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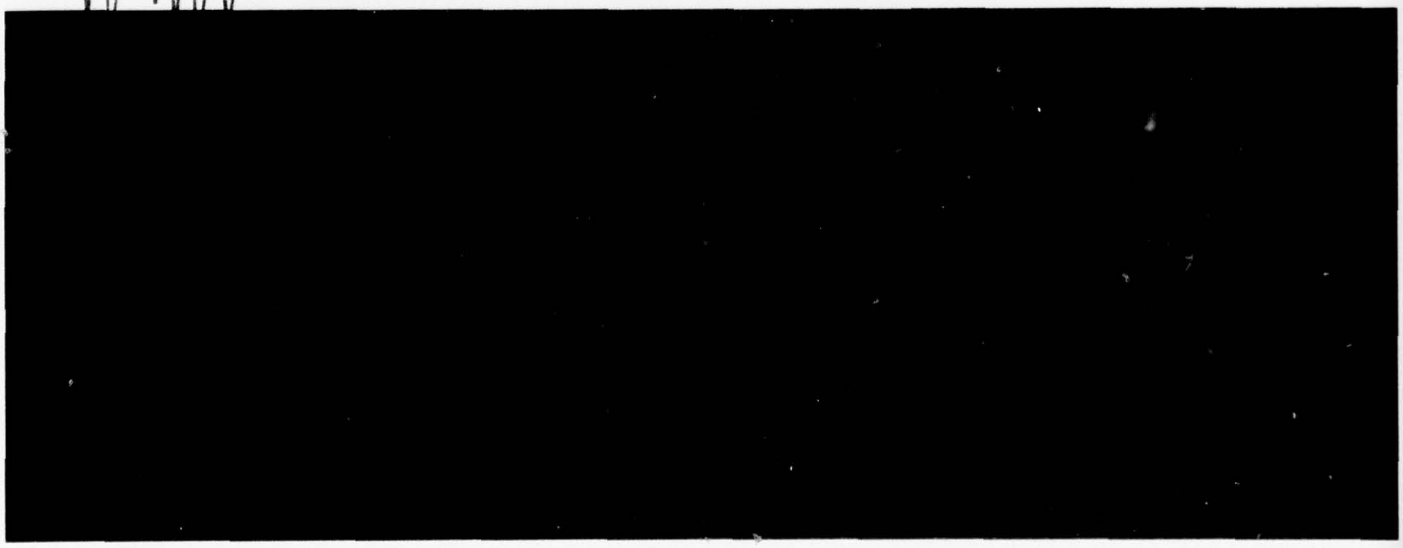
FINAL REPORT

AN/SPS-57 RADAR IMPROVEMENT PROGRAM, PHASE II

February 1977

Prepared for
U.S. COAST GUARD
400 7TH STREET, N.W.
WASHINGTON, D. C. 20590
under Contract DOT-CG-52488-A

ARINC RESEARCH CORPORATION



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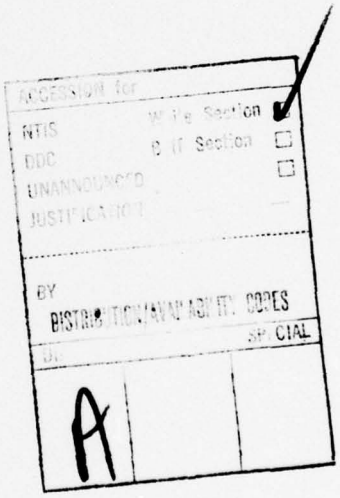

ABSTRACT

For several years the U.S. Coast Guard has been investigating problems associated with the AN/SPS-57 radar and developing corrective actions. ARINC Research Corporation was contracted to support this improvement program through a two-phase effort. In Phase I, problem areas were identified and solutions suggested; in Phase II, ARINC Research developed a series of modifications and repair procedures for the radar Antenna Unit.

This report describes the Phase II effort, including the modifications to the Antenna Unit and the associated verification tests. This report also includes an exhibit which the Coast Guard can use to prepare modification kits and a Field Change Bulletin.

SUMMARY

On the basis of the previously documented Phase I investigation of the AN/SPS-57 radar by ARINC Research Corporation, the Coast Guard selected the antenna/pedestal modifications and repair procedure preparation for accomplishment in the ARINC Research Phase II effort. Phase II, described in this report, consisted of a five-man-month effort during the period February 1976 to February 1977, under Coast Guard Contract DOT-CG-52488-A.

The Phase I effort identified potential corrective actions requiring further specific assessment and refinement prior to application as Coast Guard field changes. In Phase II, ARINC Research considered each of six specific antenna modifications, prepared appropriate modification kit items for Coast Guard use in implementing the changes, modified and laboratory-tested a prototype Antenna Unit, and monitored the field installation and limited operational test of two prototype kits. As part of the preparation of the modification kit information, repair procedures were prepared to standardize the antenna repair process.

This report includes all data necessary for Coast Guard preparation of an Electronic Field Change Bulletin and a Type I Field Change Kit. Drawings for modification items that are not standard commercial items or are not part of the Coast Guard supply stock were submitted separately. Reduced-size reproductions of the drawings are provided in the Attachment to this report.

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CONTENTS (continued)

CHAPTER ONE

INTRODUCTION

1.1 BACKGROUND

The AN/SPS-57 radar was designed by Ridge Electronics Corporation for use by the U.S. Coast Guard for surface search and navigation, primarily on search and rescue craft. Problems with the radar dictated the initiation of a problem identification and correction program by the Coast Guard, and ARINC Research Corporation was contracted to support this effort through a two-phase program. Phase I consisted of problem assessment, and this work was documented in an earlier ARINC Research report, Publication 1159-01-1-1419. As a result of the Phase I effort, some Coast Guard-identified problems were confirmed and a number of additional problem areas identified.

The Phase I report described problems in the Antenna (Unit 1), Receiver-Transmitter (Unit 2), Control Indicator (Unit 3), Power Supply (Unit 4), and a general category. Following a review of the identified problems and recommendations for possible solutions, the Coast Guard tasked ARINC Research Corporation to address the Antenna Unit problems. They tasked their Wildwood Engineering Center, which had previously undertaken AN/SPS-57 problems correction, to address the Receiver-Transmitter, Control Indicator, and Power Supply problem areas.

The ARINC Research Phase II effort was directed at an in-depth assessment of several identified antenna problems and appropriate refinements. This effort also included documentation required for preparation of a Field Change Bulletin.

1.2 APPROACH

The Phase II effort consisted of three tasks including modifications, revised inspection and repair standards, and testing. Task 1 addressed six specific Antenna Unit modifications proposed in Phase I. These modifications were completely developed and evaluated and, where the modifications proved to be feasible, prototypes were tested. The six-part Task 1 effort was as follows:

- Task 1.1: Shaft Seal Modification
- Task 1.2: Radome Mounting Modification

- Task 1.3: Bearing Lubricant Relief
- Task 1.4: Radome Window Modification
- Task 1.5: Pinion Shaft/Gear Modification
- Task 1.6: Potentiometer Retention Modification

Task 2 involved the preparation of a revised set of Antenna Unit inspection and repair standards which the Coast Guard could incorporate into the Maintenance and Instruction Manual as part of an antenna modification kit.

Task 3 provided for a limited laboratory test and field evaluation of the modifications and an evaluation of the associated instructions.

1.3 REPORT ORGANIZATION

This report summarizes the Phase II activities and presents the data for the field changes. Chapter Two discusses each of the corrective actions and describes the salient aspects of the repair standards. Chapter Three describes the laboratory tests and discusses the results. This chapter also presents the results of the field installation and in-service performance observations. Chapter Four provides the information necessary for the Coast Guard preparation of a Field Change Bulletin. A set of reduced reproductions of the full-size drawings provided to the Coast Guard Wildwood Engineering Center is included as an appendix to this report. The drawings were provided to permit procurement of the modification components that are not standard, commercially available items. An estimated cost of the field change kits is provided in Chapter Four, based on projections of the prototype costs.

CHAPTER TWO

CORRECTIVE ACTIONS

2.1 ANTENNA/PEDESTAL

The Antenna (Unit 1) consists of two principle components: the antenna or radiator assembly, and the pedestal containing the rotating drive mechanism and other components. As proposed at the conclusion of Phase I and subsequently contracted by the Coast Guard as the Phase II effort described in this report, ARINC Research was to continue the development of two radiator assembly modifications (Tasks 1.2 and 1.4) and four pedestal modifications (Tasks 1.1, 1.3, 1.5, and 1.6).

2.1.1 Task 1.1: Shaft Seal Modification

On the basis of limited fleet data and laboratory tests, moisture intrusion was not found to be a substantial problem. Undocumented complaints by field personnel, however, suggested that additional steps be considered to reduce the possibility of moisture entry into the antenna. One location where leakage was suspected (although not confirmed by data) was the point at which the rotator shaft enters the pedestal.

The original design consisted of a spring-backed, double-lip seal. It was initially considered that an alternate seal could provide better protection, particularly if the seal could be supplemented with a splash shield. A review of the seals available for this application, however, showed that no simple replacement could be substituted and be more effective than the present design. Further, the pedestal design required that the seal be placed on the shaft and pressed into place after the shaft was assembled into the pedestal, and access space be available between the antenna mounting plate and the pedestal to permit final seal installation. Thus, any splash shield design would have to be a split shield to allow for installation after the upper seal was positioned in place. A split shield that is sturdy enough for such an application would be of limited effectiveness without a seal designed to form a splash baffle.

Available data did not show moisture entry at this point. For this reason, because no better seal was found, and assembly would require a complex shield structure with limited effectiveness, the added complexity and attendant costs appeared to mitigate against the incorporation of the changes originally considered. This modification, therefore, was eliminated as a necessary change.

2.1.2 Task 1.2: Radome Mounting Modification

The original antenna design provided for attaching the radiator to the rotator by means of machine screws through the mounting plate, and clinch nuts pressed into the antenna housing. Stresses introduced by handling and structural deterioration of the housing due to corrosion at the interface between the clinch nuts and the housing, caused some housing failures. Lack of replacement housings from stock prompted the fabrication of a number of in-field "fixes" to maintain radar operation. The most effective of the field fixes did not use the clinch nuts, but employed a reinforcing member to reduce stress on the antenna housing, with tapped holes to retain the antenna-to-pedestal attachment screws.

The use of a reinforcing plate was considered to be the most effective approach because it permitted the re-use of antenna housings that had deteriorated and were not usable with clinch nuts. To obtain the greatest strength in the reinforcing plate, it was designed to utilize a rectangular piece of 1/4-inch aluminum stock. Clearance for the waveguide was achieved by milling a recess in the plate without compromising its structural integrity. A clearance hole was provided for the rotary joint, and the antenna-to-pedestal threaded holes were strengthened by the use of helical steel inserts.

2.1.3 Task 1.3: Bearing Lubricant Relief

During the problem identification phase of the contract, pinion and drive shaft misalignment was noted. The misalignment caused binding of the shaft, gear, and bearing cover, resulting in damage to these components due to friction and relative movement between the shaft and gear. It was found that gear box lubricant, trapped in the lower bearing recesses of the pedestal casting, caused the misalignment. The initial approach to the problem was to drill pressure-relief holes in the casting permitting trapped lubricant to escape, and to provide a thrust bearing surface that would limit shaft movement without damage to the cover.

A simpler method of providing pressure relief became apparent during the Phase II investigation. Since the bearings used are sealed units, it was determined that removing the seals in the lower bearings permitted the trapped lubricant to escape through the bearings. Three bearing-seal configurations were examined during the investigation: rubber, plastic, and stainless steel. All three could be removed with equal ease. When the bearings were installed, they seated squarely in the recesses without any shaft-to-inner-race binding, regardless of the amount of lubricant in the recess prior to installation. A teflon spacer was also designed to act as a thrust bearing under the bearing cover.

2.1.4 Task 1.4: Radome Window Modification

According to responses from most technicians interviewed, the problems with the radome window, although not well documented due to a lack of EICAM data, were significant. Fragility of the window, shortage of spare parts,

and lack of a clear and complete set of repair instructions were the dominant faults. In addition, the spare windows, when they were available from stock, were expensive.

In an attempt to keep the radar operating, many technicians made repairs by using locally available materials. Unfortunately, the local materials were not always compatible and frequently degraded the radar performance. Examples of improvised repairs included heavy fiberglass fabric or multiple layers of fabric, heavy applications of epoxy, and application of standard exterior boat paint over the surface of the window.

A radome window was fabricated from MIL-Spec epoxy-glass laminate with no significant change in transmission loss, as demonstrated by the ARINC Research laboratory and U.S. Coast Guard field tests identified in Chapter Three. To minimize cost, the window was designed as a simple rectangle of standard material, retained in position by two clamps and the radome housing end covers, with silicone rubber being used as a sealant to prevent the entry of moisture. The design eliminates the need for painting the radome window surface -- specifically to prevent the inadvertent field site use of lossy paint which would degrade radar performance (low-loss paint is usually not available at the field repair sites).

2.1.5 Task 1.5: Pinion Shaft/Gear Modification

In the gear box design originally furnished to the Coast Guard, the pinion shaft turned in two roller bearings (one at each end of the shaft) and the pinion gear was a friction fit on the pinion shaft (with no relative motion between the gear and shaft). Because of the restricted space in the gear box, the assembly procedure requires that the lower bearing be installed, the gear positioned in the gear box, and the shaft pressed through the gear (from an opening in the gear box casting) and into the lower bearing. The upper bearing is then pressed into place in the opening in the gear box casting and on the end of the pinion shaft. To permit assembly and disassembly of the gear box, without special tools, the fit between the shaft and the gear had to be loose enough to permit the shaft to be easily inserted through the gear. This low-friction fit and the misalignment of the shaft and bearings, caused by the lubricant entrapment (addressed in Task 1.3), resulted in rotation of the gear on the shaft and shaft abrasion against the bearing cover. The relative motion between the shaft and gear produced wear and caused the gear operation to become noisy. Wear was also caused on the bearing cover.

The approach considered in the problem identification effort during Phase I was to machine a slot in the pinion shaft and the gear for the insertion of a Woodruff key to prevent gear rotation on the shaft. A teflon spacer was also proposed to limit pinion shaft end play and abrasion. After the entrapment of the lubricant under the lower bearings was relieved (Task 1.3), bearing and shaft misalignment did not occur. The teflon spacer essentially eliminated shaft friction on the cover. As a result, the friction between the gear and shaft was sufficiently greater than the bearing rolling friction and shaft-to-cover friction that the requirement to key the gear to the shaft became nonessential. Replacing

the pinion shaft and pinion gear with components that use a Woodruff key would add $25 additional modification cost per radar and would be of questionable benefit. It was decided, therefore, that the keying modification would not be incorporated, and only the teflon spacer portion of the modification would be retained.

2.1.6 Task 1.6: Potentiometer Retention Modification

The sine-cosine potentiometer in the antenna pedestal is one of the more frequently replaced components. Replacement, according to the instructions provided by the radar manufacturer, required careful positioning of the drive gear on the potentiometer shaft, and precision drilling by the technician to pin the gear and potentiometer shaft together. The gear hub is made of relatively soft aluminum, while the potentiometer shaft is stainless steel. Under the most favorable conditions, with the gear and shaft rigidly maintained in proper mutual position and the gear hub hole used as a pilot hole, deflection of the drill by the stainless steel shaft would cause the drill to "walk", enlarging the hole in the hub and preventing positive positioning of the gear on the shaft. As a result, the technicians frequently ignored the drilling and pinning practice and used a single set screw to secure the hub to the shaft. This was satisfactory in some instances, but since the hub material is soft, the screw torque was limited and the gear was not always securely positioned.

The modification eliminated the requirement to pin the gear to the shaft. Instead, the pilot hole previously used for the shaft drilling operation was enlarged and tapped to accommodate a second set screw. This distributed the gear-to-shaft retention load between two screws, minimized the likelihood of the gear becoming loose on the potentiometer shaft, and greatly simplified the repair operation.

2.2 REPAIR STANDARDS

The AN/SPS-57 Technical Manual, provided by the manufacturer of the radar set, describes the radar set and its components, the theory of operation, installation procedures, and troubleshooting and maintenance procedures for most sections of the radar. One area that lacked a clear description or illustration for disassembly and reassembly was the antenna. While the pedestal instructions and illustration were relatively complete, the radiator assembly was not adequately described.

Thus, as an adjunct to the development of antenna modifications, a revision of the antenna/pedestal instructions was prepared. This revision and clarification resulted in a complete set of antenna repair procedures or repair standards. Disassembly and reassembly instructions were prepared, and a detailed set of antenna radiator repair procedures were developed. These procedures reflect the modifications, add information previously omitted, and correct some Technical Manual errors. The information was prepared to provide instructions for inclusion in the Type 1 Field Change and to permit substitution of new pages in the Technical Manual, as a part of the Field Change. The procedures and instructions are included as an exhibit in Chapter Four of this report.

CHAPTER THREE

TEST AND EVALUATION

3.1 LABORATORY TESTS

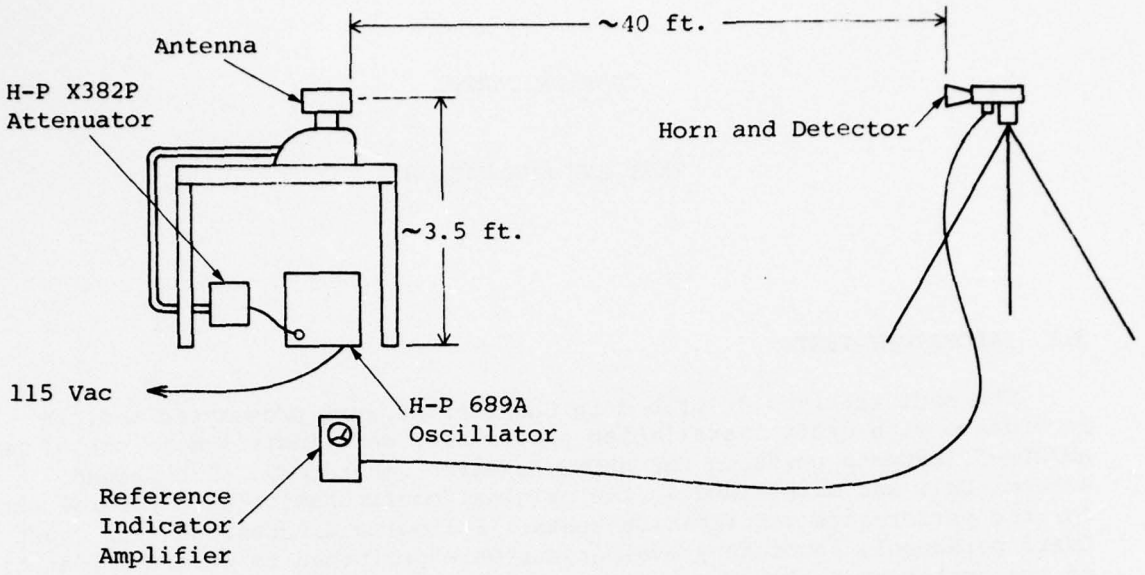
The modifications described in Chapter Two were prototyped and, in accordance with draft installation procedures, were installed in one of two AN/SPS-57 Antenna Units in the ARINC Research laboratory. The second Antenna Unit was maintained in the original configuration as a control sample for the performance verification tests. Following discussions with Coast Guard personnel, laboratory evaluations were performed to permit preparation of two prototype Field Change Kits. Four basic laboratory tests were conducted to evaluate the modifications:

1. Antenna pattern tests
2. Temperature tests
3. Temperature-humidity cycling tests
4. Vibration tests

3.1.1 Antenna Pattern Tests

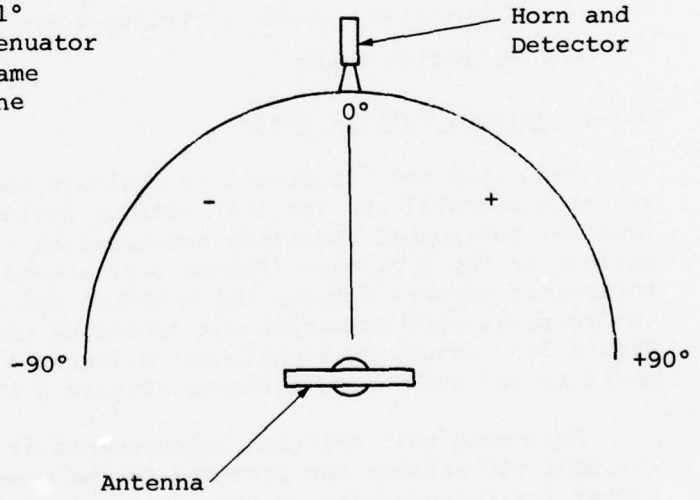
Two tests were conducted to evaluate the effect of the modifications on the horizontal and vertical antenna radiation patterns. The test setup used for horizontal radiation measurements is shown in Figure 3-1. A comparison of the test data (Figure 3-2) showed only minor variations in the horizontal pattern between the modified and unmodified antennas. Similarly, the vertical pattern, which was tested by using the setup illustrated in Figure 3-3, showed no significant difference in radiation between the modified and unmodified antennas (Figure 3-4).

Following the radiation measurements at the ARINC Research laboratory, the modified antenna was provided to the Coast Guard's Wildwood Engineering Center for measurements in free-space conditions. These tests confirmed the ARINC Research results.



Side View

Note: Antenna was turned in 1° increments and the attenuator adjusted to give the same reference reading on the indicator.



Top View

Figure 3-1. EQUIPMENT SET UP FOR HORIZONTAL ANTENNA PATTERN TEST

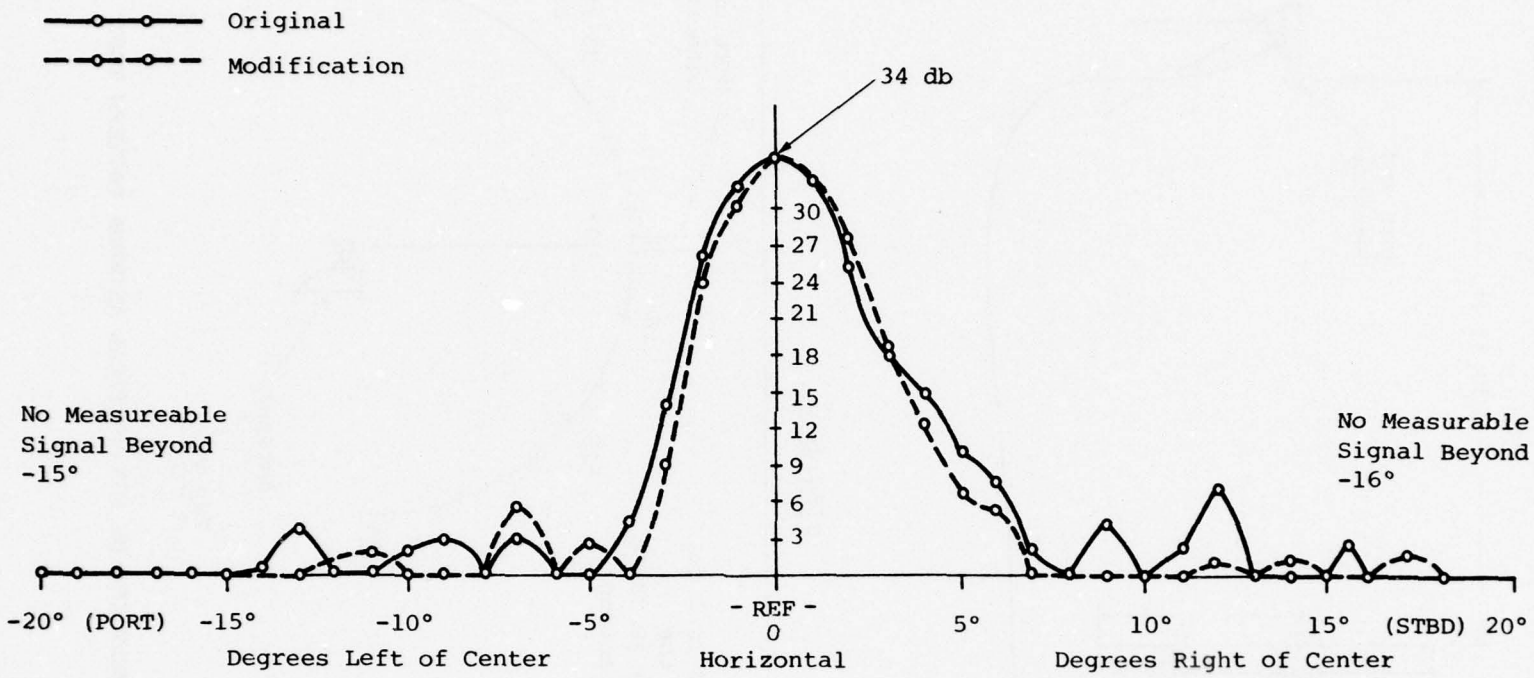
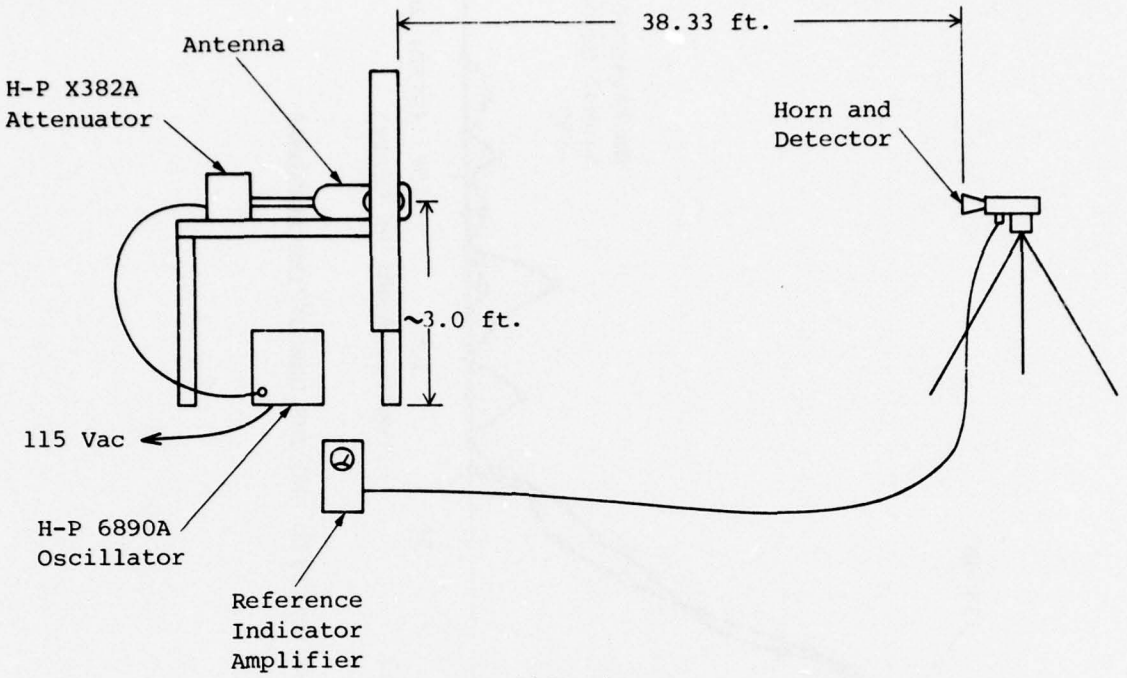
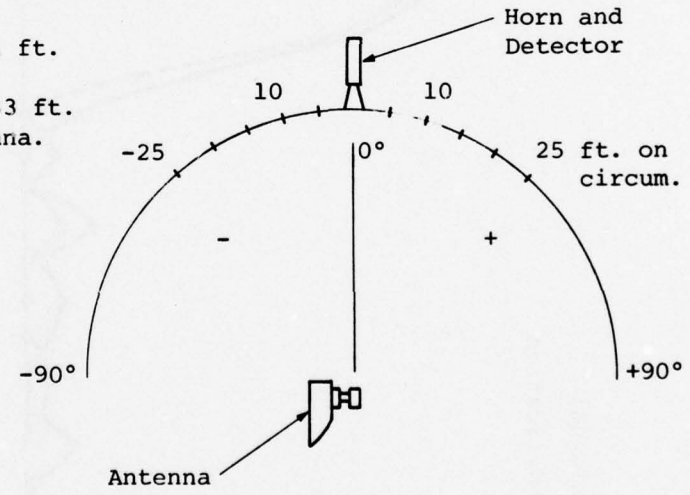


Figure 3-2. HORIZONTAL RADIATION PATTERNS OF THE MODIFIED AND THE UNMODIFIED ANTENNAS



Side View

Note: The Horn was moved in 1 ft. increments around the circumference of a 38.33 ft. circle around the antenna.



Top View

Figure 3-3. EQUIPMENT SET UP FOR VERTICAL ANTENNA PATTERN TEST

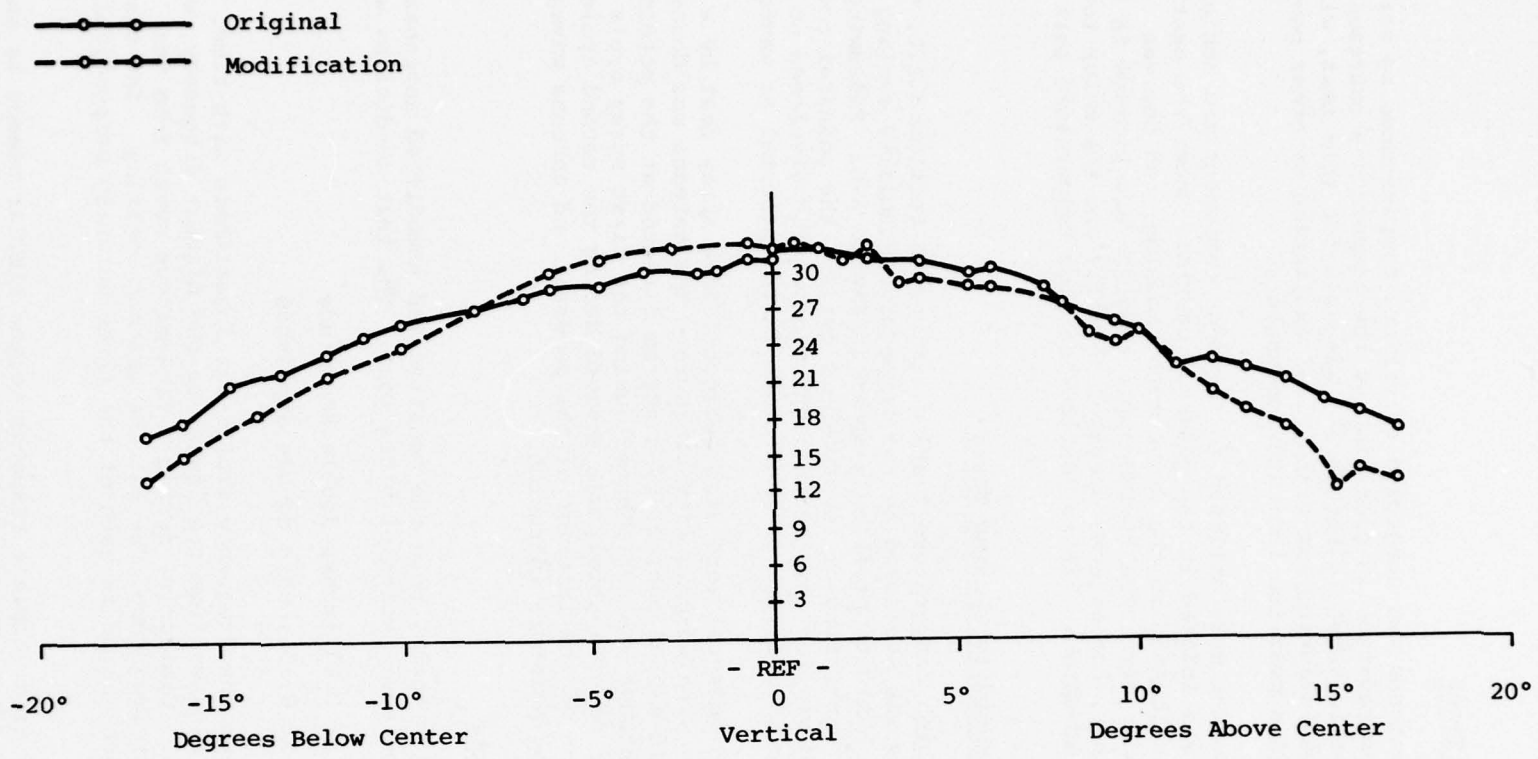


Figure 3-4. VERTICAL RADIATION PATTERNS OF MODIFIED AND UNMODIFIED ANTENNAS

3.1.2 Temperature Tests

The modified antenna was subjected to various temperatures to verify that there was no degradation in operation at the temperature extremes. The temperature profile shown in Figure 3-5 was used for this test, with rotator operating as indicated but without r-f excitation or other power applied to the antenna position indicator components.

Three thermocouples were utilized to document component and ambient temperatures. One was located in the pedestal casting, under the gearbox cover screw; one was located on the drive motor housing; and one was located in the chamber air. The thermocouple readings are plotted in Figure 3-5. During this test, the antenna operated normally and the motor temperature stabilized within acceptable limits during the high temperature part of the cycle.

3.1.3 Temperature-Humidity Cycling Tests

As in the low-high temperature tests described in Section 3.1.2, only the modified antenna was subjected to the temperature-humidity cycling tests. The temperature and humidity profile is shown in Figure 3-6. Following the conclusion of tests consisting of ten two-hour cycles, the pedestal cover and antenna were removed for inspection. This inspection disclosed no accumulation of any form of moisture or condensate in the pedestal or waveguide.

The antenna and pedestal were also subjected to a spray test by a 3/4-inch commercial hose with 60-psig line pressure. The antenna was doused completely, in two 15-minute cycles, by a stream directed at the potential leak points. The antenna was not rotated during the first spray cycle but, with no r-f or other power applied, was rotated during the second cycle. Subsequent inspection of the interior of the pedestal and antenna waveguide showed no evidence of moisture intrusion.

3.1.4 Vibration Tests

For the vibration tests, both the modified and unmodified antennas were subjected to the same series of vibrations. The test conditions were:

- 10 - 30 cps at 0.03 inches double amplitude
- 30 - 60 cps at 0.15 inches double amplitude

The sweep between the frequency limits was logarithmic with time. Each sweep was five minutes from the lowest to the highest frequency, with the antenna rotating. Similarly, during a five-minute sweep from the highest to the lowest frequency, the antenna was not rotating. The tests were repeated for each sample in each of the three mutually perpendicular planes.

A comparison of each sample's response to the similar sweeps is shown in Table 3-1. The results show no significant difference, in the 10 - 30 cps range, between the modified and unmodified units. Also, no resonance

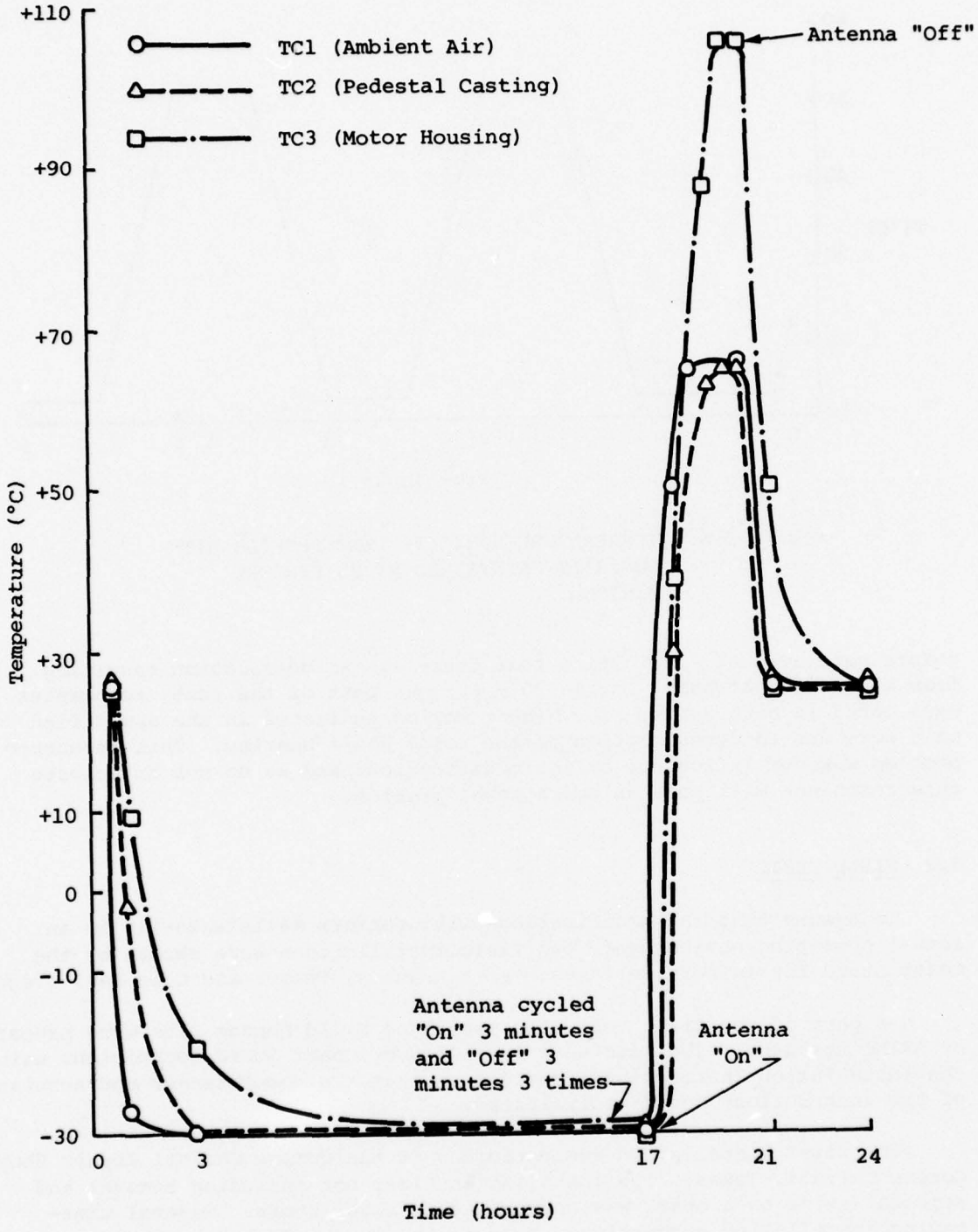


Figure 3-5. LOW/HIGH TEMPERATURE TEST

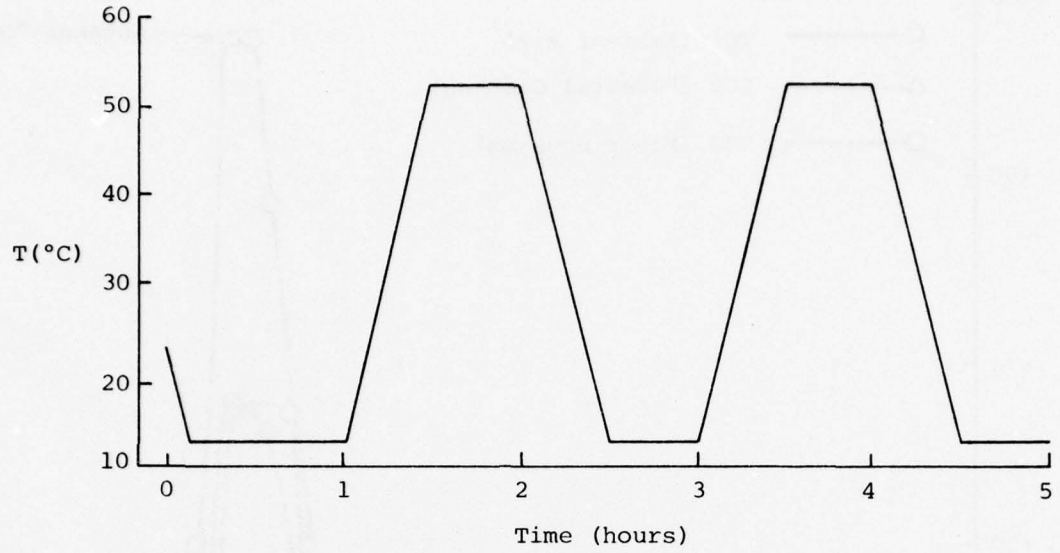


Figure 3-6. TEMPERATURE-HUMIDITY TEST PROFILE WITH HUMIDITY MAINTAINED AT 95 PERCENT MINIMUM.

points were evident, indicating that there was no degradation resulting from the modifications. In the 30 - 60 cps part of the test, resonances were noted in both units. The higher ratios indicated in the unmodified unit were due to deterioration of the rotor shaft bearing. This resonance problem was not influenced by the modifications and we do not anticipate this resonance will pose an operational problem.

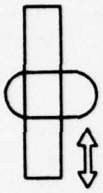
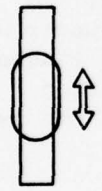
3.2 FIELD TESTS

To assure that the modifications will perform satisfactorily in an actual operating environment, two field installations were chosen by the Coast Guard for in-service tests: Port Aransas, Texas; and Coos Bay, Oregon.

As part of the field test, two prototype Field Change Kits were prepared by ARINC Research. The kits were installed by Coast Guard technicians using the installation instructions provided so that the completeness and accuracy of the instructions could be evaluated.

The first installation was performed at the Corpus Christi Repair Shop, Corpus Christi, Texas. The installation time, not including removal and reinstallation on a boat, was approximately eight hours. Several time-saving installation suggestions, made by the Corpus Christi technicians, were incorporated in the procedure. It was also suggested that several of the unusual parts be included in the kit, to avoid the problem of searching for components during field modification. When the modifications were incorporated in the antenna (Serial No. 118) on the Port Aransas Boat No.

Table 3-1. ANTENNA VIBRATION TEST RESULTS

Excitation		Unmodified	Modified
	10-30*	NR, NSD	NR, NSD
	30-10	NR, NSD	NR, NSD
	30-60*	Approx. 8:1 from 50 to 60~	Approx. 4:1 from 55 to 60~
	60-30	Approx. 3:1 from 45 to 50~	Approx. 2:1 from 45 to 55~
	10-30*	NR, NSD	NR, NSD
	30-10	NR, NSD	NR, NSD
	30-60*	Approx. 4:1 from 50 to 55~	Approx. 2:1 from 50 to 55~
	60-30	Most severe with radiator longitudinal axis parallel with pedestal longitudinal axis	
	10-30*	NR, NSD	NR, NSD
	30-10	NR, NSD	NR, NSD
	30-60*	Approx. 4:1 from 50 to 55~	Approx. 2:1 from 50 to 55~
	60-30	Most severe with radiator longitudinal axis perpendicular to pedestal longitudinal axis	

*Antenna Rotating
NR = No resonance found
NSD = No significant difference between modified and unmodified units.
Where resonances were noted, the amplification is expressed as a ratio of resonance condition to normal excitation.

41323, the radar system elapsed-time indicator (ETI) showed 300.4 hours. A subsequent ETI reading, on 10 January 1977, showed this Antenna Unit operated 80 hours without failure.

The second installation was performed at the North Bend repair shop, North Bend, Oregon. Again suggestions were made by the technician, who had considerable experience with the equipment. These comments, when integrated with those of the Corpus Christi technicians, resulted in a clear and effective statement of procedure and a less time-consuming installation. Modification of this Antenna Unit (Serial No. 125) also required approximately eight hours. Because the boat (No. 44408) on which the antenna was to be installed was undergoing repairs, the installation was delayed until 7 October 1976. When the eventual installation took place, the ETI on the Receiver-Transmitter Unit showed 437.2 hours. The late installation plus a series of problems with the boat and its radar limited the accumulated time on 10 January 1977 to approximately 22 hours.

The radar problems included a heading flasher switch and two sine-cosine potentiometer failures in the modified Antenna Unit. Only the flasher switch failure was related to the modification. Inspection of the failed heading flasher switch showed that the arm had been damaged during modification. Insertion of the teflon spacer under the bearing cover of the gear box, which acts as a thrust bearing surface for the pinion shaft, required repositioning of the flasher switch arm. The arm was apparently bent several times to obtain the desired position, causing a fracture and subsequent failure after a short period of operation. To reduce the likelihood of recurrence of this problem, the teflon spacer was changed from 0.030 inch thick to 0.015 inch thick, minimizing the flasher switch adjustment. In addition, a note was added to the modification instructions cautioning the installer against repeated bending of the switch arm.

The initial sine-cosine potentiometer failure occurred approximately six weeks after installation, with an accumulation of 19 hours of operation. According to the technician, when the pedestal was opened, two to three ounces of water was found inside. Inspection revealed that the pedestal cover gasket was improperly positioned during reinstallation following the replacement of the heading flasher switch. Although this permitted the entry of the water, there was no indication that the water caused the potentiometer failure.

The second sine-cosine potentiometer failure occurred after only an hour of operation on the boat, following the previous repair. The technician reported that such premature failures of the potentiometer were not uncommon, further supporting the observations in Phase I that the potentiometer, while very expensive, represented poor internal design and poor electrical quality control.

Thus, on the basis of the field operation, all modifications appear to be performing satisfactorily, with the only related failure being that of the flasher switch. Corrections have been implemented to prevent recurrence of the flasher switch problem.

CHAPTER FOUR

FIELD CHANGES

This chapter presents the data for the field changes. The necessary Field Change Bulletin data are presented in the format used by the Coast Guard for Electronic Field Change Bulletins No. 4 and No. 5 for the AN/SPS-57 and -57X Radar Sets. The purpose of this method of presentation is to permit the Coast Guard to prepare the Field Change Bulletin and associated kits with a minimum effort. A cost estimate of the kit, based on prototype costs, is also provided.

4.1 FIELD CHANGE BULLETIN DATA

The Exhibit, which is a part of this Chapter, contains the necessary data for a field change, and includes a typical cover letter, a list of items in the kit, step-by-step installation instructions, and changes to the Technician Manual, as reviewed with the Wildwood Engineering Center.

4.2 SOURCE/COST INFORMATION

In the field-change kit parts list, commercial item manufacturers and vendors are identified as potential sources for the items. This does not constitute a sole-source recommendation; it merely indicates commercial sources used by ARINC Research in the kit design process.

Accurate costs for each item cannot be predicted, since prices can vary significantly with purchase quantities. However, the prototype kits cost approximately $100 each. The machined items were estimated to represent the greatest variable factor due to the amortization of set-up costs. Considering the effect of a quantity of 300 units on parts cost, it is estimated that production kits could cost between $50 and $65 each.

EXHIBIT

ELECTRONIC FIELD CHANGE BULLETIN

FIELD CHANGE TO THE
AN/SPS-57/57X RADAR SET

PURPOSE:

The purpose of the Field Change is to reduce antenna susceptibility to moisture intrusion and to correct several pedestal mechanical problems.

DESCRIPTION:

The Field Change consists of replacing the present r-f window assembly with a more durable and easily replaceable window, and reinforcing the antenna housing. In addition, parts are provided to eliminate grease entrapment in some bearing recesses and binding of the shafts, as well as improvements in the repairability and adjustment of the sine-cosine potentiometer. This change can be accomplished at a minor or major depot repair facility in approximately eight hours, not including removal from and reinstallation on the boat.

IDENTIFICATION OF ACCOMPLISHMENT:

Units with the change kit installed will have the window clamps retaining an unpainted r-f window in the antenna. In addition, the teflon gasket will be visible under the bearing retainer plate in the pedestal housing when the pedestal cover is removed.

MATERIALS REQUIRED:

1. A Field Change Parts Kit, standard hand tools, and cleaning materials (Inhibisol or equivalent) will be required.
2. The list of items contained in the kit is attached as Enclosure (1) to this bulletin.
3. Step-by-step installation instructions are included as Enclosure (2) to this bulletin.
4. Technical Manual corrections are included as Enclosure (3) to this bulletin.
5. Field units will forward requests for the Field Change Kits to the appropriate district commander (flp). District commanders (flp) and commanding officers of headquarters units will send message "MILSTRIP REQUISITIONS" to Supply Center, Brooklyn, N.Y. Stock No. applies. Indicate hull number and radar system serial number in the remarks section of MILSTRIP messages.

PROCEDURE:

Step-by-step modification instructions are provided as Enclosure (2) to this bulletin. Part 1 is the instruction for modifying the antenna assembly. Part 2 is the instruction for modifying the pedestal assembly.

ROUTINE INSTRUCTIONS:

1. For EICAM reporting purposes, report completion of this field change on Form CG-4334 using AN/SPS-57 or AN/SPS-57X as EQUIPMENT MODEL/TYPE. The serial number shall be reported as shown in the CGHQ-3134. Report the date of field change installation in block 3 to 8 on Form CG-4334. Record completion by an entry on the Field Change Accomplished Plate, NSN I 0265-00-085-0000, available from NPFC, Philadelphia; and on any other required records.
2. Maintenance support facilities shall maintain a library copy of this, and all other applicable field change bulletins. Additional or missing copies can be obtained from Coast Guard Supply Center, Brooklyn, N.Y. (Code 341). Order directly, using MILSTRIP procedures; no cost is involved.
3. Upon completion, a copy of this Field Change Bulletin shall be inserted in the front of all applicable technical manuals. Cognizant commands shall ensure that the field change has been accomplished and that technical manual annotations and reports have been made. Coast Guard Supply Center, Brooklyn, N.Y. will update the Allowance Parts List to reflect any new changes.

_____

(Signature)

Enclosures: (1) Materials Required List
(2) Modification Instructions
(3) Technical Manual Corrections

LIST OF ITEMS REQUIRED AND SUPPLIED FOR FIELD CHANGE KIT

Item	Designation	Qty	Description
1		1	10-32 x 2" Pan Head Machine Screw
2		1	Wooden Tongue Depressor
3		1	3 oz. Bottle Chromate Conversion Coating per MIL-C-81706-Form I-Method A
4		2	Cotton Applicators ("Q-Tip" Large or Equivalent)
5	1A1MP9	1	Housing Reinforcing Plate
6		1	3 oz. Tube Silicone Rubber - RTV (Dow Corning 738 or Equivalent, with Key)
7	1A1MP10	2	Radiator Horn End Blocks, P/N 5B0101027
8	1A1MP1	1	Radome Cover, P/N 5B0101005
9	1A1MP11	1	Radome Clamp, Lower, P/N 5C0101029
10	1A1MP12	1	Radome Clamp, Upper, P/N 5C0101028
11		8	6-32 x 3/8" Pan Head Stainless Machine Screw
12		8	#6 Stainless Split Washer
13		8	#6 Stainless Flat Washer
14		14	8-32 x 1/2" Pan Head Stainless Machine Screw
15		14	#8 Stainless Split Washer
16		14	#8 Stainless Flat Washer
17		1	1 Pint Can, Spar Colored Enamel per MIL-E-15090, Cl 2. (for Antenna Housing, Not Window)
18		1	1/2-inch Camel-Hair Brush
19		1	8-32 x 2" Pan Head Machine Screw
20		1	Pin Punch - 1/16"
21		1	No. 36 Drill
22		1	6-32 Tap
23		2	6-32 x 1/4" Set Screw, Stainless
24	1A2MP37	1	Spacer, P/N 5B0102026
25		1	1/2-pound Can, MIL-G-23827A Grease

(continued)

ENCLOSURE: (1)

LIST OF ITEMS REQUIRED AND SUPPLIED FOR FIELD CHANGE KIT (continued)

Item	Designation	Qty	Description
26	1A2MP29	1	"O" Ring, P/N 02697/2-241
27	1A2MP17	1	"O" Ring, P/N 02697/2-037
28	1A2MP31	1	Gasket Cover, P/N 31804/5B0102024
29		1	Snap Ring Pliers, TRUARC 2180 or Equivalent
30		1	Snap Ring Pliers, TRUARC 2600 or Equivalent
31	1A2MP38	1	Snap Ring, TRUARC 5101-31 or Equivalent

ENCLOSURE: (1)

STEP-BY-STEP INSTALLATION INSTRUCTIONS

NOTE

Before attempting to install this modification for the first time, read the instructions completely and carefully to become familiar with the procedure. As the modification progresses, read each step through before proceeding.

In this procedure it is assumed that the antenna and pedestal assembly have been removed from the boat (using safety precautions as outlined in CG-165-1 Chapter 2) in accordance with the technical manual, are now in the shop work area, and no damage has been sustained by the components that would inhibit the modification process. Any damaged components that would prevent modification should be repaired or replaced, in accordance with existing procedures, before modification is attempted.

Prepare a clear workspace area so that disassembled components and associated hardware can be segregated for ease of identification and reassembly.

PART I - ANTENNA MODIFICATION (see Figure 1)

1. Remove five antenna-to-pedestal mounting screws and lock washers and save this hardware. Remove antenna (1A1) from pedestal (1A2) and remove probe (1A2W2). Set pedestal aside for modification according to PEDESTAL MODIFICATION instructions. Inspect probe and clean, as necessary.

2. Remove four retaining screws on each end cap (1A1MP4); save the end caps, but discard the screws and aluminum plates retaining the fiberglass window.

3. Using a knife or screwdriver, carefully separate the fiberglass window (1A1MP1) from the mating surface of the antenna housing (1A1MP6).

NOTE

Do not score the housing.

4. Remove seven screws on each side of the flange between the antenna housing and radiator horn (1A1MP8). Discard these fourteen screws.

5. Carefully remove the polyurethane foam grating support (1A1MP2) from the opening of the radiator horn, using the procedure that follows: Using a knife, carefully separate the support and grating from the horn; place the fiberglass radome window (Item 8 - 1A1MP1), supplied in the kit, on the face of the antenna; and place the window and antenna face down on the

ENCLOSURE: (2)

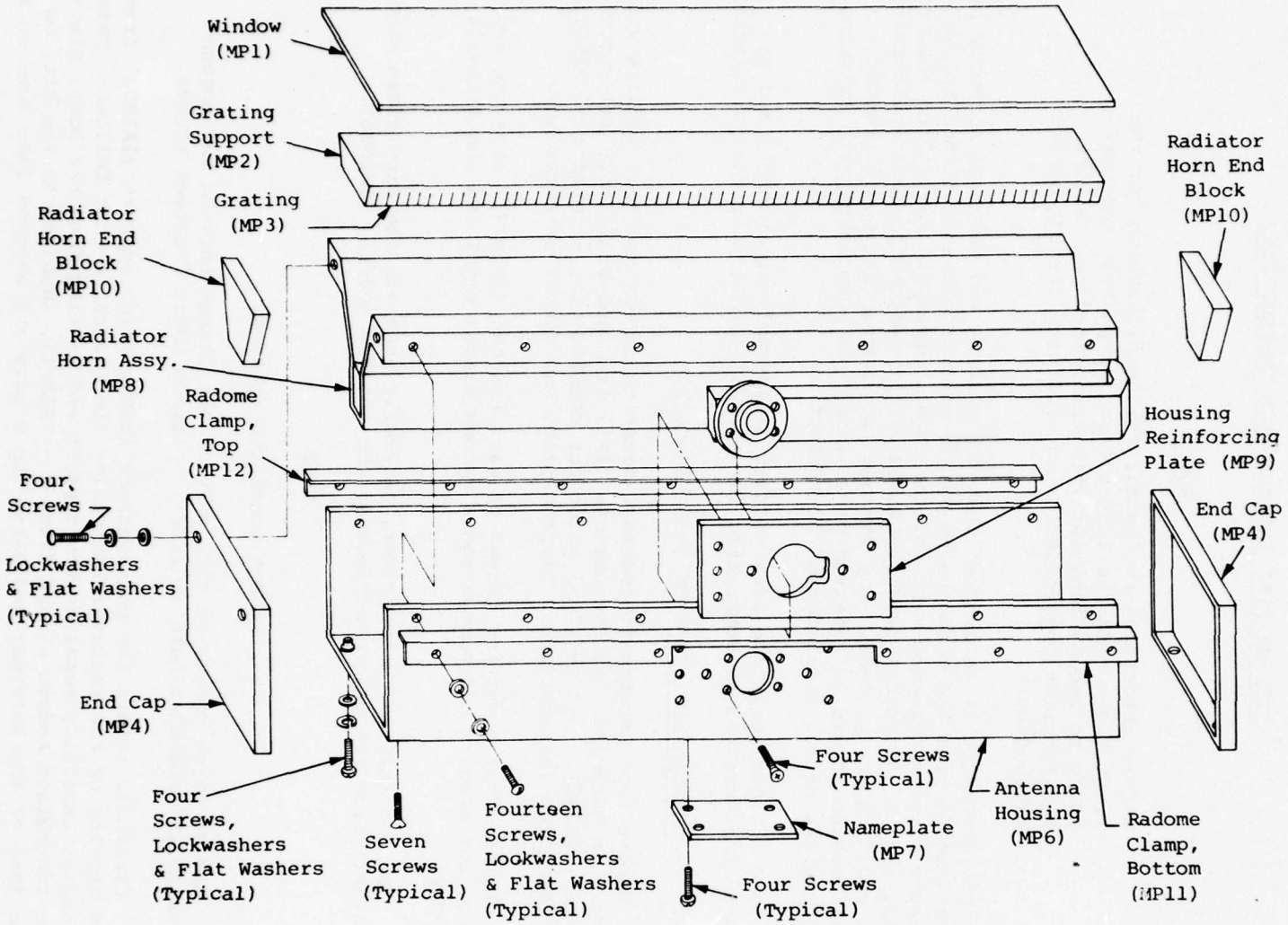


Figure 1. ANTENNA ASSEMBLY (1A1)

ENCLOSURE: (2)

work surface. Lift the antenna off of the window, tapping the assembly lightly to separate the radiator horn from the foam grating support. (This support is slotted on the horn mating surface and can be easily broken.) Extreme care is necessary in removal and handling. Care should also be exercised in retaining the metal grating plates (1A1MP3) embedded in the slots. Remove grating plates and clean all parts with fresh water, blow dry with compressed air, flush with Inhibisol or equivalent cleaning solvent, and redry with compressed air.

6. Remove four screws that attach the name plate (1A1MP7) to the rear surface of the antenna housing, and then remove the seven screws that attach the housing to the radiator horn assembly (1A1MP8). Save the screws and name plate.

7. Remove four screws that attach the housing to the rotary joint flange on the radiator horn assembly. Save the screws.

8. Remove the housing from the radiator horn assembly. Inspect and clean, as necessary.

NOTE

If housing-to-pedestal mating surface is pitted at the "O" Ring contact area, the housing should be replaced.

9. Using the 10-32 x 2" screw supplied in the kit (Item 1 on list), engage three or four threads of the clinch nuts on the housing-to-pedestal mounting surface. Rock the screw from side to side to remove the five clinch nuts. Discard the clinch nuts and save the screw for use in Step 16 of the PEDESTAL MODIFICATION.

10. Using the cleaning tool (wooden tongue depressor or equivalent), carefully remove all residual RTV and other surface contaminants from all housing mating surfaces.

11. Apply the liquid chromate surface treatment (Item 3) to the bare aluminum housing mating surfaces cleaned in Step 10, using the applicator (Item 4) and liquid provided in the kit. Allow to stand for 60 seconds and, using a damp cloth, carefully remove all liquid.

12. Position the new housing reinforcing plate (Item 5 - 1A1MP9) so the machined recesses mate with the waveguide of the radiator horn assembly.

13. Using the four screws from Step 7, reattach the housing to the waveguide rotary joint flange, capturing the reinforcing plate between the waveguide and the housing. (The reinforcing plate will be slightly loose but will be positioned properly when reassembly occurs later.)

14. Use a small dab of RTV (Item 6) in each of the seven rear housing-to-radiator horn threaded screw holes and install the seven screws removed

ENCLOSURE: (2)

in Step 6. Invert the antenna and place the radiator horn end blocks (Item 7 - 1A1MP10) in each end of the horn opening, trim with a sharp knife to obtain a flush fit between the wide top surface of the end block and the radiator horn flange.

15. Install the two radiator horn end blocks flush with each end of the horn opening, using a small amount of the RTV on the radiator contact surfaces of the end blocks. Also cover any voids in the waveguide ends of the radiator. Allow to dry for at least 30 minutes.

16. Trim (with a sharp knife) the length of the polyurethane grating support (removed during Step 5) to fit between the horn end blocks in the radiator opening.

17. Place the antenna assembly over the polyurethane grating support (the reverse of Step 5) and, using the new fiberglass radome window (Item 1) as a retainer, rotate the antenna assembly until the radiator opening is up. Remove the window and gently tap the face of the grating support to center the metal grating pieces in the radiator horn and to assure that the grating support seats flush in the radiator horn opening between the end blocks.

18. Place a small but continuous bead of RTV along the flange of the radiator horn and across the end blocks to serve as a seal between the window and the radiator horn.

NOTE

It is important that a small bead be used, to prevent the RTV from being squeezed into contact with the grating support during assembly.

19. Carefully position the window on the radiator horn over the grating support, pressing the window edges to assure uniform adhesion of the RTV between the window and horn flange.

20. Attach the end caps, assuring that the window is captured under the end cap flange, and install two 6-32 x 3/8" screws, flat washers, and split washers (Items 11, 12, and 13 from the kit) to fasten the end caps to the radiator horn.

21. Turn the antenna assembly face down and place a small dab of RTV in each of the eight remaining holes on the back surface of the antenna.

22. Install the four remaining end-cap screws removed in Step 2, and replace the name plate and its four mounting screws removed in Step 6.

23. Sparingly fillet the end-cap voids and the radome-clamp-to-housing edge with RTV, and remove all excess RTV from the antenna assembly. Allow to cure overnight.

24. Touch up, as required, using paint (Item 17) and brush (Item 18) provided. Care should be exercised to prevent any paint from being

ENCLOSURE: (2)

applied to the antenna-to-pedestal mounting surface or to the surface of the window through which radiation must pass.

NOTE

Do not paint the radiating surface of the antenna window.

PART II - PEDESTAL MODIFICATION (see Figure 2)

In this part of the modification procedure, save all hardware for reuse unless specifically instructed otherwise.

1. Remove pedestal cover by loosening the nine captive screws.

2. Remove two screws attaching the terminal assembly (1A2TB1) to the bottom of the pedestal.

3. Remove two screws attaching buffer amplifier (1A2A1) and heading flasher switch (1A2S2) bracket and, without disconnecting the harness, position the switch and bracket to one side.

4. Remove Motor (1A2B1) by removing the drive belt (1A2MP20) and three 1/2-20 bolts attaching the motor mounting bracket to the pedestal. Record the identity of the connection points. Disconnect four motor leads from 1A2TB1, and the 6-32 screw attaching the ground lead to the gear box cover.

5. Remove gear train drive pulley (1A2MP26) by using the pliers (Item 30) to remove the snap ring (1A2MP22) and remove the key.

6. Remove bearing retainer plate (under pulley) by removing two screws, lockwashers, one flat washer, and the harness ground terminal.

7. Remove two screws (from bottom side of the pedestal) that secure the potentiometer (1A2R1) mounting bracket standoffs.

8. Remove, as a unit, the potentiometer and bracket assembly and wiring harness.

9. If the gear is pinned to the potentiometer, remove the roll pin by using the pin punch (Item 20) provided in the kit, and remove the gear from the assembly. Discard the roll pin.

10. Using the #36 drill (Item 21) and tap (Item 22) in the kit, drill out one of the pin holes in the gear (1A2MP4) for a #6-23 set screw. Install two #6-32 set screws (Item 23) in gear collar.

11. Remove the gear box cover by removing 6-32 screws, flat washers, and lockwashers. Use absorbent materials to contain any leakage from the gear box and, with a suitable tool, remove the grease from the gearbox cavity.

ENCLOSURE: (2)

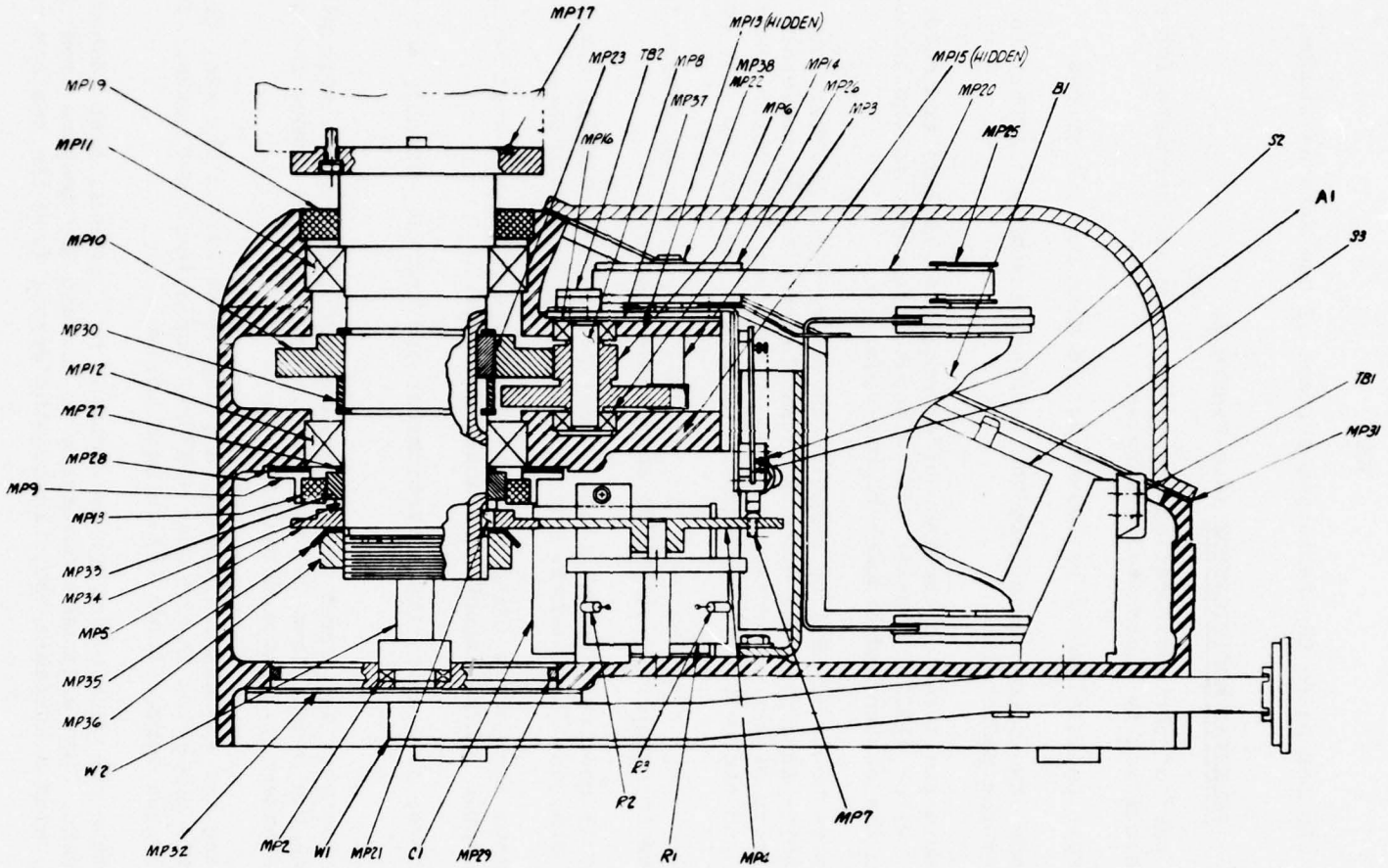


Figure 2. ANTENNA PEDESTAL ASSEMBLY (1A2)

ENCLOSURE: (2)

12. Examine gear box cavity and gear train for lack of lubrication, moisture intrusion, and excessive wear. If any gear shows excessive wear, replace during appropriate following steps. If there is evidence of moisture intrusion or deterioration of the seal (1A2MP19), it must be replaced.

13. Remove drive shaft (1A2MP3) and bearing (1A2MP13).

14. Using a #8-32 x 2" screw (Item 19, provided in the kit) to engage the tapped shaft end, remove pinion shaft (1A2MP8).

15. Remove pinion gear (1A2MP6).

16. Remove the three remaining bearings (1A2MP14, 15, 16) by hooking the 8-32 x 2" screw head under the bearing and lightly tapping against the under side of the inner race. Remove the seals from two of the four bearings, and set aside (preferably on clean white paper), exercising care to protect them from dirt. This completes the disassembly of the intermediate gear train.

17. If the seal (1A2MP19) must be replaced, as determined in Step 12, proceed with the steps as listed, otherwise omit Steps 18 through 26, 30 through 34, 46, and 47 (marked with *).

*18. Remove the waveguide strap, at the bottom of the pedestal, by removing two screws and lockwashers.

*19. With the antenna-pedestal inverted, remove six screws, flat washers, and lockwashers, and carefully remove the waveguide assembly (1A2W1), shims, "O" ring (1A2MP29), and, if necessary, bearing (1A2MP2) recessed in the rotary joint. Retain shims for replacement during reassembly. If the bearing (1A2MP2) must be replaced, verify that the outer race of the new bearing is completely seated on the shoulder in the bottom of the recess.

*20. Bend the lockwasher tab out of the groove on the locknut and, using a spanner wrench (or a screwdriver tapped lightly with a hammer), remove the nut and lockwasher from the main shaft.

*21 Remove the sine-cosine drive gear (1A2MP5), key (1A2MP21), and spacer (1A2MP34).

*22. Remove the lower main-shaft bearing (1A2MP12) by removing six screws, flat washers, lockwashers, a seal seat (1A2MP9), a seal (1A2MP18), a bearing spacer (1A2MP33), an "O" ring (1A2MP27), and a gasket (1A2MP28).

*23. Using retaining ring pliers (Item 30) remove snap ring; then remove gear spacer (1A2MP30).

*24. Place the pedestal on one side and, using a wooden block against the lower end of the main shaft, gently tap the shaft assembly to drive the seal (1A2MP19) out through the top of the pedestal casting. This seal must be replaced with a new seal when the shaft is being reassembled.

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*Omit unless 1A2MP19 or other antenna, rotor, or shaft components require replacement.

ENCLOSURE: (2)

*25. Remove the snap ring from the shaft; then remove the bearing and seal from the shaft.

*26. Using Inhibisol or equivalent, clean all surfaces of the gear box housing and all parts, and wipe dry.

27. Apply a film of MIL-G-23827A grease (Item 25) to bearing surfaces of the pedestal and to the shaft. As each gear, bearing, and seal is reassembled, apply grease to all surfaces.

28. The two bearings to be used in the lower recesses (1A2MP14 and 1A2MP15) should be those with seals removed (the upper shaft bearings must be sealed). Care should be exercised to avoid damage to the bearings or the introduction of dirt into the races.

29. Using a dowel or other suitable nonmetallic tool, tap lightly against the outer race to set the two bearings (1A2MP14 and 15) into the recesses in the lower shelf of the gear compartment.

*30. Assemble a seal (1A2MP19), a bearing (1A2MP11), and a snap ring to the shaft.

*31. Insert the antenna gear (1A2MP10) through the gear access opening and assemble the shaft, gear, and key to the pedestal. Seat the top bearing in the pedestal, but do not seat the top seal (1A2MP19) at this time.

*32. Assemble gear spacer (1A2MP30) and snap ring to the shaft. The beveled surface of the snap ring should be facing away from the spacer.

*33. Assemble the lower bearing (1A2MP12), an "O" ring (1A2MP27), a gasket (1A2MP28), a seal seat (1A2MP9), a seal (1A2MP18), and a bearing spacer (1A2MP33), using the screws, flat washers and lockwashers from Step 22.

*34. Assemble the spacer (1A2MP35) and locknut (1A2MP36) to the shaft. Using a screwdriver, tighten the locknut snugly. Check to assure that no binding occurs when the shaft is rotated through 360 degrees. One tab of the lockwasher can then be bent down into a slot on the locknut.

35. Assemble pinion gear (1A2MP6), using pinion shaft (1A2MP8) and bearing (1A2MP16). The threaded hole in 1A2MP8 should be at the top.

36. Install drive gear (1A2MP3) and bearing (1A2MP13). Check mesh of gearing by rotating pedestal shaft. After the shaft is replaced and all gearing is properly meshed, seat the seal installed in Step 31.

37. Pack the gear train with MIL-G-23827A (Item 25) grease. Wipe excess grease from gear access opening surface, and clean surface with Inhibisol or equivalent solution. Avoid getting this solution on painted surfaces and in gear housing.

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*Omit unless 1A2MP19 or other antenna, rotor, or shaft components require replacement.

ENCLOSURE: (2)

38. Replace the gear box cover using hardware removed in Step 11.

39. Verify that terminal 4 of the potentiometer is aligned with the clamp located 90 degrees from the two bracket stand-offs.

40. Connect an ohmmeter between terminals 2 and 6 of the potentiometer and rotate the shaft until maximum resistance is read on the meter.

41. Without disturbing potentiometer shaft position, install gear (1A2MP4) on the shaft with the cam screw in the gear aligned with the potentiometer clamp located 90 degrees from the two bracket stand-offs. Slide gear, hub first, onto shaft until the shaft protudes approximately 1/32 inch through the gear. Tighten the two set screws securely in the gear collar.

42. With the ohmmeter connected between terminals 2 and 6 of the potentiometer, align the cam-screw in the gear, with the potentiometer clamp located 90 degrees from the two bracket stand offs. Loosen the three clamps and rotate the potentiometer body until maximum resistance is again read on the meter. Tighten the three potentiometer clamps.

43. With the antenna mounting plate's stepped edge facing forward, line up the mounting plate rear edge to be parallel with the pedestal cover opening's top machined edge. Reassemble the potentiometer and bracket assembly, using the two screws and lockwashers removed in Step 4, making certain that the cam-screw is vertically aligned with the clamp. When assembled, the cam-screw should be positioned rearward. Adjust the gear mesh for a slight amount of backlash to avoid placing a strain on the potentiometer.

44. Position the teflon cover gasket (Item 28 in the kit) and replace the bearing retainer plate (removed in Step 6), using the hardware removed at that time.

45. Replace the pulley (1A2MP26), removed in Step 5, using key and snap ring (Item 31 - 1A2MP22).

*46. Invert the Antenna-Pedestal Assembly. Carefully replace the waveguide assembly with the hardware listed in Step 19.

*47. Replace the waveguide strap removed in Step 18.

48. Reinstall motor (1A2B1), using hardware removed in Step 3, and reconnect four motor leads disconnected in Step 4. Apply RTV to motor mounting screws.

49. Reassemble the buffer amplifier (1A2A1) and heading flasher switch (1A2S2) bracket, using hardware removed in Step 3. Tighten hardware only finger-tight at this time. Reinstall the drive belt.

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*Omit unless 1A2MP19 or other antenna, rotor, or shaft components require replacement.

ENCLOSURE: (2)

50. Reassemble the Terminal Assembly (1A2TB1) to the bottom of pedestal, using hardware removed in Step 2.

51. Set the pedestal upright and insert the probe assembly (1A2W2). Remount the antenna, visually aligning the pin (on the probe assembly) with the antenna base, using the hardware removed in initial separation of the antenna and pedestal. Apply RTV to the screws and around the screw holes.

52. Rotate the antenna by hand, clockwise (looking down from the top). As the antenna passes through "dead ahead", the microswitch (1A2S2) should actuate. If actuation does not occur at this point, carefully adjust switch and/or roller position for proper actuation and secure the mounting screws.

NOTE

Do not subject the microswitch arm to repeated bends since the arm material is brittle and will break. If adjustment is necessary, establish the desired position with a single bend.

53. Temporarily replace the pedestal cover. The assembly is now ready for installation on the boat. Following the boat installation, care should be exercised to assure proper seating of the pedestal cover gasket and, after cover screws are tightened, RTV should be applied around each cover screw.

54. Technical Manual Changes, as described in Enclosure 3, are to be incorporated at the time of Antenna Unit modification.

ENCLOSURE: (2)

TECHNICAL MANUAL CORRECTIONS

Technical Manual Changes as described in the following list are to be incorporated at the time of Antenna Unit Modifications:

1. Page replacements:

   Remove pages 5-9 through 5-19/5-20.
   Insert pages 5-9 through 5-19/5-20.

2. Corrections:

   Page i - change ref. 5-2-4 from p. 5-11 to p. 5-9A
   - change ref. 5-3A from p. 5-12 to p. 5-9A
   - Change ref. 5-3B from p. 5-13 to p. 5-9B
   - change ref. 5-4A from p. 5-13 to p. 5-9B
   - change ref. 5-4B from p. 5-16 to p. 5-17

   Page iii - change reference from Figure 5-2. Antenna Pedestal Assembly, on page 5-19/20, to Figure 5-2B. Pedestal Assembly, on page 5-19/5-20.
   - Add reference Figure 5-2A. Antenna Assembly, page 5-19.

   Page iv - Delete line 5-27 Antenna Assembly

   Page 5-48 - Cross out Figure 5-27

   Page 6-2 - change 1A1MP1 Description to "Cover, Radome 5B0101005"
   - change 1A1MP5 to Waveguide Array 31804-5D01012 and add an asterisk in the left-hand margin next to the 1A1MP5 line. Place a second asterisk in the left-hand margin approximately 1 inch below the line 1A2A1U1 and add the following lines:

1A1MP6	Antenna Housing 31804-5D0101001
1A1MP7	Nameplate 31804-5B0101025
1A1MP8	Radiator Horn Assembly 31804-5D0101002
1A1MP9	Reinforcing Plate, Housing 5C0101030
1A1MP10	End Block, Horn 5B0101027
1A1MP11	Radome Clamp, Bottom 5C0101029
1A1MP12	Radome Clamp, Top 5C0101028

ENCLOSURE: (3)

Page 6-2A - Add on the next line after 1A2R1

1A2MP33	Bearing Spacer, Pedestal 5B0102016
1A2MP34	Spacer, Gear 5A0102023
1A2MP35	Lockwasher
1A2MP36	Locknut
1A2MP37	Spacer 5B0102026
1A2MP38	Retaining Ring TRUARC 5101-31

ENCLOSURE: (3)

9. Adjust input signal to sweep between 1 and 100 MHz. Set RANGE to 2. Adjust L6 thru L10 initially for peak at 45 MHz; make minor adjustments to achieve a 3 db bandwidth of 20 $\pm$ 4 MHz and a 50 db bandwidth of 100 MHz.

10. Adjust input signal to sweep between 25 and 65 MHz. Connect scope between TP3 and ground, and adjust L1 on IF amplifier board for a maximum negative deflection at 45 MHz.

11. Replace cover on A5 and replace in cabinet, reconnecting all cables.

F. TRANSMITTER DELAY ADJUSTMENT (installation completed)

1. Place radar in full operation and perform the main bang suppression adjust per para. 5-2-2.C.

2. Place the RANGE switch in the 4 mile position and connect oscilloscope trigger to 3A1TP1; vertical input to 3A5TP2; sweep to 0.1 microsec. per DIV.

3. Observe scope presentation. Adjust 2A3C4 such that first range mark is centered about the main bang leakage pulse.

G. CRYSTAL ATTENUATOR ADJUSTMENT

1. Adjust level set attenuator (AT1) such that meter (2M2) reads between 0.5 and 0.6 in both the XTAL 1 and XTAL 2 positions of the TEST switch. Replace crystals if they are not within limits.

5-2-3 Antenna/Pedestal (see Figure 5-2B)

A. SINE-COSINE POTENTIOMETER 1A2R1

NOTE

The sine-cosine potentiometer should require no alignment unless it is replaced. In the event of replacement, use the following procedure:

1. Perform Steps 1 through 10 of 5-4 and Steps 1 through 8 of 5-4-A2.

2. Unsolder all wiring and remove the old potentiometer from pedestal, labeling each conductor as it is removed.

3. Loosen the two set screws in the gear collar and remove the gear from the assembly.

ENCLOSURE: (3)

4. Loosen three mounting clamps holding potentiometer and remove old potentiometer from mounting bracket.

5. Clamp the new potentiometer to the mounting bracket, using the three clamps previously removed.

6. Proceed to Steps 37 through 41 and Steps 46, 47, 48, 50 and 51 of 5-4-A2.

5-2-4 Power Supply Adjustments

A. OVER-VOLTAGE PROTECTION (see Figure 5-31)

Test Equipment: Multimeter
Variac

1. Disconnect power connection P1 from power supply unit.

2. With all power to equipment power lines off, connect variac in series with the input power to control input voltage.

3. Connect multimeter to terminals 1 and 2 of transformer 4T1 in Power Supply unit (output of overvoltage cutoff relay 4K2).

4. Adjust variac for input power of 115 volts. (Insure that, if sine wave power is being used, 115 Vac is applied through pin C of J1, as described in installation section).

5. Place radar in standby. Adjust variac so multimeter reads 115 V, adjust 4A3R5 ten turns clockwise, increase variac until multimeter reads 140 V, and then turn 4A3R5 slowly counterclockwise until meter voltage drops to zero.

5-3 PREVENTIVE MAINTENANCE

The following procedures are for those few components of the AN/SPS-57 Radar that will require periodic preventive maintenance:

A. Antenna Gear Train (annually or when excessive gear train noises are noted) (see Figure 5-2B).

1. Perform steps 1 through 10 of para. 5-4 and steps 1 through 10 of para. 5-4-A2.

2. If the antenna is noisy or bearing failure is evident from the inspection, proceed with appropriate subsequent steps. Otherwise, proceed to step 35 of para. 5-4-A2 and continue with reassembly.

ENCLOSURE: (3)

B. Control Indicator Unit Desiccant (Monthly)

1. Loosen front panel screws which secure Indicator chassis in the cabinet.

2. Slide chassis out of the cabinet and inspect MS-2003-2 Humidity Indicator located in the desiccant container at the top-left of the enclosure.

NOTE

Seal top mounting screws with RTV for watertight enclosure.

3. Take action in accordance with instructions on Humidity Indicator.

5-4 REPAIR OR REPLACEMENT PROCEDURES

The following procedures are presented as a guide to repairing (or replacement of component parts of) assemblies for which action to be taken is not readily apparent.

A. Antenna/Pedestal

The antenna and pedestal should be removed as a single assembly from the boat to the shop for repairs. Antenna Unit removal and replacement on the boat should be performed as follows:

1. Observe safety precautions as outlined in CG-165-1, Chapter 2.

2. Remove all power from the radar.

3. Disconnect P1 (Cable W3) at the R/T Unit.

4. Remove pedestal cover by loosening the nine captive screws.

5. Remove two screws attaching the terminal assembly 1A2TB1 to the bottom of the pedestal, saving the screws. Disconnect Cable W3 from 1A2TB1 and 1A2TB2, and temporarily replace the two screws removed earlier. Remove Cable W3 from the pedestal by loosening the stuffing tube (1A2MP1).

6. Disconnect waveguide at the pedestal flange.

7. Loosely replace the pedestal gasket and cover, using the nine captive screws.

8. Unbolt the pedestal from the deck and remove to the shop area.

ENCLOSURE: (3)

9. If another antenna and pedestal assembly are not to be installed immediately, cover the exposed waveguide and cable with a plastic bag and tape securely to prevent moisture intrusion.

10. To reinstall, reverse the process.

NOTE

In final installation of the gasket and cover, use care to assure that an adequate seal is obtained. After the nine cover screws have been securely tightened, as an extra protection against moisture entry, apply a small amount of RTV around each screw and around the peripheral seam of the pedestal cover.

5-4-A1 Antenna Repair

This procedure describes the complete process for antenna disassembly and reassembly. Maintenance actions involving specific components will require only those steps necessary to replace the component. Specific supplementary information is provided in the sections dealing with those components. See Figure 5-2A for component location.

1. Remove five antenna-to-pedestal mounting screws and lockwashers and save this hardware. Remove antenna (1A1) from pedestal (1A2). Measure probe (1A2W2) height above the antenna mounting plate and record it for reassembly data. Remove probe (1A2W2). Set pedestal aside for modification according to PEDESTAL MODIFICATION instruction. Inspect probe and clean as necessary.

2. Remove the two window clamps (1A1MP11 and 1A1MP12) by removing the seven screws on each side.

3. Remove the end caps by removing the four screws on each end.

4. Using a knife or screwdriver, carefully separate the fiberglass window (1A1MP1) from the mating surface of the antenna housing (1A1MP6).

NOTE

Do not score the housing.

5. Carefully remove the polyurethane foam grating support (1A1MP2) from the opening of the radiator horn, using the procedure that follows. Using a sharp knife, carefully separate the support and grating from the horn. Place the fiberglass radome window (1A1MP1) on the face of the antenna, and place the window and antenna face down on the work surface. Lift the antenna off the window grating and grating support, tapping the assembly lightly to separate the radiator horn from the foam grating

ENCLOSURE: (3)

support. (This support is slotted on the horn mating surface and can be easily be broken. Extreme care is therefore necessary in removal and handling.) Care should also be exercised in retaining the metal grating plates (1A1MP3) embedded in the slots. Remove grating plates, clean all metal parts with fresh hot water, blow dry with compressed air, flush with Inhibisol or equivalent cleaning solvent, and re-dry with compressed air.

6. Remove four screws that attach the name plate (1A1MP7) to the rear surface of the antenna housing and remove seven screws that attach the housing to the radiator horn assembly (1A1MP8). Save the screws and name plate.

7. Remove four screws that attach the housing to the rotary joint flange on the radiator horn assembly.

8. Remove the housing and reinforcing plate from the radiator horn assembly. Inspect and clean, as necessary.

NOTE

If housing-to-pedestal mating surface is pitted at the "O" Ring contact area, the housing should be replaced; otherwise a seal cannot be obtained and moisture can enter the antenna.

9. Using a nonmetallic scraping tool (tongue depressor), carefully remove all residual RTV and other surface contaminants from all housing mating surfaces.

10. Position the housing reinforcing plate (1A1MP9) so that the machined recesses mate with the waveguide of the radiator horn assembly.

11. Using the four screws from Step 7, reattach the housing to the waveguide rotary joint flange, capturing the reinforcing plate between the waveguide and the housing. (The reinforcing plate will be slightly loose but will be positioned properly as reassembly progresses).

12. Use a small dab of RTV to fill each of the seven rear housing-to-radiator horn threaded screw holes and install the seven screws removed in Step 6. Place the radiator horn end blocks (1A1MP10) in each end of the horn opening. If the end blocks are new, trim with a sharp knife, as necessary, to obtain a flush fit between the wide top surface of the end block and the radiator horn flange.

13. Install the two radiator horn end blocks flush with each end of the horn opening, using a small amount of RTV on the radiator contact surfaces of the end blocks. Also cover any voids in the waveguide ends of the radiator. Allow to dry for at least 30 minutes.

ENCLOSURE: (3)

14. If the polyurethane grating support (removed during Step 5) must be replaced, trim one end of the new support with a sharp knife, to fit between the horn end blocks in the radiator opening.

15. Place the antenna horn assembly over the polyurethane grating support (the reverse of Step 5) and, using the fiberglass radome window as a retainer to hold the grating and support in position, rotate the antenna assembly until the radiator opening is up. Remove the window and gently tap the face of the grating support to center the metal grating pieces in the radiator horn and to assure that the grating support seats flush in the radiator horn opening between the end blocks.

16. Place a small but continuous bead of RTV along the flange of the radiator horn and across the end blocks to serve as a seal between the window and the radiator horn.

NOTE

It is important that only enough RTV to seal is used and that, when compressed, it does not contact the grating support.

17. Carefully position the window (on the radiator horn) over the grating support, pressing the window edges to assure uniform adhesion of the RTV between the window and the horn flange.

18. Attach the end caps, assuring that the window is captured under the end cap flange, and install two of the 6-32 x 3/8" screws, flat washers, and split washers removed earlier, to fasten each end cap to the radiator horn.

19. Place a small continuous bead of RTV lengthwise along the edges of the window (which will be captured under the window clamps) and place a small dab of RTV in each of the fourteen horn flange screw holes, seven along each edge of the housing.

20. Install the two window clamps (1A1MP11 and 1A1MP12). The lower clamp is positioned to clear the antenna-to-pedestal mounting surface. The clamps are attached using the fourteen stainless steel screws (8-32 x 1/2") with a split washer and flat washer on each screw. Clean from the face of the window any RTV that squeezed out when the window clamps were attached.

21. Turn the antenna assembly face down and place a small dab of RTV in each of the eight remaining holes on the back surface of the antenna.

22. Install the four remaining end-cap screws removed in Step 3, and replace the name plate and its four mounting screws removed in Step 6.

ENCLOSURE: (3)

23. Sparingly fillet the end-cap voids and the radome-clamp-to housing edge with RTV, and remove all excess RTV from the antenna assembly. Allow to cure overnight.

24. Touchup, as required, using SPAR colored enamel per MIL-E-15090 CL 2. Care should be exercised to prevent any paint from being applied to the antenna-to-pedestal mounting surface or to the surface of the window through which radiation must pass.

NOTE

Do not paint the antenna radiation surface (window).

5-4-A2 Pedestal Repair

This procedure describes the complete process for pedestal disassembly and reassembly. Maintenance actions involving specific components will reference the applicable general sections that follow for removal and replacement, with specific supplementary information provided when required in the section for that component. Refer to Figure 5-2B for component location.

1. Remove pedestal cover by loosening the nine captive screws.

2. Remove two screws attaching 1A2TB1 to the bottom of pedestal.

3. Remove two screws attaching buffer amplifier (1A2A1) and heading flasher switch (1A2S2) bracket and, without disconnecting the harness, position the switch and bracket to one side.

4. Remove Motor 1A2B1 by removing the drive belt (1A2MP20) and three 1/2-20 bolts attaching the motor mounting bracket to the pedestal. Record the identity of the connection points, and disconnect four motor leads from 1A2TB1, and the 6-32 screw attaching the ground lead to the gear box cover.

5. Remove gear train drive pulley (1A2MP26) by removing the snap ring (1A2MP22) and key.

6. Remove bearing retainer plate (under pulley) by removing two screws, lockwashers, one flat washer and the harness ground terminal.

7. Remove two screws from the bottom side of the pedestal securing the potentiometer (1A2R1) mounting bracket standoffs.

8. Remove the potentiometer and bracket assembly and wiring harness as a unit.

9. Remove the gear box cover by removing 6-32 screws, flat washers and lock washers. Use absorbent materials to contain any leakage from the gear box and, with a suitable tool, remove the grease from the gear box cavity.

ENCLOSURE: (3)

10. Examine gear box cavity and gear train for lack of lubrication, moisture intrusion and excessive wear. If any gear shows excessive wear, replace during appropriate following steps. If there is any evidence of moisture intrusion or deterioration of a seal (1A2MP19), the seal must be replaced.

11. Remove drive shaft (1A2MP3) and bearing (1A2MP13).

12. Using an 8-32 screw to engage the tapped shaft end, remove pinion shaft (1A2MP8).

13. Remove pinion gear (1A2MP6).

14. Remove the three remaining bearings (1A2MP14, 15, 16) by hooking an 8-32 x 2" screw head under the bearing and lighly tapping against the under side of the inner race. When the bearings must be replaced, remove the seals from the two bearings that are to be placed in the lower bearing recesses and set aside (preferrably on clean white paper), exercising care to protect them from dirt. This completes the disassembly of the intermediate gear train.

15. If the seal (1A2MP19) must be replaced, as determined in Step 10, proceed with the steps as listed, otherwise omit Steps 16 through 24 and 28 through 32 (marked with *).

*16. Remove the waveguide strap at the bottom of the pedestal by removing two screws and lock washers.

*17. With the Antenna-Pedestal inverted, remove six screws, flat washers and lockwashers, and carefully remove the waveguide assembly (1A2W1), shims, "O" ring (1A2MP29), and, if necessary, the bearing (1A2MP2) recessed in the rotary joint. Retain shims for replacement during reassembly. If the bearing (1A2MP2) is replaced, verify that the outer race of the new bearing is completely seated on the shoulder in the bottom of the recess.

*18. Bend the lockwasher tab out of the groove on the locknut and, using a spanner wrench (or a screwdriver tapped lightly with a hammer), remove the nut and lockwasher from the main shaft.

*19. Remove the sine-cosine drive gear (1A2MP5), key (1A2MP21), and spacer (1A2MP34).

*20. Remove the lower main shaft bearing (1A2MP12) by removing six screws, flat washers, lockwashers, a seal seat (1A2MP9), a seal (1A2MP18), a bearing spacer (1A2MP33), an "O" ring (1A2MP27), and a gasket (1A2MP28).

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*Omit unless 1A2MP19 or other antenna, rotor, or shaft components require replacement.

ENCLOSURE: (3)

*21. Using retaining ring pliers, remove snap ring; then remove gear spacer (1A2MP30).

*22. Place the pedestal on one side and, using a wooden block against the lower end of the main shaft, gently tap the shaft assembly to drive the seal (1A2MP19) out through the top of the pedestal casting. This seal must be replaced with a new seal when reassembling the shaft.

*23. Holding the gear fixed, remove the shaft and upper bearing (1A2MP11) from the pedestal. Remove the gear through the gear access opening.

*24. Remove the snap ring from the shaft; then remove the bearing and seal from the shaft.

*25. Using Inhibisol or equivalent, clean all surfaces of the gear box housing and all parts, and wipe dry. Apply a film of MIL-G-23872A grease (or lithium-type automative wheel bearing grease) to bearing surfaces of the pedestal and to the shaft. As each gear, bearing, and seal is reassembled, apply grease to all surfaces.

26. The two bearings to be used in the lower recesses (1A2MP14 and 1A2MP15) should be those with the seals removed (the upper shaft bearings must be sealed). Exercise care in installation to avoid the damage the bearings or the introduction of dirt into the races.

27. Using a nylon or other soft towel, seat the two bearings (1A2MP14 and 1L2MP15) into the recesses in the lower shelf of the gear access compartment.

*28. Apply a light coating of grease to the lips of the seal (1A2MP19) and assemble the seal, a bearing (1A2MP11), and the upper snap ring to the shaft.

*29. Insert the antenna gear (1A2MP10) through the gear access opening and assemble the shaft, gear, and key to the pedestal. Seat the top bearing in the pedestal but do not seat the top seal (1A2MP19).

*30. Assemble gear spacer (1A2MP30) and snap ring to the shaft. The beveled surface of the snap ring should be facing away from the spacer.

*31. Assemble the lower bearing (1A2MP12), an "O" ring (1A2MP27), a gasket (1A2MP28), a seal seat (1A2MP9), a seal (1A2MP18), and a bearing spacer (1A2MP33), using the screws, flat washers, and lockwashers removed in Step 20.

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*Omit unless 1A2MP19 or other antenna, rotor, or shaft components require replacement.

ENCLOSURE: (3)

*32. Assemble the spacer (1A2MP34), a key (1A2MP21), sine-cosine drive gear (1A2MP5), lockwasher (1A2MP35), and locknut (1A3MP36) to the shaft. Using a screwdriver, tighten the locknut snugly. Check to assure that no binding occurs when the shaft is rotated through 360 degrees. One tab of the lockwasher can then be bent down into a slot on the locknut.

33. Assemble pinion gear (1A3MP6) using pinion shaft (1A2MP8) and bearing (1A2MP16). The threaded hole in 1A2MP8 should be at the top.

34. Install drive gear (1A2MP3) and bearing (1A2MP13). Check mesh of gearing by rotating pedestal shaft. After the shaft replacement and all gearing is properly meshed, seat the seal installed in Step 31.

35. Pack the gear train with MIL-G-23827A grease or equivalent. Wipe excess grease from gear access opening surface and clean surface with Inhibisol or equivalent solution. Avoid getting this solution on painted surfaces and in gear housing.

36. Replace the gear box cover, using hardware removed in Step 9.

37. Verify that terminal 4 of the potentiometer is aligned with the clamp located 90 degrees from the two bracket stand-offs.

38. Connect an ohmmeter between terminals 2 and 6 of the potentiometer and rotate this shaft until maximum resistance is read on the meter.

39. Without distrubing the potentiometer shaft position, install gear (1A2MP4) on the shaft, with the cam screw in the gear aligned with the potentiometer clamp located 90 degrees from the two bracket stand-offs. Slide the gear, hub first, onto the shaft until the shaft protrudes approximately 1/32 inch through the gear. Tighten the two set screws securely in the gear collar.

40. With the ohmmeter connected between terminals 2 and 6 of the potentiometer, align the cam-screw in the gear, with the potentiometer clamp located 90 degrees from the two bracket stand-offs. Loosen the three clamps and rotate the potentiometer body until maximum resistance is again read on the meter. Tighten the three potentiometer clamps.

41. With the antenna mounting plate (stepped edge) facing forward, line up mounting plate rear edge to be parallel with the pedestal cover opening's top machined edge. Reassemble the potentiometer and bracket assembly, using the two screws and lockwashers

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*Omit unless 1A2M19 or other antenna, rotor, or shaft components require replacement.

ENCLOSURE: (3)

removed in Step 7, making certain that the cam-screw is vertically aligned with the clamp. When assembled, the cam-screw should be positioned rearward. The gear mesh should provide a slight amount of backlash to avoid placing a strain on the potentiometer.

42. Using a teflon spacer (1A2MP37), replace the bearing retainer plate removed in Step 12 with the hardware removed at that time.

43. Replace the pulley (1A2MP26), removed in Step 5, using the key and snap ring (1A2MP22).

*44. Invert the Antenna-Pedestal Assembly. Carefully seat the waveguide assembly so as not to damage the "O" ring seal. If the waveguide assembly, lower probe bearing, probe, or radiator horn assembly have been replaced, install and tighten several screws to assure that the waveguide is fully and evenly seated. If none of these components have been replaced, install all waveguide assembly screws and tighten securely. When one of the components (identified above) has been replaced, it is necessary to be certain that the probe is properly positioned in the radiator rotary joint, as described in Step 45.

*45. Replace the waveguide strap removed in Step 18. Set the pedestal upright and, if components identified in Step 44 were replaced, temporarily insert the probe and check for proper probe height at upper pedestal surface as measured in 5-4-A1 Step 1. If height must be adjusted, the shims on the waveguide assembly must be selected to obtain correct probe height. When proper probe height is achieved, the probe may be removed and all screws retaining the waveguide assembly should be installed and tightened.

46. Reconnect four motor leads disconnected in Step 4 and reinstall motor (1A2B1), using hardware removed in Step 4. Apply RTV to motor screws.

47. Reassemble the buffer amplifier (1A2A1) and heading flasher switch (1A2S2) bracket, using hardware removed in Step 3. Tighten hardware only finger-tight at this time. Reinstall the drive belt.

48. Reassemble 1A2TB1 to the bottom of pedestal, using hardware removed in Step 1.

49. Set the pedestal upright and insert the probe assembly (1A2W2). Remount the antenna, visually aligning the pin (on the probe assembly) with the antenna base, using the hardware removed in initial separation of the antenna and pedestal. After the

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*Omit unless 1A2M19 or other antenna, rotor, or shaft components require replacement.

ENCLOSURE: (3)

mounting screws are tightened securely, apply RTV to the screws and around the screw holes.

50. Rotate the antenna by hand, clockwise (looking down from the top). As the antenna passes through "dead ahead", the microswitch (1A2S2) should actuate. If actuation does not occur at this point, carefully adjust switch and/or roller position for proper actuation.

NOTE

Care must be exercised to assure that if the switch arm is bent to obtain proper operation, it is not bent repeatedly. The switch roller arm is brittle and can be damaged during this adjustment, if repeated bending is attempted.

51. Temporarily replace the pedestal cover. The assembly is now ready for installation on the boat.

B. Control Indicator CRT Replacement (Ref. Figure 5-16).

WARNING

Extreme care should be exercised in the performance of the following procedure in order to avoid striking or dropping of the CRT which may result in an implosion and result in injury or death of personnel.

1. Insure that indicator power is OFF.

2. Disconnect CRT leads from TB1.

3. Loosen wing nut and remove centering magnet (MP1).

4. Disconnect high voltage (HV) lead on side of CRT.

5. Loosen screw on yoke clamp, slide forward and set aside.

6. Slightly loosen the three top-most nuts mounting the segmented CRT mounting ring (MP23).

7. Loosen (3 or 4 turns) the 3 screws (top, Rte-Side, bottom) joining the mounting ring segments.

8. Gently lift rear of CRT and slide off yoke.

9. Carefully lift CRT from ring mounting and from indicator.

10. Slide neck of new CRT into yoke, and carefully position CRT into mounting ring. Allow approximately 1/16 inch between face of CRT and plexiglass filter (MP21).

ENCLOSURE: (3)

11. Place yoke clamp over yoke (do not tighten).

12. Place centering magnet on neck of CRT about 1/12 inch from end.

13. Attach CRT leads to TB1 and connect HV lead to side. HV connector should be in Horiz. plane.

14. Rotate (Indicator energized) yoke such that heading marker illumination aligns with zero on front-mounted azimuth ring.

15. Tighten screws joining mounting ring segments and ring mounting nuts insuring that CRT is centered in viewing window.

16. Tighten yoke clamp insuring that yoke is fully forward against bulb of CRT. If position is incorrect, loosen yoke mounting block screws by removing 3C1, and position block. Retighten block screws and replace 3C1.

17. Adjust per Para. 5-2-1.A and 5-2-1.B.

C. Cursor Assembly Removal or Replacement.

NOTE

From time-to-time it will become necessary to remove the plexiglass cursor marker for cleaning. At this time also clean the filter and the inside of the viewing window. Use soft, clean rag and cleaner (G-C 60 or equivalent).

1. Remove CRT per Para 5.4.B, steps 1 through 9.

2. Remove the four lamp assemblies from the CRT mounting ring.

3. Remove four each nuts and washers mounting segmented mounting ring to front panel. Remove ring.

4. Remove second set of nuts (4 each) and washers retaining tinted plexiglass filter (MP21).

5. Loosen (only) third set of nuts (4 each) retaining plexiglass cursor (MP20). Slide guides away from cursor. Remove plexiglass cursor.

6. Replace cursor by reversing the disassembly procedure insuring that the center of the cursor is exactly centered in the viewing window.

7. Replace CRT per steps 10 through 17 of Para. 5.4.B.

ENCLOSURE: (3)

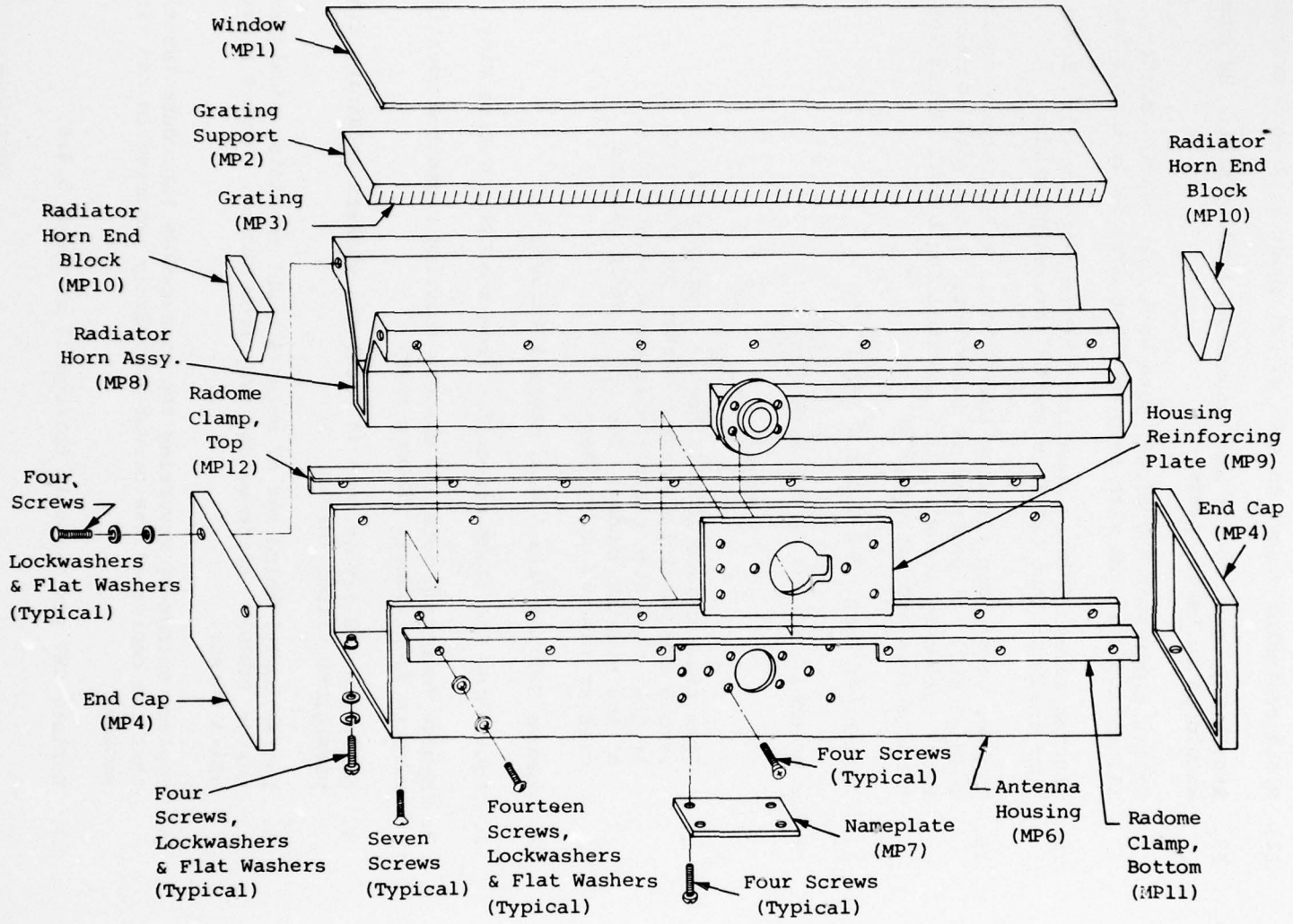
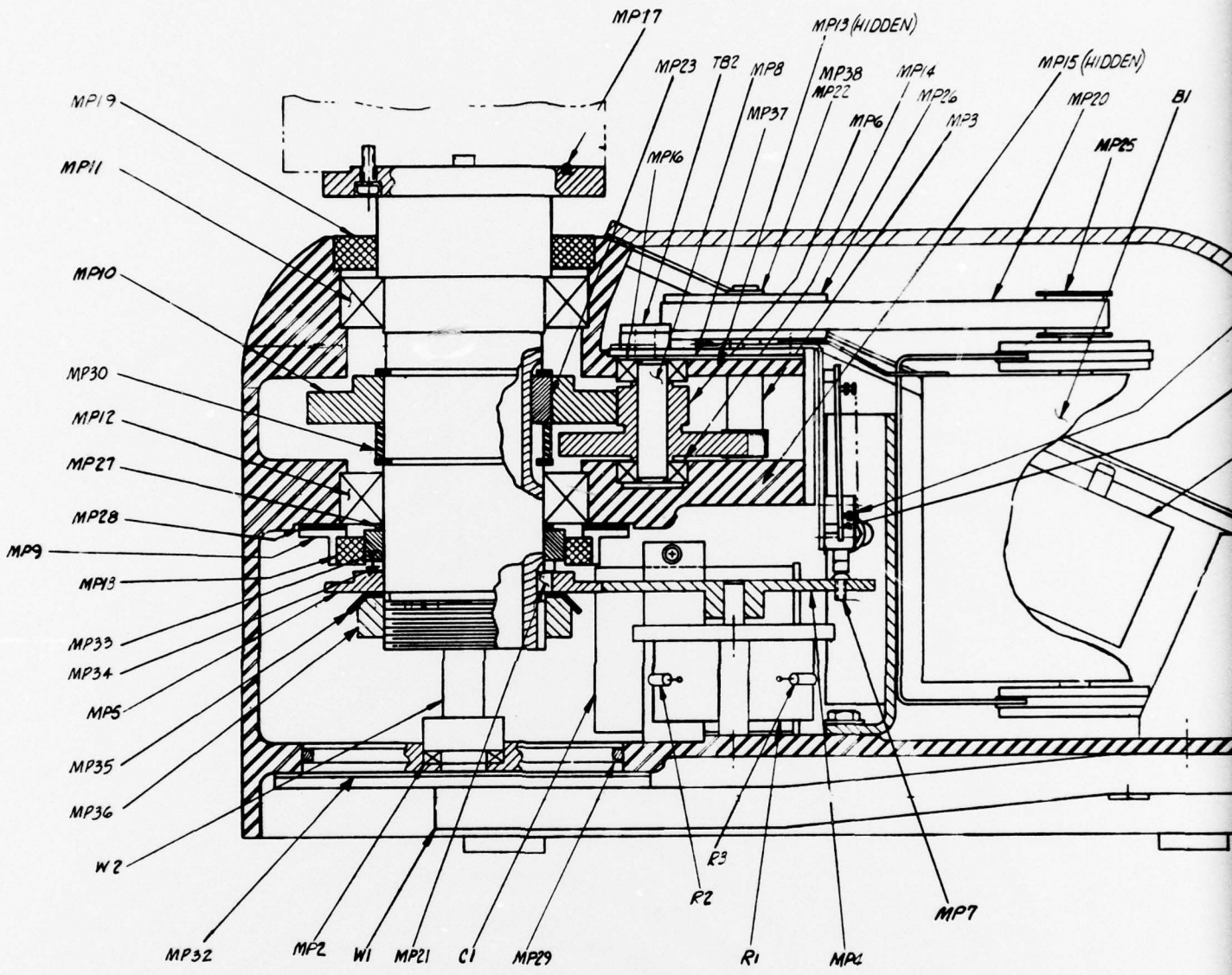


Figure 5-2A. ANTENNA ASSEMBLY


MP17
MP13 (HIDDEN)
MP15 (HIDDEN)
MP23
TB2
MP8
MP38
MP14
MP22
MP26
MP37
MP6
MP3
MP20
B1
MP16
MP25
MP19
MP11
MP10
MP30
MP12
MP27
MP28
MP9
MP18
MP33
MP34
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R3
R2
R1
MP4
MP7

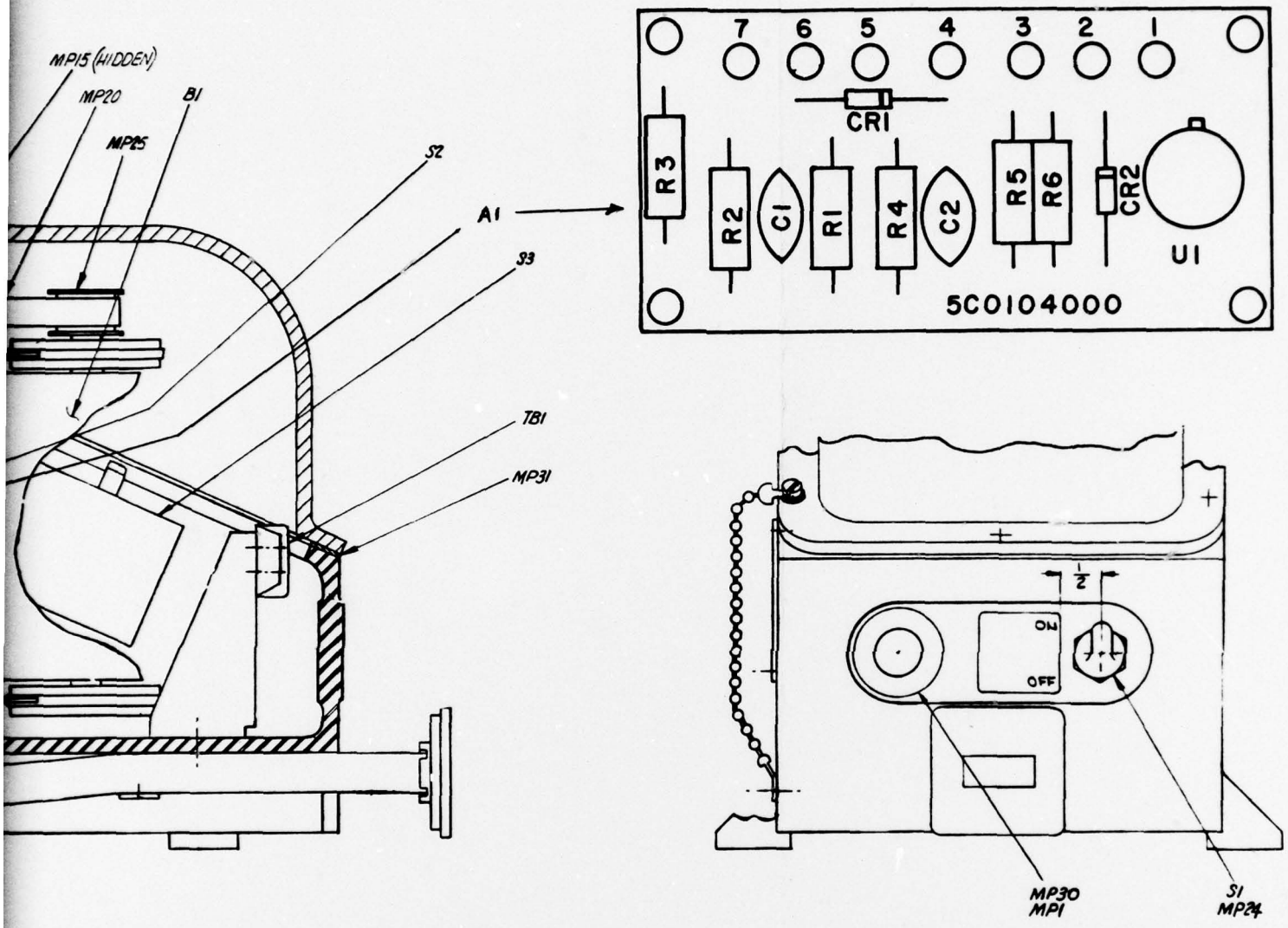


Figure 5-2B Antenna Pedestal Assembly. (1A2)

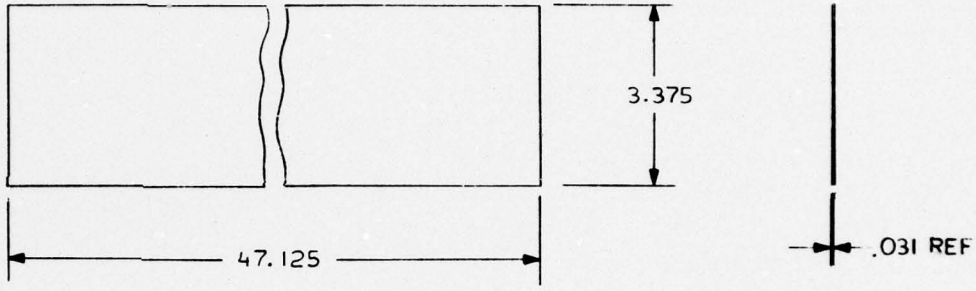
ATTACHMENT

REPRODUCTIONS OF MODIFICATION ITEM DRAWINGS

NOTES:

1. MATERIAL - PLASTIC, SHEET, .031 THK LAM, PER MIL-P-18177, TYPE GEB

REVISIONS				
SYM	ZONE	DESCRIPTION	DATE	APPROVED
A		ZONE C-6, DIM 47 7/32 WAS 47 1/4 ; ADDED NOTE 3. (CN462)	5-18-73	
B	C6	IN MTL BLOCK REMVD "MOLDED" .025 THK; ADDED INDICATION OF FRONT SURFACE ADDED CONSTRUCTION DETAIL; REVISED NOTE 3; ADDED NOTES 4, 5 & 6. (CN463)	5/22/73	
C		REDRAWN; CHANGED DIM & DWG SIZE	7/17/76	



ITEM	QTY.	NEXT ASSY	USED ON
	1	5D0101000	AN/SPS-57

APPLICATION

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES

TOLERANCES ON:

FRACT.	DECIMALS	ANGLES
± —	.XX ± — .XXX ± .020	± —

MATERIAL 1.

TREATMENT —

FINISH —

UNITED STATES COAST GUARD
ELECTRONICS ENGINEERING CENTER
WILDWOOD, NEW JERSEY

TITLE: COVER, RADOME

SCALE 1/2 | DR. BY | PROJECT NO.

DATE 10 JAN 77 | CK'D. BY

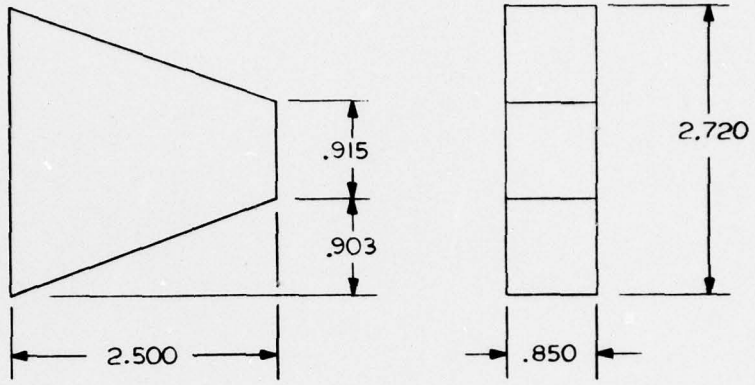
APPROVED BY (COMMANDING OFFICER) _____

DRAWING NO. 5B0101005

REVISIONS				
SYM	ZONE	DESCRIPTION	DATE	APPROVED

NOTES :

1. MATERIAL - POLYURETHANE FOAM ELASTIC, MIL-P-26514, TYPE I, CLASS 2, 2-4 POUNDS/CU. FT.



ITEM	QTY.	NEXT ASSY	USED ON
	2	5D0101000	AN/SPS-57

APPLICATION

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES

TOLERANCES ON:
FRACT. ± —
DECIMALS .XX ± —
.XXX ± .020
ANGLES ± —

MATERIAL 1.

TREATMENT —

FINISH —

UNITED STATES COAST GUARD
ELECTRONICS ENGINEERING CENTER
WILDWOOD, NEW JERSEY

TITLE
END BLOCK, HORN

SCALE 1/1	DR. BY	PROJECT NO.
DATE 10 JAN 77	CK'D. BY	

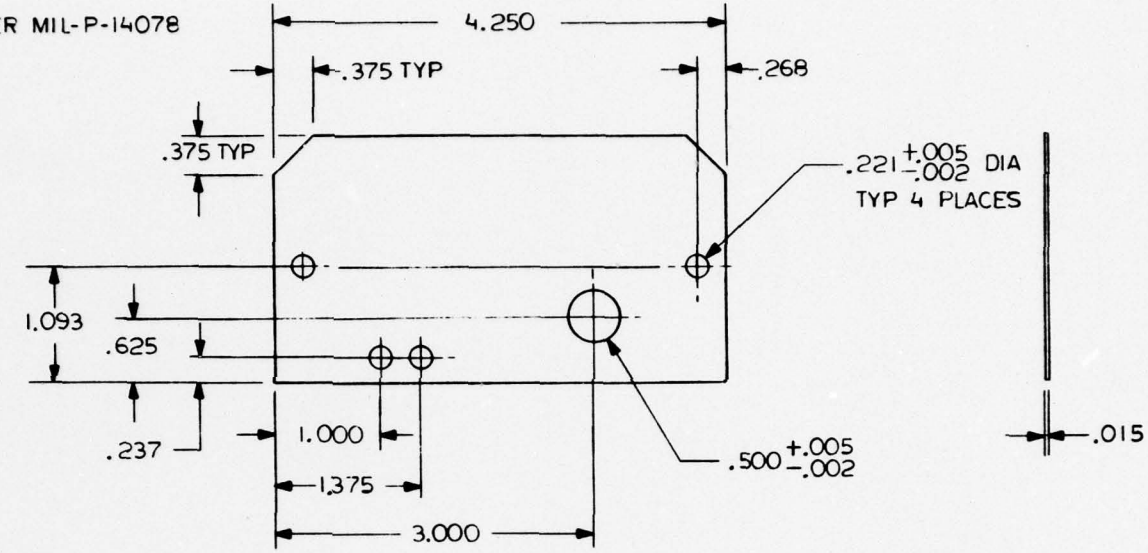
APPROVED BY (COMMANDING OFFICER)

DRAWING NO.
5B0101027

REVISIONS				
SYM	ZONE	DESCRIPTION	DATE	APPROVED

NOTES:

1. MATERIAL — TEFLON SHEET PER MIL-P-14078



QTY. REQ.	DESCRIPTION	PART NO.	MATERIAL	SPECIFICATION	ZONE	ITEM

LIST OF MATERIALS

ITEM	QTY.	NEXT ASSY	USED ON
	1	5D0102000	AN/SPS-57

APPLICATION

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES

TOLERANCES ON:
FRACT. ± —
DECIMALS .XX ± —
.XXX ± .020
ANGLES ± —

MATERIAL 1.

TREATMENT —

FINISH —

UNITED STATES COAST GUARD
ELECTRONICS ENGINEERING CENTER
WILDWOOD, NEW JERSEY

TITLE: SPACER

SCALE 1/1 | DR. BY | PROJECT NO.

DATE 10 JAN 77 | CK'D. BY

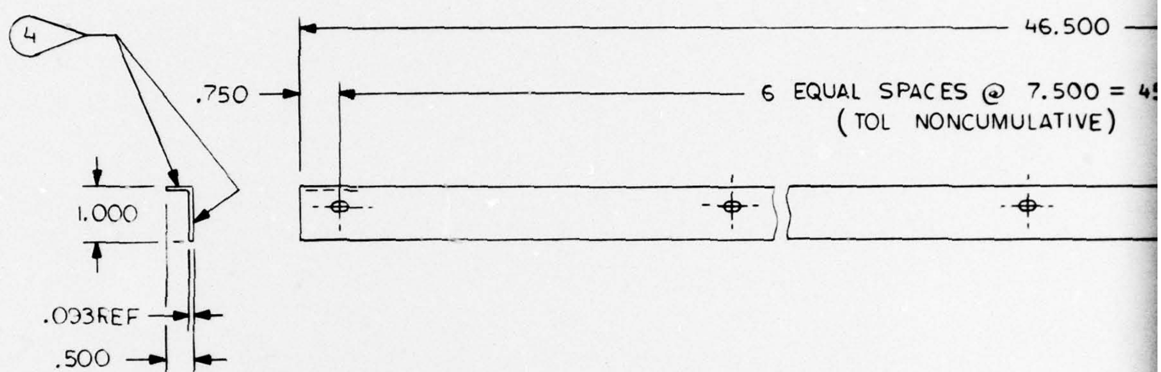
APPROVED BY (COMMANDING OFFICER)

DRAWING NO. 5B0102026

4 | 3

D

C



B

NOTES:

1. MATERIAL - .093 THK, 1/2 X 1 ALUMINUM ALLOY EXTRUSION PER 6061-T6/QQ-A-250/11.
2. FINISH - CHEM FILM, CHROMATE, MIL-C-5541, CL 3.
3. REMOVE BURRS AND SHARP EDGES .005 R MAX.
4. PAINT SURFACES AS FOLLOWS:
   A. PRIME PER MIL-P-15328.
   B. PAINT 2 COATS SPAR COLORED ENAMEL PER MIL-E-15090 CL2.

QTY. REQ.

A

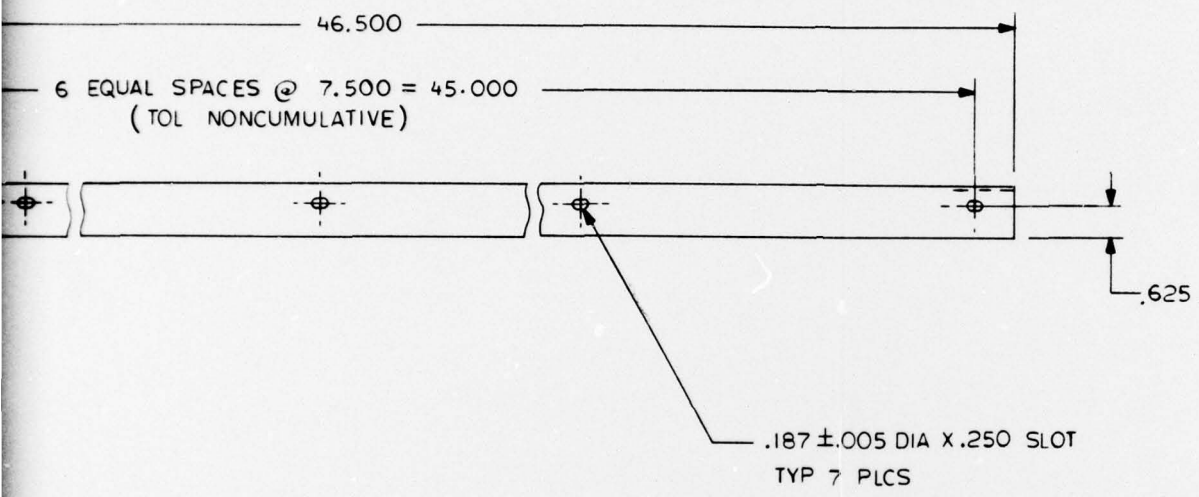
ITEM	QTY.	NEXT ASSY	USED ON
	1	5D0101000	AN/SPS-57

APPLICATION

4 | 3

2

REVISIONS				
SYM	ZONE	DESCRIPTION	DATE	APPROVED



5C0101028

QTY. REQ.	DESCRIPTION	PART NO.	MATERIAL	SPECIFICATION	ZONE	ITEM

LIST OF MATERIALS

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON:
FRACT. ± —
DECIMALS .XX ± —
.XXX ± .020
ANGLES ± —

MATERIAL (1)

TREATMENT —

FINISH (2)

ITEM	QTY.	NEXT ASSY	USED ON
	1	5D0101000	AN/SPS-57

APPLICATION

UNITED STATES COAST GUARD
ELECTRONICS ENGINEERING CENTER
WILDWOOD, NEW JERSEY

TITLE: RADOME CLAMP, TOP

SCALE 1/2 | DR. BY | PROJECT NO.

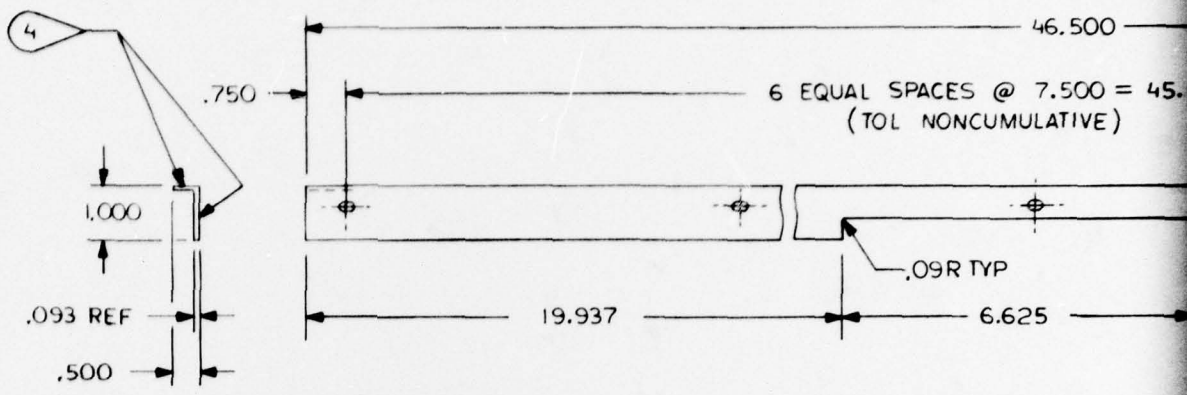
DATE 10 JAN 77 | CK'D. BY

APPROVED BY (COMMANDING OFFICER)

DRAWING NO. 5C0101028

D C A

2 1



NOTES:

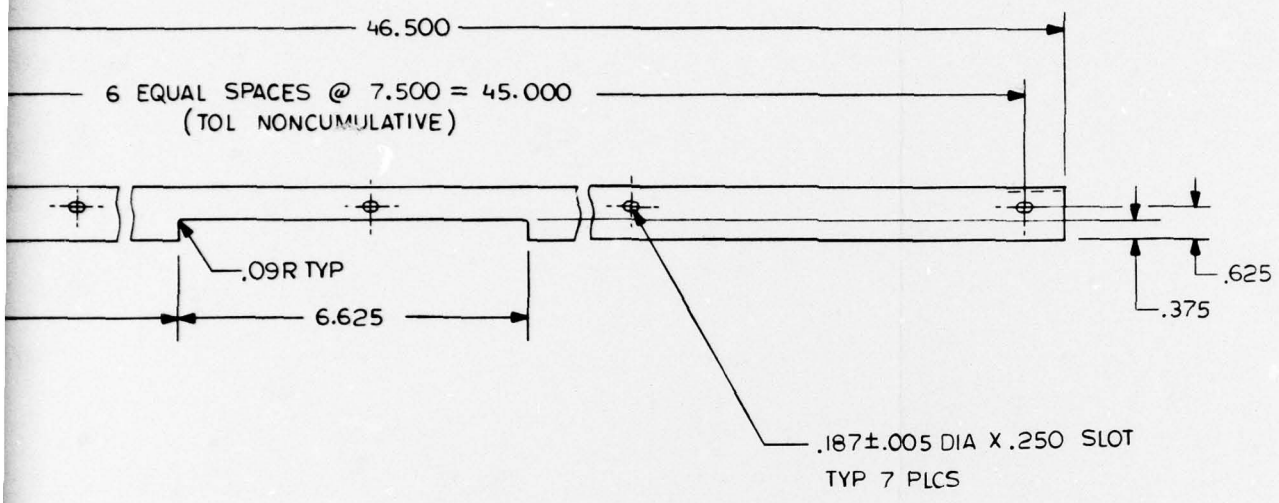
1. MATERIAL - .093 THK, 1/2 X 1 ALUMINUM ALLOY EXTRUSION PER 6061-T6/QQ-A-250/11
2. FINISH - CHEM FILM, CHROMATE, MIL-C-5541, CL3.
3. REMOVE BURRS AND SHARP EDGES .005 R MAX
4. PAINT SURFACES AS FOLLOWS:
   A. PRIME PER MIL-P-15328.
   B. PAINT 2 COATS SPAR COLORED ENAMEL PER MIL-E-15090, CL2.

QTY. REQ.

ITEM	QTY.	NEXT ASSY	USED ON
	1	5D0101000	AN/SPS-57

APPLICATION

REVISIONS				
SYM	ZONE	DESCRIPTION	DATE	APPROVED



QTY. REQ.	DESCRIPTION	PART NO.	MATERIAL	SPECIFICATION	ZONE	ITEM

LIST OF MATERIALS

ITEM	QTY.	NEXT ASSY	USED ON
	1	5D0101000	AN/SPS-57

APPLICATION

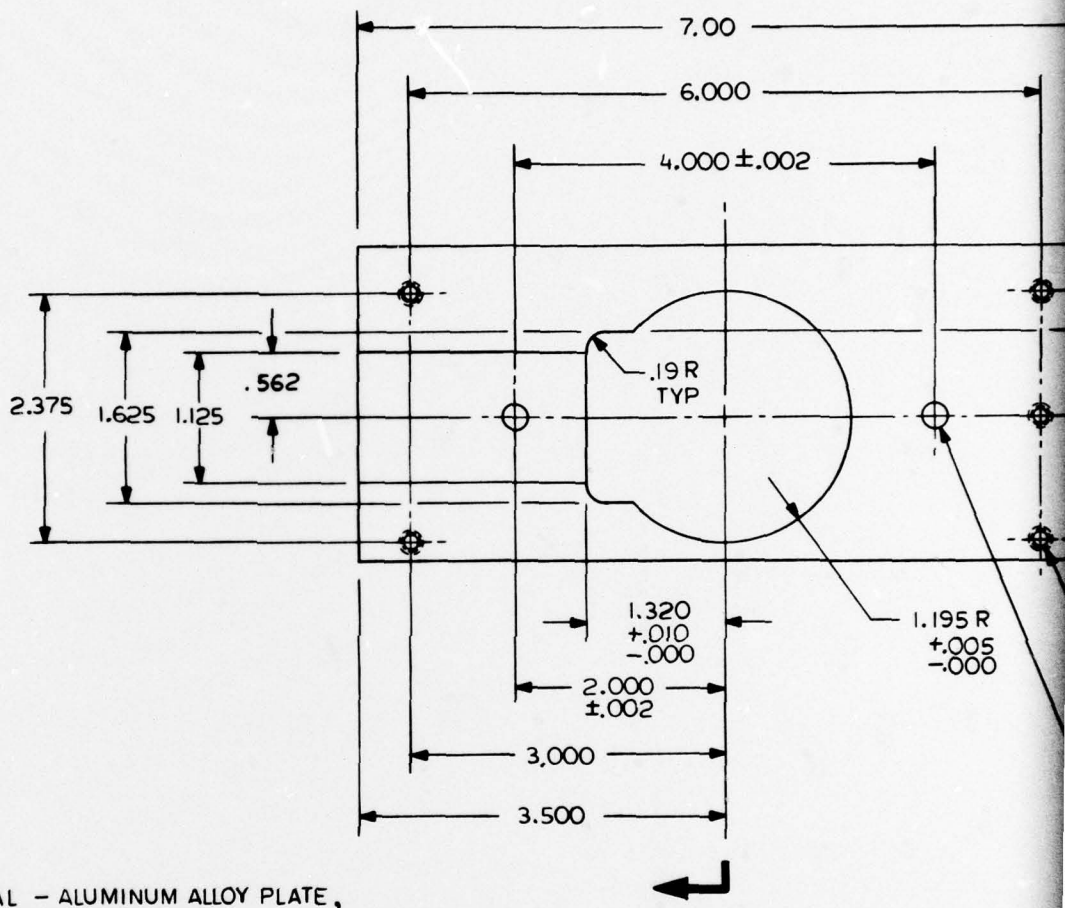
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES ON:
FRACT. ± DECIMALS .XX ± .XXX ± .020 ANGLES ±
MATERIAL (1.)
TREATMENT —
FINISH (2.)

UNITED STATES COAST GUARD
ELECTRONICS ENGINEERING CENTER
WILDWOOD, NEW JERSEY

TITLE RADOME CLAMP, BOTTOM

SCALE 1/2	DR. BY	PROJECT NO.
DATE 10 JAN 77	CK'D. BY	
APPROVED BY (COMMANDING OFFICER)		DRAWING NO. 5C0101029

5C0101029



NOTES:

1. MATERIAL – ALUMINUM ALLOY PLATE, 6061-T6 PER QQ-A-250/11.
2. CHEM FILM, CHROMATE, PER MIL-C-5541, CL 3.
3. REMOVE BURRS AND SHARP EDGES. .005 R MAX
4. INSTALL ITEM 1 FROM FARSIDE IN ACCORDANCE WITH MS33646.

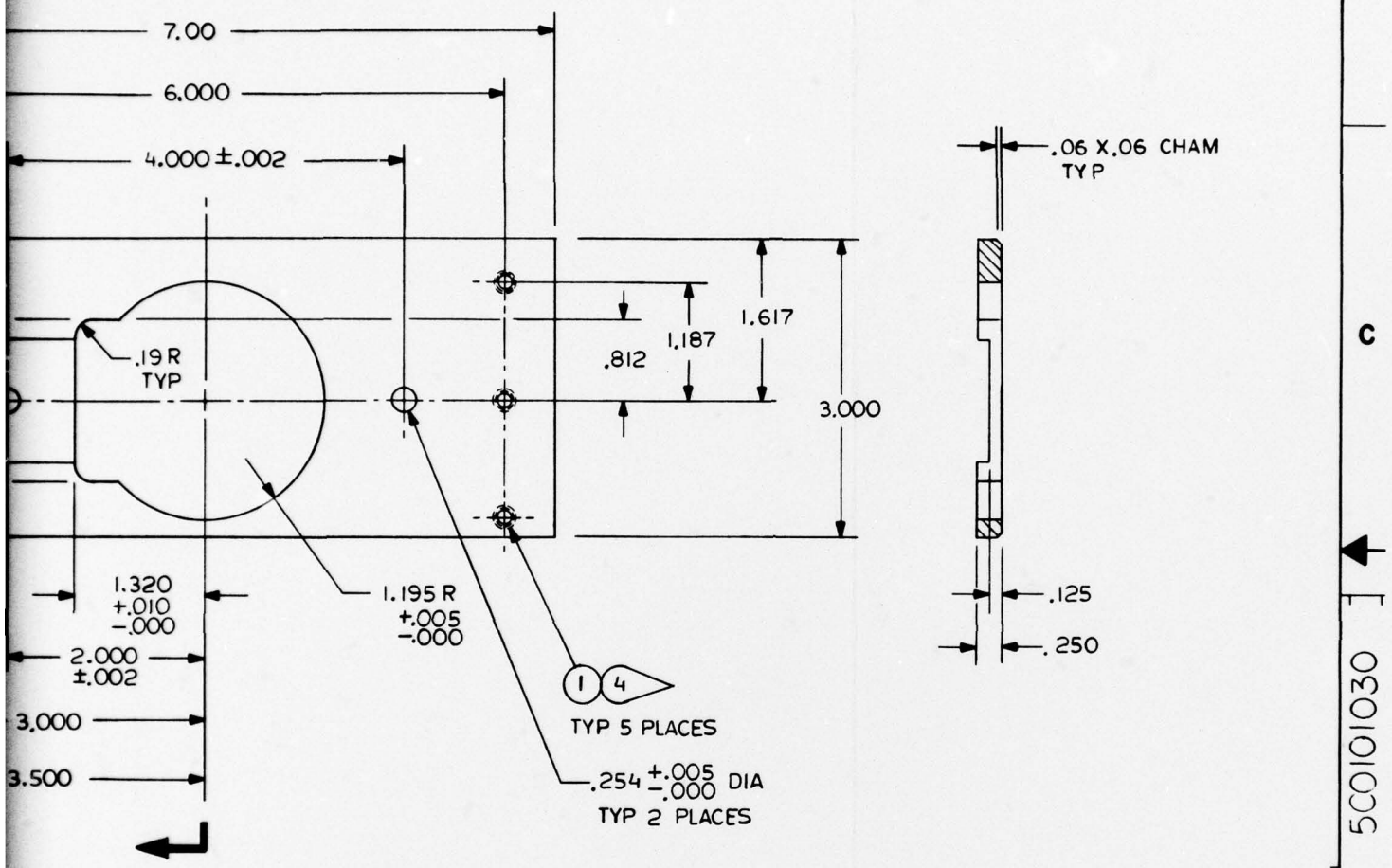
ITEM	QTY.	NEXT ASSY	USED ON
	1	5D0101000	AN/SPS-57

APPLICATION

QTY. REQ.	DESC
5	INSERT S

UNLESS DIMEN
TOLER FRACT. ± —
MATE
TREAT
FINISH

REVISIONS				
SYM	ZONE	DESCRIPTION	DATE	APPROVED



QTY. REQ.	DESCRIPTION	PART NO.	MATERIAL	SPECIFICATION	ZONE	ITEM
5	INSERT SCREW THREAD	MS21208-F1-10				1

LIST OF MATERIALS

ITEM	QTY.	NEXT ASSY	USED ON
	1	5D0101000	AN/SPS-57

APPLICATION

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES

TOLERANCES ON:

FRACT.	DECIMALS	ANGLES
± —	.XX ±.020	± —
	.XXX ± 005	

MATERIAL (1)

TREATMENT

FINISH (2)

UNITED STATES COAST GUARD
ELECTRONICS ENGINEERING CENTER
WILDWOOD, NEW JERSEY

TITLE
REINFORCEMENT PLATE, HOUSING

SCALE	DR. BY	PROJECT NO.
DATE 10 JAN 77	CK'D. BY	
APPROVED BY (COMMANDING OFFICER)		DRAWING NO. 5C0101030

5C0101030 1