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MARATHON MANAGEMENT COMPANY
(A SUBSIDIARY OF MARATHON WATCH COMPANY LTD.)
67A STEELCASE RD. WEST, MARKHAM, ONT. L3R 2M4

August 29, 1989

Nuclear Regulatory Commission
1 White Flint North
11555 Rockville Pike
Rockville, MD 20852
U.S.A.

Attention: Floyd Deschamps (301) 492-0503

Enclosed please find specs for the navigational watch, our model 211,
as per our previous telephone conversation.

We hope the information is to your satisfaction.

Yours truly,

MARATHON MANAGEMENT COMPANY LTD.

Leon Wein

Encl/cw

SA-ALC/MMI PD-496

Watch, Wrist: Quartz Analog

1. SCOPE

1.1 Scope. This purchase description contains the requirements for a wrist watch with quartz movement and an elapsed time ring capable of operating at a depth of 3 atmospheres and at an altitude of 35,000 feet above sea level. A strap is furnished with the watch.

1.2 Classification. Wrist watches covered by this purchase description shall be of the following types:

Type I - Symbolized dial (see Figure 3).

Type II - Numbered dial (see Figure 4).

Style N - Navigation Elapsed Time Ring (see Figure 2).

Style S - Submersible Elapsed Time Ring (see Figure 7).

2. APPLICABLE DOCUMENTS

2.1 The following documents of the issue in effect on date of invitation for bids or request for proposal, form a part of this purchase description to the extent specified herein.

SPECIFICATIONS

Federal

PPP-T-360

Time Measuring Instruments; Packaging Of

Military

MIL-S-46383

Strap, Wrist: Instrument

STANDARDS

Federal

FED-STD-595

Colors

Military

MIL-STD-105	Sampling Procedures and Tables for Inspection by Attributes
MIL-STD-109	Quality Assurance Terms and Definitions
MIL-STD-202	Test Methods for Electronic and Electric Component Parts
MIL-STD-810	Environmental Test and Engineering Guidelines
MIL-STD-889	Dissimilar Metals

2.2 Other Publications. The following document forms a part of this purchase description to the extent specified herein. Unless otherwise indicated, the issue in effect on date of invitation for bids or request for proposal shall apply.

CODE OF FEDERAL REGULATIONS

U.S. Nuclear Regulatory Commission, Rules and Regulations
Title 10, Chapter 1, Parts 30 and 32

3. REQUIREMENTS

3.1 First Article. When specified in the purchase description, the contractor shall furnish sample unit(s) for first article inspection (see 4.4).

3.2 Design and Construction.

3.2.1 General Design. The watch shall be designed to operate at a water depth of 3 atmospheres and an altitude of 35,000 feet. The watch shall have a quartz time base, battery powered movement with a quartz crystal oscillator, frequency divider and motor drive circuit. The watch shall have a corrosion resistant non-reflecting metal case with stainless steel back.

3.2.2 Power. The watch shall be powered by self-contained power cell(s) which are commercially available from a minimum of two manufacturers. The watch shall be designed to operate a minimum of 1 year on a single power cell. The power cell(s) shall contain orientation marks which identify the positive (+) side. The power cell(s) shall be easily accessible by either removal of the case back or power cell hatch. When specified (see 6.1), the power cell(s) shall be furnished with the watch.

3.3 Materials. All materials shall be of uniform quality and free of defects which might impair the functioning or accuracy of the watch. Material which is not specified by a definite material specification shall be of a composition and quality that will enable the watches to meet all requirements of this specification.

3.3.1 Dissimilar Metals. Units shall be protected against dissimilar metal contact in accordance with MIL-STD-889. All external metal parts shall be corrosion resistant steel.

3.3.2 Paint.

3.3.2.1 White Paint. All areas of the dials, hands, and elapsed time ring for which White, Color No. 37875 (see Figures 2, 3, 4, 5 and 7) is specified, shall be a paint or lacquer containing a minimum of 25% pigment. The pigment

shall contain a minimum of 90% Titanium Dioxide (TiO₂).

3.3.2.2 Self-Luminous Paint. The self-luminous paint for dials, hands and elapsed time ring (bezel) shall consist of tritium paint. The quantity of tritium in the self-luminous paint shall be as specified for time pieces in Title 10, Chapter 1, Part 30.15 of the code of federal regulations (or an equivalent Agreement State regulation), or a watch that can be received as a generally licensed item and is manufactured in accordance with Title 10, Chapter 1, Part 32 of the code of federal regulations (or an equivalent Agreement State regulation). Certification of compliance with the specific license (see 6.3) shall be provided for each batch of material processed for application to the dial, hands, and elapsed ring.

3.3.2.2.1 Undercoat. A paint or lacquer undercoat shall be applied to the total areas of the dial, hands and elapsed time ring containing self-luminous paint (see Figures 2, 3, 4, 5, and 7). The undercoat shall be a minimum thickness of 0.001 inch and contain a minimum of 25% pigment. The pigment shall contain a minimum of 90% Titanium Dioxide (TiO₂).

3.4 Second Hand Stop Mechanism. The watch shall have a crown set movement containing a second hand stop mechanism, a manually locking crown and a shock absorbing device that shall drive concentrically mounted hour, minute and sweep second hands. Pulling the crown to the setting position shall result in stopping of the movement and hands. Rotation of the crown shall allow the minutes and hours to be set without any movement to the second hand. The depressing of the crown shall result in the movement and hands resuming the measurement of time.

3.5 Case. The case shall be constructed in accordance with Figures 1 and 6.

The case backs shall be designed to allow for the easy removal and replacement of power cells, using a simple nonspecial tool specified by the manufacturer.

3.5.1 Case Bars. The bars of the case through which the strap is inserted shall be an integral part of the case or solid bars permanently secured to the case and capable of withstanding a pull of 40 pounds, $\pm 1/2$ pound.

3.5.2 Crown. The crown shall have a straight knurl, conform to the dimensions in Figure 1, and include a locking mechanism.

3.5.3 Finish. The case, case bars, and crown shall have a dull non-reflecting finish.

3.5.4 Crystal. The crystal shall be made of tempered glass, mineral crystal or nonhygroscopic, thermosetting plastic. The crystal shall be clear and uncolored, and free from bubbles, striae, scratches, chips, or other imperfections which may interfere with the reading of the watch. Plastic crystals shall be mounted with an o-ring type seal or cemented in place using a clear nonhygroscopic adhesive which is non soluble in water and which is compatible with the plastic crystal.

3.5.5 Elapsed Time Ring. Unless otherwise specified, the elapsed time ring shall conform to Style N (Figure 2). The ring shall permit rotation and setting by pressure of the fingers and be designed to assure that the ring does not move when exposed to shock and vibration. The outer edges shall be serrated (see Figures 2 and 7).

3.5.5.1 Finish. The elapsed time ring shall have a dull non-reflecting finish.

3.5.5.2 Style N Ring. The Style N ring, graduated in hour and minutes, shall conform to Figure 2.

3.5.5.3 Style S Ring. The Style S ring, graduated in minutes and seconds shall conform to Figure 7.

3.6 Dial. Unless otherwise specified, the dial shall be Type II and conform to Figure 4. The dial face, with markings, shall have a durable transparent protective coating. The dial shall be of a material which will allow the watch to meet the requirements of this specification.

3.7 Hands. There shall be three hands, one each to indicate the hour, minute and seconds. The hands shall conform to Figure 5.

3.8 Strap. The strap shall be as specified in MIL-S-46383. The color of the strap shall be black.

3.9 Performance.

3.9.1 Synchronization. The hands shall be synchronized to eliminate the possibility of error in reading correct time. The hour hand shall indicate the correct time within the tolerance indicated for each dial, when the minute hand is at any hour, from 1 through 12:

- a. Types I: \pm six (6) degrees
- b. Types II: \pm one (1) dial graduation

3.9.2 Crown. The locking mechanism shall remain in the locked position when subjected to shock, vibration, a pull of 10 pounds ± 0.25 pound and a torque of 8 inch-ounces, $\pm 1/2$ inch-ounce.

3.9.2.1 Setting. The crown, while being moved to the setting position, shall be capable of withstanding a pull of seven (7) pounds, ± 0.25 pounds.

3.9.3 Elapsed Time Ring.

3.9.3.1 Design. The elapsed time ring shall be designed to assure that the outer edge (shoulder) of the crystal is recessed within the elapsed time ring.

The elapsed time ring shall be of a material which will allow the watch to meet the requirements of this specification.

3.9.3.2 Torque. The elapsed time ring shall move only when a torque of 26 ± 6 inch ounces is applied.

3.9.3.3 Displacement. The elapsed time ring shall be capable of withstanding, without damage, two forces, each of ten (1), ± 0.5 pounds, applied to the lower side of the elapsed time ring. The forces shall be applied alternately to opposite sides of the elapsed time ring with the index (triangle) of the elapsed time ring at the 3 o'clock position of the dial.

3.9.4 Brightness. The watch shall be capable of being distinctly read in darkness at a minimum distance of twelve (12) inches from the eyes of a dark adapted observer having normal vision.

3.9.5 Vibration. While running, the watch shall not be damaged by ninety (90) minutes of simple harmonic motion having an amplitude of 0.03 inch (0.06 inch maximum total excursion), the frequency being varied uniformly between the approximate limits of 10 and 55 hertz (Hz). The entire frequency range, between 10 and 55 Hz and return to 10 Hz, shall be traversed in approximately one (1) minute.

3.9.6 Storage. The watches shall show no evidence of damage after being subjected to storage temperatures of -20°C and $+60^{\circ}\text{C}$ for 24 hours at each temperature.

3.9.7 Altitude. The watches shall show no evidence of damage when subjected to an altitude of 35,000 feet for a minimum of sixty (60) minutes.

3.9.8 Accuracy. After meeting the requirements of 3.9.1 to 3.9.7 inclusive,

the watches shall have a daily rate and mean daily rate not to exceed 0.5 seconds per day. The mean daily rate shall be computed using three consecutive days of operation at room temperature.

3.9.9 Shock. The watch shall show no evidence of damage after one uncontrolled drop, while running, from a height of two (2) feet, 6 inches onto a block of hard wood.

3.9.10 Water Resistance/Waterproof. Watches shall show no evidence of damage and reject the entry of water at a depth of 3 atmospheres for a minimum of sixty (60) minutes.

3.9.11 Salt Resistance. The watch shall conform to the salt fog requirement of MIL-STD-810. This 48 hour test, using a wet, dense salt spray, shall determine the corrosive resistance of the watch case. Upon completion of this test, there shall be no evidence of damage to the crystal and the operation of the watch shall not be affected.

3.9.12 Human Perspiration Resistance. The watch shall be subjected to an accelerated lactic acid test (see 4.7.11) to determine the resistance of external case metals to human perspiration. Upon completion of this test, the case shall show no evidence of corrosion or discoloration, as specified in paragraph 4.7.11.

3.10 Identification. The back of each case shall be permanently marked as specified in Figure 6.

3.11 Operation Instructions. An operating instruction, conforming to 3.11.1 shall be furnished with each watch. If watches are furnished without power cell(s) (see 6.1), the operating instructions shall be marked, stamped or printed on top and bottom margin of the front page with the following words

"power cell(s) is (are) not furnished with this watch."

3.11.1 Typical Operating/Setting Instructions.

a. General. This section shall describe all the functions of the watch, the durability (i.e., shock and water resistance features) and accuracy that can be expected from the watch, and any precautions that should be observed during the life of the watch.

b. Starting the Watch. This section shall contain specific step by step instructions on how to activate or start-up the watch if it is received not running.

c. Setting the Watch. This section shall contain specific instructions and drawings concerning the setting of various functions of the watch to reflect desired times.

3.12 Workmanship. Workmanship shall be of a quality consistent with the highest instrument production standards and practices. All finished surfaces shall be protected against corrosion or damage during manufacture prior to delivery. All surfaces shall be free of burrs and sharp edges. All material shall be sound, of uniform quality and condition, and free from seams, cracks and other defects which may adversely affect the strength, endurance or wear resistance of the watch. Any material which has been treated in any manner to conceal defects therein, shall not be offered for Government acceptance.

4. QUALITY ASSURANCE PROVISIONS

4.1 Production Quality-Control. The supplier shall maintain a production quality control program which is adequate to ensure that each unit delivered to the government meets the requirements of this purchase description.

4.2 Responsibility for Inspection. Unless otherwise specified in the

contract or purchase order, the supplier is responsible for the performance of all inspection requirements as specified herein. Except as otherwise specified in the contract or order, the supplier may use his own or other facilities suitable for the performance of the inspection requirements specified herein, unless disapproved by the government. The government reserves the right to perform any of the inspections set forth in the purchase description where such inspections are deemed necessary to assure supplies and services conform to prescribed requirements.

4.3 Classification of Inspections Examination Sampling and Testing of the watch shall be classified as follows:

- a. First Article Inspection (4.4)
- b. Quality Conformance Inspection (4.5)

Should it become evident during testing that the procedures are inadequate, the government reserves the right to alter the test procedures to insure that the government receives a high quality item.

4.4 First Article Inspection. First article inspection shall be as specified in the contract or purchase order. First article inspection shall be in conformance with the first article tests listed in Table I. Failure of the first article to conform to all the requirements shall be cause for rejection of the first article.

TABLE I - FIRST ARTICLE INSPECTION

<u>Examination or Test</u>	<u>Requirement Paragraph</u>	<u>Method Paragraph</u>
General Design	3.2.1	---
Materials	3.3	4.6.1
Dissimilar Metals	3.3.1	---
Luminous Material	3.3.2.2	4.6.2
Undercoat	3.3.2.2.1	4.6.2.1
Second Hand Stop Mechanism	3.4	4.7.1.3.2
Case	3.5	4.6.3
Case Bars	3.5.1	4.6.4
Crown	3.5.2	4.6.5
Finish	3.5.3, 3.5.5.1	4.6.6
Crystal	3.5.4	4.6.7
Elapsed Time Ring		
Style N	3.5.5.2	4.6.8.1
Style S	3.5.5.3	4.6.8.2
Dial	3.6	4.6.9
Hands	3.7	4.6.10
Strap	3.8	4.6.11
Synchronization	3.9.1	4.7.1.3.1
Crown	3.9.2, 3.9.2.1	4.7.1.1, 4.7.1.2
Elapsed Time Ring	3.9.3.1	4.7.2
Torque	3.9.3.2	4.7.2.1
Displacement	3.9.3.3	4.7.2.2

Brightness	3.9.4	4.7.3
Vibration	3.9.5	4.7.4
Storage	3.9.6	4.7.5
Altitude	3.9.7	4.7.6
Accuracy	3.9.8	4.7.7.1, 4.7.7.2
Shock	3.9.9	4.7.8
Water Resistance	3.9.10	4.7.9
Salt Resistance	3.9.11	4.7.10
Human Pers Resistance	3.9.12	4.7.11
Identification	3.10	4.7.12
Operating Instructions	3.11	4.7.13
Workmanship	3.12	4.7.14

4.4.1 Samples. Six watches shall be subjected to first article inspection. The watches shall be manufactured in the same manner, using the same materials, equipment, processes and procedures as used in regular production.

4.4.2 Failure. Failure of any sample watch to pass all the tests listed in Table I is cause for rejection of all samples submitted at one time for first article inspection.

4.5 Quality Conformance Inspection. Quality conformance inspection shall be in accordance with the examinations and tests listed in Tables II and III.

4.5.1 Inspection Lot. Unless otherwise specified by the contracting officer, inspection lot size, formation and presentation of lots shall be in accordance with "Submission of Product" and "Drawing of Samples" specified in MIL-STD-105.

4.5.2 Classification of Examinations and Tests. Examinations and tests shall be performed on a defect (individual characteristic) basis in accordance MIL-STD-105 and the inspection level and sampling plans specified in Tables II and III. Examination and tests for packaging, packing and marking shall be in accordance with PPP-T-360 and Section 5 herein. The tabulated classification of defects shall constitute the minimum inspection to be performed by the supplier prior to government acceptance or rejection by lot. The government reserves the right to inspect for any applicable requirement, and to reject individual nonconforming items.

TABLE II - CLASSIFICATION OF DEFECTS
 LEVEL II OF TABLE I WITH SAMPLING PLAN TABLE II-A OF
 MIL-STD-105

	<u>REQUIREMENT</u>	<u>METHOD</u>
<u>CRITICAL:</u> AQL 0.0		
1. Waterproofness	3.9.10	4.7.9
2. Torque	3.9.3.2	4.7.2.1
<u>MAJOR:</u> AQL 1.5		
Second Hand Stop Mechanism	3.4	4.7.1.3.2
Case Bars	3.5.1	4.6.4
Crystal	3.5.4	4.6.7
Elapsed Time Ring		
Style N	3.5.5.2	4.6.8.1
Style S	3.5.5.3	4.6.8.2
Synchronization	3.9.1	4.7.1.3.1
Displacement	3.9.3.3	4.7.2.2
Storage	3.9.6	4.7.5
<u>MINOR:</u> AQL 2.5		
Strap	3.8	4.6.11
Identification	3.10	4.7.12
Operating Instructions	3.11	4.7.13
Workmanship	3.12	4.7.14

TABLE III - CLASSIFICATION OF DEFECTS
 LEVEL S-4 OF TABLE I WITH SAMPLING PLAN
 TABLE II-A OF MIL-STD-105

<u>CRITICAL:</u> None		
<u>MAJOR:</u> AQL 4.0	<u>REQUIREMENT</u>	<u>METHOD</u>
Brightness	3.9.4	4.7.3
Vibration	3.9.5	4.7.4
Altitude	3.9.7	4.7.6
Accuracy	3.9.8	4.7.7.2
Shock	3.9.9	4.7.8

4.6 First Article Test Methods. Unless otherwise specified in the purchase description, the first article shall be subjected to the following tests.

4.6.1 Materials. Acceptance of materials shall be by certification. Where defects or inferior quality is evident, and the Government deems a material analysis necessary, the contractor will be requested to submit samples to the contracting officer for analysis and approval.

4.6.2 Luminous Material. The luminous material for watches containing Tritium shall be tested as specified for timepieces in Part 32 of Title 10, Chapter I of the Code of Federal Regulations. Certification of compliance with the specific license (see 6.3) shall be provided for each batch of material processed for application to the dial, hands and elapsed time ring.

4.6.2.1 Undercoat. The dials, hands and elapsed time ring of each watch shall be certified to have an undercoat with a minimum thickness of 0.001 inch containing a minimum of 25% pigment that contains a minimum of 90% Titanium Dioxide (TiO_2).

4.6.3 Case. The case shall be inspected visually and dimensionally to determine conformance to Figures 1 and 6.

4.6.4 Case Bars. A visual examination shall be made to insure that the bars are an integral part of the case. The strap (see 3.8) shall be looped successively around each case bar. With the watch in a secured position and the strap held in a position that will not exert pressure on the buckle or the keeper of the strap, a pulling force of 40 pounds, $\pm 1/2$ pound, shall be applied to the case bar via the strap without the case bar permanently bending or causing other damage to the bar or case.

4.6.5 Crown. The crown shall be inspected visually and dimensionally to

determine conformance to Figure 1. The locking mechanism shall be checked to assure that it is activated when the crown is pressed toward the case.

4.6.6 Finish. The case, case bars, crown and elapsed time ring shall be visually examined for a dull, nonreflecting finish.

4.6.7 Crystal. The crystal, after the tests of 4.7.5, 4.7.6 and 4.7.8 shall be visually examined for any imperfections which would interfere with reading of the watch, and shall show no evidence of scratches or digs.

4.6.8 Elapsed Time Ring.

4.6.8.1 Style S. Ring shall be inspected visually and dimensionally to determine conformance with Figure 7 and 4.7.2.

4.6.8.2 Style N. Ring shall be inspected visually and dimensionally to determine conformance to Figure 2 and 4.7.2.

4.6.9 Dial. The dial shall be visually and dimensionally examined to determine conformance to Figure 3 for the Type I dial and to Figure 4 for the Type II dial.

4.6.10 Hands. The hands shall be visually and dimensionally examined to determine conformance to Figure 5.

4.6.11 Strap. The strap shall be certified to be in conformance with Type III of MIL-S-46383.

4.7 Performance.

4.7.1 Crown.

4.7.1.1 Locked Position. In the locked position the functions of the crown shall not be impaired when subjected to:

- a. A torque of $\bar{8}$ (8) inch-ounces, ± 0.5 inch-ounces.
- b. A direct force (pull) of ten (10) pounds, ± 0.25 pound. The

application of the direct force, in addition to not resulting in damage, shall not result in the crown moving into the setting position.

4.7.1.2 Setting. The crown shall not be damaged by a direct force (pull) of 7 pounds, ± 0.25 pound, applied while moving the crown to setting position.

4.7.1.3 Setting Position.

4.7.1.3.1 Synchronization. In the setting position the crown shall be turned and readings observed with the minute hand at 12. At any hour the readings shall indicate the correct time within ± 6 degrees (one dial graduation).

4.7.1.3.2 Second Hand Stop Mechanism. In the setting position the crown shall be turned to move the hour and minute hands forward two hours. This action shall be repeated five times. The second hand moving with the crown in the setting position shall be cause for rejection.

4.7.2 Elapsed Time Ring. The elapsed time ring shall be visually examined to assure that the outer edge (shoulder) of the crystal is recessed within the elapsed time ring.

4.7.2.1 Torque. The elapsed time ring shall move only when subjected to a torque applied clockwise and counterclockwise, of 26 ± 6 inch-ounces.

4.7.2.2 Displacement. With the index (triangle) at the 3 o'clock position of the dial, a force of ten (10) pounds, $\pm 1/2$ pound, shall be applied successively, 180° apart, to the lower side of the elapsed time ring without the ring being damaged or separating from the case.

4.7.3 Brightness. Brightness shall be tested in a totally darkened area by an observer who has been dark adapted. The observer shall be able to read the time, with the watch a minimum of twelve (12) inches from the eyes of the observer. The watch tested shall have been kept in total darkness a minimum

of 8 hours prior to this test.

4.7.4 While running, the watch shall be subjected to Method 201 of MIL-STD-202 for 30 minutes in each of the following directions:

- a. Perpendicular to dial
- b. Through the 6 and 12 positions of the dial
- c. Through the 3 and 9 positions of the dial

4.7.5 Storage. The watch shall not be damaged when subjected to:

- a. -20°C (-4°F) $\pm 1^{\circ}\text{C}$ for 24 hours
- b. $+60^{\circ}\text{C}$ (140°F) $\pm 1^{\circ}\text{C}$ for 24 hours

4.7.6 Altitude. The watch shall be subjected to air pressure equivalent to that experienced at 35,000 feet (550 mm Hg Vacuum) for 60 minutes without damage.

4.7.7 Accuracy Tests (First Article Only).

4.7.7.1 Magnetism. The timekeeping of the watch shall not be affected when subjected for 10 minutes to a magnetic field of 125 Gauss ± 1.00 Gauss in any direction.

4.7.7.2 Temperature. After completion of all tests, except shock (4.7.8) and waterproofness (4.7.9), the mean daily rate (see 6.2.4) shall not exceed the following values at the temperatures specified below. The watches shall be subjected to the temperature test for at least 4 hours prior to the test.

<u>Temperature</u>	<u>Mean Daily Rate (Seconds Per Day)</u>
$+1^{\circ} \pm 2^{\circ}\text{C}$	3
$+26^{\circ} \pm 2^{\circ}\text{C}$	0.5
$+40^{\circ} \pm 2^{\circ}\text{C}$	3

4.7.8 Shock. While running, the watch shall be dropped, uncontrolled, from a

height of two feet, six inches onto the end grain of beech, oak or hard maple, the size of which shall be a minimum of four inches square by four inches thick. The watch, at the conclusion of the test, shall show no evidence of damage. The daily rate (see 6.2.3), after the test, at 23°C, $\pm 10^\circ\text{C}$, in the positions of (1) dial up and (2) crown down shall not exceed +10 seconds, -5 seconds.

4.7.9 Water Resistance/Waterproof. The watch shall be immersed in distilled water. The water shall be subjected to a pressure of 45 pounds per square inch for 60 minutes. After removal from water, the watch shall be subjected to a temp of $+45^\circ\text{C}$, $\pm 1^\circ\text{C}$, for thirty minutes. After the test the watch shall not show evidence of damage or condensation within the case. The daily rate (see 6.2.3) after the test, at 23°C, $\pm 10^\circ\text{C}$, in the positions of (1) dial up and (2) crown down, shall not exceed +10 seconds, -5 seconds. The waterproofness test shall be the last test to which the watches are subject.

4.7.10 Salt Fog Test. The watch shall be subjected to a salt fog test as specified in Method 509.2 of MIL-STD-810.

4.7.11 Human Perspiration Resistance. This accelerated lactic is designed to determine porosity and resistance to corrosion by skin chemicals, or their equivalents. The test shall be conducted as follows:

a. The watch shall be immersed for a period of 3-5 seconds in a concentrated (saturated) sodium chloride solution, containing a 5 percent volume of lactic acid (65 percent strength) at a temperature of $91^\circ\text{C} \pm 2^\circ\text{C}$. (Note: This high temperature allows the rapid flash off of water.)

b. The watch shall be suspended in an air-tight chamber for 20 hours, in a vapor produced by 100 milliliters of a 50 percent solution of acetic acid in

water, in a small open container.

c. Upon completion of this 20-hour test, the watch shall show no evidence of base metal corrosion (slight staining is permitted).

4.7.12 Identification. All numbers, names and location of identification marking shall be inspected for compliance with Figure 6.

4.7.13 Operating Instructions. The operating instructions shall be inspected for compliance with 3.11.1.

4.7.14 Workmanship. Quality of workmanship in conjunction with industry standard practices shall be inspected, at the discretion of the Government, during in-process and on completed watches to insure that watches are continually produced in accordance with 3.12.

5. PACKAGING

5.1 Preservation-Packaging. Each item shall be preserved and packaged in accordance with the normal commercial practice of the manufacturer for commercially marketed watches. The complete package shall be designed to protect the item during shipment, handling and storage.

5.2 Marking. In addition to the marking requirements specified in PPP-T-360, the unit package, intermediate package and shipping container shall be marked with the date of acceptance by the Government.

6. NOTES

6.1 Ordering Data. Procurement documents should specify the following:

- a. Title, number and date of this specification.
- b. Type and style of watch required.
- c. Selection of applicable levels of packaging and packing.
- d. Applicable stock number.

e. List of serial numbers to be assigned.

f. Specify whether watches shall include or exclude power cell(s). NOTE: It is recommended that watches purchased for long-term storage (over 18 months) should not be equipped with power cell(s).

6.2 Definitions of Terms Used.

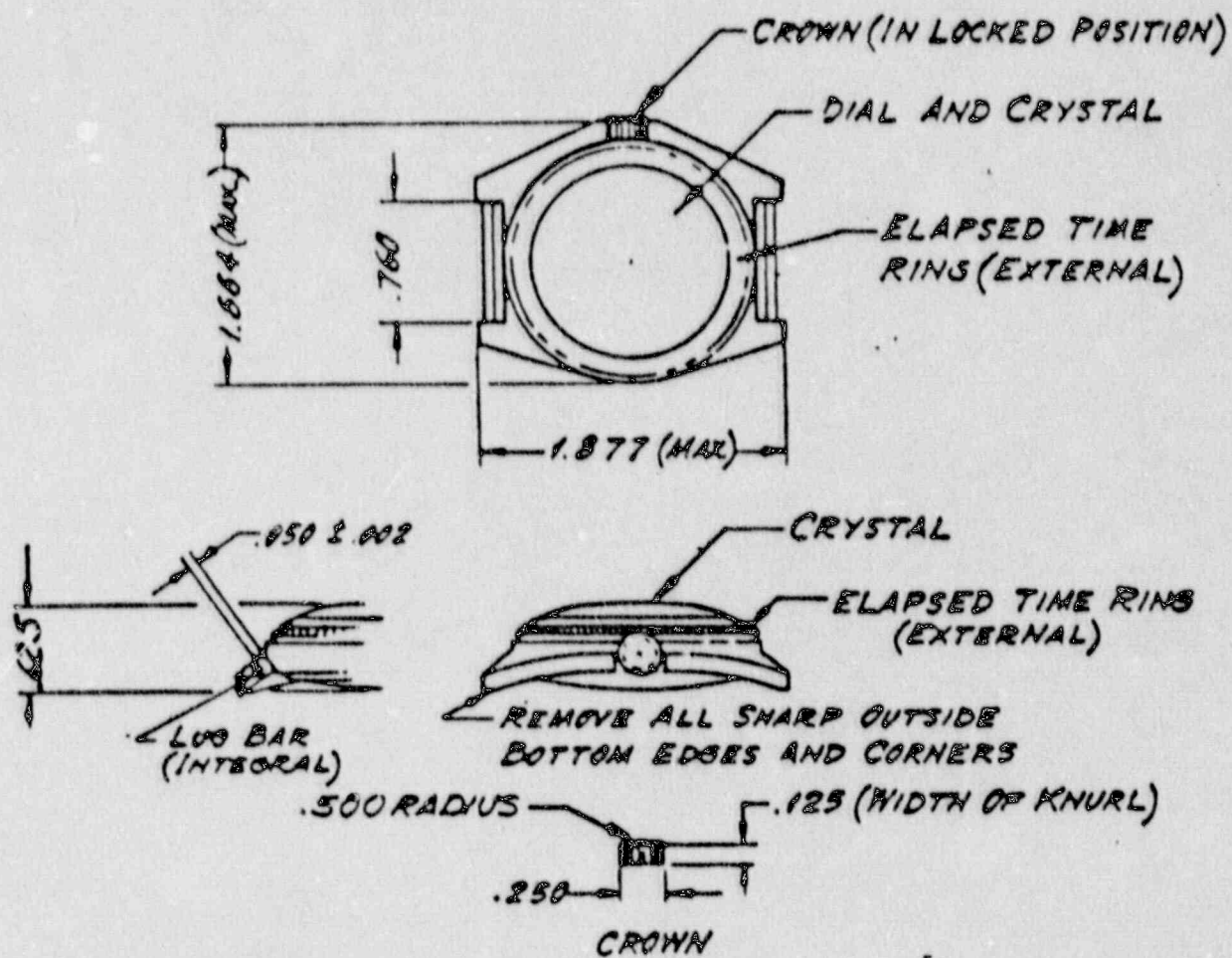
6.2.1 Accuracy Error Notation. Where algebraic signs are used to denote the direction of timekeeping accuracy error, the plus (+) sign represents "fast" and the minus (-) sign "slow".

6.2.2 Rate. Rate is the error, in seconds, between any two readings of the watch.

6.2.3 Daily Rate. The term "daily rate" is used synonymously with the terms "daily error" and "daily accuracy."

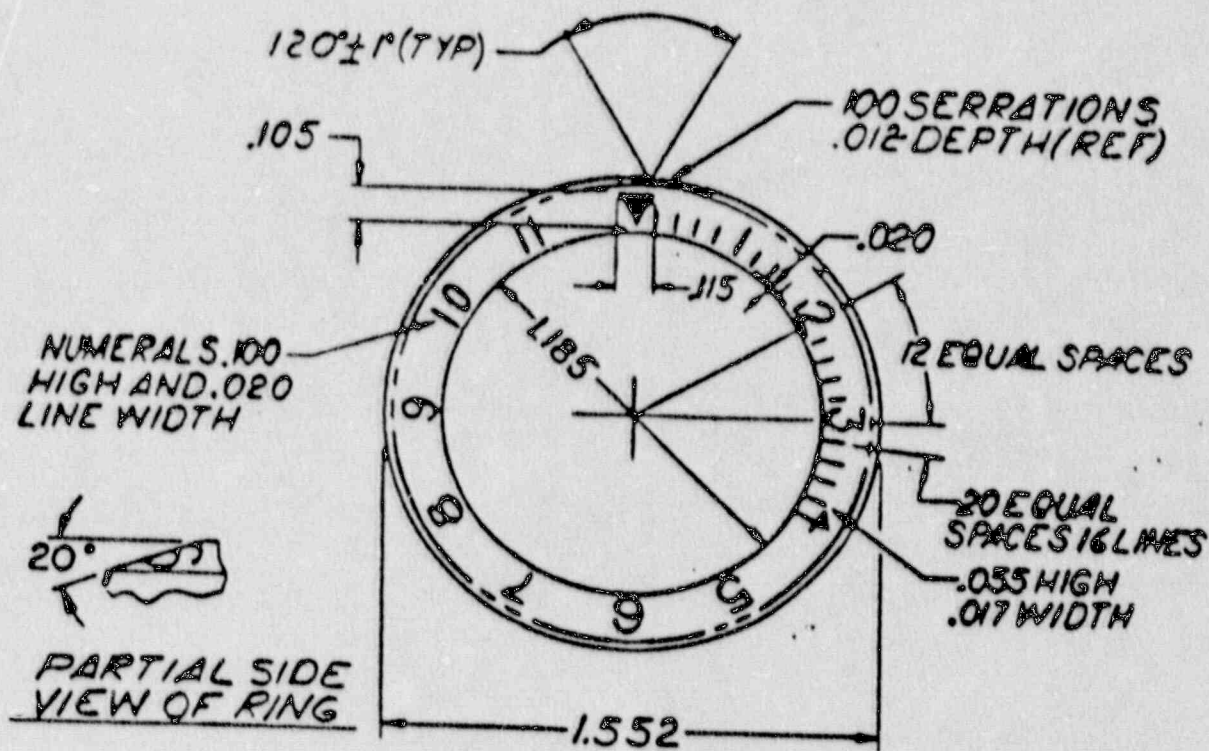
6.2.4 Mean Daily Rate. Mean daily rate is the arithmetic average of individual daily rates (daily errors) with proper regard to algebraic signs in the summation. Unless otherwise specified, the mean daily rate shall be for three (3) consecutive days operation.

6.3 Luminous Material. Prospective bidders shall be cognizant of the need for a license in the application of Tritium as required in Sections 30.15 and 32.14 of CFR, Title 10, as referenced in 2.2.



DIMENSIONS IN INCHES
 TOLERANCES $\pm .010$ (UNLESS OTHERWISE SPECIFIED)

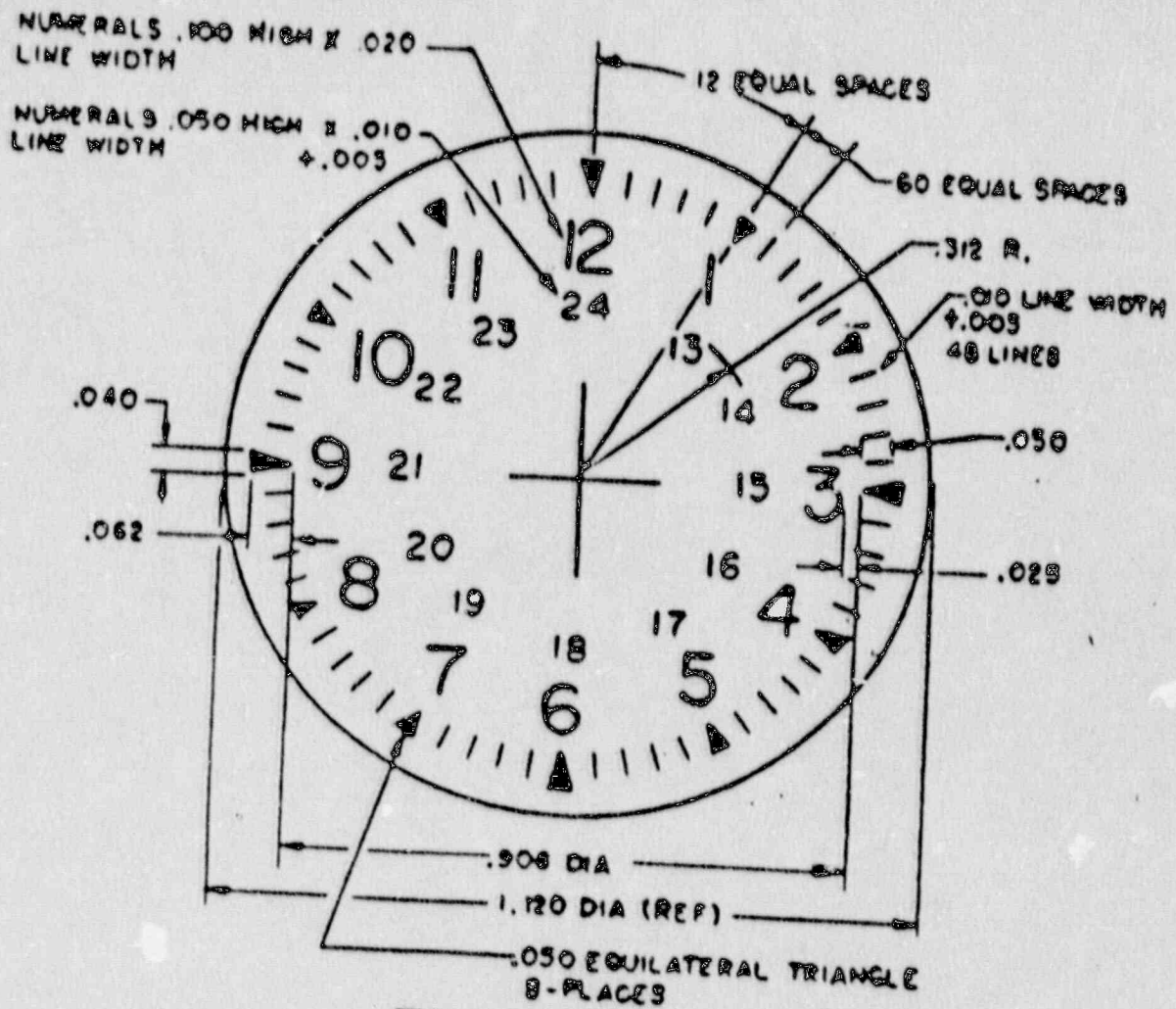
FIGURE 1



NOTES:

1. BACKGROUND IN ACCORDANCE WITH FED-STD-595, COLOR BLACK NO. 37038.
2. NUMBERS AND GRADUATIONS IN ACCORDANCE WITH FED-STD-595, COLOR WHITE NO. 37875.
3. SHADED TRIANGLE:
LUMINOUS GREEN (SEE 332, 3321 AND 3322)
4. MINUTE GRADUATIONS BETWEEN TRIANGLE AND 4 ONLY
DIMENSIONS IN INCHES UNLESS
OTHERWISE SPECIFIED
TOLERANCES ± .010
ANGLES ± 1°

FIGURE 2



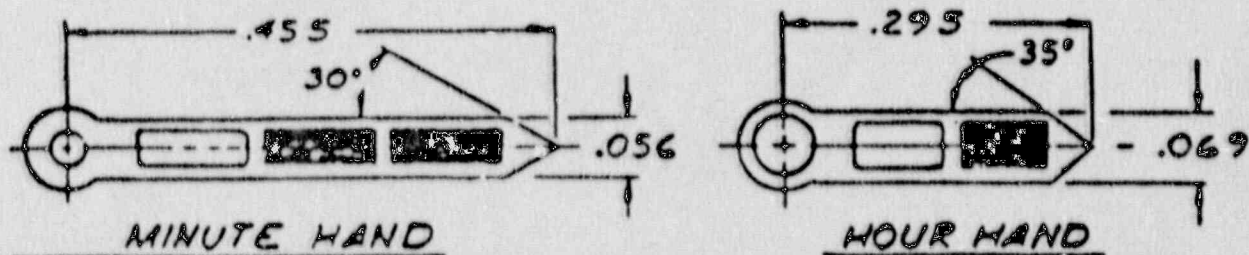
TYPE II

NOTES:

1. DIAL FACE BACKGROUND IN ACCORDANCE WITH FED-STD-595 COLOR BLACK NO.3703B
2. NUMBERS AND GRADUATIONS IN ACCORDANCE WITH FED-STD-595, COLOR WHITE NO.3707S
3. SHADED AREAS:
LUMINOUS GREEN (SEE 3.3.2, 3.3.21, AND 3.3.22)

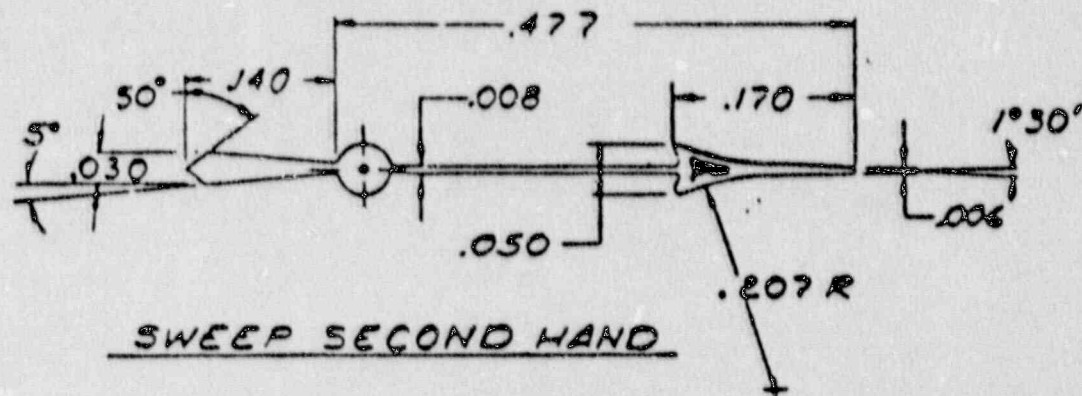
DIMENSIONS IN INCHES
UNLESS OTHERWISE
SPECIFIED.
TOLERANCES:
DECIMALS $\pm .010$

FIGURE 4



MINUTE HAND

HOUR HAND



SWEEP SECOND HAND

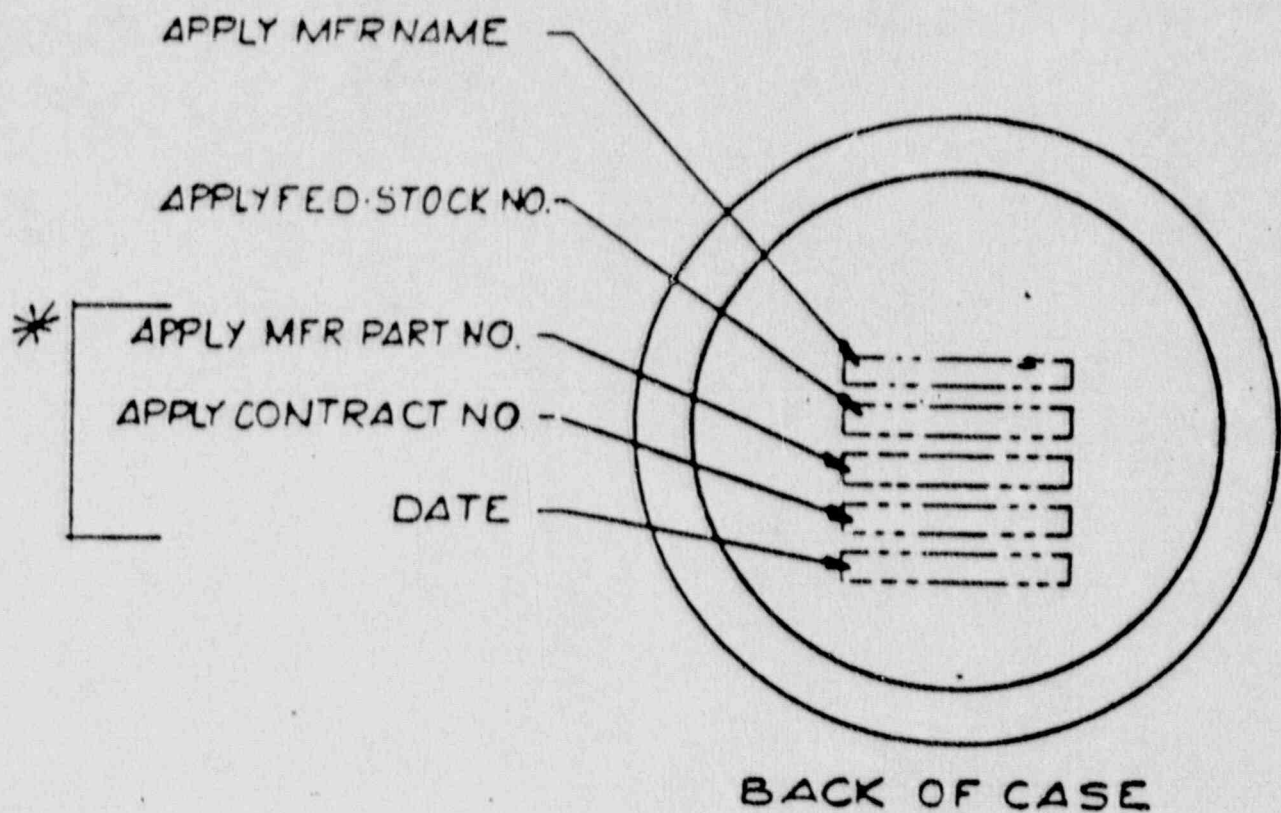
NOTES:

1. UNSHADED AREAS TO BE IN ACCORDANCE WITH FED-STD-595, COLOR WHITE NO.37875.
2. SHADED AREAS:
LUMINOUS GREEN (SEE 3.3.2, 3.3.2.1 AND 3.3.2.2)
3. THE HANDS, MAY BE
SOLID HANDS, NOT SKELETON HANDS AS
ILLUSTRATED.

DIMENSIONS IN INCHES
UNLESS OTHERWISE
SPECIFIED.

TOLERANCES:
DECIMALS $\pm .010$

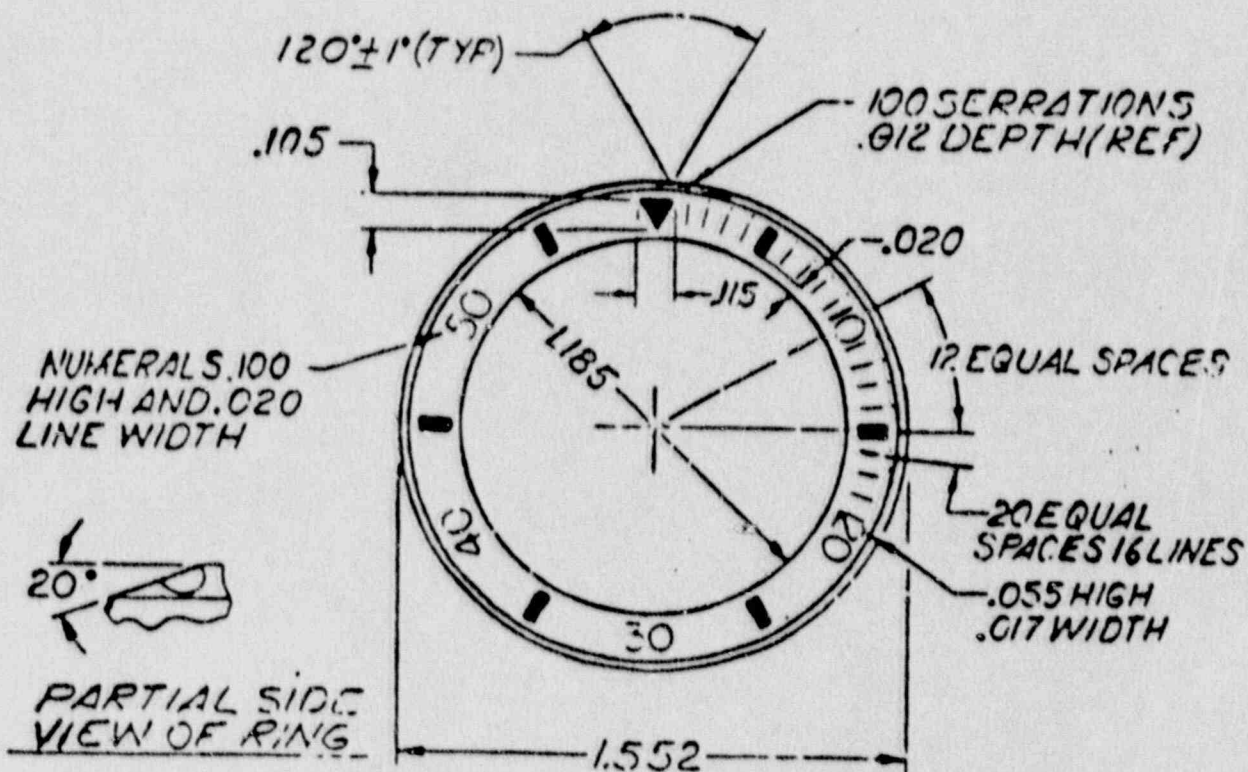
FIG. 5



DIMENSIONS IN INCHES.
TOLERANCES $\pm .01$.

* IN LIEU OF PERMANENT MARKING ON THE OUTSIDE OF CASE BACK, THIS INFORMATION MAY BE PROVIDED WITH A LABEL PLACED ON INSIDE OF CASE BACK.

FIGURE 6. Back Of Case Identification Markings



NOTES:

1. BACKGROUND IN ACCORDANCE WITH FED-STD-595,
COLOR BLACK NO. 37038.
2. NUMBERS AND GRADUATIONS IN ACCORDANCE WITH
FED-STD-595; COLOR WHITE NO. 37875.
3. SHADED TRIANGLE:
LUMINOUS GREEN (SEE 3.32.3.321 AND 3.322)
4. MINUTE GRADUATIONS BETWEEN TRIANGLE & 20 ONLY.
DIMENSIONS IN INCHES UNLESS
OTHERWISE SPECIFIED
TOLERANCES ± .010
ANGLES ± 1°

FIGURE 7