQUIPMENT REQUIRED

ID	NAME
-	Remote Satellite
-	Assembly Kit

NO. 38 TITLE Optimum Baseline – Remote Satellite

INTERRUPTIBLE Yes DURATION (HR) 3 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 3 NO. OF CYCLES 20

PREDECESSOR TASK NO. 138

SUCCESSOR TASK NO. AND INITIAL LAG TIME 246, 2 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	66	3	0
1	71	3	0

ELECTRICAL POWER 100 W 1 HR/CYCLE

2 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3

(See 138)

EQUIPMENT REQUIRED

ID	NAME
14	Lidar

TASK NO. 40 TITLE Development of Methods of Ejecting, Operating, and Recovering Polarimeter Transponder Satellite

LEVEL Development Tests

DESCRIPTION

This task is to aid development of the transponder satellite command and control subsystem for the S-band polarimeter and will consist of evaluating methods of launching, retrieving, and controlling the attitude of the remote satellite relative to the laboratory.

The remote satellite will be launched and its controls and orientation system evaluated by executing the task from the MORL under appropriate procedures. The task will include the initial check-out procedure, the launch procedure, a series of orientation maneuvers in accordance with pre-established procedures, and the retrieval procedure. The object will be to prove the technique or to discover limitations requiring further improvements.

JUSTIFICATION

Since sea state is of interest in oceanographic applications, the measurement of relative range to the ocean surface from the laboratory has been identified as a requirement for the derivation of ocean dynamics. To perform measurements with bistatic laser radar, accurate control of the orientation and maintenance of orientation stability of the remote satellite, relative to the laboratory, is required. Consequently, a task has been specified for evaluating methods of achieving accurate control of the remote satellite system.

TASK PARAMETERS

NO. 140 TITLE Assemble Remote Transponder Satellite (Polarimeter System)

INTERRUPTIBLE Yes DURATION (HR) 3 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 3 NO. OF CYCLES 3

PREDECESSOR TASK NO. 31

SUCCESSOR TASK NO. AND INITIAL LAG TIME 40, 0 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	60	3	0
1	72	3	0

ELECTRICAL POWER 0 W 0 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 500 LB SHIPPING VOLUME 9 FT^3

EQUIPMENT REQUIRED

ID	NAME
18	S-Band Polarimeter
-	Transponder Satellite
-	Assembly Kit

NO. 40 TITLE Methods of Ejecting, Operating, and Recovering Polarimeter Transponder Satellite

INTERRUPTIBLE Yes DURATION (HR) 4 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 4 NO. OF CYCLES 10

PREDECESSOR TASK NO. 140

SUCCESSOR TASK NO. AND INITIAL LAG TIME 246, 0 hr; 242, 0 hr; 138, 0 hr; 244, 0 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	60	4	0
1	72	4	0

ELECTRICAL POWER 100 W 2 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3 (See 140)

EQUIPMENT REQUIRED

ID	NAME
18	S-Band Polarimeter

TASK NO. 71 TITLE Assembly, Maintenance, and Repair Methods for External Optical Components

LEVEL Development Tests

DESCRIPTION

This task is to be performed on external optical components; it requires testing of previously developed techniques for attaching or mounting optical systems external to the laboratory, testing prescribed techniques for repairing or replacing components of the optical system, and evaluating the performance of the lubrication methods employed.

The task would be performed in accordance with pre-established procedures for several installation, repair, and evaluation cycles to determine limitations and possibly to establish improved procedures and/or techniques of operation.

JUSTIFICATION

Since optical subsystems may not be permanently installed aboard the laboratory, they may be repeatedly taken outside the laboratory, installed, and operated. Therefore, procedures and techniques for the performance of this function in orbit must be developed.

TASK PARAMETERS

NO. 71 TITLE Assembly, Maintenance, and Repair Methods for External Optical Components

INTERRUPTIBLE Yes DURATION (HR) 4 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 4 NO. OF CYCLES 2

PREDECESSOR TASK NO. 6

SUCCESSOR TASK NO. AND INITIAL LAG TIME 1230, 340 hr; 72, 0 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	60	4	0
1	72	4	0

ELECTRICAL POWER 0 W 0 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 30 LB SHIPPING VOLUME 0.5 FT^3

EQUIPMENT REQUIRED

ID	NAME
-	Special Tools
-	Movie Camera

TASK NO. 72 TITLE Boresight and Alignment Techniques, Alignment Feasibility

LEVEL Development Tests

DESCRIPTION

This task requires that the equipment operator conduct experiments to determine the effectiveness with which the optical subsystem can be aligned with respect to the MORL platform. The ease, speed, and accuracy of alignment will be evaluated, and the extent to which hardware design change may be required to improve accuracy should be included in the tests.

JUSTIFICATION

Optical subsystems will be used in several instruments that operate in the IR, visible, and UV frequencies. The exact location of the Earths' surface being interrogated by each instrument will be critically dependent on the accuracy to which the optical subsystem can be aligned relative to the MORL reference system. Therefore, the accuracy achievable, subject to constraints imposed by the laboratory, must be measured.

TASK PARAMETERS

NO. 72 TITLE Boresight and Alignment Techniques

INTERRUPTIBLE Yes DURATION (HR) 4 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 4 NO. OF CYCLES 6

PREDECESSOR TASK NO. 6, 71

SUCCESSOR TASK NO. AND INITIAL LAG TIME 1230, 340 hr; 1234, 340 hr; 1239, 0 hr; 1703, 0 hr; 1704, 0 hr; 1705, 0 hr; 1710, 0 hr; 1713, 0 hr; 1716, 0 hr; 1719, 0 hr; 1711, 0 hr; 1721, 0 hr; 1700, 0 hr; 1718, 0 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	66	4	0
1	72	4	0

ELECTRICAL POWER 20 W 4 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 30 LB SHIPPING VOLUME 0.5 FT^3

EQUIPMENT REQUIRED

ID	NAME
-	Gimbaled Optical Turret
-	Mechanical Alignment Equipment

TASK NO. 201 TITLE Assembly and Maintenance Methods for Radar Antennas

LEVEL Development Tests

DESCRIPTION

This task requires testing of previously developed techniques for attaching or mounting antenna systems external to the laboratory, testing prescribed techniques for repairing or replacing components of the antenna system, and evaluating the performance of the lubrication methods employed. The task will be performed in accordance with pre-established procedures for several installations and cycles to detect limitations of, or possible improvements to, procedures and techniques.

The antenna system will be set up and assembled prior to operation in accordance with established procedures. These procedures will be evaluated by having trained personnel perform the setup, installation, and checkout aboard the MORL.

JUSTIFICATION

Several applications require that the distance from the laboratory to the Earth's surface be measured, and radar provides a convenient means of making such measurements. The feasibility of placing a radar antenna subsystem external to the laboratory to radiate and receive RF energy is therefore an implied task.

TASK PARAMETERS

NO. 201 TITLE Assembly and Maintenance Methods for Radar Antennas

INTERRUPTIBLE Yes DURATION (HR) 4 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 4 NO. OF CYCLES 3

PREDECESSOR TASK NO. 1, 4, 5

SUCCESSOR TASK NO. AND INITIAL LAG TIME 1226, 336 hr; 202, 0 hr; 103, 336 hr; 1232, 0 hr; 242, 0 hr; 227, 0 hr; 228, 0 hr; 1236, 0 hr; 1723, 0 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	66	4	0
1	72	4	0

ELECTRICAL POWER 50 W 4 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 50 LB SHIPPING VOLUME 1. FT^3

EQUIPMENT REQUIRED

ID	NAME
-	Miscellaneous Test Equipment
-	External Antenna Assembly

TASK NO. 202 TITLE Boresight and Alignment Methods for Radar Antenna System

LEVEL Development Task

DESCRIPTION

This task requires that the equipment operator conduct experiments to determine the effectiveness with which the antenna can be aligned with respect to the MORL platform. The ease, speed, and stability results of the alignment procedure will be evaluated to support accuracy of measurements and the extent to which hardware design changes may be required.

Procedures must be established to accomplish antenna system adjustments. Procedures and methods will be evaluated by having trained personnel make the adjustments under operational conditions while following pre-established procedures. Measurements of time required to accomplish each step will be recorded.

JUSTIFICATION

Several applications require that the distance from the laboratory to the Earth's surface be measured, and radar provides a convenient means of making such measurements. Therefore, the evaluation of methods for boresighting and aligning the antenna system is an implied task.

TASK PARAMETERS

NO. 202 TITLE Boresight and Alignment Methods – Radar Antenna

INTERRUPTIBLE Yes DURATION (HR) 4 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 4 NO. OF CYCLES 4

PREDECESSOR TASK NO. 1, 4, 5, 201

SUCCESSOR TASK NO. AND INITIAL LAG TIME 1226, 336 hr; 1232, 0 hr; 227, 0 hr; 228, 0 hr; 1723, 0 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	66	4	0
1	72	4	0

ELECTRICAL POWER 20 W 4 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 50 LB SHIPPING VOLUME 1 FT^3

EQUIPMENT REQUIRED

ID	NAME
-	Miscellaneous Test Equipment
-	Movie Camera

TASK NO. 226 TITLE System Integration Tests — K- and C-Band Radar System

LEVEL System Integration

DESCRIPTION

This task is to be performed on K-band and/or C-band radar; it will consist of the subtasks outlined below. Subsystems will be integrated into final system for test against known conditions. The subtasks are as follows:

1. Determine radio interference control requirements.
2. Determine compatibility of antenna mount with attitude control system. Measure short-time and long-time effects.
3. Integrate signal processor with data storage system.
4. Establish and evaluate airlock and equipment handling methods.
5. Evaluate repair and maintenance techniques (external).
6. Evaluate emergency procedure resulting from overload protection failure.

JUSTIFICATION

Several applications require that the distance from the laboratory to the Earth's surface be measured and radar provides a convenient means of making such measurements. An implied task, therefore, is the evaluation of the performance of the radar system aboard the MORL.

TASK PARAMETERS

NO. 1226 TITLE Install K- and C-Band Radar

INTERRUPTIBLE Yes DURATION (HR) 4 (ON TIME CYCLE)

CYCLE PERIOD (HR) 4 NO. OF CYCLES 18

PREDECESSOR TASK NO. 201, 202, 227, 228, 634

SUCCESSOR TASK NO. AND INITIAL LAG TIME 226, 0 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	60	4	0
1	66	4	0
1	67	4	0

ELECTRICAL POWER 0 W 0 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 150 LB SHIPPING VOLUME 3 FT^3

EQUIPMENT REQUIRED

ID	NAME
13	Radar
-	Installation Kit

NO. 226 TITLE System Integration Test — K- and C-Band Radar

INTERRUPTIBLE Yes DURATION (HR) 4 (ON TIME CYCLE)

CYCLE PERIOD (HR) 4 NO. OF CYCLES 10

PREDECESSOR TASK NO. 1226

SUCCESSOR TASK NO. AND INITIAL LAG TIME 252, 0 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	60	4	0
1	66	4	0
1	67	4	0

ELECTRICAL POWER 500 W 4 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3 (See 1226)

EQUIPMENT REQUIRED

ID	NAME
13	Radar

TASK NO. 227 TITLE Radar Lock-On Procedure for Acquisition of Test Targets

LEVEL Development Tests

DESCRIPTION

This task is to be performed on the display and control equipment associated with K- and C-band radars. The task requires that the equipment operator conduct tests to determine accuracy and effectiveness of procedures for acquiring and tracking targets.

A target generator will be used to evaluate lock-on and target acquisition procedures. The operators will follow pre-established procedure to acquire and track the targets for specified time periods. Data for determining time to acquire, accuracy of tracking, and target handling capacity will be recorded.

JUSTIFICATION

Since several applications require that the distance from the laboratory to the Earth's surface be measured accurately, radar has been specified for making such measurements. Because tracking and target acquisition will be performed by the operator in the laboratory, it is essential that the effectiveness of procedures for locking on to test targets be evaluated.

TASK PARAMETERS

NO. 227 TITLE Radar Lock-On Procedure

INTERRUPTIBLE Yes DURATION (HR) 2 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 2 NO. OF CYCLES 1

PREDECESSOR TASK NO. 201, 202

SUCCESSOR TASK NO. AND INITIAL LAG TIME 1226, 0.5 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	62	2	0

ELECTRICAL POWER 500 W 1 HR/CYCLE

1 HR FROM START OF CYCLE

SHIPPING WEIGHT 150 LB SHIPPING VOLUME 3 FT^3

EQUIPMENT REQUIRED

ID	NAME
-	Special Test Equipment
-	Display and Control Equipment Components

TASK NO. 228 TITLE Radar Control System Tracking Capability

LEVEL Development Tests

DESCRIPTION

This task is to be performed on the control system associated with radar tracking. System lags and time constants involved in both equipment and operator performance will be evaluated.

The task requires that the equipment operator conduct experiments to determine the performance of the radar control and acquisition equipments. The radar control systems will be operated in the MORL by a trained radar operator, who will perform a series of tests, using simulated targets, to evaluate the adequacy and/or limitations of the radar control system. These tests will require the monitoring, under controlled conditions, of measurements of speed to acquire, information content at the display, lock-on indication and accuracy, and reacquisition time.

JUSTIFICATION

Several applications require accurate measurements of the distance from the laboratory to the ocean surface, and radar has been specified for this purpose. Thus, the evaluation of tracking accuracy and performance limitations of the control and tracking subsystems is an implied task; and, because tracking and target acquisition will probably be performed by the operator in the laboratory, evaluation of the effectiveness of procedures for locking-on to test targets is essential.

TASK PARAMETERS

NO. 228 TITLE Radar Control System Tracking Capability

INTERRUPTIBLE Yes DURATION (HR) 4 (ON TIME CYCLE)

CYCLE PERIOD (HR) 4 NO. OF CYCLES 5

PREDECESSOR TASK NO. 201, 202

SUCCESSOR TASK NO. AND INITIAL LAG TIME 1226, 0.5 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	67	4	0
1	71	4	0

ELECTRICAL POWER 20 W 3 HR/CYCLE

1 HR FROM START OF CYCLE

SHIPPING WEIGHT 15 LB SHIPPING VOLUME 0.5 FT^3

EQUIPMENT REQUIRED

ID	NAME
-	Radar Control System Components
-	Special Test Equipment

TASK NO. 229 TITLE Lock-On Procedure for Acquisition of Test Targets by an Optical Driftmeter

LEVEL Development Tests

DESCRIPTION

This task is to be performed on the display and control equipment associated with the optical driftmeter; it requires that the equipment operator conduct tests to determine the accuracy and effectiveness of procedures for acquiring and tracking targets.

The optical driftmeter control system will be operated in the MORL by a trained operator, who will perform a series of tests, using simulated targets, to evaluate the adequacy or limitations of the optical driftmeter control system. These tests will require the monitoring, under controlled conditions, of measurements of speed to acquire, information content at the display, lock-on indication and accuracy, and reacquisition time.

JUSTIFICATION

Tsunami warning information might be derived from accurate measurement of distance from the laboratory to the ocean surface, and an optical driftmeter has been specified for making such measurements. Since tracking and target acquisition will probably be performed by an operator in the laboratory, it is essential that the effectiveness of procedures for lock-on to test targets be evaluated.

TASK PARAMETERS

NO. 229 TITLE Lock-On Procedure--Optical Driftmeter

INTERRUPTIBLE Yes DURATION (HR) 4 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 4 NO. OF CYCLES 5

PREDECESSOR TASK NO. None

SUCCESSOR TASK NO. AND INITIAL LAG TIME 1230, 0.5 hr

NO. OF MEN	SKILL ID	HR CYCLE	HR FROM START OF CYCLE
1	60	4	0
1	66	4	0

ELECTRICAL POWER 20 W 3 HR/CYCLE

1 HR FROM START OF CYCLE

SHIPPING WEIGHT 15 LB SHIPPING VOLUME 0.33 FT^3

EQUIPMENT REQUIRED

ID	NAME
-	Optical Driftmeter Display and Control Equipment

TASK NO. 230 TITLE System Integration Tests of Optical Driftmeter

LEVEL System Integration Tests

DESCRIPTION

This task will consist of the subtasks listed below and will be performed on the optical driftmeter. The subsystems will be combined to form the final system and conduct tests against known targets. The subtasks are as follows:

1. Integrate signal processor with data storage system.
2. Evaluate airlock and equipment handling methods.
3. Evaluate repair and maintenance techniques (external).
4. Evaluate emergency procedure resulting from overload protection failure.

JUSTIFICATION

Since Tsunami warning information can be derived from accurate measurement of distance from the laboratory to the ocean surface, an optical driftmeter (or V/H meter) has been specified as a possible means of making such measurements. The performance of the optical driftmeter when receiving the passive radiation from the ocean's surface is therefore an implied task.

This specific task evaluates the integration of the optical driftmeter with the orbital laboratory and cooperative instruments. The task must be completed before actual use of the instrument.

TASK PARAMETERS

NO. 1230 TITLE Install Optical Driftmeter

INTERRUPTIBLE Yes DURATION (HR) 4 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 4 NO. OF CYCLES 2

PREDECESSOR TASK NO. 71, 72, 229, 231

SUCCESSOR TASK NO. AND INITIAL LAG TIME 230, 0 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	66	4	0
1	72	4	0

ELECTRICAL POWER 0 W 0 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 150 LB SHIPPING VOLUME 3 FT^3

EQUIPMENT REQUIRED

ID	NAME
-	Optical Driftmeter
-	Installation Kit

NO. 230 TITLE System Integration Test--Optical Driftmeter

INTERRUPTIBLE Yes DURATION (HR) 4 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 4 NO. OF CYCLES 4

PREDECESSOR TASK NO. 1230

SUCCESSOR TASK NO. AND INITIAL LAG TIME 253, 1 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	60	4	0
1	66	4	0
1	67	4	0

ELECTRICAL POWER 500 W 4 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3 (See 1230)

EQUIPMENT REQUIRED

ID	NAME
-	Optical Driftmeter

TASK NO. 231 TITLE Tracking Capability of Control System for Optical Driftmeter

LEVEL Development Tests

DESCRIPTION

This task is to be performed on the control system associated with optical tracking and the evaluation of system lags and time constants involved in both equipment and operator performance. The task requires that the equipment operator conduct experiments to determine tracking accuracy and evaluate tracking procedures. The radar control system will be operated in the MORL by a trained radar operator, who will perform a series of tests, using simulated targets, to evaluate the adequacy and/or limitations of the driftmeter control system. These tests will require that measurements of speed to acquire, information content at the display, lock-on indication and accuracy, and reacquisition time be monitored under controlled conditions.

JUSTIFICATION

Since Tsunami warning information can be derived from accurate measurement of distance from the laboratory to the ocean surface, a driftmeter has been specified for making such measurements. Thus, evaluation of tracking accuracy and performance limitations of the tracking and control subsystems is an implied task. Also, since tracking and target acquisition will probably be performed by the operator in the laboratory, it is essential that the effectiveness of procedures for locking-on to test targets be evaluated.

TASK PARAMETERS

NO. 231 TITLE Tracking Capability--V/h Meter Control System

INTERRUPTIBLE Yes DURATION (HR) 4 (ON TIME CYCLE)

CYCLE PERIOD (HR) 4 NO. OF CYCLES 5

PREDECESSOR TASK NO. None

SUCCESSOR TASK NO. AND INITIAL LAG TIME 1230, 0 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	66	4	0
1	71	4	0

ELECTRICAL POWER 20 W 3 HR/CYCLE

1 HR FROM START OF CYCLE

SHIPPING WEIGHT 15 LB SHIPPING VOLUME 0.5 FT^3

EQUIPMENT REQUIRED

ID	NAME
-	Control System Components
-	Target Simulator
-	Special Test Equipment

TASK NO. 232 TITLE System Integration Tests of Radar Profilometer

LEVEL System Integration Tests

DESCRIPTION

This task will be performed on the K-Band Profilometer. The integrated system will be evaluated against known targets. This task consists of the following subtasks:

1. Determine radio interference control needs.
2. Determine compatibility of antenna mount with attitude control system. Measure short-time and long-time effects.
3. Integrate signal processor with data storage system.
4. Establish and evaluate airlock and equipment handling methods.
5. Evaluate repair and maintenance techniques (external).
6. Evaluate emergency procedure resulting from overload protection failure.

JUSTIFICATION

Since information about beaches and harbors can be derived from ocean profile measurements, a radar profilometer has been specified as a possible means of making such measurements.

The radar profilometer will be integrated into the orbiting laboratory and cooperative instrument systems. This task will be accomplished prior to making system evaluation measurements.

TASK PARAMETERS

NO. 1232 TITLE Install Radar Profilometer

INTERRUPTIBLE Yes DURATION (HR) 4 (ON TIME / CYCLE)

CYCLE PERIOD (HR) 4 NO. OF CYCLES 18

PREDECESSOR TASK NO. 201, 202, 233

SUCCESSOR TASK NO. AND INITIAL LAG TIME 232, 0 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	60	4	0
1	67	4	0
1	72	4	0

ELECTRICAL POWER 0 W 0 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 150 LB SHIPPING VOLUME 3 FT^3

EQUIPMENT REQUIRED

ID	NAME
-	Radar Profilometer
-	Installation Kit

NO. 232 TITLE System Integration Test--Radar Profilometer

INTERRUPTIBLE Yes DURATION (HR) 4 (ON TIME CYCLE)

CYCLE PERIOD (HR) 4 NO. OF CYCLES 6

PREDECESSOR TASK NO. 1232

SUCCESSOR TASK NO. AND INITIAL LAG TIME 254, 0.5 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	60	4	0
1	66	4	0
1	67	4	0

ELECTRICAL POWER 500 W 4 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3 (See 1232)

EQUIPMENT REQUIRED

ID	NAME
-	Radar Profilometer

TASK NO. 233 TITLE Lock-On Procedures and Target Acquisition Methods--Radar Profilometer Controls and Displays Subsystem

LEVEL Development Tests

DESCRIPTION

This task will be performed on the controls and displays subsystem of the K-band radar profilometer. The task requires that the equipment operator conduct experiments to determine the performance of the profilometer control and acquisition equipments. The system will be operated in the MORL by a trained operator who will perform a series of tests, using simulated targets, to evaluate the adequacy and/or limitations of the profilometer control system. These tests will require the monitoring, under controlled conditions, of measurements of speed to acquire, information content at the display, lock-on indication and accuracy, and reacquisition time.

JUSTIFICATION

The need for relative range measurements of the sea surface/land surface interface variation requires a range measuring device. A K-band profilometer can be used to make these measurements. Development of methods of acquiring targets and of aligning the control and display system with respect to the laboratory coordinate reference is an implied task. Orientation of the control system and monitoring display will be required to establish target acquisition, target lock, and area scan.

TASK PARAMETERS

NO. 233 TITLE Lock-On Procedures--V/h Controls and Display Subsystem

INTERRUPTIBLE Yes DURATION (HR) 4 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 4 NO. OF CYCLES 5

PREDECESSOR TASK NO. None

SUCCESSOR TASK NO. AND INITIAL LAG TIME 1232, 0 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	67	4	0
1	71	4	0

ELECTRICAL POWER 20 W 3 HR/CYCLE

1 HR FROM START OF CYCLE

SHIPPING WEIGHT 15 LB SHIPPING VOLUME 0.5 FT^3

EQUIPMENT REQUIRED

ID	NAME
-	V/h Meter Controls and Displays Components
-	Target Simulator
-	Special Test Equipment

TASK NO. 234 TITLE System Integration Tests of Camera System

LEVEL Systems Integration Tests

DESCRIPTION

This task will be performed on a variable focal length, high-speed, large format camera. It consists of the following subtasks:

1. Mount compatibility with optics and interchangeability evaluation.
2. Use of dark room and film handling procedures.
3. Data storage and retrieval techniques.
4. Comparison of photographic data with known target characteristics.

A system integration test requires that the entire camera system be operated with all combinations of optics, film, and film processing. Tests will be conducted using pre-established procedures and will employ known targets.

JUSTIFICATION

Photography will be used to obtain information relating to sea state, shallow water characteristics of the ocean bottom, and certain phenomena associated with the shoreline interface.

Camera systems, including automatic tracking equipment, must be integrated with the orbiting laboratory and cooperative instruments prior to evaluation tests.

TASK PARAMETERS

NO. 1234 TITLE Install Camera System

INTERRUPTIBLE Yes DURATION (HR) 4 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 4 NO. OF CYCLES 4

PREDECESSOR TASK NO. 16, 72, 235

SUCCESSOR TASK NO. AND INITIAL LAG TIME 234, 0 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	60	4	0
1	72	4	0

ELECTRICAL POWER 0 W 0 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 20 LB SHIPPING VOLUME 0.5 FT^3

EQUIPMENT REQUIRED

ID	NAME
-	Camera Installation Kit
19	Camera

NO. 234 TITLE System Integration Test--Camera Systems

INTERRUPTIBLE Yes DURATION (HR) 2 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 2 NO. OF CYCLES 5

PREDECESSOR TASK NO. 1234

SUCCESSOR TASK NO. AND INITIAL LAG TIME 255, 0.25 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	60	2	0

ELECTRICAL POWER 10 W 2 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 (See 1234) FT^3

EQUIPMENT REQUIRED

ID	NAME
12	Camera

TASK NO. 235 TITLE Dynamic Interaction of Camera Mount with MORL--Effect on Image Motion Compensation

LEVEL Development Test

DESCRIPTION

This task is to be performed on the telescope mount of the variable focal length camera. Dynamic interaction measurements will be made to determine errors and the need for image motion compensation. The camera will be used to photograph surface targets of known characteristics. The photographs will be compared to photographs taken at much slower speed and with a camera of equivalent focal length and resolution. The comparison will establish the need for image motion compensation for shutter speed changes.

JUSTIFICATION

Photography will be used to obtain information relating to sea state, shallow water characteristics of the ocean bottom, and certain phenomena associated with the shoreline interface. Therefore, evaluation of the need for image motion compensation and of accuracy limits is an implied task.

Development tests may be required for an optical telescope mount and for image motion compensation methods. Operation of a fast shutter over extended periods may require special techniques for image motion compensation in an orbital environment.

TASK PARAMETERS

NO. 1235 TITLE Install Camera Mount

INTERRUPTIBLE Yes DURATION (HR) 4 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 4 NO. OF CYCLES 2

PREDECESSOR TASK NO. None

SUCCESSOR TASK NO. AND INITIAL LAG TIME 235, 0 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	60	4	0
1	72	4	0

ELECTRICAL POWER 0 W 0 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 20 LB SHIPPING VOLUME 0.5 FT^3

EQUIPMENT REQUIRED

ID	NAME
19	Camera
-	Camera Mount
-	Installation Kit

NO. 235 TITLE Dynamic Interaction--Camera/MORL

INTERRUPTIBLE Yes DURATION (HR) 1 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 2 NO. OF CYCLES 4

PREDECESSOR TASK NO. 1235

SUCCESSOR TASK NO. AND INITIAL LAG TIME 1234, 0.5 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	60	1	0

ELECTRICAL POWER 10 W 0.5 HR/CYCLE

0.5 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3 (See 1235)

EQUIPMENT REQUIRED

ID	NAME
19	Camera

TASK NO. 236 TITLE System Integration Test-- Microwave Radiometer

LEVEL System Integration Tests

DESCRIPTION

The radiometer will be assembled as a system and operated to establish its ability to measure sea surface temperature with instrumented surface targets. Measurements of sea surface temperature will be compared to known values to establish correction tables under varying atmospheric conditions of fog. Tests will be conducted to determine accuracy, range, resolution, and to resolve effects of clouds and fog on microwave and infrared measurements.

Subtasks are the following:

1. Establish compatibility of optics filter and mount.
2. Determine electromechanical interference.
3. Establish compatibility with attitude control system.
4. Evaluate calibration methods.

JUSTIFICATION

Since the passive microwave radiation from the ocean's surface is potentially useful in collecting data for several oceanographic applications, a task has been specified for monitoring this radiation.

The 12-17 KMC radiometer promises better capability to penetrate fog for detecting temperature contrast at the ocean surface. This radiometer must be integrated with laboratory systems and cooperating instruments before it is used.

TASK PARAMETERS

NO. 1236 TITLE Install Microwave Radiometer

INTERRUPTIBLE Yes DURATION (HR) 4 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 4 NO. OF CYCLES 8

PREDECESSOR TASK NO. 18, 201, 237, 601, 604, 608, 623

SUCCESSOR TASK NO. AND INITIAL LAG TIME 236, 0 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	60	4	0
1	66	4	0
1	67	4	0

ELECTRICAL POWER 0 W 0 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 20 LB SHIPPING VOLUME 0.5 FT^3

EQUIPMENT REQUIRED

ID	NAME
12	Microwave Radiometer
-	Installation Kit

NO. 236 TITLE System Integration Test--Microwave Radiometer

INTERRUPTIBLE Yes DURATION (HR) 4 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 4 NO. OF CYCLES 20

PREDECESSOR TASK NO. 1236

SUCCESSOR TASK NO. AND INITIAL LAG TIME 256, 0.5 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	60	4	0
1	66	4	0
1	67	4	0

ELECTRICAL POWER 20 W 4 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3

(See 1236)

EQUIPMENT REQUIRED

ID	NAME
12	Microwave Radiometer

TASK NO. 237 TITLE Absolute Accuracy Test of Black-Body Calibration Reference for Microwave Radiometer

LEVEL Development Tests

DESCRIPTION

A microwave radiometer requires that a calibrating device be part of the equipment. The stability and associated variation will be measured in the MORL environment. This task is performed on the black-body calibration reference for the K-band radiometer. The calibration device will be installed and operated as part of the system. Measurements will be recorded while radiation from a known source is monitored, and accuracy subsequently will be determined.

JUSTIFICATION

Since the passive microwave radiation from the ocean's surface is useful for collecting data for weather forecasting applications, a task has been specified for monitoring this radiation. The development and testing for a calibration device reference is an implied task.

A calibration and reference device will be required for operation with the radiometer. Its accuracy, stability, and general characteristics will be tested in the MORL orbital environment.

TASK PARAMETERS

NO. 237 TITLE Absolute Accuracy Test--Microwave Radiometer Black-Body Calibration Reference

INTERRUPTIBLE Yes DURATION (HR) 0.5 (ON TIME CYCLE)

CYCLE PERIOD (HR) 0.5 NO. OF CYCLES 1

PREDECESSOR TASK NO. 1, 3, 21

SUCCESSOR TASK NO. AND INITIAL LAG TIME 1236, 0 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	61	0.5	0

ELECTRICAL POWER 20 W 0.5 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 30 LB SHIPPING VOLUME 0.5 FT^3

EQUIPMENT REQUIRED

ID	NAME
12	Microwave Radiometer
-	Calibration Device
-	Special Test Equipment

TASK NO. 239 TITLE System Integration Tests--Infrared Radiometers

LEVEL System Integration Tests

DESCRIPTION

The IR radiometer system will be installed and operated in accordance with a pre-established procedure for performance of all subtasks. Data will be recorded and will be compared with known surface measurements to evaluate system performance. Final system tests will be conducted for accuracy, range, and resolution.

Subtasks are as follows:

1. Determine compatibility of optics, filter, and mount.
2. Evaluate electromechanical interference.
3. Establish compatibility with attitude control system.
4. Perform integrated tests with multiple instruments on common mount.
5. Evaluate calibration methods and accuracy of measurements.

JUSTIFICATION

Several oceanographic applications can be supported from accurate measurements of ocean surface temperatures; an IR radiometer has been specified as a means of making such measurements.

Prior to use of an IR radiometer for orbital measurements, the instrument must be integrated with laboratory and cooperating instrument systems.

TASK PARAMETERS

NO. 1239 TITLE Install Infrared Radiometer

INTERRUPTIBLE Yes DURATION (HR) 4 (ON TIME / CYCLE)

CYCLE PERIOD (HR) 4 NO. OF CYCLES 8

PREDECESSOR TASK NO. 23, 25, 72, 601, 604, 608

SUCCESSOR TASK NO. AND INITIAL LAG TIME 239, 0 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	60	4	0
1	66	4	0
1	67	4	0

ELECTRICAL POWER 0 W 0 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 20 LB SHIPPING VOLUME 0.5 FT^3

EQUIPMENT REQUIRED

ID	NAME
11	IR Radiometer
-	Installation Kit

NO. 239 TITLE System Integration Test--Infrared Radiometers

INTERRUPTIBLE Yes DURATION (HR) 4 (ON TIME CYCLE)

CYCLE PERIOD (HR) 8 NO. OF CYCLES 5

PREDECESSOR TASK NO. 1239

SUCCESSOR TASK NO. AND INITIAL LAG TIME 257, 0.5 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	60	4	0
1	66	4	0
1	67	4	0

ELECTRICAL POWER 20 W 4 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3 (See 1239)

EQUIPMENT REQUIRED

ID	NAME
11	IR Radiometer
-	Special Test Kit

TASK NO. 242 TITLE System Integration Test of Polarimeter and Transponder Satellite as a System

LEVEL System Integration Tests

DESCRIPTION

The polarimeter system will be installed and operated in accordance with all pre-established procedures for performance of subtasks. Data will be recorded which will be compared with known measurements to evaluate system performance.

Subtasks are the following:

1. Remote satellite launch electromechanical interface.
2. Effects on MORL attitude control system.
3. Retrieval system.
4. Evaluate remote satellite attitude control.
5. Test radar against surface transponder.
6. Test system over water of known salinity.
7. Test with surface radar.

JUSTIFICATION

Since several oceanographic applications require that measurements of salinity of the ocean surface be made, a polarimeter may be conveniently used to make such measurements. The polarimeter measures the shift in polarization of a transmitted S-band signal. This shift is related to surface conductivity and, therefore, salinity.

The polarimeter and transponder satellite system must be integrated with the laboratory and cooperating instrumentation prior to measurement performance tests.

TASK PARAMETERS

NO. 242 TITLE Test of Polarimeter and Transponder Satellite as a System

INTERRUPTIBLE Yes DURATION (HR) 2 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 3 NO. OF CYCLES 5

PREDECESSOR TASK NO. 201, 40, 243, 244,

SUCCESSOR TASK NO. AND INITIAL LAG TIME 259, 0.5 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	60	2	0
1	66	2	0
1	67	2	0

ELECTRICAL POWER 100 W 2 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 250 LB SHIPPING VOLUME 4 FT^3

EQUIPMENT REQUIRED

ID	NAME
18	S-Band Polarimeter

TASK NO. 243 TITLE Alignment and Lock-On Procedures--S-Band Polarimeter Satellite Control and Display Subsystem

LEVEL Development Tests

DESCRIPTION

This task is performed on the controls and displays associated with the S-band polarimeter transponder satellite. It requires that the equipment operator conduct experiments to determine the performance of the polarimeter control and acquisition equipment.

The system will be operated in the MORL by a trained operator, who will perform a series of tests, using simulated targets, to evaluate the adequacy and/or limitations of the polarimeter control system. These tests will require the monitoring, under controlled conditions, of measurements of speed to acquire, information content at the display, lock-on indication and accuracy, and reacquisition time.

JUSTIFICATION

Since ocean surface salinity is a useful parameter in oceanographic applications, a requirement has been identified for monitoring surface salinity by examining the rotation in the plane of polarization of an S-band signal reflected from the ocean surface. Thus, the evaluation and testing of methods of aligning the system and acquiring the transponder signal is an implied task.

TASK PARAMETERS

NO. 1243 TITLE Assemble Polarimeter Satellite Control and Display Subsystem

INTERRUPTIBLE Yes DURATION (HR) 4 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 4 NO. OF CYCLES 8

PREDECESSOR TASK NO. None

SUCCESSOR TASK NO. AND INITIAL LAG TIME 243, 0 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	60	4	0
1	66	4	0
1	67	4	0

ELECTRICAL POWER 0 W 0 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 15 LB SHIPPING VOLUME 0.5 FT^3

EQUIPMENT REQUIRED

ID	NAME
18	S-Band Polarimeter
-	Special Test Equipment

NO. 243 TITLE Alignment and Lock-On Procedure--S-Band Polarimeter Satellite Control and Display Subsystem

INTERRUPTIBLE Yes DURATION (HR) 4 (ON TIME CYCLE)

CYCLE PERIOD (HR) 4 NO. OF CYCLES 5

PREDECESSOR TASK NO. 1243

SUCCESSOR TASK NO. AND INITIAL LAG TIME 242, 0 hr

NO. OF MEN	SKILL ID	HR CYCLE	HR FROM START OF CYCLE
1	61	4	0
1	62	4	0

ELECTRICAL POWER 20 W 3 HR/CYCLE

1 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3 (See 1234 and 140)

EQUIPMENT REQUIRED

ID	NAME
18	S-Band Polarimeter
-	Target Simulator
-	Special Test Equipment

TASK NO. 244 TITLE Methods of Automatic and Manual Tracking -- Polarimeter Transponder Satellite Antenna

LEVEL Development Tests

DESCRIPTION

This task will be performed on the transponder antenna of the S-band polarimeter system. The task requires that the equipment operator conduct experiments to determine tracking accuracy and to evaluate tracking procedures. The polarimeter system will be operated on board MORL by a trained operator, who will perform a series of tests, using simulated targets, to evaluate the adequacy and/or limitations of the polarimeter system. These tests will require the monitoring, under controlled conditions, of measurements of speed to acquire, information content at the display, lock-on indication and accuracy, and reacquisition time.

JUSTIFICATION

Since ocean surface salinity is a useful parameter in oceanographic applications, a requirement has been identified for monitoring surface salinity by examining the rotation in the plane of polarization of an S-band signal reflected from the ocean surface. Thus, the evaluation and development of methods for tracking the transponder signal is an implied task.

TASK PARAMETERS

NO. 244 TITLE Methods of Tracking -- Polarimeter Transponder Satellite Antenna

INTERRUPTIBLE Yes DURATION (HR) 4 (ON TIME CYCLE)

CYCLE PERIOD (HR) 4 NO. OF CYCLES 5

PREDECESSOR TASK NO. 40

SUCCESSOR TASK NO. AND INITIAL LAG TIME 242, 0.5 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	61	4	0
1	62	4	0

ELECTRICAL POWER 20 W 3 HR/CYCLE

1 HR FROM START OF CYCLE

SHIPPING WEIGHT 15 LB SHIPPING VOLUME 0.5 FT^3

(See 140)

EQUIPMENT REQUIRED

ID	NAME
18	S-Band Polarimeter
-	Target Simulator
-	Special Test Equipment

TASK NO. 246 TITLE System Integration Tests of Monostatic and Bistatic Laser

LEVEL System Integration Test

DESCRIPTION

This task will be performed on the monostatic and bistatic laser and will include the following subtasks:

1. Remote satellite launch electromechanical interface.
2. Effects on MORL attitude control system.
3. Retrieval system.
4. Remote satellite attitude control evaluation.
5. Integrate laser transmitter and receiver into laboratory cooperative instrument system.

JUSTIFICATION

Since sea state is a parameter of interest in oceanographic applications, a requirement has been identified for measuring relative range to the ocean surface from the laboratory in order to derive ocean dynamics. A bistatic or monostatic laser radar may be a possible means of making these measurements. This task will evaluate the integration of the laser satellite receiver system with the laboratory and cooperative instruments.

TASK PARAMETERS

NO. 246 TITLE System Integration Test -- Monostatic and Bistatic Laser

INTERRUPTIBLE Yes DURATION (HR) 4 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 4 NO. OF CYCLES 5

PREDECESSOR TASK NO. 38, 40, 36, 247, 248, 616, 617

SUCCESSOR TASK NO. AND INITIAL LAG TIME 260, 0.5 hr

NO. OF MEN	SKILL ID	HR CYCLE	HR FROM START OF CYCLE
1	60	4	0
1	66	4	0
1	67	4	0

ELECTRICAL POWER 500 W 4 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3

(See 1247)

EQUIPMENT REQUIRED

ID	NAME
14	Lidar

TASK NO. 247 TITLE Alignment and Lock-On Procedures -- Bistatic Laser Remote Satellite Displays and Control Subsystem

LEVEL Development Tests

DESCRIPTION

This task is performed on the displays and control subsystem for the bistatic laser. It requires that the equipment operator conduct tests to determine the accuracy and effectiveness of procedures for acquiring and tracking targets. A target generator will be used to evaluate lock-on and target acquisition procedures for the radar. Successive target data will be presented to the operator, who will follow pre-established procedures to acquire and track the targets for specified time periods. Data for determining time to acquire, accuracy of tracking, and target handling capacity will be recorded.

JUSTIFICATION

Since sea state is a parameter of interest in oceanographic applications, a requirement has been identified for measuring relative range to the ocean surface from the laboratory in order to evaluate ocean dynamics. Consequently, a task has been specified for evaluating the alignment and target acquisition subsystem of the bistatic laser radar to establish the operational procedures and design performance.

TASK PARAMETERS

NO. 1247 TITLE Assemble Bistatic Laser Satellite

INTERRUPTIBLE Yes DURATION (HR) 4 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 4 NO. OF CYCLES 6

PREDECESSOR TASK NO. None

SUCCESSOR TASK NO. AND INITIAL LAG TIME 247, 0 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	60	4	0
1	66	4	0
1	67	4	0

ELECTRICAL POWER 0 W 0 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 150 LB SHIPPING VOLUME 3 FT^3

EQUIPMENT REQUIRED

ID	NAME
14	Lidar
-	Laser Satellite Assembly Kit

TASK PARAMETERS

NO. 247 TITLE Alignment and Lock-On Procedures -- Bistatic Laser Remote Satellite Displays and Controls Subsystem

INTERRUPTIBLE Yes DURATION (HR) 1 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 1 NO. OF CYCLES 3

PREDECESSOR TASK NO. 1247

SUCCESSOR TASK NO. AND INITIAL LAG TIME 246, 0.5 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	61	1	0

ELECTRICAL POWER 500 W 1 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3 (See 1247)

EQUIPMENT REQUIRED

ID	NAME
14	Lidar
-	Target Simulator
-	Special Test Equipment

TASK NO. 248 TITLE Manual and Automatic Tracking -- Bistatic-Laser, Remote Satellite Receiver Antenna

LEVEL Development Test

DESCRIPTION

This task is proposed for remote satellite antenna for the bistatic laser. The remote satellite will be mounted and operated outside the orbiting laboratory. An instrumentation system will be used to monitor data from antenna angle measuring devices on the satellite. Antenna tracking capability will be evaluated with the aid of a signal simulator.

JUSTIFICATION

Sea state is a parameter useful to many oceanographic applications. A bistatic laser ranging system has been proposed as a system potentially useful in measuring this parameter; if this system is to be used, the tracking capability of the remote satellite antenna must be evaluated in the operational environment.

TASK PARAMETERS

NO. 248 TITLE Tracking -- Bistatic Laser Remote Satellite Receiver Antenna

INTERRUPTIBLE Yes DURATION (HR) 2 (ON TIME CYCLE)

CYCLE PERIOD (HR) 3 NO. OF CYCLES 3

PREDECESSOR TASK NO. None

SUCCESSOR TASK NO. AND INITIAL LAG TIME 246, 0.5 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	61	2	0
1	62	2	0

ELECTRICAL POWER 20 W 1 HR/CYCLE

1 HR FROM START OF CYCLE

SHIPPING WEIGHT 25 LB SHIPPING VOLUME 0.5 FT^3

(See 1247)

EQUIPMENT REQUIRED

ID	NAME
14	Lidar
-	Signal Simulator
-	Special Test Equipment

TASK NO. 252 TITLE Design Evaluation and Approval Tests of Final Radar Equipment

LEVEL Design, Evaluation, and Approval Tests

DESCRIPTION

The system will be installed, checked out, and operated. Its performance will be measured by monitoring the signals received from fully instrumented, preprogrammed, surface-based targets. The data received by the MORL system and performance parameters, will be recorded. Data will be compared with those from the transponder program.

This task is to evaluate the capability of the system in achieving the objective measurements with specified resolution, accuracy, and appropriate coverage or range. Where different methods are to be compared, additional data will be recorded to allow a tradeoff analysis to be accomplished.

Subtasks are the following:

1. Test and calibration against known targets, using ground-based targets at known locations and of known characteristics.
2. Evaluation of accuracy of measurements.
3. Evaluation of resolution of data.
4. Determination of range of parameter coverage.
5. Determination of stability of operation.
6. Final test against instrumented sea surface.

JUSTIFICATION

Several applications require that the distance from the laboratory to the Earth's surface be measured. Radar provides a convenient means of making such measurements.

This task will be required to evaluate the ability of the complete instrument/laboratory system to make satisfactory measurements. System performance will be matched against design requirements. Satisfactory completion of these tests will constitute design approval and formal acceptance of the instrument for subsequent prototype operational use.

TASK PARAMETERS

NO. 252 TITLE Design Evaluation of Final Radar Equipment

INTERRUPTIBLE Yes DURATION (HR) 0.5 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 1.5 NO. OF CYCLES 20

PREDECESSOR TASK NO. 226

SUCCESSOR TASK NO. AND INITIAL LAG TIME 261, 0 hr; 262, 500 hr; 263, 500 hr; 264, 500 hr; 265, 500 hr; 266, 500 hr; 267, 500 hr; 268, 500 hr; 802, 816, 819, 828, 833 all at 0 hr

NO. OF MEN	SKILL ID	HR CYCLE	HR FROM START OF CYCLE
1	62	0.5	0.25
1	71	0.5	0.25

ELECTRICAL POWER 1,030 W 0.5 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3

EQUIPMENT REQUIRED

ID	NAME
13	Radar

TASK NO. 253 TITLE Design Evaluation and Approval Test of Optical Driftmeter

LEVEL Design Evaluation and Approval Test

DESCRIPTION

This task will be performed on the finally configured optical driftmeter system and will include as a subtask testing against known targets (daylight only) and sea surface using instrumented reflecting surface points.

The system will be installed, checked out, and operated. Its performance will be measured by monitoring the signals received from fully instrumented, surface-based targets operating in a preprogrammed fashion. The data received by the MORL system and the performance parameters will be recorded. Data comparisons with the transponder program will furnish a method of comparing results.

The task is to evaluate the capability of the system in achieving the objective measurements with specified resolution, accuracy, and appropriate coverage or range. The elements of this task will include all subtasks associated with obtaining these data. Where different methods are to be compared, additional data will be recorded to allow a tradeoff analysis to be accomplished.

JUSTIFICATION

Since Tsunami warning information can be derived from accurate measurement of distance from the laboratory to the ocean surface, an optical driftmeter has been specified as a possible means of making such measurements.

This task will be required to evaluate the capability of the complete instrument/laboratory system to obtain satisfactory measurements. Satisfactory completion of these tests will constitute design approval and formal acceptance of the optical driftmeter for subsequent prototype operational use.

TASK PARAMETERS

NO. 253 TITLE Design Evaluation and Approval Test--Optical Driftmeter

INTERRUPTIBLE Yes DURATION (HR) 1 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 1.5 NO. OF CYCLES 10

PREDECESSOR TASK NO. 230

SUCCESSOR TASK NO. AND INITIAL LAG TIME 261, 30 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	61	1	0
1	71	1	0

ELECTRICAL POWER 500 W 1 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3

EQUIPMENT REQUIRED

ID	NAME
-	Optical Driftmeter

TASK NO. 254 TITLE Design Evaluation and Approval Test of K-Band Profilometer

LEVEL Design Evaluation and Approval Test

DESCRIPTION

This task will be performed on the K-band profilometer system and will consist of the following subtasks:

1. Test and calibration against known targets.
2. Evaluation of performance against land-sea interface of known profile and contour.

The system will be installed, checked out, and operated. Its performance will be measured by monitoring the signals received from fully instrumented surface based targets which operate in a preprogrammed fashion. The data received by the MORL system and the performance parameters will be recorded. Data comparison with the transponder program will furnish a method of comparing results.

The task is to evaluate the capability of the system in achieving the objective measurements with specified resolution, accuracy, and appropriate coverage or range. The elements of this task will include all subtasks associated with obtaining these data. Where different methods are to be compared, additional data will be recorded to allow a tradeoff analysis to be accomplished.

JUSTIFICATION

Beaches and harbor information can be derived from ocean profile measurements, and a radar profilometer has been specified as a possible means of making such measurements.

The task will be required to determine whether the complete instrument/laboratory system can make acceptable measurements. System performance will be matched against design requirements. Satisfactory completion of this task will constitute both design approval and formal acceptance for subsequent prototype operations.

TASK PARAMETERS

NO. 254 TITLE Design Evaluation and Approval Test – K-Band Profilometer

INTERRUPTIBLE Yes DURATION (HR) 1 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 1.5 NO. OF CYCLES 10

PREDECESSOR TASK NO. 232

SUCCESSOR TASK NO. AND INITIAL LAG TIME 279, 720 hr; 280, 24 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	62	1	0
1	71	1	0

ELECTRICAL POWER 500 W 1 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3

EQUIPMENT REQUIRED

ID	NAME
-	Radar Profilometer

TASK NO. 255 TITLE Design Evaluation and Approval Tests — Variable Focal Length, High-Speed, Large Format Camera

LEVEL Design Evaluation and Approval Test

DESCRIPTION

This task will be performed on the camera system and will consist of the following subtasks:

1. Test and calibration against known targets.
2. Test and comparison against simultaneous aircraft photography.

The camera system will be assembled in its final configuration and system evaluation tests will be performed. Its performance will be determined by measuring (photographing) surface areas of known characteristics and at known locations. The photographs will be developed and photogrammetric and/or sensitometric analysis made to obtain the required data. Comparison of the data with known parameter values will yield system performance data in terms of the resolution of the measurements, accuracy of the measurements, and the range of values obtained.

The instrument's capability to achieve measurement objectives can then be determined by comparison with desired values. Tradeoffs can be made among similar instruments.

JUSTIFICATION

Photographic techniques will be used to obtain information relating to sea state, shallow water characteristics of the ocean bottom, and certain phenomena associated with the shoreline interface. Areas of interest include the following:

1. Weather Forecasting — Current boundaries and mass transport of sea water can be conveniently monitored through analyzing successive color photographs of dye markers placed in the current streams.
2. Fisheries Production
   - A. The concentration and distribution of sea surface plant life can be conveniently analyzed with color photographs by monitoring the color distribution.
   - B. Plankton concentration and distribution can be conveniently monitored by photographing the bioluminescence of the sea surface.
   - C. Distribution of fish stocks possibly can be monitored by comparing successive photographs of schooling species on the surface.
3. Waste Disposal and Pollution
   - A. Shallow water bottom contours in both the littoral and neritic zone can be studied with photogrammetric analyses of successive photographs.
   - B. The sedimentation rate and characteristics of the sea bottom can be analyzed photographically by the use of dyed sand and by analysis of successive photographs.
   - C. The character of the interface between fresh water and sea water can be analyzed by comparing successive color photographs.
4. Shipping and Navigation
   - A. The characteristics of surface currents that contribute to sea-state determination can be analyzed by photographically monitoring the position and motion of surface floats that act as current tags.
   - B. Shallow water subsurface hazards to shipping and navigation can be detected by photography using polarized light.

This task will evaluate the complete camera/laboratory system. Performance will be matched against design requirements. Satisfactory completion of these tests will constitute both design approval and formal acceptance of the camera for subsequent prototype operational use.

TASK PARAMETERS

NO. 255 TITLE Design Evaluation and Approval Test – Camera

INTERRUPTIBLE Yes DURATION (HR) 0.5 (ON TIME CYCLE)

CYCLE PERIOD (HR) 1.5 NO. OF CYCLES 30

PREDECESSOR TASK NO. 234

SUCCESSOR TASK NO. AND INITIAL LAG TIME 269, 720 hr; 271, 720 hr; 272, 720 hr; 273, 720 hr; 274, 720 hr; 275, 720 hr; 276, 720 hr; 277, 720 hr; 278, 720 hr; 281, 720 hr; 282, 720 hr; 283, 720 hr; 284, 720 hr; 270, 720 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	60	0.5	0
1	66	0.5	0
1	67	0.5	0

ELECTRICAL POWER 100 W 0.25 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3

EQUIPMENT REQUIRED

ID	NAME
19	Camera

TASK NO. 256 TITLE Design Evaluation and Approval Tests of Microwave Radiometers

LEVEL Design Evaluation and Approval Tests

DESCRIPTION

This task will be performed on the microwave radiometer subsystem and will consist of the following subtasks:

1. Determination of accuracy, resolution, and range against known surface temperatures and of path attenuation and refraction effects.
2. Combine with all components for final test.

This task will examine the performance capability of the final system in measuring surface temperature and temperature contrasts. Measurements obtained from the radiometer will be recorded and later compared with known values recorded on the surface over the same time intervals.

Simultaneously, data describing the characteristics of the atmosphere along the line of sight will be determined to isolate the effects caused by atmospheric attenuation. The data will be recorded and analyzed to determine resolution, accuracy, and range of measurements as an evaluation of instrument performance.

JUSTIFICATION

Since passive microwave radiation from the ocean's surface is useful in collecting data for oceanographic applications, monitoring of this radiation is required.

This task will evaluate the ability of the complete instrument/laboratory system to make satisfactory measurements. System performance will be matched against design requirements. Satisfactory completion of these tests will constitute design approval and formal acceptance of the instrument for subsequent prototype operational use.

TASK PARAMETERS

NO. 256 TITLE Design Evaluation and Approval Test — Microwave Radiometer

INTERRUPTIBLE Yes DURATION (HR) 1.5 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 1.5 NO. OF CYCLES 20

PREDECESSOR TASK NO. 236

SUCCESSOR TASK NO. AND INITIAL LAG TIME 270, 720 hr; 271, 720 hr; 272, 720 hr; 285, 720 hr; 286, 720 hr; 287, 720 hr; 288, 720 hr; 289, 720 hr; 290, 720 hr; 80101, 81001, 81201, 82501, 83001, 81501, 82701, 83201, 81402, 82902 all 0 hr.

NO. OF MEN	SKILL ID	HR CYCLE	HR FROM START OF CYCLE
1	67	0.5	1.0
1	71	0.5	1.0

ELECTRICAL POWER 80 W 1.5 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3

EQUIPMENT REQUIRED

ID	NAME
12	Microwave Radiometer

TASK NO. 257 TITLE Design Evaluation and Approval Tests of Infrared Radiometer

LEVEL Design Evaluation and Approval Test

DESCRIPTION

Examine the performance capability of the final system in measuring surface temperature and temperature contrasts. Measurements obtained from the radiometer will be recorded and later compared with known values recorded on the surface over the same time intervals.

Simultaneously, data describing the characteristics of the atmosphere along the line of sight will be determined to isolate the effects caused by atmospheric attenuation. The data will be recorded and analyzed to determine resolution, accuracy and range of measurements as an evaluation of instrument performance.

This task consists of the following subtasks:

1. Determine accuracy, resolution, and range against known surface temperature path attenuation and refraction effects.
2. Evaluate minimum absorption window errors for several orbits against known integrated locations.
3. Evaluate O_3 absorption errors for several orbits against known integrated locations.
4. Combine with all components for final test.

JUSTIFICATION

Information can be derived from accurate measurement of sea surface temperature from the laboratory, and, therefore, an IR radiometer has been specified as a possible means of making such measurements.

This task will be required to evaluate the capability of the complete instrument/orbital laboratory system. System performance will be matched against design requirements. Satisfactory completion of these tests will constitute design approval and formal acceptance of the radiometer for subsequent applications.

TASK PARAMETERS

NO. 257 TITLE Design Evaluation and Approval Test – IR Radiometer

INTERRUPTIBLE Yes DURATION (HR) 1.5 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 1.5 NO. OF CYCLES 30

PREDECESSOR TASK NO. 239

SUCCESSOR TASK NO. AND INITIAL LAG TIME 270, 271, 272, 285, 286, 287, 288, 289, 290 @740 hr; 804, 808, 811, 817, 820, 823, 834, 837, 839, 840, 845 @0 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	60	1.5	0
1	66	1.5	0
1	67	1.5	0

ELECTRICAL POWER 50 W 1.5 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3

EQUIPMENT REQUIRED

ID	NAME
11	IR Radiometer

TASK NO. 259 TITLE Design Evaluation and Approval Tests of Polarimeter System

LEVEL Design Evaluation and Approval Tests

DESCRIPTION

This task will be performed on the S-band polarimeter system and will consist of the following subtasks:

1. Conduct salinity measurement of instrumented sea surface.
2. Determine coverage limitations.
3. Evaluate accuracy, resolution, calibration, and data reduction.

The system will be installed and operated to gather data from which sea surface salinity can be determined. The task will require that a transponder satellite be used to provide a retransmitted signal after receiving an interrogation signal from the MORL and after reflection off the sea surface. The polarization shift contains the information relating to conductivity and, therefore, surface salinity.

System performance will be measured by operating the system against a sea surface where the salinity is known. The data from the polarimeter will be recorded and will be used to evaluate the capability of the instrument to obtain measurements with acceptable values of resolution, accuracy, and range of salinity value.

JUSTIFICATION

Since oceanographic information can be derived from ocean salinity measurements, an S-band polarimeter has been specified as a possible means of making such measurements.

This task will evaluate the ability of the complete polarimeter/remote satellite/manned laboratory system to make satisfactory measurements of surface salinity. Performance will be evaluated against design requirements. Satisfactory completion of these tests will constitute design approval and formal acceptance of the instrument for subsequent prototype operational use.

TASK PARAMETERS

NO. 259 TITLE Design Evaluation and Approval Test — Polarimeter System

INTERRUPTIBLE Yes DURATION (HR) 1.0 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 1.5 NO. OF CYCLES 10

PREDECESSOR TASK NO. 242

SUCCESSOR TASK NO. AND INITIAL LAG TIME 270, 720 hr; 271, 720 hr; 272, 720 hr; 276, 720 hr; 285, 720 hr; 286, 720 hr; 288, 720 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	62	1	0
1	71	1	0

ELECTRICAL POWER 100 W 0.5 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3

EQUIPMENT REQUIRED

ID	NAME
18	S-Band Polarimeter

TASK NO. 260 TITLE Design Evaluation and Approval Test of Bistatic and Monostatic Laser Ranging System

LEVEL Design Evaluation and Approval Test

DESCRIPTION

This task will be performed on the monostatic and bistatic laser ranging system (Lidar) and will consist of the following subtasks:

1. Determine atmospheric effects with instrument ground-based reflectors.
2. Determine day-night (sunlight) difference effects.
3. Determine refractive characteristics.
4. Repeat for both operating modes.

The laser system will operate in two modes — bistatic and monostatic. This task will evaluate the performance capability of the laser for both modes. This system will be used to measure and record range data to instrumented surface targets of known reflectivity for both the bistatic and monostatic modes.

The data will be compared to known values to establish the range, accuracy, and resolution of the measurements. Atmospheric effects will be evaluated by comparing data over various angles (with respect to vertical.)

JUSTIFICATION

Since sea state is a parameter of interest in oceanographic applications, a requirement has been identified for measuring relative range to the ocean surface from the laboratory to evaluate ocean dynamics.

This task will evaluate the capability of the complete laser/remote satellite receiver/manned laboratory complex to accurately determine sea state. Performance will be matched against design requirement specifications. Satisfactory completion of these tests will constitute design approval and formal acceptance of the instrument for subsequent prototype operational use.

TASK PARAMETERS

NO. 260 TITLE Design Evaluation and Approval — Bistatic and Mono-Static Laser Ranging System

INTERRUPTIBLE Yes DURATION (HR) 1.0 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 1.5 NO. OF CYCLES 20

PREDECESSOR TASK NO. 246

SUCCESSOR TASK NO. AND INITIAL LAG TIME 291, 720 hr; 292, 720 hr; 80301, 0 hr; 81301, 0 hr; 82201, 0 hr; 82601, 0 hr; 83101, 0 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	61	1	0
1	62	1	0
1	71	1	0

ELECTRICAL POWER 1000 W 0.5 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3

EQUIPMENT REQUIRED

ID	NAME
14	Lidar

TASK NO. 261 TITLE Measure Relative Range to Determine Tsunami Wave Height Relative to Sea Level Reference

LEVEL Measurements

DESCRIPTION

Using a V/h meter and K-band radar, conduct a series of range measurements to detect and monitor Tsunami wave height. The computation of relative range from image motion rate will be performed and recorded and compared with corresponding radar data. These measurements are to be conducted with the ocean surface as a target to gather data on range, accuracy, and resolution under typical ocean conditions.

JUSTIFICATION

Tsunami wave height measurement is required for determining wave energy spectrum and energy transfer characteristics, which are important factors in developing Tsunami prediction and warning methods.

TASK PARAMETERS

NO. 261 TITLE Measurement of Relative Range — Tsunami Wave Height

INTERRUPTIBLE Yes DURATION (HR) 1 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 1.5 NO. OF CYCLES 126

PREDECESSOR TASK NO. 252, 253

SUCCESSOR TASK NO. AND INITIAL LAG TIME 293, 0 hr

NO. OF MEN	SKILL ID	HR CYCLE	HR FROM START OF CYCLE
1	67	1	0

ELECTRICAL POWER 1030 W 1 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3

EQUIPMENT REQUIRED

ID	NAME
13 -	Radar V/h Meter

TASK NO. 262 TITLE Measure Relative Range to Determine Change in Position of Tsunami Wave Maxima as a Function of Time

LEVEL Measurements

DESCRIPTION

Conduct a series of radar relative range measurements to detect and monitor the position of Tsunami wave maxima as a function of time. These measurements are to be performed under typical ocean conditions to gather data on range, accuracy, and resolution. The data is to be recorded for future correlation with other measurements.

JUSTIFICATION

Tsunami wave direction in conjunction with the energy spectrum is an important measure of the propagation characteristics and, therefore, has important application for developing Tsunami prediction and warning methods.

TASK PARAMETERS

NO. 262 TITLE Measure Relative Range – Tsunami Wave History

INTERRUPTIBLE Yes DURATION (HR) 1.5 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 1.5 NO. OF CYCLES 126

PREDECESSOR TASK NO. 252

SUCCESSOR TASK NO. AND INITIAL LAG TIME 294, 0 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	67	1	0.5

ELECTRICAL POWER 1030 W 1.5 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3

EQUIPMENT REQUIRED

ID	NAME
13	Radar

TASK NO. 263 TITLE Measure Relative Range for Wave Profile Determination

LEVEL Measurements

DESCRIPTION

Conduct a series of radar relative range measurements to monitor the sea surface height over a region comparable to a typical Tsunami wavelength. These measurements are to be performed over a variety of ocean regions to enhance the probability of encountering Tsunami phenomena. Data is to be gathered on range, accuracy, and resolution and is to be recorded for future correlation with other measurements.

JUSTIFICATION

Wave profile measurement is a factor in deriving wave velocity and energy transfer characteristics which are important factors in developing Tsunami prediction and warning methods.

TASK PARAMETERS

NO. 263 TITLE Measure Relative Range – Wave Profile Determination (Tsunami)

INTERRUPTIBLE Yes DURATION (HR) 1.5 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 1.5 NO. OF CYCLES 126

PREDECESSOR TASK NO. 252

SUCCESSOR TASK NO. AND INITIAL LAG TIME 293, 0 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	67	1	0.5

ELECTRICAL POWER 1030 W 1.5 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3

EQUIPMENT REQUIRED

ID	NAME
13	Radar

TASK NO. 264 TITLE Measure Relative Range to Compare Sea Level with Shore Height in the Littoral Zone

LEVEL Measurements

DESCRIPTION

Conduct a series of radar relative range measurements to determine the sea height in the littoral zone relative to a reference height on the shore. These measurements are to be performed under a variety of ocean conditions to gather data on range, accuracy, and resolution. The data is to be recorded for future correlation with other measurements.

JUSTIFICATION

Tidal sea height is an important parameter in predicting Tsunami effects and in evaluating energy transfer to shore as opposed to total energy content associated with Tsunami waves.

TASK PARAMETERS

NO. 264 TITLE Measure Relative Range — Littoral Sea Height as Opposed to Shore Height (Tsunami)

INTERRUPTIBLE Yes DURATION (HR) 1.5 (ON TIME CYCLE)

CYCLE PERIOD (HR) 1.5 NO. OF CYCLES 126

PREDECESSOR TASK NO. 252

SUCCESSOR TASK NO. AND INITIAL LAG TIME 295, 0 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	67	0.5	1.0

ELECTRICAL POWER 1030 W 1.5 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3

EQUIPMENT REQUIRED

ID	NAME
13	Radar

TASK NO. 265 TITLE Measure Relative Range to Compare Shore Height to Sea Surface in the Neritic Zone

LEVEL Measurement

DESCRIPTION

Conduct a series of radar relative range measurements to determine the sea height in the neritic zone relative to a reference height on the shore. The measurements are to be performed under a variety of ocean conditions to gather data on range, accuracy, and resolution. The data is to be recorded for future correlation with other measurements.

JUSTIFICATION

Tidal sea height is an important parameter in predicting Tsunami effects and in evaluating energy transfer to shore as opposed to total energy content associated with Tsunami waves.

TASK PARAMETERS

NO. 265 TITLE Measure Relative Range – Neritic Sea Height vs. Shore Height (Tsunami)

INTERRUPTIBLE Yes DURATION (HR) 1.5 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 1.5 NO. OF CYCLES 126

PREDECESSOR TASK NO. 252

SUCCESSOR TASK NO. AND INITIAL LAG TIME 295, 0 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	67	0.5	1.0

ELECTRICAL POWER 1030 W 1.5 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3

EQUIPMENT REQUIRED

ID	NAME
13	Radar

TASK NO. 266 TITLE Measure Relative Range to Compare Shore Height to Surface of the Sea in the Oceanic Zone

LEVEL Measurements

DESCRIPTION

Conduct a series of radar relative range measurements to determine the sea height in the oceanic zone relative to a reference height on the shore. These measurements are to be performed under a variety of ocean conditions to gather data on range, accuracy, and resolution. The data is to be recorded for future correlation with other measurements.

JUSTIFICATION

Tidal sea height is an important parameter in predicting Tsunami effects and in evaluating energy transfer to shore as opposed to total energy content associated with Tsunami waves.

TASK PARAMETERS

NO. 266 TITLE Measure Relative Range – Oceanic Sea Height as Opposed to Shore Height (Tsunami)

INTERRUPTIBLE Yes DURATION (HR) 1.5 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 1.5 NO. OF CYCLES 126

PREDECESSOR TASK NO. 252

SUCCESSOR TASK NO. AND INITIAL LAG TIME 295, 0 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	67	0.5	1.0

ELECTRICAL POWER 1030 W 1.5 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3

EQUIPMENT REQUIRED

ID	NAME
13	Radar

TASK NO. 267 TITLE Measure Relative Range to Determine Wave Amplitude Distribution over a Selected Area of the Sea Surface

LEVEL Measurements

DESCRIPTION

Conduct a series of measurements of radar relative range and derive the amplitude variation over a selected region of the sea. These measurements are to be performed under a variety of ocean conditions to gather data on range, accuracy, and resolution. The data is to be recorded for future correlation with other measurements.

JUSTIFICATION

To separate Tsunami waves from the smaller scale perturbations in sea height, small-scale sea-state measurements are necessary so that the Tsunami wave can be treated as a slowly varying bias on this high-frequency phenomena.

TASK PARAMETERS

NO. 267 TITLE Measure Relative Range – Amplitude Distribution (Tsunami)

INTERRUPTIBLE Yes DURATION (HR) 1.5 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 1.5 NO. OF CYCLES 126

PREDECESSOR TASK NO. 252

SUCCESSOR TASK NO. AND INITIAL LAG TIME 296, 0 hr

NO. OF MEN	SKILL ID	HR CYCLE	HR FROM START OF CYCLE
1	67	0.5	1.0

ELECTRICAL POWER 1,030 W 1.5 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3

EQUIPMENT REQUIRED

ID	NAME
13	Radar

TASK NO. 268 TITLE Measure Relative Range to Determine Time Separation between Wave Maxima for a Particular Region of the Ocean Surface

LEVEL Measurements

DESCRIPTION

Conduct a series of measurements of radar relative range and derive the time variation over a selected region of the sea. These measurements are to be performed under a variety of ocean conditions to gather data on range, accuracy, and resolution. The data is to be recorded for future correlation with other measurements.

JUSTIFICATION

To separate Tsunami waves from the smaller scale perturbations in sea height, the small-scale sea-state measurements are required so that the Tsunami wave can be treated as a slowly varying bias on this high-frequency phenomena.

TASK PARAMETERS

NO. 268 TITLE Measure Relative Range – Time Separation Between Wave Maxima (Tsunami)

INTERRUPTIBLE Yes DURATION (HR) 1.5 (ON TIME CYCLE)

CYCLE PERIOD (HR) 1.5 NO. OF CYCLES 126

PREDECESSOR TASK NO. 252

SUCCESSOR TASK NO. AND INITIAL LAG TIME 296, 0 hr

NO. OF MEN	SKILL ID	HR CYCLE	HR FROM START OF CYCLE
1	67	0.5	1.0

ELECTRICAL POWER 1,030 W 1.5 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3

EQUIPMENT REQUIRED

ID	NAME
13	Radar

TASK NO. 269 TITLE Photographic Measurements to Determine Direction of Propagation and Evaluate Scale for Wave Spectrum Determination

LEVEL Measurements

DESCRIPTION

Analyze photograph of a given region of the ocean surface to determine direction of propagation and to evaluate scale for the determination of wavelength and period. These measurements are to be performed by scaling the distance difference between crests on a single photograph and the distance moved by corresponding crests on successive photographs. The data is to be recorded for future correlation with other measurements.

JUSTIFICATION

The determination of sea state for Tsunami warning is based on wave phenomena and requires a measurement of wavelength, period, and direction of propagation of waves.

TASK PARAMETERS

NO. 269 TITLE Photographic Measurements – Wave Spectrum (Tsunami)

INTERRUPTIBLE Yes DURATION (HR) 1.5 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 1.5 NO. OF CYCLES 126

PREDECESSOR TASK NO. 255

SUCCESSOR TASK NO. AND INITIAL LAG TIME 296, 0 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	60	1.5	0

ELECTRICAL POWER 100 W 0.25 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3

EQUIPMENT REQUIRED

ID	NAME
19	Camera

TASK NO. 270 TITLE Measure Color Concentration, Surface Salinity, and Surface Temperature to Locate Water Masses of Particular Characteristics for Use with Fish Population History

LEVEL Measurements

DESCRIPTION

Monitor surface temperature and surface salinity with radiometric and polarimetric methods and measure surface color concentrations with photographic methods. Measurements will be recorded for correlation with information on the location and movement of fish species as a function of time.

JUSTIFICATION

Surface salinity and surface temperature data are important for direct correlation with fish stock history.

TASK PARAMETERS

NO. 270 TITLE Measure Color Concentration, Surface Salinity, and Temperature -- Water Mass Characteristics

INTERRUPTIBLE Yes DURATION (HR) 1 (ON TIME CYCLE)

CYCLE PERIOD (HR) 1.5 NO. OF CYCLES 126

PREDECESSOR TASK NO. 256, 257, 259, 255

SUCCESSOR TASK NO. AND INITIAL LAG TIME 304, 0 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	67	1	0

ELECTRICAL POWER 330 W 1 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3

EQUIPMENT REQUIRED

ID	NAME
11	IR Radiometer
12	Microwave Radiometer
18	S-Band Polarimeter
19	Camera

TASK NO. 271 TITLE Measure Sea Surface Color Concentration, Salinity, and Temperature, and Correlate Data to Establish Favorable Conditions for Plant Production

LEVEL Measurements

DESCRIPTION

Measure color concentration in ocean and correlate with known areas favorable to plant life. This measurement consists of taking color photographs of selected ocean areas and comparing areas of known plant life conditions by measuring the color differences as a possible basis for discerning regions most favorable to plant life. Ocean surface salinity and temperature measurements will be made concurrently with polarimetric and radiometric techniques.

JUSTIFICATION

The determination of regions in the ocean favorable to production of plant life is extremely important for fisheries production applications.

TASK PARAMETERS

NO. 271 TITLE Measure Sea Surface Color, Salinity, and Temperature -- Favorable Conditions for Plant Production

INTERRUPTIBLE Yes DURATION (HR) 1.5 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 1.5 NO. OF CYCLES 126

PREDECESSOR TASK NO. 255, 256, 257, 259

SUCCESSOR TASK NO. AND INITIAL LAG TIME 302, 0 hr

NO. OF MEN	SKILL ID	HR CYCLE	HR FROM START OF CYCLE
1	67	1.5	0

ELECTRICAL POWER 330 W 1.5 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3

EQUIPMENT REQUIRED

ID	NAME
11	IR Radiometer
12	Microwave Radiometer
18	S-Band Polarimeter
19	Camera

TASK NO. 272 TITLE Measure Bioluminescence, Surface Salinity and Temperature, and Collate Data to Determine Favorable Conditions for Plankton Production

LEVEL Measurements

DESCRIPTION

Combine photographic, radiometric, and polarimetric information on bioluminescence, surface temperature, and surface salinity to derive information on plankton concentration (or mass numbers), which is related to the evaluation of favorable conditions for fisheries production. This task consists of making the measurements, then preprocessing and formatting the various measurements for inputting to the laboratory general purpose computer where correlation analysis will be conducted. Part of the photographic preprocessing for inputting the computer will be performed by laboratory personnel.

JUSTIFICATION

The determination of regions of the ocean favorable to production of plankton is extremely important for fisheries production applications.

TASK PARAMETERS

NO. 272 TITLE Measure Bioluminescence, Surface Salinity, and Temperature -- Plankton Production

INTERRUPTIBLE Yes DURATION (HR) 1 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 1.5 NO. OF CYCLES 126

PREDECESSOR TASK NO. 255, 256, 257, 259

SUCCESSOR TASK NO. AND INITIAL LAG TIME 303, 0 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	67	1.0	0

ELECTRICAL POWER 330 W 1 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3

EQUIPMENT REQUIRED

ID	NAME
11	IR Radiometer
12	Microwave Radiometer
18	S-Band Polarimeter
19	Camera

TASK NO. 273 TITLE Measure Predator Distribution, Surface Schooling of Species, and Track Tagged Species to Estimate Quantity and Determine Location and Movement as a Function of Time

LEVEL Measurements

DESCRIPTION

Make high-resolution photographic measurements of the ocean surface in an attempt to locate and track surface schooling species. Successive high-resolution photographs of the ocean surface are to be visually examined by laboratory personnel, and data relative to the geographic location of possible schooling species is to be recorded for future comparison with data on plant life and color measurements.

JUSTIFICATION

In fisheries production, it is important to correlate food supply time history with fish stock population; therefore a task has been identified for estimating the location and movement of schooling species.

TASK PARAMETERS

NO. 273 TITLE Measure Predator Distribution, Surface Schooling, and Tagged Species (Fish Stock History)

INTERRUPTIBLE Yes DURATION (HR) 1 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 1.5 NO. OF CYCLES 126

PREDECESSOR TASK NO. 255

SUCCESSOR TASK NO. AND INITIAL LAG TIME 304, 0 hr

NO. OF MEN	SKILL ID	HR CYCLE	HR FROM START OF CYCLE
1	67	1.0	0

ELECTRICAL POWER 100 W 0.25 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3

EQUIPMENT REQUIRED

ID	NAME
19	Camera

TASK NO. 274 TITLE Photographically Measure Bottom Contours with Respect to Shore Reference

LEVEL Measurements

DESCRIPTION

Make photographic measurements of contours in littoral and neritic zones. Comparison of high-resolution photographs with shore reference contours is to be made by laboratory personnel, and data denoting changes are to be recorded for future analysis.

JUSTIFICATION

These measurements are important for waste disposal and pollution applications because such measurements can be used to identify potential fill areas, to locate changing characteristics, and to identify potential causes of pollution.

TASK PARAMETERS

NO. 274 TITLE Photographically Measure Bottom Contours (Waste Disposal and Pollution)

INTERRUPTIBLE Yes DURATION (HR) 0.5 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 1.5 NO. OF CYCLES 126

PREDECESSOR TASK NO. 255

SUCCESSOR TASK NO. AND INITIAL LAG TIME 305, 0 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	67	0.5	0

ELECTRICAL POWER 100 W 0.25 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3

EQUIPMENT REQUIRED

ID	NAME
19	Camera

TASK NO. 275 TITLE Photographically Measure Tagged Sediment Drift to Determine Rate and Character

LEVEL Measurements

DESCRIPTION

Measure bottom sedimentation rate and character by photographically monitoring tagged sediment drifts. Successive high-resolution photographs of the ocean surface are to be visually examined by laboratory personnel, and data on sedimentation are to be recorded for future comparison with areas of sediment deposition.

JUSTIFICATION

These measurements are useful in determining mechanisms for deposition and for locating and identifying pollution sources.

TASK PARAMETERS

NO. 275 TITLE Photographically Measure Tagged Sediment Drift (Waste Disposal and Pollution)

INTERRUPTIBLE Yes DURATION (HR) 0.5 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 1.5 NO. OF CYCLES 126

PREDECESSOR TASK NO. 255

SUCCESSOR TASK NO. AND INITIAL LAG TIME 305, 0.5 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	67	0.5	0

ELECTRICAL POWER 100 W 0.25 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3

EQUIPMENT REQUIRED

ID	NAME
19	Camera

TASK NO. 276 TITLE Measure Color Contrast and Surface Salinity

LEVEL Measurements

DESCRIPTION

Measure color contrast and surface salinity in certain ocean regions using polarimetric and photographic methods. Color photographs and polarimetric measurements of salinity are to be made simultaneously over the same shoreline regions, and the data on color and the data on differences in salinity are to be recorded for future correlation with possible sources of polution.

The following are to be determined:

1. Character and change nature of interface.
2. Shoreline effects on pollution.
3. Surface isolation.
4. Development of methods of waste disposal.

JUSTIFICATION

The measurement of fresh-water/sea-water interface, the shoreline effects on pollution, and the isolation of sources of pollution are areas of application to which these measurements contribute.

TASK PARAMETERS

NO. 276 TITLE Measure Color and Salinity -- Fresh-Water/Sea-Water Interface (Waste Disposal and Pollution)

INTERRUPTIBLE Yes DURATION (HR) 0.5 (ON TIME CYCLE)

CYCLE PERIOD (HR) 1.5 NO. OF CYCLES 126

PREDECESSOR TASK NO. 255, 259

SUCCESSOR TASK NO. AND INITIAL LAG TIME 306, 0 hr

NO. OF MEN	SKILL ID	HR CYCLE	HR FROM START OF CYCLE
1	67	0.5	0

ELECTRICAL POWER 200 W 0.25 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3

EQUIPMENT REQUIRED

ID	NAME
18	S-Band Polarimeter
19	Camera

TASK NO. 277 TITLE Photographically Track Passive Tags to Determine Direction of Propagation of Surface Currents

LEVEL Measurements

DESCRIPTION

Photographically monitor passive tag tracking devices to establish the direction of surface currents. Successive high-resolution photographs of tagged regions of the ocean surface are to be visually examined by laboratory personnel, and data on direction and location of ocean currents are to be derived and recorded for later correlation.

JUSTIFICATION

Direction of propagation is a factor in establishing sea state for shipping and navigation applications.

TASK PARAMETERS

NO. 277 TITLE Photographically Track Passive Tags – Surface Current Direction (Shipping and Navigation)

INTERRUPTIBLE Yes DURATION (HR) 0.5 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 1.5 NO. OF CYCLES 126

PREDECESSOR TASK NO. 255

SUCCESSOR TASK NO. AND INITIAL LAG TIME 307, 0 hr

NO. OF MEN	SKILL ID	HR CYCLE	HR FROM START OF CYCLE
1	67	0.5	0

ELECTRICAL POWER 100 W 0.25 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3

EQUIPMENT REQUIRED

ID	NAME
19	Camera

TASK NO. 278 TITLE Photographically Measure Surface to Subsurface Contrasts

LEVEL Measurements

DESCRIPTION

Using polarized light photographic techniques, conduct measurements to determine surface to subsurface contrast for particular ocean regions. High-resolution polarized photography will be used to collect data on contrast values over particular ocean regions corresponding to important shipping lanes. This data will be recorded for later readout.

JUSTIFICATION

The detection of submerged objects and the plotting and tracking of hazardous conditions can be derived from such measurements.

TASK PARAMETERS

NO. 278 TITLE Photographically Measure Surface to Subsurface Contrasts (Ship and Navigation)

INTERRUPTIBLE Yes DURATION (HR) 0.5 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 1.5 NO. OF CYCLES 126

PREDECESSOR TASK NO. 255

SUCCESSOR TASK NO. AND INITIAL LAG TIME 309, 0 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	60	0.5	0

ELECTRICAL POWER 100 W 0.25 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3

EQUIPMENT REQUIRED

ID	NAME
19	Camera

TASK NO. 279 TITLE Measure Relative Range to Determine Sea Height and Wave Height in the Littoral Zone

LEVEL Measurements

DESCRIPTION

The time history of the relative range data will be examined to determine if the time rates of range change are consistent with ocean surface dynamics. The stability of this data and the effects of high-frequency noise fluctuations will be evaluated to determine smoothing requirements for enhancing accuracy of sea-state measurement. The data will be smoothed by appropriate circuitry, and the smoothed values will be examined by laboratory personnel and also recorded for later readout.

JUSTIFICATION

This task is required to determine the effects of the sea state as it influences beaches and harbors.

TASK PARAMETERS

NO. 279 TITLE Measure Relative Range -- Sea Height and Wave Height -- Littoral Zone (Beaches and Harbors)

INTERRUPTIBLE Yes DURATION (HR) 1 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 1.5 NO. OF CYCLES 16

PREDECESSOR TASK NO. 254

SUCCESSOR TASK NO. AND INITIAL LAG TIME 298, 0 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	61	1	0

ELECTRICAL POWER 500 W 1 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3

EQUIPMENT REQUIRED

ID	NAME
-	Radar Profilometer

TASK NO. 280 TITLE Measure Changes in Shoreline Topography to Determine Smallest Rate of Topographical Change to be Measured

LEVEL Measurements

DESCRIPTION

Measure change in shoreline topography, including man-made changes, by monitoring land-sea interface profile. Radar maps of the shoreline topography will be compared from orbit to orbit, and the changes will be noted and recorded to establish rate requirements for the measurement of topographical change.

JUSTIFICATION

Land-mass slumping and erosion information are important to beaches and harbors, and therefore a task has been identified to monitor this data.

TASK PARAMETERS

NO. 280 TITLE Measure Changes in Shoreline Topography (Beaches and Harbors)

INTERRUPTIBLE Yes DURATION (HR) 0.5 (ON TIME CYCLE)

CYCLE PERIOD (HR) 1.5 NO. OF CYCLES 126

PREDECESSOR TASK NO. 254

SUCCESSOR TASK NO. AND INITIAL LAG TIME 300, 0 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	61	0.25	0.25

ELECTRICAL POWER 500 W 0.5 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3

EQUIPMENT REQUIRED

ID	NAME
-	K-Band Radar Profilometer

TASK NO. 281 TITLE Measure Near-Shore Winds by Determining the Horizontal and Vertical Motion of Smoke

LEVEL Measurements

DESCRIPTION

Near-shore winds will be measured by photographically monitoring the motion of smoke drift. Successive high-resolution photographs of near-shore smoke drifts will be visually examined by laboratory personnel, and wind motion will be noted and recorded for future analysis and readout.

JUSTIFICATION

Wind condition is a contributing factor in the evaluation of the effect of sea state and tides on beaches and harbors.

TASK PARAMETERS

NO. 281 TITLE Photographically Measure Near-Shore Winds Using Smoke Drift (Beaches and Harbors)

INTERRUPTIBLE Yes DURATION (HR) 0.25 (ON TIME / CYCLE)

CYCLE PERIOD (HR) 1.5 NO. OF CYCLES 126

PREDECESSOR TASK NO. 255

SUCCESSOR TASK NO. AND INITIAL LAG TIME None

NO. OF MEN	SKILL ID	HR CYCLE	HR FROM START OF CYCLE
1	60	0.25	0

ELECTRICAL POWER 100 W 0.25 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3

EQUIPMENT REQUIRED

ID	NAME
19	Camera

TASK NO. 282 TITLE Photographic Measurement of Sediment Drift to Determine Smallest Rate of Topographical Change To Be Measured

LEVEL Measurements

DESCRIPTION

Using color photography, measure the change in man-made effects and shoreline sediment drift. High-resolution color photography of the shoreline topography will be compared from orbit to orbit, and the changes will be noted and recorded to establish rate requirements for the measurement of topographical change.

JUSTIFICATION

Shoreline erosion and buildup information is useful for beach and harbor applications. Color photography may be used to monitor these shoreline changes.

TASK PARAMETERS

NO. 282 TITLE Photographic Measurement of Sediment Drift (Beaches and Harbors)

INTERRUPTIBLE Yes DURATION (HR) 0.25 (ON TIME CYCLE)

CYCLE PERIOD (HR) 1.5 NO. OF CYCLES 126

PREDECESSOR TASK NO. 255

SUCCESSOR TASK NO. AND INITIAL LAG TIME 300, 0 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	60	0.25	0

ELECTRICAL POWER 100 W 0.25 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3

EQUIPMENT REQUIRED

ID	NAME
19	Camera

TASK NO. 283 TITLE Photographically Monitor Movement of Dye Markers to Analyze Procedures to Select Minimum Sample Rates for Current Boundaries and Mass Transport

LEVEL Measurements

DESCRIPTION

Monitor movement of dye markers to establish dispersion rate so that photographic sample rates can be selected which are compatible with the desired accuracy. Successive color photographs of the ocean surface over special regions planted with dye markers will be examined by laboratory personnel, and dispersion rates will be estimated and recorded in order to evaluate photographic sample rates required.

JUSTIFICATION

The measurement of current boundaries and mass transport are useful in weather forecasting applications, and hence a requirement has been identified to monitor these effects by color photography and with dye markers on the ocean surface.

TASK PARAMETERS

Photographically Measure Movement of Dye Markers -- Current Boundaries and Mass Transport (Weather Forecasting)

NO. 283 TITLE

INTERRUPTIBLE Yes DURATION (HR) 0.25 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 1.5 NO. OF CYCLES 126

PREDECESSOR TASK NO. 255

SUCCESSOR TASK NO. AND INITIAL LAG TIME None

NO. OF MEN	SKILL ID	HR CYCLE	HR FROM START OF CYCLE
1	60	0.25	0

ELECTRICAL POWER 100 W 0.25 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3

EQUIPMENT REQUIRED

ID	NAME
19	Camera

TASK NO. 284 TITLE Photographically Monitor Tagged Long-Shore Currents to Determine Dye Quantity and Effect of Dispersion

LEVEL Measurements

DESCRIPTION

Using color photography, monitor a given region of the ocean surface and measure the dispersion and spreading of dye markers in the ocean. Successive color photographs of the ocean surface over special regions planted with dye markers will be examined by laboratory personnel, and dispersion rates will be estimated and recorded in order to evaluate photographic sample rates required.

JUSTIFICATION

Since long-shore currents and littoral drift are important factors in determining the near-shore circulation, the measurement of dye dispersion is applicable for beaches and harbors.

TASK PARAMETERS

NO. 284 TITLE Photographically Measure Tagged Long-Shore Currents (Beaches and Harbors)

INTERRUPTIBLE Yes DURATION (HR) 0.25 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 1.5 NO. OF CYCLES 126

PREDECESSOR TASK NO. 255

SUCCESSOR TASK NO. AND INITIAL LAG TIME 299, 0 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	60	0.25	0

ELECTRICAL POWER 100 W 0.25 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3

EQUIPMENT REQUIRED

ID	NAME
19	Camera

TASK NO. 285 TITLE Simultaneously Measure Surface Temperature and Salinity for Diurnal Samples Over Same Areas

LEVEL Measurements

DESCRIPTION

Conduct a series of radiometric and polarimetric measurements to determine surface temperature and salinity. Certain areas of the ocean visible during several orbits within a time span of approximately 48 hours will be monitored, and changes in radiometric and polarimetric data will be recorded and correlated to deduce information on diurnal changes in temperature and salinity.

JUSTIFICATION

Since diurnal changes in surface heating are a measure of the air/sea energy interchange, these measurements are important in weather forecasting.

TASK PARAMETERS

NO. 285 TITLE Measure Surface Salinity and Temperature -- Surface Heating (Weather Forecasting)

INTERRUPTIBLE Yes DURATION (HR) 0.5 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 1.5 NO. OF CYCLES 126

PREDECESSOR TASK NO. 256, 257, 259

SUCCESSOR TASK NO. AND INITIAL LAG TIME 301, 0 hr

NO. OF MEN	SKILL ID	HR CYCLE	HR FROM START OF CYCLE
1	67	0.5	0

ELECTRICAL POWER 230 W 0.5 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3

EQUIPMENT REQUIRED

ID	NAME
11	IR Radiometer
12	Microwave Radiometer
18	S-Band Polarimeter

TASK NO. 286 TITLE Measure Surface Salinity and Temperature to Locate Areas of Nutrient Supply Due to Upwelling and Overturn

LEVEL Measurements

DESCRIPTION

Monitor surface temperature and salinity changes by use of radiometric and polarimetric methods. Unusual changes in radiometric and polarimetric measurements will be recorded and correlated with information on regions favorable to plant life.

JUSTIFICATION

The supply of nutrients through upwelling and overturn is correlated with surface temperature and salinity changes. This data assists in the determination of favorable regions for plankton and hence fisheries production.

TASK PARAMETERS

Measure Surface Salinity and Temperature -- Locate Areas of Nutrient Supply for Plankton (Fisheries Production)

NO. 286 TITLE

INTERRUPTIBLE Yes DURATION (HR) 1.5 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 1.5 NO. OF CYCLES 126

PREDECESSOR TASK NO. 256, 257, 259

SUCCESSOR TASK NO. AND INITIAL LAG TIME 303, 0 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	67	1	0.5

ELECTRICAL POWER 230 W 1.5 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3

EQUIPMENT REQUIRED

ID	NAME
11	IR Radiometer
12	Microwave Radiometer
18	S-Band Polarimeter

TASK NO. 287 TITLE Measure Surface Temperature to Determine Influence of Neritic Currents on Waste Disposal

LEVEL Measurements

DESCRIPTION

Conduct radiometric measurements of surface temperature to determine surface current boundaries in the neritic zone. Radiometric data will be recorded and correlated with other data on surface current measurements taken over the same area at the same time.

JUSTIFICATION

The long- and short-term effects of ocean currents may be useful in developing methods for predicting pollution and methods for establishing the cause and control of pollution.

TASK PARAMETERS

NO. 287 TITLE Measure Surface Temperature -- Neritic Currents (Waste Disposal and Pollution)

INTERRUPTIBLE Yes DURATION (HR) 0.5 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 1.5 NO. OF CYCLES 126

PREDECESSOR TASK NO. 256, 257

SUCCESSOR TASK NO. AND INITIAL LAG TIME 306, 0 hr

NO. OF MEN	SKILL ID	HR CYCLE	HR FROM START OF CYCLE
1	67	0.5	0

ELECTRICAL POWER 130 W 0.5 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3

EQUIPMENT REQUIRED

ID	NAME
11	IR Radiometer
12	Microwave Radiometer

TASK NO. 288 TITLE Measure Surface Temperature and Salinity to Locate Water Masses of Particular Characteristics

LEVEL Measurements

DESCRIPTION

Measure surface temperature and salinity and gather sufficient synoptic information along long-time samples to be used to predict dewpoint. Radiometric and polarimetric data will be recorded and correlated with other measurements to produce a long-term history of changes over geographical regions corresponding to important shipping lanes.

JUSTIFICATION

These measurements can be used to derive ocean dynamics and to locate areas of potential fog conditions and, therefore, are very useful in shipping and navigation.

TASK PARAMETERS

NO. 288 TITLE Measure Surface Salinity and Temperature -- Locate Water Masses of Particular Characteristics (Shipping and Navigation)

INTERRUPTIBLE Yes DURATION (HR) 1 (ON TIME CYCLE)

CYCLE PERIOD (HR) 1.5 NO. OF CYCLES 126

PREDECESSOR TASK NO. 256, 257, 259

SUCCESSOR TASK NO. AND INITIAL LAG TIME 308, 0 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	67	0.5	0.5

ELECTRICAL POWER 230 W 1 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3

EQUIPMENT REQUIRED

ID	NAME
11	IR Radiometer
12	Microwave Radiometer
18	S-Band Polarimeter

TASK NO. 289 TITLE Measure Temperature Contrast to Isolate Objects of Potential Hazard and Update Data to Improve Isolation and Tracking Ability

LEVEL Measurements

DESCRIPTION

Conduct temperature contrast measurements for locating floating objects, such as ships, icebergs, and debris. Radiometric data will be recorded, and unusual changes in temperature will be noted for communication to ground tracking stations for possible identification and confirmation. Potentially hazardous objects will be isolated by comparing data with other measurements.

JUSTIFICATION

Certain floating objects (such as icebergs) are a hazard to shipping and navigation. The location and tracking of such objects would contribute to safety.

TASK PARAMETERS

NO. 289 TITLE Measure Surface Temperature -- Locate Floating Objects (Shipping and Navigation)

INTERRUPTIBLE Yes DURATION (HR) 1 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 1.5 NO. OF CYCLES 126

PREDECESSOR TASK NO. 256, 257

SUCCESSOR TASK NO. AND INITIAL LAG TIME 309, 0 hr

NO. OF MEN	SKILL ID	HR CYCLE	HR FROM START OF CYCLE
1	67	1.0	0

ELECTRICAL POWER 130 W 1. HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3

EQUIPMENT REQUIRED

ID	NAME
11	IR Radiometer
12	S-Band Polarimeter

TASK NO. 290 TITLE Measure Surface Temperature to Determine Amount of Energy at Sea Surface (Long-Term Averages)

LEVEL Measurements

DESCRIPTION

Conduct radiometric measurements to determine diurnal surface temperature variation. Certain areas of the ocean which are visible during several orbits within a time span of approximately 48 hours will be monitored, and changes in radiometric data will be recorded and correlated.

JUSTIFICATION

Since diurnal changes in surface heating are a measure of the air/sea energy interchange; radiometeric measurements are important in weather forecasting.

TASK PARAMETERS

NO. 290 TITLE Measure Surface Temperature -- Determine Energy at Sea Surface (Weather Forecasting)

INTERRUPTIBLE Yes DURATION (HR) 0.5 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 1.5 NO. OF CYCLES 126

PREDECESSOR TASK NO. 256, 257

SUCCESSOR TASK NO. AND INITIAL LAG TIME 301, 0 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	67	0.5	0

ELECTRICAL POWER 130 W 0.5 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3

EQUIPMENT REQUIRED

ID	NAME
11	IR Radiometer
12	Microwave Radiometer

TASK NO. 291 TITLE Measure Relative Range -- Perform Spectral Analysis to Determine Sea State

LEVEL Measurements

DESCRIPTION

Conduct measurements of radar relative range with sufficient accuracy to estimate ocean dynamics. Derived spectral parameters, which are pertinent to sea-state description, shall be recorded for comparison with other weather forecasting data.

JUSTIFICATION

The amplitude distribution of wave height is an important measure of sea state which establishes ocean dynamics information critical in weather forecasting.

TASK PARAMETERS

NO. 291 TITLE Measure Relative Range -- Spectral Analysis for Sea State (Weather Forecasting)

INTERRUPTIBLE Yes DURATION (HR) 1 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 1.5 NO. OF CYCLES 126

PREDECESSOR TASK NO. 260

SUCCESSOR TASK NO. AND INITIAL LAG TIME None

NO. OF MEN	SKILL ID	HR CYCLE	HR FROM START OF CYCLE
1	67	1	0

ELECTRICAL POWER 1000 W 1 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3

EQUIPMENT REQUIRED

ID	NAME
14	Lidar

TASK NO. 292 TITLE Make Relative Range Measurements to Determine Sea State Along Shipping Lanes

LEVEL Measurements

DESCRIPTION

Collect Lidar data of sufficient content to generate a synoptic picture of sea-state conditions along shipping lanes. Data which are indicative of hazardous sea-state conditions will be noted and designated for immediate transmission to ground tracking stations.

JUSTIFICATION

The measurement and prediction of sea-state conditions are an important factor in locating hazardous sea conditions and in establishing the best routes for shipping and navigation.

TASK PARAMETERS

NO. 292 TITLE Measure Relative Range -- Determine Sea State Along Shipping Lanes

INTERRUPTIBLE Yes DURATION (HR) 1 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 1.5 NO. OF CYCLES 126

PREDECESSOR TASK NO. 260

SUCCESSOR TASK NO. AND INITIAL LAG TIME 307, 0 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	62	1	0

ELECTRICAL POWER 1,000 W 1 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3

EQUIPMENT REQUIRED

ID	NAME
14	Lidar

TASK NO. 293 TITLE Monitor Tsunami Wave Height and Sea Height Over Tsunami Wavelength to Develop Data Processing to Determine Frequency and Amplitude Distribution

LEVEL Phenomena to be Monitored

DESCRIPTION

In order to derive Tsunami wave-energy spectrum data, it is necessary to process the wave-height information by use of appropriate spectral analysis programs. Data processing methods for combining and weighting relevant Tsunami wave measurements require development.

Preprocessing of data and formatting for transmission to surface will be performed aboard the MORL. The wave-height data and the Tsunami profile data will be combined and filtered aboard the MORL. Data-point selection methods will be used as part of the preprocessing to reduce redundancy and, therefore, compact the data.

In addition, preliminary calculations of the wave-energy spectrum will be completed for immediate use in warning to endangered areas. More detailed analysis will be performed on surface ships where better computing facilities are available.

JUSTIFICATION

To develop predictive techniques for Tsunami warning, a requirement has been identified to provide information on Tsunami wave-energy spectrum.

TASK PARAMETERS

NO. 293 TITLE Monitor Tsunami Wave Height and Sea Height

INTERRUPTIBLE No DURATION (HR) 0.5 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 0.5 NO. OF CYCLES 10

PREDECESSOR TASK NO. 261, 263

SUCCESSOR TASK NO. AND INITIAL LAG TIME 310, 0 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	67	0.5	0
1	71	0.5	0

ELECTRICAL POWER 1,030 W 0.2 HR/CYCLE

0.3 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3

EQUIPMENT REQUIRED

ID	NAME
13	Radar

TASK NO. 294 TITLE Monitor Tsunami Propagation Speed to Derive Vector Velocity of Wave Front

LEVEL Phenomena to be Monitored

DESCRIPTION

Develop data processing methods for deriving propagation direction and propagation velocity of wave front based on measured position of wave maxima and minima as a function of time. The radar range data will be preprocessed aboard MORL to extract speed and direction of Tsunami propagation to support the warning systems. To significantly reduce the data transmission problem, analysis of the data will be accomplished in real time, and the results will be formatted for transmission to the surface.

JUSTIFICATION

The derivation of Tsunami warning information requires the derivation of vector velocity of the Tsunami wave front.

TASK PARAMETERS

NO. 294 TITLE Monitor Tsunami Propagation Speed

INTERRUPTIBLE No DURATION (HR) 0.5 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 0.5 NO. OF CYCLES 4

PREDECESSOR TASK NO. 262

SUCCESSOR TASK NO. AND INITIAL LAG TIME 310, 0 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	62	0.5	0

ELECTRICAL POWER 1,030 W 0.5 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3

EQUIPMENT REQUIRED

ID	NAME
13	Radar

TASK NO. 295 TITLE Monitor Synoptic Data on Sea Height Deviations From Normal Characteristics

LEVEL Phenomena to be Monitored

DESCRIPTION

Synoptic tidal characteristics will be measured and catalogued to establish standards from which deviations from normal characteristics will yield changes due to Tsunami waves. This procedure will generally be performed automatically; however, data comparisons will be made periodically by laboratory personnel to ensure confidence in the data.

Data processing methods to calculate the deviation from mean sea height in the littoral zone, in the neritic zone, and in the oceanic zone will be developed.

JUSTIFICATION

In order to provide information on tidal sea height, it is necessary to monitor and calculate the deviation from normal sea height in the zones noted.

TASK PARAMETERS

NO. 295 TITLE Monitor Synoptic Data -- Sea Height Deviation From Normal

INTERRUPTIBLE Yes DURATION (HR) 0.5 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 1.5 NO. OF CYCLES 5,840 (1 year)

PREDECESSOR TASK NO. 264, 265, 266

SUCCESSOR TASK NO. AND INITIAL LAG TIME 311, 0 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	67	0.5	0

ELECTRICAL POWER 1,030 W 0.5 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3

EQUIPMENT REQUIRED

ID	NAME
13	Radar

TASK NO. 296 TITLE Monitor Wave Height and Period to Determine Spectral Distribution and Amplitude

LEVEL Phenomena to be Monitored

DESCRIPTION

Using the measured information on wave height and wave period, data processing methods will be developed to calculate the amplitude spectral distribution of the ocean's surface. Sea-state calculations will be performed on board MORL because the information is needed to establish the existence of the Tsunami.

This task will require data analysis. Data will then be used to determine bias which may exist in the data. The bias terms will be used to confirm the existence of a Tsunami.

In addition, the same task will be required to assess the effects of the Tsunami wave as it approaches a shoreline. Sea-state measurements and computation will indicate the extent of expected damage.

JUSTIFICATION

The determination of Tsunami effects requires the monitoring of sea state so that Tsunami effects can be evaluated as bias terms on a rapidly fluctuating normal sea state.

TASK PARAMETERS

NO. 296 TITLE Monitor Wave Height and Period to Determine Spectral Distribution

INTERRUPTIBLE Yes DURATION (HR) 0.5 (ON TIME CYCLE)

CYCLE PERIOD (HR) 1.5 NO. OF CYCLES 10

PREDECESSOR TASK NO. 267, 268, 269

SUCCESSOR TASK NO. AND INITIAL LAG TIME 311, 0 hr

NO. OF MEN	SKILL ID	HR CYCLE	HR FROM START OF CYCLE
1	67	0.5	0
1	71	0.5	0

ELECTRICAL POWER 1,130 W 0.5 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3

EQUIPMENT REQUIRED

ID	NAME
13	Radar
19	Camera

TASK NO. 298 TITLE Monitor Sea and Wave Height in the Littoral Zone to Evaluate Sampling Methods

LEVEL Phenomena to be Monitored

DESCRIPTION

Conduct experiments to evaluate optimum sampling rates and sampling methods for deriving wave height and sea height information in littoral zone, considering laboratory orbit constraints and the required speeds and accuracies of sampling. Evaluation of data-point selection methods and data collection methods will be required to establish optimum methods for continuous use.

JUSTIFICATION

Since severe information capacity limits may exist in the laboratory, it is essential that appropriate sampling methods which provide very large input data rates be developed and evaluated when phenomena are being monitored.

TASK PARAMETERS

NO. 298 TITLE Monitor Sea and Wave Height in Littoral Zone

INTERRUPTIBLE Yes DURATION (HR) 0.5 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 1.5 NO. OF CYCLES 100

PREDECESSOR TASK NO. 279

SUCCESSOR TASK NO. AND INITIAL LAG TIME 312, 0 hr

NO. OF MEN	SKILL ID	HR CYCLE	HR FROM START OF CYCLE
1	62	0.5	0

ELECTRICAL POWER 500 W 0.5 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3

EQUIPMENT REQUIRED

ID	NAME
-	K-Band Radar Profilometer

TASK NO: 299 TITLE Monitor Long-Shore Currents to Evaluate Sampling Methods

LEVEL Phenomena to be Monitored

DESCRIPTION

Conduct experiments to evaluate optimum sampling rates and methods for long-shore currents, considering laboratory orbit constraints and the required speeds and accuracies of sampling.

JUSTIFICATION

Since severe information capacity limits may exist in the laboratory, it is essential that appropriate sampling methods which provide vary large input data rates be developed and evaluated when phenomena are being monitored.

TASK PARAMETERS

NO. 299 TITLE Monitor Long-Shore Currents – Evaluate Sampling Methods

INTERRUPTIBLE Yes DURATION (HR) 0.25 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 1.5 NO. OF CYCLES 100

PREDECESSOR TASK NO. 284

SUCCESSOR TASK NO. AND INITIAL LAG TIME 312, 0 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	62	0.25	0

ELECTRICAL POWER 100 W 0.25 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3

EQUIPMENT REQUIRED

ID	NAME
19	Camera

TASK NO. 300 TITLE Monitor Wave Reflection and Refraction, and Shoreline Erosion and Buildup to Make a Land/Sea Interface Profile Evaluation

LEVEL Phenomena to be Monitored

DESCRIPTION

Collect data to evaluate changes in shoreline profile by correlating measured profiles against references.

This task requires analyses of radar profilometer and photographic data to perform change analyses to evaluate erosion and buildup of the shoreline. These results will be correlated with the sea state, wind state, and long-shore currents to examine the cause and to predict future trends.

JUSTIFICATION

Since shoreline morphology and breakwater, jetty, and groin data are significant for beach and harbor applications, task to evaluate the land/sea interface is required.

TASK PARAMETERS

NO. 300 TITLE Monitor Wave Reflection and Refraction and Shoreline Erosion and Buildup

INTERRUPTIBLE Yes DURATION (HR) 2 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 2,190 NO. OF CYCLES 8

PREDECESSOR TASK NO. 280, 282

SUCCESSOR TASK NO. AND INITIAL LAG TIME 312, 0 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	67	2	0

ELECTRICAL POWER 100 W 2 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3

EQUIPMENT REQUIRED

ID	NAME
19	Camera

TASK NO. 301 TITLE Monitor Surface Heating (Diurnal Changes) and Incident Radiation to Analyze Heat Budget at Air/Sea Interface

LEVEL Phenomena to be Monitored

DESCRIPTION

The derivation of data on the air/sea energy interchange requires an analysis of the surface temperature.

This task requires that raw data will be inserted in an on-board computer for pre-processing prior to transmission to the surface for detailed analysis.

JUSTIFICATION

Ocean surface heating and, in particular, diurnal changes in surface heating are important in weather forecasting since this data can be used to calculate the air/sea energy interchange.

TASK PARAMETERS

NO. 301 TITLE Monitor Surface Heating

INTERRUPTIBLE Yes DURATION (HR) 1 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 1.5 NO. OF CYCLES 100

PREDECESSOR TASK NO. 285, 290

SUCCESSOR TASK NO. AND INITIAL LAG TIME None

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	67	0.5	0.5
1	71	0.5	0.5

ELECTRICAL POWER 230 W 1 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3

EQUIPMENT REQUIRED

ID	NAME
11	IR Radiometer
12	Microwave Radiometer
18	S-Band Polarimeter

TASK NO. 302 TITLE Monitor Concentration (Mass Numbers) and Environmental Factors to Determine Synoptic Distribution of Areas Favorable to Plant-Life Production

LEVEL Phenomena to be Monitored

DESCRIPTION

Develop methods to identify and display areas of the ocean favorable to plant-production based on concentration (mass numbers) and the measured environmental factors.

The data will be preprocessed to isolate and identify favorable areas, and the results reformatted for transmission to surface. This task will require special processing devices for geographic plots on board MORL. Change analysis will be used to further reduce data redundancy.

JUSTIFICATION

The determination of regions in the ocean which are favorable to production of plant life is extremely important for application to increase fisheries' production.

TASK PARAMETERS

NO. 302 TITLE Monitor Plant Concentration and Environmental Factors -- Plant Production

INTERRUPTIBLE Yes DURATION (HR) 1 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 24 NO. OF CYCLES 365

PREDECESSOR TASK NO. 271

SUCCESSOR TASK NO. AND INITIAL LAG TIME 313, 0 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	67	1	0

ELECTRICAL POWER 330 W 1 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3

EQUIPMENT REQUIRED

ID	NAME
11	IR Radiometer
12	Microwave Radiometer
18	S-Band Polarimeter
19	Camera

TASK NO. 303 TITLE Monitor Concentration (Mass Numbers), Environmental Factors, Osmotic Balance, and Supply of Nutrients Due to Upwelling and Overturn to Determine Conditions for Plankton Production

LEVEL Phenomena to be Monitored

DESCRIPTION

Combine measurements on bioluminescence, surface temperature and salinity; and combine the factors derived from correlating this information to predict favorable conditions for the production of plankton. The data will be preprocessed and reformatted for transmission to the surface. A general purpose computer will be used to accomplish this task as an off-line function. Data-point selection methods will be used.

JUSTIFICATION

The determination of ocean regions favorable to production of plant life is extremely important for applications to increase fisheries' production.

TASK PARAMETERS

NO. 303 TITLE Monitor Concentration, Osmotic Balance, Etc. -- Plankton Production

INTERRUPTIBLE Yes DURATION (HR) 1 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 24 NO. OF CYCLES 365

PREDECESSOR TASK NO. 272, 286

SUCCESSOR TASK NO. AND INITIAL LAG TIME 314, 0.5 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	67	1	0

ELECTRICAL POWER 330 W 1 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3

EQUIPMENT REQUIRED

ID	NAME
11	IR Radiometer
12	Microwave Radiometer
18	S-Band Polarimeter
19	Camera

TASK NO. 304 TITLE Monitor Fish Population and Distribution (Time, Location) to Determine Synoptic Distribution of Surface Observed Fish Stock History

LEVEL

DESCRIPTION

Combine all data pertinent to determine fish-stock location in order to provide a synoptic display of fish-stock movement. The data will be preprocessed and formatted for transmission to ground locations where detailed analysis will be performed. A general purpose computer operating off-line will be used for this task.

JUSTIFICATION

In fisheries' production, it is important to correlate food-supply history with fish-stock population; therefore, a task has been identified to estimate the location and movement of schooling species.

TASK PARAMETERS

NO. 304 TITLE Monitor Fish Population and Distribution

INTERRUPTIBLE Yes DURATION (HR) 1 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 24 NO. OF CYCLES 365

PREDECESSOR TASK NO. 270, 273

SUCCESSOR TASK NO. AND INITIAL LAG TIME 315, 0.5 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	67	1	0

ELECTRICAL POWER 330 W 1 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3

EQUIPMENT REQUIRED

ID	NAME
11	IR Radiometer
12	Microwave Radiometer
18	S-Band Polarimeter
19	Camera

TASK NO. 305 TITLE Monitor Bottom Contours in Littoral and Neritic Zones; Monitor Bottom Sedimentation to Determine Trends in Changing Bottom Characteristics to Predict Future History

LEVEL Phenomena to be Monitored

DESCRIPTION

Combine data on bottom contours and sediment deposition to determine bottom characteristics and to predict future time history of bottom topography in critical areas. Data preprocessing will be accomplished aboard the MORL for detection of changes. This highly reduced data and the raw data will be formatted and transmitted to the ground periodically for further analysis.

JUSTIFICATION

These measurements are important for waste disposal and pollution applications because the measurements can be used to identify potential fill areas, locate changing characteristics, and identify potential causes of pollution.

TASK PARAMETERS

NO. 305 TITLE Monitor Bottom Contours and Sedimentation

INTERRUPTIBLE Yes DURATION (HR) 2 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 2,190 NO. OF CYCLES 8

PREDECESSOR TASK NO. 274, 275

SUCCESSOR TASK NO. AND INITIAL LAG TIME 316, 0 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	67	2	0

ELECTRICAL POWER 100 W 1 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3

EQUIPMENT REQUIRED

ID	NAME
19	Camera

TASK NO. 306 TITLE Monitor Fresh-Water/Sea-Water Interface

LEVEL Phenomena to be monitored

DESCRIPTION

Correlate data on currents with reference data on regions of pollution. The data will be analyzed aboard the MORL to discover the nature of the near shore-water motion process and to analyze the motion of currents. The preprocessed data will be transmitted to the ground for detailed analysis after formatting.

JUSTIFICATION

This data can assist in determining the degree to which currents can be used to avoid pollution, and the degree to which currents cause and control pollution.

TASK PARAMETERS

NO. 306 TITLE Monitor Fresh-Water/Sea-Water Interface

INTERRUPTIBLE Yes DURATION (HR) 1 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 3 NO. OF CYCLES 12

PREDECESSOR TASK NO. 276, 287

SUCCESSOR TASK NO. AND INITIAL LAG TIME 316, 0 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	67	1	0

ELECTRICAL POWER 330 W 1 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3

EQUIPMENT REQUIRED

ID	NAME
11	IR Radiometer
12	Microwave Radiometer
18	S-Band Polarimeter
19	Camera

TASK NO. 307 TITLE Monitor Surface Currents and Wave Height (To Generate Synoptic Picture of Sea-State Conditions)

LEVEL Phenomena to be Monitored

DESCRIPTION

Combine data on wave height, wave period, and surface currents to establish a set of indicators of sea state which can be synoptically displayed.

The data will be processed continuously aboard the MORL to maintain synoptic information on sea state. Change analysis will be conducted, and the changes communicated to ground stations on a near real-time basis as a contribution to shipping and navigation aids.

JUSTIFICATION

The measurement and prediction of sea state is an important factor in locating hazardous sea conditions and in establishing best routes for shipping and navigation.

TASK PARAMETERS

NO. 307 TITLE Monitor Surface Currents and Wave Height - Synoptic Sea State

INTERRUPTIBLE Yes DURATION (HR) 0.5 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 1.5 NO. OF CYCLES 5,840

PREDECESSOR TASK NO. 277, 292

SUCCESSOR TASK NO. AND INITIAL LAG TIME 317, 0 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	67	0.5	0

ELECTRICAL POWER 1,100 W 0.5 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3

EQUIPMENT REQUIRED

ID	NAME
14	Lidar
19	Camera

TASK NO. 308 TITLE Monitor Surface Current Boundaries to Locate Areas of Potential Fog Conditions

LEVEL Phenomena to be Monitored

DESCRIPTION

Combine all data on surface current boundaries (from surface temperature and surface salinity) to determine the presence of conditions on the ocean surface which may produce fog conditions. The data will be preprocessed aboard the MORL and a fog warning message transmitted to the ground.

JUSTIFICATION

These measurements can be used to derive ocean dynamics and to locate areas of potential fog conditions and are, therefore, useful in shipping and navigation.

TASK PARAMETERS

NO. 308 TITLE Monitor Surface Current Boundaries — Locate Potential Fog Areas

INTERRUPTIBLE Yes DURATION (HR) 0.25 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 1.5 NO. OF CYCLES 200

PREDECESSOR TASK NO. 288

SUCCESSOR TASK NO. AND INITIAL LAG TIME 317, 0 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	66	0.25	0

ELECTRICAL POWER 330 W 0.25 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3

EQUIPMENT REQUIRED

ID	NAME
11	IR Radiometer
12	Microwave Radiometer
18	S-Band Polarimeter

TASK NO. 309 TITLE Monitor Submerged and Floating Objects (Ships, Icebergs, Debris) to Plot and Track Hazardous Conditions

LEVEL Phenomena to be Monitored

DESCRIPTION

Combine data on all submerged and floating objects detected to produce a composite indication of potentially hazardous conditions. A continuous plot of all hazardous objects will be maintained aboard the MORL. Change data will be transmitted to the ground for data updating and for subsequent use by ships at sea.

JUSTIFICATION

The detection of submerged objects and the plotting and tracking of hazardous conditions can be derived from such measurements.

TASK PARAMETERS

NO. 309 TITLE Monitor Submerged and Floating Objects — Plot Hazardous Conditions

INTERRUPTIBLE Yes DURATION (HR) 0.25 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 1.5 NO. OF CYCLES 100

PREDECESSOR TASK NO. 278, 289

SUCCESSOR TASK NO. AND INITIAL LAG TIME 317, 0 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	67	0.25	0

ELECTRICAL POWER 230 W 0.25 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3

EQUIPMENT REQUIRED

ID	NAME
11	IR Radiometer
12	Microwave Radiometer
19	Camera

TASK NO. 310 TITLE Assist in the Development of Predictive Techniques for Tsunami Forecasting and Warning

LEVEL Specific Application Areas

DESCRIPTION

Develop techniques to analyze all information on the various phenomena monitored to provide an effective practical basis for Tsunami forecasting and warning. The pre-processed Tsunami wave-energy spectrum information and the Tsunami wave-direction information will be formatted and transmitted to the surface. Detailed data processing of this information and the raw-data information will be performed at ground stations to develop predictive techniques and improved methods of Tsunami warning and forecasting.

JUSTIFICATION

To develop predictive techniques for Tsunami warning applications, a requirement has been identified for integrating the data provided by the measured phenomena into a data processing program based on a predictive analytical model.

TASK PARAMETERS

NO. 310 TITLE Develop Tsunami Predictive Techniques

INTERRUPTIBLE Yes DURATION (HR) 1 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 2 NO. OF CYCLES 24

PREDECESSOR TASK NO. 293, 294

SUCCESSOR TASK NO. AND INITIAL LAG TIME None

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	66	1	0
1	71	1	0

ELECTRICAL POWER 1,030 W 1.0 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3

EQUIPMENT REQUIRED

ID	NAME
13	Radar

TASK NO. 311 TITLE Assist in the Evaluation of Tsunami Predictive Techniques

LEVEL Specific Applications Area

DESCRIPTION

Compare Tsunami effect prediction, based on laboratory measurements, with known sea states and tidal effects to validate the predictive techniques developed. The pre-processed information for tidal sea height, for sea state, and for bottom photography will be combined into a formatted message and transmitted to ground stations for further processing. Ground processing will analyze the effects of Tsunamis on shore-lines to improve predictive methods.

JUSTIFICATION

To evaluate Tsunami predictions, it is necessary to monitor and calculate the deviation from normal sea height in the various zones and to validate these calculations by comparison with known sea states.

TASK PARAMETERS

NO. 311 TITLE Evaluate Tsunami Prediction

INTERRUPTIBLE Yes DURATION (HR) 1 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 1.5 NO. OF CYCLES 24

PREDECESSOR TASK NO. 295, 296

SUCCESSOR TASK NO. AND INITIAL LAG TIME None

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	66	1	0

ELECTRICAL POWER 1,130 W 1 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3

EQUIPMENT REQUIRED

ID	NAME
13	Radar
19	Camera

TASK NO. 312 TITLE Assist in the Development and Evaluation of Predictive Techniques Describing Shoreline Processes

LEVEL Specific Application Area

DESCRIPTION

Combine pertinent data on sea state, tides, wind state, littoral drift, shoreline morphology, breakwaters, jetties and groins to derive the predictive programs and the orbit requirements to achieve optimum coverage.

Preprocessed information regarding sea state, tide state, wind state, littoral drift, shoreline morphology, breakwater, jetty and groin data will be combined into a single formatted message for telemetry to the surface. On the surface, detailed computer programs will derive predictive methods and analytical methods for determining the effects of the shoreline processes on beaches and harbors.

JUSTIFICATION

Since severe information capacity limits may exist in the laboratory, it is essential that appropriate sampling and data collation methods be developed and evaluated when phenomena are being monitored which provide very large input data rates.

TASK PARAMETERS

NO. 312 TITLE Development and Evaluation of Predictive Techniques — Shoreline Processes

INTERRUPTIBLE Yes DURATION (HR) 2 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 168 NO. OF CYCLES 52

PREDECESSOR TASK NO. 298, 299, 300

SUCCESSOR TASK NO. AND INITIAL LAG TIME None

NO. OF MEN	SKILL ID	HR CYCLE	HR FROM START OF CYCLE
1	67	2	0

ELECTRICAL POWER 100 W 1 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3

EQUIPMENT REQUIRED

ID	NAME
19	Camera

TASK NO. 313 TITLE Develop Methods to Determine the History of Plant Concentration over the Ocean's Surface

LEVEL Specific Applications Area

DESCRIPTION

Correlate all data pertinent to plant production and develop methods for locating and determining the time history of plant concentration over the ocean's surface. Preprocessed information regarding location and distribution of surface sea plants will be transmitted to the surface for further detailed analysis and maintenance of synoptic plots of surface plant concentration and their motion.

JUSTIFICATION

The determination of regions in the ocean which are favorable to production of plant life is extremely important for applications to fisheries' production.

TASK PARAMETERS

NO. 313 TITLE Determine History of Plant Concentration

INTERRUPTIBLE Yes DURATION (HR) 1 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 24 NO. OF CYCLES 365

PREDECESSOR TASK NO. 302

SUCCESSOR TASK NO. AND INITIAL LAG TIME None

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	67	1	0

ELECTRICAL POWER 330 W 1 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3

EQUIPMENT REQUIRED

ID	NAME
11	IR Radiometer
12	Microwave Radiometer
18	S-Band Polarimeter
19	Camera

TASK NO. 314 TITLE Determine Methods of Locating Plankton or Recognizing Conditions Favorable to the Presence of Plankton

LEVEL Specific Application Area

DESCRIPTION

Correlate and analyze all data associated with the presence of plankton or conditions favorable to the production of plankton and develop procedures to locate and determine the history of plankton concentration over the ocean's surface.

Preprocessed information regarding location and distribution of plankton will be transmitted to the surface for further detailed analysis and maintenance of synoptic plots of plankton production and their motion.

JUSTIFICATION

The determination of regions in the ocean favorable to production of plankton is extremely important for applications to fisheries' production.

TASK PARAMETERS

NO. 314 TITLE Locate Plankton

INTERRUPTIBLE Yes DURATION (HR) 1 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 24 NO. OF CYCLES 365

PREDECESSOR TASK NO. 303

SUCCESSOR TASK NO. AND INITIAL LAG TIME None

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	67	1	0

ELECTRICAL POWER 330 W 1 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3

EQUIPMENT REQUIRED

ID	NAME
11	IR Radiometer
12	Microwave Radiometer
18	S-Band Polarimeter
19	Camera

TASK NO. 315 TITLE Study the History of Fish Species Movements

LEVEL Specific Applications Area

DESCRIPTION

Correlate all data pertinent to the distribution of fish stock and develop analytical programs to determine the history of fish movement. The information regarding location and distribution of fish stocks, which resulted from processing information relating to the observance of schooling of specific species, their distribution, and their quantity, will be transmitted to the surface. On the surface, synoptic plots of fish stocks, their motion, and their history will be maintained.

JUSTIFICATION

In fisheries' production, it is important to correlate food-supply history with fish-stock population, and therefore a task has been identified to estimate the location and movement of schooling species.

TASK PARAMETERS

NO. 315 TITLE History of Fish Species Movement

INTERRUPTIBLE Yes DURATION (HR) 1 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 24 NO. OF CYCLES 365

PREDECESSOR TASK NO. 304

SUCCESSOR TASK NO. AND INITIAL LAG TIME None

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	67	1	0

ELECTRICAL POWER 330 W 1 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3

EQUIPMENT REQUIRED

ID	NAME
11	IR Radiometer
12	Microwave Radiometer
18	S-Band Polarimeter
19	Camera

TASK NO. 316 TITLE Analyze The Causes of Existing Pollution; Identify Future Pollution Problems and Potential Solutions

LEVEL Specific Application Area

DESCRIPTION

Correlate and analyze data to determine causes of existing pollution; to identify future pollution problems, and to detail the limitation on industrial and population growth caused by these pollution problems. Bottom topographic information and near-shore information will be preprocessed on board the MORL and will be transmitted to the surface. On the surface, detailed data analysis will be used to determine influences on waste disposal and pollution as affected by both bottom topography and near-shore currents.

JUSTIFICATION

This investigation is important for waste disposal and pollution applications because resulting data can be used to identify potential fill areas, locate changing characteristics, and identify potential causes of pollution.

TASK PARAMETERS

NO. 316 TITLE Analyze the Causes of Existing Pollution

INTERRUPTIBLE Yes DURATION (HR) 1 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 168 NO. OF CYCLES 52

PREDECESSOR TASK NO. 305, 306

SUCCESSOR TASK NO. AND INITIAL LAG TIME None

NO. OF MEN	SKILL ID	HR CYCLE	HR FROM START OF CYCLE
1	67	1	0

ELECTRICAL POWER 330 W 1 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3

EQUIPMENT REQUIRED

ID	NAME
11	IR Radiometer
12	Microwave Radiometer
18	S-Band Polarimeter
19	Camera

TASK NO. 317 TITLE Establish Favorable Shipping Routes Considering Sea State, Ocean Dynamics, and Hazards

LEVEL Specific Applications Area

DESCRIPTION

Combine all data pertinent to sea-state measurements, ocean dynamics, and hazards; derive methods to locate and forecast best routes, locate hazards, and provide warning of impending conditions of danger. Preprocessed information regarding ocean hazards to navigation, ocean dynamics and synoptic distribution of sea-state conditions will be combined and transmitted to the surface. On the surface, detailed analysis will be performed to maintain synoptic plots of hazards for locating and forecasting best shipping routes, to generate warning networks, and to create data for general improvements in ship design.

JUSTIFICATION

The measurement and prediction of sea state is an important factor in locating hazardous sea conditions and in establishing best routes for shipping and navigation.

TASK PARAMETERS

NO. 317 TITLE Establish Favorable Shipping Routes

INTERRUPTIBLE Yes DURATION (HR) 0.5 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 1.5 NO. OF CYCLES 5,840

PREDECESSOR TASK NO. 307, 308, 309

SUCCESSOR TASK NO. AND INITIAL LAG TIME None

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	67	0.5	0

ELECTRICAL POWER 1,330 W 0.5 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3

EQUIPMENT REQUIRED

ID	NAME
11	IR Radiometer
12	Microwave Radiometer
14	Lidar
18	S-Band Polarimeter
19	Camera

TASK PARAMETERS

NO. 1501 TITLE Install Experiment Package

INTERRUPTIBLE Yes DURATION (HR) 4 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 4 NO. OF CYCLES 2

PREDECESSOR TASK NO. None

SUCCESSOR TASK NO. AND INITIAL LAG TIME 501, 0 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	66	4	0
1	72	4	0

ELECTRICAL POWER 250 W 4 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 1.5 LB SHIPPING VOLUME 0.08 FT^3

EQUIPMENT REQUIRED

ID	NAME
-	Miscellaneous Test Equipment

NO. 501 TITLE IR and UV Detectors — Space Effects

INTERRUPTIBLE Yes DURATION (HR) 4 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 120 NO. OF CYCLES 72

PREDECESSOR TASK NO. 1501

SUCCESSOR TASK NO. AND INITIAL LAG TIME 1601, 0 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	66	4	0
1	71	4	0

ELECTRICAL POWER 100 W 1 HR/CYCLE

118 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3 (See 1501)

EQUIPMENT REQUIRED

ID	NAME

TASK NO. 502 TITLE Effects of Space Environment on Radiometer Windows and Lens Coatings. Further Research on Propagation of Microwaves and Millimeter Waves Through the Upper Atmosphere.

LEVEL Applied Research for Design Data

DESCRIPTION

The effects of space environment on the properties of lens coatings and windows, which are employed in a microwave radiometer, will be determined. Several modular samples will be exposed to the space environment outside the laboratory. The samples will be inspected and tested periodically by returning them to the laboratory interior. Materials will be examined for deterioration or changes. Auxiliary equipment required will include a test module mounting kit, a microwave signal generator and evaluator test set, and a magnifying viewer.

JUSTIFICATION

This task applies to antennas on a microwave radiometer used to measure atmospheric temperature. When dielectric lenses are used as a means of focusing energy on microwave antennas, the properties of the lenses, their windows, and coatings differ from those used at visible frequencies.

This task is required to determine the adequacy of potential microwave radiometer lenses and window systems after exposure to a space environment.

Further research on propagation of microwaves and millimeter waves through the upper atmosphere is required, particularly where this instrument may be used from a synchronous orbit at great ranges from the phenomena being measured. To the present time, little research has been done on the propagation of energy at these frequencies and over large distances in the space environment.

TASK PARAMETERS

NO. 1502 TITLE Install Experiment Package

INTERRUPTIBLE Yes DURATION (HR) 4 (ON TIME / CYCLE)

CYCLE PERIOD (HR) 4 NO. OF CYCLES 2

PREDECESSOR TASK NO. None

SUCCESSOR TASK NO. AND INITIAL LAG TIME 502, 0 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	66	4	0
1	72	4	0

ELECTRICAL POWER 250 W 4 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 2 LB SHIPPING VOLUME 0.2 FT^3

EQUIPMENT REQUIRED

ID	NAME
-	Miscellaneous Test Equipment

NO. 502 TITLE Effects of Space Environment on Radiometer Windows and Coatings

INTERRUPTIBLE Yes DURATION (HR) 4 (ON TIME / CYCLE)

CYCLE PERIOD (HR) 120 NO. OF CYCLES 72

PREDECESSOR TASK NO. 1502

SUCCESSOR TASK NO. AND INITIAL LAG TIME 18, 0 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	66	4	0
1	71	4	0

ELECTRICAL POWER 20 W 1 HR/CYCLE

118 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3 (See 1502)

EQUIPMENT REQUIRED

ID	NAME

TASK NO. 504 TITLE Zero-G Effects on Lubricants for Internal Bearings

LEVEL Applied Research for Design Data

DESCRIPTION

The purpose of the test is to determine the retention of the lubricant material under zero-g conditions. Delicate or critical moving parts of instruments (spectrometers, telescopes, antennas, etc.) employing precision movements will require constant lubrication. By testing various lubricants inside the laboratory, a comprehensive analysis of zero-g effects can be obtained.

Exposure time will be for a period that will provide acceptable statistical values. Lubricants will be applied to bearings representative of the sleeve, pivot, cylindrical, ball or flat surface types, made of various materials. These lubricants will vary in chemical and physical properties as required.

The test procedure will consist of comparing the coefficient of friction of the test item after exposure to the value obtained previously on Earth. Bearings will be tested in the orbiting laboratory prior to exposure and after exposure. Gauls and other surface defects could be noted. Coefficient of friction and viscosity measurements will be determined by direct standard testing of the lubricant. A simple motor-driven test module will be employed to drive the bearings during evaluation tests.

Evaluating the bearing lubrication test early in the orbiting flight is important because the integrity of many mechanical movements will require confirmation.

Auxiliary equipment will include bearing surface tester, viscosity determination instruments, coefficient of friction instrument, lubrication dispenser and scale.

JUSTIFICATION

This task applies to bearings within the instrument. Potential end instruments include an IR spectrometer which is used for measuring solar backscatter radiation, a wide band visible radiometer which is used for measuring solar backscatter radiation, and a UV spectrometer which is used for measuring ozone.

These tasks pertain to bearings which are contained within instruments and are sealed from space environment so that only zero-g effects will act upon them. These are considered to be precision bearings, and the lubrication techniques used may have a critical effect on their performance. Typically, in an IR spectrometer or a UV spectrometer, bearings are used to position a prism or a defraction grating.

TASK PARAMETERS

NO. 1504 TITLE Install Experiment Package

INTERRUPTIBLE Yes DURATION (HR) 4 (ON TIME CYCLE)

CYCLE PERIOD (HR) 4 NO. OF CYCLES 2

PREDECESSOR TASK NO. None

SUCCESSOR TASK NO. AND INITIAL LAG TIME 504, 0 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	66	4	0
1	72	4	0

ELECTRICAL POWER 250 W 4 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 50 LB SHIPPING VOLUME 4 FT^3

EQUIPMENT REQUIRED

ID	NAME
-	Miscellaneous Test Equipment and Samples

NO. 504 TITLE Zero-g Effects on Lubricants For Internal Bearings

INTERRUPTIBLE Yes DURATION (HR) 3 (ON TIME CYCLE)

CYCLE PERIOD (HR) 168 NO. OF CYCLES 30

PREDECESSOR TASK NO. 1504

SUCCESSOR TASK NO. AND INITIAL LAG TIME 1604, 0.5 hr

NO. OF MEN	SKILL ID	HR CYCLE	HR FROM START OF CYCLE
1	66	3	0
1	71	3	0

ELECTRICAL POWER 20 W 1 HR/CYCLE

2 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3

(See 1504)

EQUIPMENT REQUIRED

ID	NAME

TASK NO. 510 TITLE Environmental Effects on Mirror Surfaces

LEVEL Applied Research for Design Data

DESCRIPTION

The purpose of this test is to determine deterioration of mirror surfaces in space which could be caused by solarization, contamination, distortions,and damage by particle impact. The test is necessary to determine the environmental effects of space that reduce the functional capability of mirrors.

This will be a long-term test requiring enough samples of each mirror material to obtain valid statistical data so as to separate the various environmental parameters.

Sample mirrors will be mounted externally and oriented to be exposed preferentially to the space environment. Samples will periodically be returned to the laboratory for examination and measurements. Optical surface quality will be of prime concern. After evaluation, the samples are returned to the test positions.

Auxiliary equipment will include a test module mounting tool kit, a reflectometer, and a microscope.

JUSTIFICATION

This task applies to large mirrors (approximately 7 ft in diameter) that are used with a pulsed searchlight and detector or a pulsed laser and detector (Lidar) which are used to measure the height of cloud tops and atmospheric pressure.

These large mirrors will be installed externally and therefore will be subject to the full impact of space environment. Over the several years that these mirrors may be used, a gradual deterioration may result from damage by impact of meteorites and other particles. Exposure to the radiations from the sun over long periods of time may cause damage to the mirror or darkening (solarization) of the surfaces. Contaminants in space or contaminants from the exhausts of the laboratory could coat the surfaces. Thermal stresses may act upon the mirror when it is partially exposed to the sunlight.

TASK PARAMETERS

NO. 1510 TITLE Install Experiment Package

INTERRUPTIBLE Yes DURATION (HR) 4 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 4 NO. OF CYCLES 6

PREDECESSOR TASK NO. None

SUCCESSOR TASK NO. AND INITIAL LAG TIME 510, 0 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	66	4	0
1	72	4	0

ELECTRICAL POWER 250 W 4 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 10 LB SHIPPING VOLUME 2 FT^3

EQUIPMENT REQUIRED

ID	NAME
-	Miscellaneous Test Equipment and Samples

NO. 510 TITLE Environmental Effects on Mirror Surfaces

INTERRUPTIBLE Yes DURATION (HR) 4 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 120 NO. OF CYCLES 72

PREDECESSOR TASK NO. 1510

SUCCESSOR TASK NO. AND INITIAL LAG TIME 1614, 0.5 hr; 1616, 0 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	66	4	0
1	71	4	0

ELECTRICAL POWER 20 W 0.33 HR/CYCLE

2 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3

(See 1510)

EQUIPMENT REQUIRED

ID	NAME

TASK NO. 521 TITLE Development of Nonencapsulated Detectors

LEVEL Development Test

DESCRIPTION

Photosensitive materials are to be tested. The material will be exposed to observe the effects of space environment. This test will require a long period. A sufficient number of sample materials will be required to obtain statistical values, subsequent to manufacturing quality control determination. A protective enclosure will shield the samples from space environment effects not being tested. However, all samples must be exposed to vacuum. Auxiliary equipment will include a test module mounting kit and a radiation calibration module.

JUSTIFICATION

This task is performed as part of the development of a detector for a dual star tracker which is used to measure atmospheric pressure and atmospheric temperature. The purpose of the test is to determine the physical, chemical, and electrical properties of the detector material after exposure to space environment, and to determine the feasibility of eliminating the encapsulating material (required in an earth environment) when the detector is used in space. The encapsulated material limits the spectral range and sensitivity while an unencapsulated material for space use could expand its applications.

TASK PARAMETERS

NO. 1521 TITLE Install Experiment Package

INTERRUPTIBLE Yes DURATION (HR) 4 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 4 NO. OF CYCLES 2

PREDECESSOR TASK NO. None

SUCCESSOR TASK NO. AND INITIAL LAG TIME 521, 0 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	66	4	0
1	72	4	0

ELECTRICAL POWER 250 W 4 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 1.5 LB SHIPPING VOLUME 0.1 FT^3

EQUIPMENT REQUIRED

ID	NAME
-	Miscellaneous Test Equipment

NO. 521 TITLE Development of Nonencapsulated Detectors

INTERRUPTIBLE Yes DURATION (HR) 4 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 480 NO. OF CYCLES 18

PREDECESSOR TASK NO. 1521

SUCCESSOR TASK NO. AND INITIAL LAG TIME 1713, 0.5 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	66	4	0
1	71	4	0

ELECTRICAL POWER 50 W 1 HR/CYCLE

2 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3

(See 1521)

EQUIPMENT REQUIRED

ID	NAME

TASK NO. 523 TITLE Develop Stabilization Techniques and Determine MORL Dynamic Disturbances

LEVEL Applied Research for Design Data

DESCRIPTION

This test will consist of evaluating the gyro stabilizers employed in dual star trackers.

The gyro stabilization mechanisms will be mounted externally by one crew member. Automatic recording of the vibrations and motions will be obtained for all three axes of each mechanism through the application of small seismic recorders.

The auxiliary on-board equipment will include a test module mounting kit and a seismic recorder.

JUSTIFICATION

This task pertains to gyros that are used on a dual star tracker that measures atmospheric pressure and atmospheric temperature. The task is necessary to determine and measure the forces that cause disturbing movements affecting the function of the star trackers. Actually, the task applies more to the gyro-stabilization system of the telescope rather than to the gyros. The platform for the telescope must be stable and small disturbing forces which tend to rotate MORL would tend to rotate the star tracker unless it were repositioned by a controlled stabilization loop. Because of this, the dynamic disturbances of MORL must be studied and understood so that the control loop for the star tracker can be properly designed.

TASK PARAMETERS

NO. 1523 TITLE Install Experiment Package

INTERRUPTIBLE Yes DURATION (HR) 3 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 3 NO. OF CYCLES 1

PREDECESSOR TASK NO. None

SUCCESSOR TASK NO. AND INITIAL LAG TIME 523, 0 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	66	3	0
1	72	3	0

ELECTRICAL POWER 250 W 3 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 10 LB SHIPPING VOLUME 1 FT^3

EQUIPMENT REQUIRED

ID	NAME
-	Miscellaneous Test Equipment

NO. 523 TITLE Develop Stabilization Techniques

INTERRUPTIBLE Yes DURATION (HR) 0.5 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 72 NO. OF CYCLES 60

PREDECESSOR TASK NO. 1523

SUCCESSOR TASK NO. AND INITIAL LAG TIME 1639, 0.5 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	66	0.5	0
1	71	0.5	0

ELECTRICAL POWER 20 W 0.5 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3 (See 1523)

EQUIPMENT REQUIRED

ID	NAME

TASK NO. 534 TITLE Environmental Effects on Television Detectors

LEVEL Applied Research for Design Data

DESCRIPTION

The material to be tested consists of photosensitive surfaces to be employed in television imaging devices. This test is applied to a material; however, the physical and chemical properties of the photosensitive material are difficult to separate from a completed component. Therefore, this test may have to be applied at the component level. The purpose of the test is to determine the physical, chemical, and electrical properties of the material when exposed to a space environment either encapsulated or unencapsulated depending upon component design. This test is necessary to confirm advanced TV camera concepts which will be required for observing cloud configurations during nighttime viewing and for narrow spectral band observation. Unencapsulated versions must be placed outside the laboratory so as to observe the various space phenomena on the photosensitive surfaces. Encapsulated versions may be located inside the laboratory to evaluate standard imaging properties. The test period will be of long duration so as to determine reliability and sensitivity improvements. General testing procedures will be to determine the chemical and physical characteristic changes, such as its deterioration and resistivity, due to ultraviolet and other radiations. Unencapsulated test procedures are to be utilized when applicable. Auxiliary equipment will include test module mounting kit, calibrated light source test kit, and testing TV system for evaluation.

JUSTIFICATION

This task is applied to TV detectors that are used on a high-resolution TV system for observing cloud types and patterns, and to a dual-channel TV system to measure the height of cloud tops. It is conducted to determine the effects of radiation, deterioration by space particles, effects of laboratory propulsion exhausts, and zero-g effects on photosensitive surfaces to be employed in television imaging devices.

TASK PARAMETERS

NO. 1534 TITLE Install Experiment Package

INTERRUPTIBLE Yes DURATION (HR) 3 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 3 NO. OF CYCLES 1

PREDECESSOR TASK NO. None

SUCCESSOR TASK NO. AND INITIAL LAG TIME 534, 0 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	66	3	0
1	72	3	0

ELECTRICAL POWER 250 W 3 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 15 LB SHIPPING VOLUME 1 FT^3

EQUIPMENT REQUIRED

ID	NAME
-	Miscellaneous Test Equipment

NO. 534 TITLE Environmental Effects on TV Detectors

INTERRUPTIBLE Yes DURATION (HR) 4 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 120 NO. OF CYCLES 72

PREDECESSOR TASK NO. 1534

SUCCESSOR TASK NO. AND INITIAL LAG TIME 1657, 0.5 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	66	4	0
1	71	4	0

ELECTRICAL POWER 50 W 0.5 HR/CYCLE

2 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3

(See 1534)

EQUIPMENT REQUIRED

ID	NAME

TASK NO. 601 TITLE Determine Characteristics and Verify Cooling Techniques of Infrared and Ultraviolet Detectors

LEVEL Development Test

DESCRIPTION

Infrared and ultraviolet detectors must be tested. The purpose of these tests is to determine operating characteristics and verify cooling techniques employed in space. An integral part of the test is the temperature range required. Cryogenic, radiation, and thermal-electric cooling techniques may be evaluated.

The test will be performed externally. It will be necessary to remove the detectors from storage, mount, align, and shield the instrument. Three samples probably will be required of each detector. They will be assembled in a module which will be inserted in the test instrument, then exposed to calibrated radiation sources. Readout will be automatically recorded within the laboratory. After the calibration test, the detectors will be pointed to observe natural targets.

The equipment necessary to mount the detectors will include a mounting tool kit, recording oscilloscope within the laboratory, a calibrated energy source module, and a temperature evaluation module.

JUSTIFICATION

This task is required to determine the operating characteristics of IR and UV detectors, as they are applied to the specific instruments which use them. The characteristics of these detectors, such as wavelength, sensitivity, frequency response, and how these vary in space will be determined.

Detectors, especially if the application requires a high sensitivity, will require cooling. Cooling may be by cryogenics, radiative techniques, or thermoelectric techniques, or combinations of these techniques.

TASK PARAMETERS

NO. 1601 TITLE Install Experiment Package

INTERRUPTIBLE Yes DURATION (HR) 4 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 4 NO. OF CYCLES 1

PREDECESSOR TASK NO. 501

SUCCESSOR TASK NO. AND INITIAL LAG TIME 1601, 0 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	66	4	0
1	72	4	0

ELECTRICAL POWER 300 W 3 HR/CYCLE

1 HR FROM START OF CYCLE

SHIPPING WEIGHT 1.5 LB SHIPPING VOLUME 0.4 FT^3

EQUIPMENT REQUIRED

ID	NAME
-	Miscellaneous Test Equipment and Samples

NO. 601 TITLE Determine Detector Characteristics, Verify Cooling

INTERRUPTIBLE Yes DURATION (HR) 3 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 168 NO. OF CYCLES 16

PREDECESSOR TASK NO. 1601

SUCCESSOR TASK NO. AND INITIAL LAG TIME 1236, 0 hr; 1239, 0 hr; 1704, 0 hr; 1705, 0 hr; 1719, 0 hr; 1711, 0 hr; 1716, 0 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	66	3	0
1	71	3	0

ELECTRICAL POWER 150 W 3 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3

(See 1601)

EQUIPMENT REQUIRED

ID	NAME

TASK NO. 603 TITLE Determine Characteristics of Photomultipliers

LEVEL Development Test

DESCRIPTION

Three photomultipliers will be contained in a module. A crew member will remove the module from the storage area and mount it in a receptacle located outside the laboratory. After mounting, it will be necessary to expose the photomultiplier tubes to a test module containing calibrated energy sources. Each group of three photomultiplier tubes is to be shielded from all but certain specified radiations. A mounting tool kit, calibrated energy source module, and automatic recording devices on board the laboratory will be required to install and test the tubes.

JUSTIFICATION

Photomultipliers must be tested in this task to obtain operating characteristics of photomultiplier tubes for light-sensitive surfaces. The photomultipliers are employed in dual-channel visible and wide-band radiometers to measure the height of cloud tops; these radiometers will occupy a critical position outside the laboratory.

This task is to determine whether the characteristics of the photomultiplier tubes are as anticipated for operation in an Earth-orbit environment.

TASK PARAMETERS

NO. 1603 TITLE Install Experiment Package

INTERRUPTIBLE Yes DURATION (HR) 3.5 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 3.5 NO. OF CYCLES 1

PREDECESSOR TASK NO. 6

SUCCESSOR TASK NO. AND INITIAL LAG TIME 603, 0 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	66	3.5	0
1	72	3.5	0

ELECTRICAL POWER 400 W 3.5 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 15 LB SHIPPING VOLUME 0.6 FT^3

EQUIPMENT REQUIRED

ID	NAME
-	Miscellaneous Test Equipment
-	Sample Detectors

NO. 603 TITLE Determine Characteristics (of Photomultipliers)

INTERRUPTIBLE Yes DURATION (HR) 0.3 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 168 NO. OF CYCLES 8

PREDECESSOR TASK NO. 1603

SUCCESSOR TASK NO. AND INITIAL LAG TIME 1703, 0.25 hr; 1700, 0.25 hr.

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	66	0.3	0
1	71	0.3	0

ELECTRICAL POWER 200 W 0.3 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3

(See 1603)

EQUIPMENT REQUIRED

ID	NAME

TASK NO. 604 TITLE Verify Lubrication Techniques in an Orbital Environment

LEVEL Development Test

DESCRIPTION

The purpose of this task is to verify lubricant parameters in a space environment. The test is necessary to determine the coefficient of friction, adhesive, and viscosity capabilities when applied to gimbals, bearings, and mounts. The test will be performed outside laboratory on appropriate portions of instruments such as cameras, radiometers, and antennas.

A crew member must apply the lubricants to proper surfaces at time of instrument installation. Measurement of friction and viscosity during installation will be made along with the amount of lubrication applied. The lubricant is to be monitored periodically throughout the duration of the program. Whenever possible, materials are to be retained for more detailed analysis. Equipment necessary to perform this task will include a lubrication applicator, volumetric measurer, viscosity measurement device, coefficient of friction measurement or torque indicator tool, and miscellaneous assembly alignment tools.

JUSTIFICATION

In a space environment or in a zero-g environment, the success of the lubrication qualities and overall effectiveness of lubrication will be determined to a large extent by the design of the bearing and the lubrication methods. Tests will be conducted in a space environment to ensure that the lubrication will remain effective over long periods of time. Lubrication techniques will be tested on virtually all components of instruments utilized on board the laboratory.

TASK PARAMETERS

NO. 1604 TITLE Install Experiment Equipment

INTERRUPTIBLE Yes DURATION (HR) 4 (ON TIME CYCLE)

CYCLE PERIOD (HR) 4 NO. OF CYCLES 1

PREDECESSOR TASK NO. 1, 504

SUCCESSOR TASK NO. AND INITIAL LAG TIME 604, 0 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	66	4	0
1	72	4	0

ELECTRICAL POWER 500 W 4 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 7 LB SHIPPING VOLUME 0.3 FT^3

EQUIPMENT REQUIRED

ID	NAME
-	Miscellaneous Test Equipment
-	Lubricant Samples

NO. 604 TITLE Verify Lubrication Techniques

INTERRUPTIBLE Yes DURATION (HR) 0.25 (ON TIME CYCLE)

CYCLE PERIOD (HR) 168 NO. OF CYCLES 10

PREDECESSOR TASK NO. 1604

SUCCESSOR TASK NO. AND INITIAL LAG TIME 1236, 0 hr; 1239, 0 hr; 1700, 0 hr; 1703, 0 hr; 1704, 0 hr; 1705, 0 hr; 1710, 0 hr; 1711, 0 hr; 1713, 0 hr; 1718, 0 hr; 1719, 0 hr; 1721, 0 hr.

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	66	0.25	0
1	71	0.25	0

ELECTRICAL POWER 375 W 0.25 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3 (See 1604)

EQUIPMENT REQUIRED

ID	NAME

TASK NO.. 608 TITLE Extravehicular Assembly Techniques (Optical Instruments)

LEVEL Development Test

DESCRIPTION

This task is to determine proper techniques for handling refracting and reflecting items. Tests will be conducted inside and outside the laboratory. The test procedure will consist of obtaining the optical elements from storage and mounting them to the various instruments used. An important phase of this task will be the competence of the crew members near the end of their tour of duty.

Proper installation will be verified through the use of calibration instruments so as to ensure that the instruments are properly aligned and tuned. The materials will be retained. Equipment necessary for installation will include an installation assembly tool kit, an alignment kit, and a calibrated energy source.

JUSTIFICATION

Extra and intravehicular assembly techniques are to be examined in this task. The purpose is to determine proper techniques for handling refracting and reflecting items to preserve their optical quality in space environments. The test is necessary because incorrect handling techniques could easily damage the delicate surfaces of the items. In many instances, these instruments will be mounted inside the laboratory. In this case, some type of mirror on the gimbal mount may be employed outside the laboratory to provide the scanning angle required for these instruments. Also, when the instruments are mounted inside the laboratory, optical windows will be required. These windows and mirrors will require great handling care so that their optical qualities will be maintained and special techniques may be required. This could pose some definite problems in extravehicular assembly techniques.

TASK PARAMETERS

NO. 1608 TITLE Install Experiment Package

INTERRUPTIBLE Yes DURATION (HR) 4 (ON TIME CYCLE)

CYCLE PERIOD (HR) 4 NO. OF CYCLES 3

PREDECESSOR TASK NO. 6

SUCCESSOR TASK NO. AND INITIAL LAG TIME 608, 0 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	60	4	0
1	66	4	0
1	67	4	0

ELECTRICAL POWER 1,000 W 4 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 20 LB SHIPPING VOLUME 1 FT^3

EQUIPMENT REQUIRED

ID	NAME
-	Miscellaneous Installation and Test Equipment

NO. 608 TITLE Extravehicular Assembly Techniques

INTERRUPTIBLE Yes DURATION (HR) 3 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 720 NO. OF CYCLES 2

PREDECESSOR TASK NO. 1608

SUCCESSOR TASK NO. AND INITIAL LAG TIME 1236, 0 hr; 1239, 0 hr; 1700, 0 hr; 1703, 0 hr; 1704, 0 hr; 1705, 0 hr; 1710, 0 hr; 1711, 0 hr; 1716, 0 hr; 1718, 0 hr; 1719, 0 hr; 1721, 0 hr.

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	60	3	0
1	66	3	0
1	67	3	0

ELECTRICAL POWER 200 W 1.5 HR/CYCLE

1.5 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3 (See 1608)

EQUIPMENT REQUIRED

ID	NAME

TASK NO. 613 TITLE Evaluate Photomultiplier Detectors

LEVEL Development Test

DESCRIPTION

The test will be conducted inside the laboratory. It will be necessary to obtain the photomultiplier tube from storage and, after insertion of the proper filters, to align and tune the photomultiplier to the pulsed searchlight. Recording of the photomultiplier output will concern proper alignment which will aid in determining the signal-to-noise ratio. After the initial installation and alignment procedures, the test will be automatic. However, the installation and alignment techniques will initially require two men. The test should be repeated as atmospheric conditions on Earth change. The equipment necessary to conduct these tests will include a recording oscilloscope, photomultiplier tube-calibration kit, alignment instrumentation, meters, and various hand tools.

JUSTIFICATION

This task is to be applied to a photomultiplier detector for a pulsed searchlight and detector that is used to measure the height of cloud tops and measure atmospheric pressure. Photomultiplier signal-to-noise ratio is to be determined in this test. The pulsed searchlight normally operates at visible frequencies and therefore would normally be restricted to operation at night. There is a possibility that an absorption line of the solar spectrum could be used for daytime operation and, with the photomultiplier detector tuned to this absorption line, the searchlight could be used during daylight with little interference. The purpose of the test is to verify the selective wavelengths and filters against background ambient light. This test is necessary to determine the feasibility of utilizing a spectrum absorption line of a solar spectrum during daylight. This will be a new concept and will require verification in space. The second part of the task would be to determine the background noise level caused by the residual ambient skylight that has not been filtered out. This task also includes evaluation of the filters that will be used to accomplish this task.

TASK PARAMETERS

NO. 1613 TITLE Install Experiment Package

INTERRUPTIBLE Yes DURATION (HR) 3 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 3 NO. OF CYCLES 1

PREDECESSOR TASK NO. None

SUCCESSOR TASK NO. AND INITIAL LAG TIME 613, 0 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	66	3	0
1	72	3	0

ELECTRICAL POWER 500 W 3 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 20 LB SHIPPING VOLUME 1 FT^3

EQUIPMENT REQUIRED

ID	NAME
1	Miscellaneous Test Equipment and Samples

NO. 613 TITLE Evaluate Photomultiplier Detectors

INTERRUPTIBLE Yes DURATION (HR) 0.3 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 4 NO. OF CYCLES 6

PREDECESSOR TASK NO. 1613

SUCCESSOR TASK NO. AND INITIAL LAG TIME None

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	66	0.3	0
1	71	0.3	0

ELECTRICAL POWER 200 W 0.3 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3 (See 1613)

EQUIPMENT REQUIRED

ID	NAME

TASK NO. 614 TITLE Verify Space Assembly Boresight and Alignment Techniques -- Large Mirror

LEVEL Development Test

DESCRIPTION

Assembly procedures for mirrors, gimballed mounts, boresighting and alignment of mirrors will be examined in this task. The test will be located both inside and outside the laboratory. It will be necessary for two crew members to obtain the mirror and gimballed assemblies and mount them on the proper receptacle. After mounting, the crew members will perform alignment tests to ensure proper assembly. The mirror will also be checked with boresighting and alignment checks. The materials are to be retained. The equipment necessary to perform the task will include mounting tools and alignment instruments, boresighting modules, oscilloscopes, and cameras.

JUSTIFICATION

This task pertains to mirrors which are used in a pulsed searchlight and detector which is used for measuring height of cloud tops and atmospheric pressure. This task is similar to other extravehicular tasks which involve the space assembly technique. The mirrors are large and bulky and may be difficult to mount and align correctly. Because these highly directive mirrors have a narrow field of view, the two mirrors must be aligned accurately, one with the other. If the searchlight mirror does not shine upon the same area of the Earth that is being scanned by the detector mirror, proper signal response will not result. Therefore, the prime task is to determine how accurately two mirrors can be aligned or boresighted to the same pointing direction.

TASK PARAMETERS

NO. 1614 TITLE Install Experiment Package

INTERRUPTIBLE Yes DURATION (HR) 4 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 4 NO. OF CYCLES 4

PREDECESSOR TASK NO. 510

SUCCESSOR TASK NO. AND INITIAL LAG TIME 614, 0 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	60	4	0
1	66	4	0
1	67	4	0

ELECTRICAL POWER 1,000 W 3 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 200 LB SHIPPING VOLUME 10 FT^3

EQUIPMENT REQUIRED

ID	NAME
-	Miscellaneous Test and Installation Equipment
-	Two 7-ft diameter mirrors

NO. 614 TITLE Verify Space Assembly Techniques

INTERRUPTIBLE Yes DURATION (HR) 2 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 2 NO. OF CYCLES 2

PREDECESSOR TASK NO. 1614

SUCCESSOR TASK NO. AND INITIAL LAG TIME None

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	60	2	0
1	66	2	0
1	67	2	0

ELECTRICAL POWER 200 W 2 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3 (See 1614)

EQUIPMENT REQUIRED

ID	NAME

TASK NO. 615 TITLE Determine Radiation Effects on Discharge Tube Characteristics

LEVEL Development Test

DESCRIPTION

A discharge tube is to be tested outside the laboratory. It will be necessary for one crew member to obtain the discharge tube and direct its radiation towards a calibrating photomultiplier tube. The duration of the flash as a function of voltage applied must be recorded and analyzed. The photomultiplier tube output must also be recorded and analyzed to determine the band width as observed through various filters. Materials are to be retained. The equipment required will be optical filters, recording oscilloscope, various standard meters, and the general analytical instruments available on board the laboratory.

JUSTIFICATION

This task applies to a discharge tube which serves as a pulsed light source for a pulsed searchlight and detector, which is an instrument used to measure the height of cloud tops and atmospheric pressure. The pulsed light source is a high-intensity pulse of a short duration. The pulse of light is currently conceived as being generated by storing a large amount of energy in a capacitor or other storage device and then suddenly discharging it across a spark gap. The amount of energy that is released depends upon the voltage at the initiation of the discharge. If the MORL vehicle happens to be in radiation environment, and the gas within the discharge is partially ionized, the discharge tube characteristics may be altered and the characteristics or magnitude of the light output may be affected. These effects could alter the intensity of the pulse and consequently alter the ability of the detectors to see the light that is reflected back from this lower intensity pulse. The purpose of the test is to verify radiation specifications in space during operation in a typical radiation environment.

TASK PARAMETERS

NO. 1615 TITLE Install Experiment Package

INTERRUPTIBLE Yes DURATION (HR) 3.5 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 3.5 NO. OF CYCLES 1

PREDECESSOR TASK NO. None

SUCCESSOR TASK NO. AND INITIAL LAG TIME 615, 0 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	66	3.5	0
1	72	3.5	0

ELECTRICAL POWER 1,000 W 3.5 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 5 LB SHIPPING VOLUME 2 FT^3

EQUIPMENT REQUIRED

ID	NAME
-	Miscellaneous Test Equipment

NO. 615 TITLE Determine Radiation Effects on Discharge Tube

INTERRUPTIBLE Yes DURATION (HR) 0.3 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 0.6 NO. OF CYCLES 5

PREDECESSOR TASK NO. 1615

SUCCESSOR TASK NO. AND INITIAL LAG TIME None

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	66	0.3	0
1	71	0.3	0

ELECTRICAL POWER 1,000 W 0.3 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3

(See 1615)

EQUIPMENT REQUIRED

ID	NAME

TASK NO. 616 TITLE Verify Space Assembly and Alignment Techniques — Lidar Detection Mirror

LEVEL Development Test

DESCRIPTION

Assembly techniques are to be tested during this task. The purpose is to verify space assembly procedures for erecting and mounting a 7-ft mirror and aligning the mirror with a laser beam in space environment. The test will be conducted outside the laboratory. It will be necessary for the first test to retrieve the mirror from the storage area. Two crew members will be required to assemble, erect, and mount the mirror on gimbal mounts. Then, the two crew members will move the mirror to the gimbal mount site and align the mirror to within 20 to 30 sec of arc of a specified target. Verification or rejection of the alignment will be obtained through readout equipment located inside the laboratory. The alignment procedure will require the utilization of laser photographic techniques and a ground base target. A mounting tool kit, alignment tool kit, and laser instrumentation, plus aligning camera module, will also be required.

JUSTIFICATION

This task will utilize a mirror approximately 7 ft in diameter mounted or used in a Lidar which may be used to measure the height of cloud tops, atmospheric pressure, and sea state.

GENERAL COMMENTS

Task 616 is similar to Task 614 which pertains to the pulsed searchlight and detector. The primary difference is that a single spectral line of visible radiation is used as a pulse laser rather than the broader spectrum of visible energy used by the pulsed searchlight. In this case, only one mirror is involved since the laser itself provides a narrow beam width.

As with the pulse searchlight, accurate alignment of the laser with the detector mirror is necessary. However, the accuracy does not have to be as great because the laser beam illuminates an area which is only a small part of the area viewed by the detection mirror. Therefore, the laser energy will be returned if it falls somewhere within the detection circle of the mirror.

TASK PARAMETERS

NO. 1616 TITLE Install Experiment Package

INTERRUPTIBLE Yes DURATION (HR) 4 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 4 NO. OF CYCLES 4

PREDECESSOR TASK NO. 510

SUCCESSOR TASK NO. AND INITIAL LAG TIME 616, 0 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	60	4	0
1	66	4	0
1	72	4	0

ELECTRICAL POWER 1,000 W 4 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 100 LB SHIPPING VOLUME 15 FT^3

EQUIPMENT REQUIRED

ID	NAME
-	Miscellaneous Test and Installation Equipment
-	One 7-ft diam Mirror
-	Laser Signal Generator

NO. 616 TITLE Verify Space-Assembly and Alignment Techniques

INTERRUPTIBLE Yes DURATION (HR) 0.5 (ON TIME CYCLE)

CYCLE PERIOD (HR) 168 NO. OF CYCLES 2

PREDECESSOR TASK NO. 1616

SUCCESSOR TASK NO. AND INITIAL LAG TIME 246, 0.5 hr; 617, 0 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	60	0.5	0
1	66	0.5	0
1	71	0.5	0

ELECTRICAL POWER 2,000 W 0.5 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3 (See 1616)

EQUIPMENT REQUIRED

ID	NAME

TASK NO. 617 TITLE Evaluate Pulsed Laser Excitor Tube in the Orbital Environment

LEVEL Development Test

DESCRIPTION

Laser functions are to be tested in this task. The purpose of the test is to determine radiation effects on pulse-laser excitor tube. Its signal-to-noise ratio, beam width, and frequencies for night and day operation must be determined. The test will be conducted outside the laboratory. It will be necessary for one crew member to obtain the laser instrumentation from the storage area and mount it on a site located on the structure of the laboratory. Measurements will then be made of the ambient radiation level, pulse duration, and intensities. The returned beam-width diameter will be measured by moving the photomultiplier tube test module to the extremities of the beam cross-sectional area. Signal-to-noise ratio is to be determined inside the laboratory. Equipment will include a mounting tool kit, alignment tool kit, photomultiplier test module, and recording instrumentation on board the laboratory.

JUSTIFICATION

This task is applied to a pulsed laser which is employed in the Lidar system used to measure the height of cloud tops and atmospheric pressure. If the MORL is in a radiation environment, it may be that the ionization characteristics of the excitor tube may be affected, and part of this task will be to determine whether or not those effects are detrimental to the operation of the laser. As in the pulsed searchlight and detector, it may be necessary to determine laser frequencies that will permit both day and night operation. Because of the differences between the beam width of the detection mirror and the beam width of the laser transmitter, it may be desirable to alter the output beam width of the laser.

TASK PARAMETERS

NO. 617 TITLE Evaluate Pulsed Laser Excitor Tube

INTERRUPTIBLE Yes DURATION (HR) 0.25 (ON TIME CYCLE)

CYCLE PERIOD (HR) 3 NO. OF CYCLES 10

PREDECESSOR TASK NO. 616

SUCCESSOR TASK NO. AND INITIAL LAG TIME 246, 0.25 hr

NO. OF MEN	SKILL ID	HR CYCLE	HR FROM START OF CYCLE
1	66	0.25	0
1	71	0.25	0

ELECTRICAL POWER 2,000 W 0.25 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3 (See 1616)

EQUIPMENT REQUIRED

ID	NAME
14	Lidar

TASK NO. 619 TITLE Determine Characteristics and Verify Cooling Techniques — Detectors for Visible Radiometers

LEVEL Development Test

DESCRIPTION

The test will be conducted outside the laboratory. Cryogenic, radiation, and thermal electric cooling techniques must be applied and evaluated to ensure that the desired temperature has been achieved. It will be necessary for one crew member to obtain the detectors from the storage area and to mount them in a shielded module so that all extraneous radiation will not be interfering with the test. The mounting unit will provide cooling instrumentation and a calibrated light source. Readout will take place in the laboratory and will be continuously monitored.

JUSTIFICATION

This task applies to detectors that are used in dual-channel and wide-band visible radiometers which are used for measuring solar backscattering radiation and height of cloud tops and on a polarimeter that is used to measure phase of cloud hydrometeors. This task will test the detector characteristics during specified cooling procedures. The purpose of the task is to verify whether or not the cooling technique is functioning properly. It is necessary to conduct the test to ensure spectral response and sensitivity of the detector. The determination of the temperature range that will be required is an integral part of the test.

TASK PARAMETERS

NO. 1619 TITLE Install Experiment Package

INTERRUPTIBLE Yes DURATION (HR) 4 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 4 NO. OF CYCLES 8

PREDECESSOR TASK NO. None

SUCCESSOR TASK NO. AND INITIAL LAG TIME 619, 0 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	60	4	0
1	66	4	0
1	72	4	0

ELECTRICAL POWER 500 W 2.5 HR/CYCLE

1.5 HR FROM START OF CYCLE

SHIPPING WEIGHT 10 LB SHIPPING VOLUME 0.5 FT^3

EQUIPMENT REQUIRED

ID	NAME
-	Miscellaneous Test Equipment
-	Sample Detectors

NO. 619 TITLE Determine Characteristics and Cooling — Visible Radiometer Detectors

INTERRUPTIBLE Yes DURATION (HR) 0.5 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 24 NO. OF CYCLES 10

PREDECESSOR TASK NO. 1619

SUCCESSOR TASK NO. AND INITIAL LAG TIME 1700, 0 hr; 1703, 0.25 hr; 1710, 0 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	66	0.5	0
1	71	0.5	0

ELECTRICAL POWER 200 W 0.25 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3 (See 1619)

EQUIPMENT REQUIRED

ID	NAME

TASK NO. 623 TITLE Evaluate Microwave Radiometer Components

LEVEL Development Tests

DESCRIPTION

Microwave radiometer performance will be tested in this task. The instrument will be located outside the laboratory. A crew member will obtain the radiometer from a storage area and mount it on a support outside the laboratory. Results will be recorded and readout will be made inside the laboratory where signal-to-noise ratios will be determined. Space and environmental effects are to be noted as a phenomenon occurs. Readings of temperature standards must be made periodically to ensure proper overall function. Known microwave radiations from specific locations will be read periodically to determine repeatability of the instrument. Installation equipment, alignment equipment, and a portable microwave energy source will be required.

JUSTIFICATION

This task applies to the microwave radiometer used for the purpose of measuring atmospheric humidity. This application of the microwave radiometer requires obtaining radiometric measurements at several microwave frequencies while the antenna of the instrument is scanned in a vertical plane, forward along the flight path of the MORL vehicle. Humidity data are determined through a mathematical procedure which relates the several simultaneous measurements at each of several pointing angles.

Since this new technique is in a development phase, it will be necessary to determine the proper angles at which the various readings should be made. Since microwave radiometers usually have integration times on the order of 1 sec, the spacing of sequential groups of readings may determine the accuracy with which the mathematical procedures will interpret the data in terms of humidity. Therefore, a period of trial and error will be necessary.

Measurements over known areas will be taken and work will be performed with the data obtained. While a microwave radiometer is being used, periodic readings of a reference temperature standard must be made. Also, each instrument channel must be calibrated before and after each group of measurements are made. Therefore, this task really relates to developing the proper procedures to be used in calibrating the instruments and using the reference temperature standards, as well as the establishing pointing angle stabilization techniques and data rates for the humidity measuring experiment.

TASK PARAMETERS

NO. 1623 TITLE Install Experiment Package

INTERRUPTIBLE Yes DURATION (HR) 2.5 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 4 NO. OF CYCLES 8

PREDECESSOR TASK NO. 18

SUCCESSOR TASK NO. AND INITIAL LAG TIME 623, 0 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	66	2.5	0
1	72	2.5	0

ELECTRICAL POWER 500 W 2.5 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 20 LB SHIPPING VOLUME 2 FT^3

EQUIPMENT REQUIRED

ID	NAME
-	Miscellaneous Test Equipment

NO. 623 TITLE Evaluate Microwave Radiometer Components

INTERRUPTIBLE Yes DURATION (HR) 0.5 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 168 NO. OF CYCLES 20

PREDECESSOR TASK NO. 1623

SUCCESSOR TASK NO. AND INITIAL LAG TIME 1236, 0.25 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	66	0.5	0
1	71	0.5	0

ELECTRICAL POWER 250 W 0.3 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3 (See 1623)

EQUIPMENT REQUIRED

ID	NAME

TASK NO. 634 TITLE Evaluate Radar Components

LEVEL Development Tests

DESCRIPTION

Radar operation is to be tested in this task. The purpose of the task is to determine space environment effects on tuning, adjusting, aligning, and operating a radar from an orbiting laboratory. The test is necessary because radar instruments will be highly complex and critical. The test will be located outside and inside the laboratory. Three crew members will be necessary to procure the radar instrumentation from the storage area. Assembling, aligning, and adjusting the instrument will require portable signal generators. Meters, oscilloscopes, and visual-display radar screens will be operated within the laboratory. Specific targets will be used to determine the characteristics of these instruments as observed by the radar and to determine the ability of the radar to lock on to the target. An alignment tool kit, oscilloscope, various meters, and a calibrated signal generator will be required.

JUSTIFICATION

This task pertains to radar in K and C bands, one of which may be used for range measurements. Involved in this task are tuning, adjusting, aligning, maintaining, and operating a radar from a space vehicle. The radar may be considered a complex component consisting of transmitter, receiver, antenna controls, and visual displays. In the case of K-band radar, it is foreseen that different frequencies within the K-band region may be required to operate upon different types of targets. This is because the K-band frequency region is an area containing both atmospheric transmission and nonatmospheric transmission bands. Therefore, a frequency used to observe the ground may not be the proper frequency when observing clouds.

Because of the complexity of the radar, it is foreseen that the operating personnel will require the use of signal generators, oscilloscopes, and other meters to align and adjust and keep the radar in operating condition. It will be necessary to determine the ability of the radar to acquire and lock on targets from a space vehicle. The measurement of wind, as presently conceived, involves the detection and tracking of balloons which may be instrumented to measure meteorological parameters. These balloons must be tracked and interrogated by the radar. The approximate balloon location must be known and then a suitable radar search pattern must be applied which will detect the presence of the balloon, lock on, and continue to track it. This must be done in the presence of large ground based reflective targets which may be at the same detection range as the balloon, or even closer depending upon the pointing angle of the radar. The problem will be to ensure that the radar maintains its range gate locked on to the desired target and not upon some other ground target which appears to be larger at the time. This may require a transponder on the balloon which responds at a frequency offset from the radar frequency.

The radar operator may have to vary the radar's operating parameters to make it function properly. The radar antenna must move in a scan pattern to acquire the target. It may well be that reaction torques will be set up which cause the MORL attitude-control system to respond. In this case, the two systems may oppose each other and it may be difficult to aim at, and lock onto, the target.

TASK PARAMETERS

NO. 1634 TITLE Install Experiment Package

INTERRUPTIBLE Yes DURATION (HR) 4 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 4 NO. OF CYCLES 18

PREDECESSOR TASK NO. None

SUCCESSOR TASK NO. AND INITIAL LAG TIME 634, 0hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	60	4	0
1	66	4	0
1	72	4	0

ELECTRICAL POWER 1,000 W 3 HR/CYCLE

1 HR FROM START OF CYCLE

SHIPPING WEIGHT 200 LB SHIPPING VOLUME 20 FT^3

EQUIPMENT REQUIRED

ID	NAME
- B	Miscellaneous Test and Installation Equipment Radar

NO. 634 TITLE Evaluate Radar Components

INTERRUPTIBLE Yes DURATION (HR) 1 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 168 NO. OF CYCLES 30

PREDECESSOR TASK NO. 1634

SUCCESSOR TASK NO. AND INITIAL LAG TIME 1226, 0.5 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	60	1	0
1	66	1	0
1	71	1	0

ELECTRICAL POWER 600 W 1 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3 (See 1634)

EQUIPMENT REQUIRED

ID	NAME
B	Radar

TASK NO. 639 TITLE Determine Platform Stabilization Characteristics

LEVEL Development Test

DESCRIPTION

Gyro characteristics are to be examined. The purpose of the test is to determine stability or attitude control of dual-star trackers for space environment. Because of the highly critical and accurate measurements required of this instrument, the test will be conducted outside and inside the laboratory. The track assembly will be mounted prior to launch and prepared for operational tests by removing protective covers and tie-down restraints. The tracking mode will be programmed. Two crew members will activate the instrument by switch and point the tracker in the general direction of simulated star pattern. The equipment necessary will be a simulated star pattern module, a vibration recorder, and recording instrumentation located inside the laboratory.

JUSTIFICATION

This task is applied to gyros which are used in a dual-star tracker for measuring atmospheric pressure and atmospheric temperature.

A stable platform, or at least a platform of known characteristics, will be required to obtain accurate measurements with the dual-star tracker. Stabilization or attitude control may be sufficient. However, if stabilization or attitude control is insufficient, local stabilization of the dual-star tracker may be required. Nevertheless, the characteristics of the stabilization or attitude control of the platform must be known.

TASK PARAMETERS

NO. 1639 TITLE Install Platform

INTERRUPTIBLE Yes DURATION (HR) 3.5 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 3.5 NO. OF CYCLES 2

PREDECESSOR TASK NO. 523

SUCCESSOR TASK NO. AND INITIAL LAG TIME 639, 0 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	66	3.5	0
1	72	3.5	0

ELECTRICAL POWER 500 W 2.5 HR/CYCLE

1 HR FROM START OF CYCLE

SHIPPING WEIGHT 10 LB SHIPPING VOLUME 0.5 FT^3

EQUIPMENT REQUIRED

ID	NAME
-	Miscellaneous Test Equipment
-	Stable Platform

NO. 639 TITLE Determine Platform Stabilization Characteristics

INTERRUPTIBLE Yes DURATION (HR) 0.5 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 96 NO. OF CYCLES 5

PREDECESSOR TASK NO. 1639

SUCCESSOR TASK NO. AND INITIAL LAG TIME 1713, 0.25 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	66	0.5	0
1	71	0.5	0

ELECTRICAL POWER 200 W 0.5 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3

(See 1639)

EQUIPMENT REQUIRED

ID	NAME

TASK NO. 640 TITLE Intravehicular and Extravehicular Assembly Techniques -- Star Tracker Components

LEVEL Development Test

DESCRIPTION

Because of the accuracies required of star trackers, this will be a highly critical test. The tests will be conducted outside and inside the laboratory. The star tracker will be retrieved from the storage area along with associated instrumentation. It will be assembled and tested inside the laboratory and then later re-assembled, mounted, and tested externally. The tests will utilize a simulated star pattern module. Two crew members will be required for this operation. An assembly tool kit will be necessary to install the star tracker, and a star-pattern simulation module will be necessary to check the function of the tracker.

JUSTIFICATION

This task is applied to optical, electronic, and mechanical components that are used in a dual-star tracker for measuring atmospheric pressure and atmospheric temperature. This task requires development of intravehicular and extravehicular assembly techniques of optical, electronic, and mechanical components that are to be used in the dual-star tracker. The dual-star tracker requires precision optical, electronic, and mechanical components in its assembly, and handling of these components in space will require special assembly techniques, tools, etc. These skills can be developed in space. Also, pointing accuracies of the dual-star tracker will be tested.

TASK PARAMETERS

NO. 1640 TITLE Install Experiment Package

INTERRUPTIBLE Yes DURATION (HR) 3.5 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 3.5 NO. OF CYCLES 2

PREDECESSOR TASK NO. None

SUCCESSOR TASK NO. AND INITIAL LAG TIME 640, 0 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	66	3.5	0
1	72	3.5	0

ELECTRICAL POWER 500 W 3.5 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 65 LB SHIPPING VOLUME 3.2 FT^3

EQUIPMENT REQUIRED

ID	NAME
-	Miscellaneous Test Equipment
-	Star Tracker

NO. 640 TITLE Intravehicular and Extravehicular Assembly Techniques

INTERRUPTIBLE Yes DURATION (HR) 0.5 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 120 NO. OF CYCLES 3

PREDECESSOR TASK NO. 1640

SUCCESSOR TASK NO. AND INITIAL LAG TIME 1713, 0.25 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	66	0.5	0
1	71	0.5	0

ELECTRICAL POWER 200 W 0.5 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3

(See 1640)

EQUIPMENT REQUIRED

ID	NAME
-	Star Tracker

TASK NO. 657 TITLE Determine Characteristics of Television Detectors

LEVEL Development Test

DESCRIPTION

Television light sensitive surfaces will be tested in this task. The test will take place outside the laboratory. One crew member will obtain the television test module from the storage area and mount the module on the laboratory support structure. Alignment and adjustment will be obtained by directing the camera to a high-resolution test module, with the result being recorded on a laboratory instrument. The equipment necessary will be instrument mounting tool kit, instrument aligning tool kit, and high-resolution television target.

JUSTIFICATION

This task applies to TV detectors that are employed in a high-resolution TV system for determining or observing cloud types and patterns, and is used in a dual-channel TV system to measure the height of cloud tops. It is possible that these detectors will not be ordinary vidicon or image orthicon detectors but instruments that will advance the state of the art. The general effects of either radiation or magnetic fields, different in orbit than that on Earth, could upset the high-precision linearity required in these detectors. Also, it is possible in the case of a high-resolution TV system that an infrared sensitive device will be used and the operating characteristics of these detectors should be proved on an orbiting vehicle.

TASK PARAMETERS

NO. 1657 TITLE Install Experiment Package

INTERRUPTIBLE Yes DURATION (HR) 3.5 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 3.5 NO. OF CYCLES 1

PREDECESSOR TASK NO. 534

SUCCESSOR TASK NO. AND INITIAL LAG TIME 657, 0 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	66	3.5	0
1	72	3.5	0

ELECTRICAL POWER 500 W 3.5 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 150 LB SHIPPING VOLUME 6 FT^3

EQUIPMENT REQUIRED

ID	NAME
-	Miscellaneous Test and Installation Equipment
-	Sample TV Detectors
-	TV System Components

NO. 657 TITLE Determine Characteristics of TV Detectors

INTERRUPTIBLE Yes DURATION (HR) 0.5 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 72 NO. OF CYCLES 3

PREDECESSOR TASK NO. 1657

SUCCESSOR TASK NO. AND INITIAL LAG TIME 1718, 0.5 hr; 1721, 0 hr; 1659, 0 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	66	0.5	0
1	71	0.5	0

ELECTRICAL POWER 500 W 0.5 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3 (See 1657)

EQUIPMENT REQUIRED

ID	NAME
10	TV System

TASK NO. 659 TITLE Determine Characteristics of Zoom Lenses

LEVEL Development Test

DESCRIPTION

Zoom lens focusing and mechanical movements are to be tested in this task. One member of the crew will remove the lens from the storage area and mount it on a TV camera. A resolution target will be presented beyond the designed infinity distance for that lens. Automatic recording of the image will take place inside the laboratory while the crew member outside the laboratory places the target at various distances. Resolution targets, instrument assembly kit, assembly kit, and instrument alignment kit will be required. An image recording device will also be required inside the laboratory.

JUSTIFICATION

This task applies to zoom lenses that are to be employed on a high-resolution TV system used to observe cloud types and patterns, and on a dual-channel TV system which is used to obtain height of cloud tops. Basic operating characteristics of zoom lenses are of two different types. One type relates to the resolution or imaging qualities as a function of focal lengths, and the other type relates to the accuracy of the mechanical motions and calibration of these lenses. This task is to determine and evaluate these characteristics in a space environment.

TASK PARAMETERS

NO. 1659 TITLE Install Zoom Lens

INTERRUPTIBLE Yes DURATION (HR) 3 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 3 NO. OF CYCLES 1

PREDECESSOR TASK NO. 1 and 657

SUCCESSOR TASK NO. AND INITIAL LAG TIME 659, 0 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	66	3	0
1	72	3	0

ELECTRICAL POWER 500 W 3 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 10 LB SHIPPING VOLUME 0.3 FT^3 (See 1657)

EQUIPMENT REQUIRED

ID	NAME
10	TV System
-	Sample Zoom Lenses
-	Miscellaneous Test and Assembly Equipment

NO. 659 TITLE Determine Characteristics of Zoom Lens

INTERRUPTIBLE Yes DURATION (HR) 0.5 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 168 NO. OF CYCLES 3

PREDECESSOR TASK NO. 1659

SUCCESSOR TASK NO. AND INITIAL LAG TIME 1718, 0.5 hr; 1721, 0 hr

NO. OF MEN	SKILL ID	HR CYCLE	HR FROM START OF CYCLE
1	66	0.5	0
1	71	0.5	0

ELECTRICAL POWER 500 W 0.3 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 0 LB SHIPPING VOLUME 0 FT^3 (See 1659)

EQUIPMENT REQUIRED

ID	NAME
10	TV System

TASK NO. 673 TITLE Determine Optimum Parameters for Sferics Detection

LEVEL Development Test

DESCRIPTION

Tests will be run using a standard radio receiver to determine the optimum frequency for reception of sferics (RF emissions caused by lightning). Since reception will probably be in the 100 mc/sec frequency, narrow beam directional antennas would have to be large, on the order of hundreds of feet in diameter. Therefore, various techniques will have to be investigated for location of lightning discharges, possibly involving optical techniques.

Other problems involve:

1. Lightning's RF signature characteristics determination--power, envelope duration, pulse characteristics, etc.
2. Environmental noise--terrestrial and extraterrestrial.
3. Propagation of the signal through the atmosphere and ionosphere.
4. The climatological aspects of the density of thunderstorms to be expected within the antenna pattern and the frequency of lightning strokes from a thunderstorm cell.

Sferics reception will have to be collated with ground observations of thunderstorm and lightning activity.

JUSTIFICATION

This task applies to a directional sferics receiver which is used to count, measure the strength of, and locate atmospheric electrical discharges. It will be necessary to conduct experimentation on various methods for locating and measuring lightning discharges.

TASK PARAMETERS

NO: 673 TITLE Determine Optimum Parameters for Sferics Detection

INTERRUPTIBLE Yes DURATION (HR) 1 (ON TIME/CYCLE)

CYCLE PERIOD (HR) 24 NO. OF CYCLES 20

PREDECESSOR TASK NO. None

SUCCESSOR TASK NO. AND INITIAL LAG TIME 1723, 2160 hr

NO. OF MEN	SKILL ID	HR/CYCLE	HR FROM START OF CYCLE
1	62	1	0

ELECTRICAL POWER 30 W 1 HR/CYCLE

0 HR FROM START OF CYCLE

SHIPPING WEIGHT 20 LB SHIPPING VOLUME 1 FT^3

EQUIPMENT REQUIRED

ID	NAME
19	Camera
--	Radio Receiver