

MIL-C-1194D
13 April 1984
SUPERSEDING
MIL-C-1194C
26 March 1965
(See 6.5)

MILITARY SPECIFICATION

CLOCK, QUARTZ CRYSTAL, BATTERY POWERED

This specification is approved for use by all Departments and Agencies of the Department of Defense.

1. SCOPE

1.1 Scope. This specification covers battery powered, quartz crystal clocks having solid state circuitry intended for general purpose and bulkhead mounted shipboard applications.

1.2 Classification. Clocks shall be of the following types and sizes, as specified (see 6.2):

Type A - 24-hour dial
Size - 8-1/2-inch diameter dial

Type B - 12-hour dial
Size - 6-inch diameter dial
Size - 8-1/2-inch diameter dial

2. APPLICABLE DOCUMENTS

2.1 Government documents.

2.1.1 Specifications and standards. Unless otherwise specified, the following specifications and standards of the issue listed in that issue of the Department of Defense Index of Specifications and Standards (DoDISS) specified in the solicitation form a part of this specification to the extent specified herein.

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: Commander, Naval Sea Systems Command, SEA 5523, Department of the Navy, Washington, DC 20362 by using the self-addressed Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

FSC 6645

MIL-C-1194D

SPECIFICATIONS

MILITARY

- MIL-S-901 - Shock Tests, H.I. (High-Impact); Shipboard Machinery, Equipment and Systems, Requirements for.
- MIL-E-16400 - Electronic, Interior Communication, and Navigation Equipment Naval Ship and Shore: General Specification for.
- MIL-I-46058 - Insulating Compound, Electrical (for Coating Printed Circuit Assemblies).

STANDARDS

FEDERAL

- FED-STD-595 - Colors.

MILITARY

- MIL-STD-105 - Sampling Procedures and Tables for Inspection by Attributes.
- MIL-STD-167-1 - Mechanical Vibrations of Shipboard Equipment (Type I - Environmental and Type II - Internally Excited).

2.1.2 Government drawings. The following Government drawings form a part of this specification to the extent specified herein.

DRAWINGS

NAVAL SHIP ENGINEERING CENTER, MECHANICSBURG DIVISION
 9240-036 - Case Assembly, 8-1/2-inch Clock
 9240-037 - Case Assembly, 6-inch Clock

(Copies of specifications, standards and drawings required by the contractors in connection with specific acquisition functions should be obtained from the contracting activity or as directed by the contracting officer.)

2.2 Order of precedence. In the event of a conflict between the text of this specification and the references cited herein, the text of this specification shall take precedence.

3. REQUIREMENTS

3.1 First article. When specified, a sample shall be subjected to first article inspection (see 4.3 and 6.3).

3.2 General requirements. The clock shall measure and display time using a 12- or 24-hour dial as shown on figure 1, 2 or 3. The clock shall indicate hours, minutes and seconds by means of a dial and three concentric hands as shown on figure 4. The clock shall be powered as specified in 3.3.2. The dial shall be fully visible through a dial cover.

MIL-C-1194D

3.2.1 Materials and processes. Unless otherwise specified, materials and processes shall enable the clock to conform to the requirements of this specification.

3.2.2 Electronic parts. Unless otherwise specified, component parts shall be selected in accordance with MIL-E-16400.

3.2.3 Printed wiring. Unless otherwise specified, printed wiring shall conform to the requirements of MIL-E-16400. Conformal coating in accordance with MIL-I-46058 may be used.

3.2.4 Transducer system. The electromechanical drive element shall be a self starting, unidirectional rotating permanent magnetic stepping motor delivering at least one step per second.

3.3 Design and construction.

3.3.1 General. The clock shall be constructed so that no parts will work loose in service. Conditions incident to shipping, storage, installation and service shall not affect the serviceability of the clock.

3.3.2 Power. The clock shall be powered by self-contained cells and shall operate a minimum of 1 year on a single set of batteries. Batteries shall be easily replaced, requiring only simple hand tools. Batteries shall not be furnished as part of the equipment. The clock shall maintain accuracy during the life expectancy of the batteries by which the clock is powered. Clock design shall be such that damage will not occur if batteries are installed with polarity reversed or design shall preclude installation of batteries with polarity reversed.

3.3.3 Time generator. The basic element for time generation shall be a quartz crystal oscillator.

3.3.4 Dial. Dial size, markings and lay out shall be as shown on figures 1, 2 and 3. There shall be no visible eccentricity of the paths formed by the moving tips of the second, minute and hour hands with the tracks or markings on the dial for corresponding readings. The minute and hour hands shall be synchronized to eliminate the possibility of error in reading the correct time. The hour hand shall point to the hour graduation within plus or minus 3 degrees when the minute hand is centered on the 60 minute position and the hour hand is at any hour.

3.3.5 Reliability. The clock shall have a minimum specified operating life of 3 years without maintenance, other than battery replacement, and without degradation in performance.

3.3.6 Case assembly. The case assembly shall be in accordance with Drawing 9240-036, for 8-1/2-inch clock and Drawing 9240-037, for 6-inch clock. The assembly shall be of two piece unit consisting of bezel, fitted with a dial cover and a single piece case bottom. A seal shall be secured in a groove between the bezel and the case bottom. To assure compliance with vibration and shock requirements the internal components may be provided with shock resistant features. The color of the case assembly shall be black.

MIL-C-1194D

3.3.7 Bezel. The bezel shall be the same material and color as the case. The hinges shall permit a free bezel swing of at least 195 degrees.

3.3.7.1 Bezel catch. The bezel shall have a catch which will ensure that the bezel is held firmly against the gasket.

3.3.7.2 Gasket. The bezel shall contain a gasket to ensure a watertight seal when the bezel is closed. Cork shall not be used.

3.3.7.3 Dial cover. The dial cover in the bezel shall be clean, uncolored and free of bubbles, scratches and imperfections.

3.3.8 Dial. The dial shall be as shown on figure 1, 2 or 3 as applicable.

3.3.9 Hands. There shall be three hands; one each to indicate hour, minute and second. The hands shall be fabricated as shown on figure 4. The clock shall be constructed so that the second and minute hand may be manually rotated clockwise or counterclockwise without damaging the movement.

3.3.10 Shock. The clock shall withstand without damage the grade B, class II, type A, lightweight shock test in accordance with MIL-S-901, equipment classification.

3.3.11 Vibration. The clock shall withstand without damage the vibration test, type I in accordance with MIL-STD-167-1.

3.3.12 Temperature. While running, the accuracy of the clock shall not be affected when subjected to the temperature conditions as specified in 4.5.4.

3.3.13 Magnetism. While running, the accuracy of the clock shall not be affected when subjected to magnetic test as specified in 4.5.5.

3.3.14 Humidity. The clock shall conform to the humidity requirements in accordance with MIL-E-16400.

3.3.15 Accuracy. While operating at a temperature of 20 degrees Celsius ($^{\circ}\text{C}$), plus or minus 3°C , the daily rate shall be within plus or minus 0.5 seconds.

3.3.16 Salt fog. The clock shall conform to the salt fog requirements in accordance with MIL-E-16400 for sheltered equipment.

3.3.17 Fungus. The clock shall conform to the fungus requirements in accordance with MIL-E-16400.

3.3.18 Label. A label shall be affixed to the rear of the dial movement. The label shall contain instructions on changing of batteries and precautions prohibiting mercury and lithium batteries. The label shall not become detached, damaged or discolored as a result of any test specified in 4.3 or 4.4.

MIL-C-1194D

4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for inspection. Unless otherwise specified in the contract or purchase order, the contractor is responsible for the performance of all inspection requirements as specified herein. Except as otherwise specified in the contract or purchase order, the contractor may use his own or any 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 specification where such inspections are deemed necessary to assure supplies and services conform to prescribed requirements.

4.2 Classification of inspections. The inspection requirements specified herein are classified as follows:

- (a) First article inspection (see 4.3).
- (b) Quality conformance inspection (see 4.4).

4.3 First article inspection. First article inspection shall be conducted on four clocks and shall consist of tests specified in table I (see 6.2).

TABLE I. First article inspection.

Test	Requirement paragraph	Examination or test paragraph
Surface examination	---	4.5.9
Shock	3.3.10	4.5.2
Vibration	3.3.11	4.5.3
Temperature	3.3.12	4.5.4
Magnetism	3.3.13	4.5.5
Humidity	3.3.14	4.5.6
Accuracy ^{1/}	3.3.15	4.5.1
Salt fog	3.3.16	4.5.7
Fungus	3.3.17	4.5.8

^{1/} When the tests for shock, vibration, temperature, magnetism, humidity, salt fog and fungus are required, the accuracy test shall be performed after the other tests are completed.

4.3.1 First article inspection report. The contractor shall prepare a first article inspection report in accordance with the data ordering document included in the contract (see 6.2.2).

4.4 Quality conformance inspection. Quality conformance inspection shall consist of the group A and B tests as specified in 4.4.1.2, 4.4.1.3 and 4.4.1.3.1.

4.4.1 Sampling for quality conformance inspection.

4.4.1.1 Lot. A lot shall consist of all clocks offered for delivery at one time and produced on the same facility using identical materials, manufacturing and assembly procedures.

MIL-C-1194D

4.4.1.2 Group A. Each clock offered for delivery shall be subjected to the group A test shown in table II. Any clock failing the group A test shall be rejected.

4.4.1.3 Sampling for group B test. A random sample of clocks shall be selected from each lot in accordance with MIL-STD-105, inspection level S-1 and acceptable quality level (AQL) of 1.5 percent and shall be subjected to the group B test as specified in 4.4.1.3.1.

4.4.1.3.1 Group B. Each sample clock selected in accordance with 4.4.1.3 shall be subjected to the group B test shown in table II. If any sample clock fails the group B test, the lot represented by the sample shall be rejected. Sample clocks passing the tests as specified in 4.5.3 and 4.5.4 shall be considered part of the lot.

TABLE II. Quality conformance testing.

Test	Requirement paragraph	Examination or test paragraph
Group A Surface examination	---	4.5.9
Group B Shock	3.3.10	4.5.2
Vibration	3.3.11	4.5.3

4.5 Tests.

4.5.1 Accuracy. Accuracy of test apparatus shall be in accordance with the requirements of MIL-E-16400. No adjustments to the frequency determining circuits will be permitted after the beginning of the test (see 3.3.15).

4.5.2 Shock test. The clock shall be subjected to a grade B, class II, type A deck mounted, lightweight shock test in accordance with MIL-S-901. Clock shall be equipped with batteries with the timekeeping mechanism in operation at time of test.

4.5.3 Vibration test. A vibration test shall be conducted in accordance with type I of MIL-STD-167-1. The clock shall be in operation during the test.

4.5.4 Temperature test.

4.5.4.1 Low temperature. The clock shall be held at a temperature of minus $6.7 \pm 3^{\circ}\text{C}$ for at least 2 hours.

4.5.4.2 High temperature. The clock shall be held at a temperature of $49 \pm 3^{\circ}\text{C}$ for at least 2 hours.

4.5.5 Magnetism. While running, the clock shall be subjected to a magnetic field environment test in accordance with MIL-E-16400.

4.5.6 Humidity. Humidity test shall be conducted in accordance with MIL-E-16400.

MIL-C-1194D

4.5.7 Salt fog test. A salt fog test shall be conducted in accordance with MIL-E-16400.

4.5.8 Fungus. A fungus test shall be conducted in accordance with MIL-E-16400.

4.5.9 Surface examination. Each clock shall be visually and dimensionally examined to verify conformance with the requirements of this specification. Any clock containing one or more of the following defects shall be rejected.

- (a) Case not as specified.
- (b) Dial cover broken, poor visibility, not free of bubbles, scratches, and distortions.
- (c) Dial not as specified, incorrect size, wrong color, scratched, damaged or not legible.
- (d) Hands bent, not of proper size or shape.
- (e) Battery replacement requires more than simple tools.
- (f) Mercury and lithium battery warning label not included.
- (g) Movement of hands not concentric with dial markings.
- (h) Hour hand not within plus or minus 3 degrees of hour graduation when minute hand is centered on the 60 minute position.
- (i) Material not as specified.
- (j) Label missing or not as specified.
- (k) Bezel catch will not secure dial cover.

4.6 Inspection of packaging. Sample packages and packs, and the inspection of the preservation-packaging, packing and marking for shipment and storage shall be in accordance with the requirements of section 5.

5. PACKAGING

(The preparation for delivery requirements specified herein apply only for direct Government acquisition. For the extent of applicability of the preparation for delivery requirements of referenced documents listed in section 2, see 6.4.)

5.1 Packaging, packing and marking. Packaging, packing, marking and level of protection shall be as specified in the contracting document.

6. NOTES

6.1 Intended use. The battery powered, quartz crystal clocks having solid state circuitry shall be used for general purpose and bulkhead mounted shipboard applications.

6.2 Ordering data.

6.2.1 Acquisition requirements. Acquisition documents should specify the following:

- (a) Title, number and date of this specification.
- (b) Type and size (see 1.2).
- (c) Applicable stock number.
- (d) The quantity required for first article inspection (see 4.3).

MIL-C-1194D

6.2.2 Data requirements. When this specification is used in an acquisition which incorporates a DD Form 1423, Contract Data Requirements List (CDRL), the data requirements identified below shall be developed as specified by an approved Data Item Description (DD Form 1664) and delivered in accordance with the approved CDRL incorporated into the contract. When the provisions of DAR 7-104.9 (n)(2) are invoked and the DD Form 1423 is not used, the data specified below shall be delivered by the contractor in accordance with the contract or purchase order requirements. Deliverable data required by this specification is cited in the following paragraph.

<u>Paragraph no.</u>	<u>Data requirement title</u>	<u>Applicable DID no.</u>	<u>Option</u>
4.3.1	Report test	DI-T-2072	----

(Data item descriptions related to this specification, and identified in section 6 will be approved and listed as such in DoD 5000.19L., Vol. II, AMSDL. Copies of data item descriptions required by the contractors in connection with specific acquisition functions should be obtained from the Naval Publications and Forms Center or as directed by the contracting officer.)

6.2.2.1 The data requirements of 6.2.2 and any task in sections 3, 4, or 5 of this specification required to be performed to meet a data requirement may be waived by the contracting/acquisition activity upon certification by the offeror that identical data were submitted by the offeror and accepted by the Government under a previous contract for identical item acquired to this specification. This does not apply to specific data which may be required for each contract regardless of whether an identical item has been supplied previously (for example, test reports).

6.3 First article inspection. Invitations for bids should provide that the Government reserves the right to waive the requirement for samples for first article inspection as to those bidders offering a product which has been previously acquired or tested by the Government, and that bidders offering such products, who wish to rely on such production or test, must furnish evidence with the bid that prior Government approval is presently appropriate for the pending contract.

6.4 Sub-contracted material and parts. The preparation for delivery requirements of referenced documents listed in section 2 do not apply when material and parts are acquired by the contractor for incorporation into the equipment and lose their separate identity when the equipment is shipped.

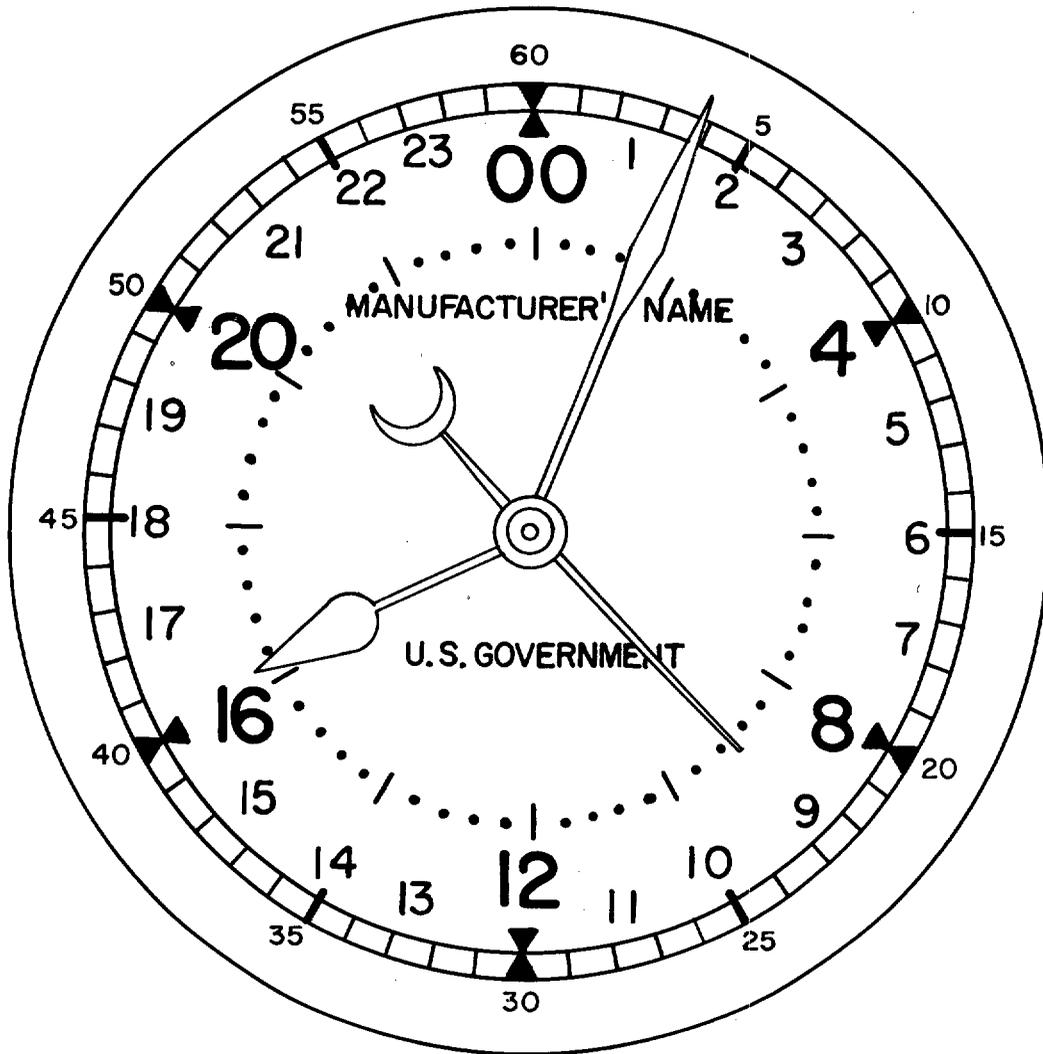
6.5 Changes from previous issue. Asterisks are not used in this revision to identify changes with respect to the previous issue, due to the extensiveness of the changes.

Custodians:
 Army - AR
 Navy - SH
 Air Force - 82

Preparing activity:
 Navy - SH
 (Project 6645-0359)

User activities:
 Army - ME
 Navy - MC, CG

MIL-C-1194D

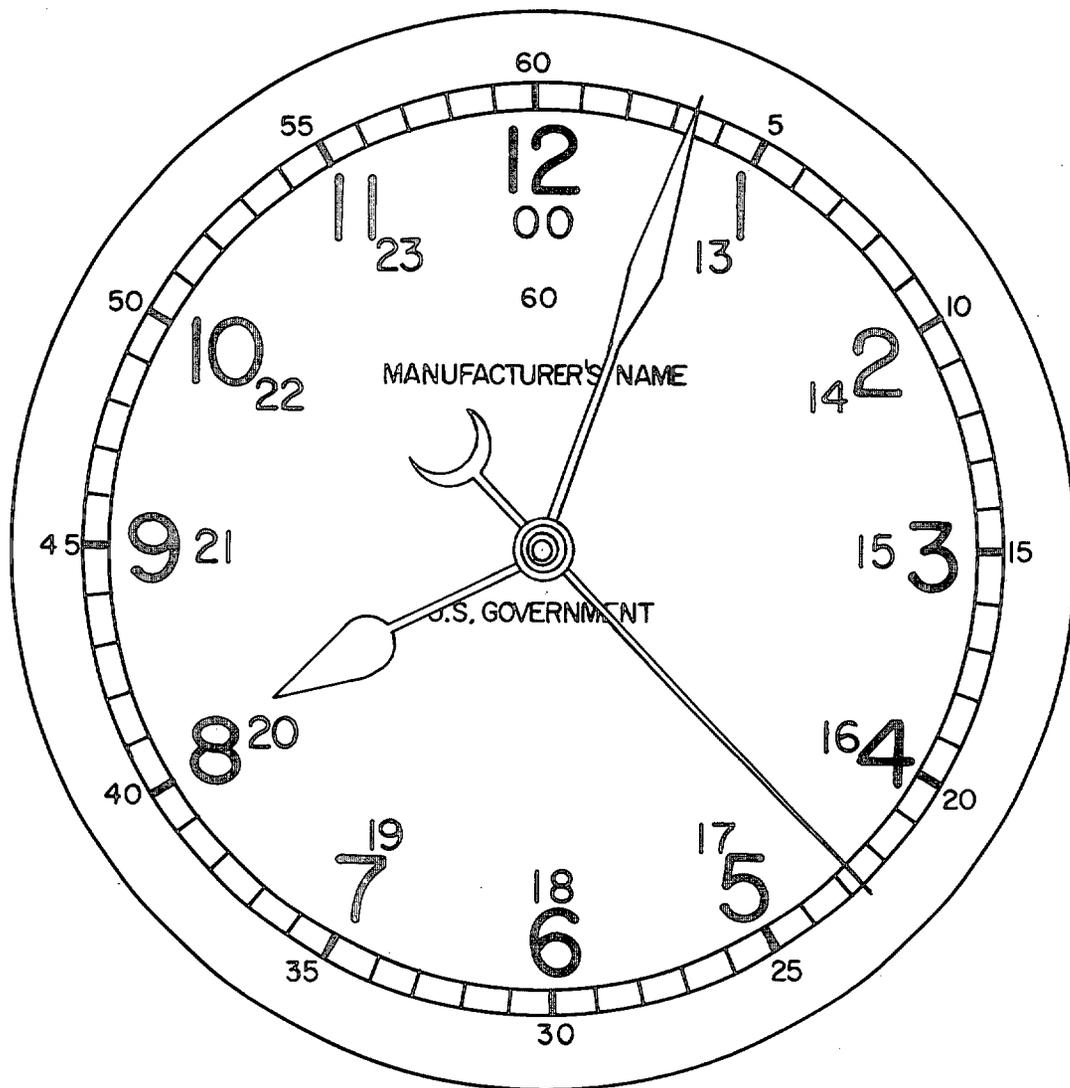


SH 12148

- NOTES: 1. Dial to be white, color no. 37875, in accordance with FED-STD-595.
2. Numerals, letters and graduations to be black, color no. 37038, in accordance with FED-STD-595.

FIGURE 1. Twenty-four hour dial, type A, 8-1/2 inch.

MIL-C-1194D

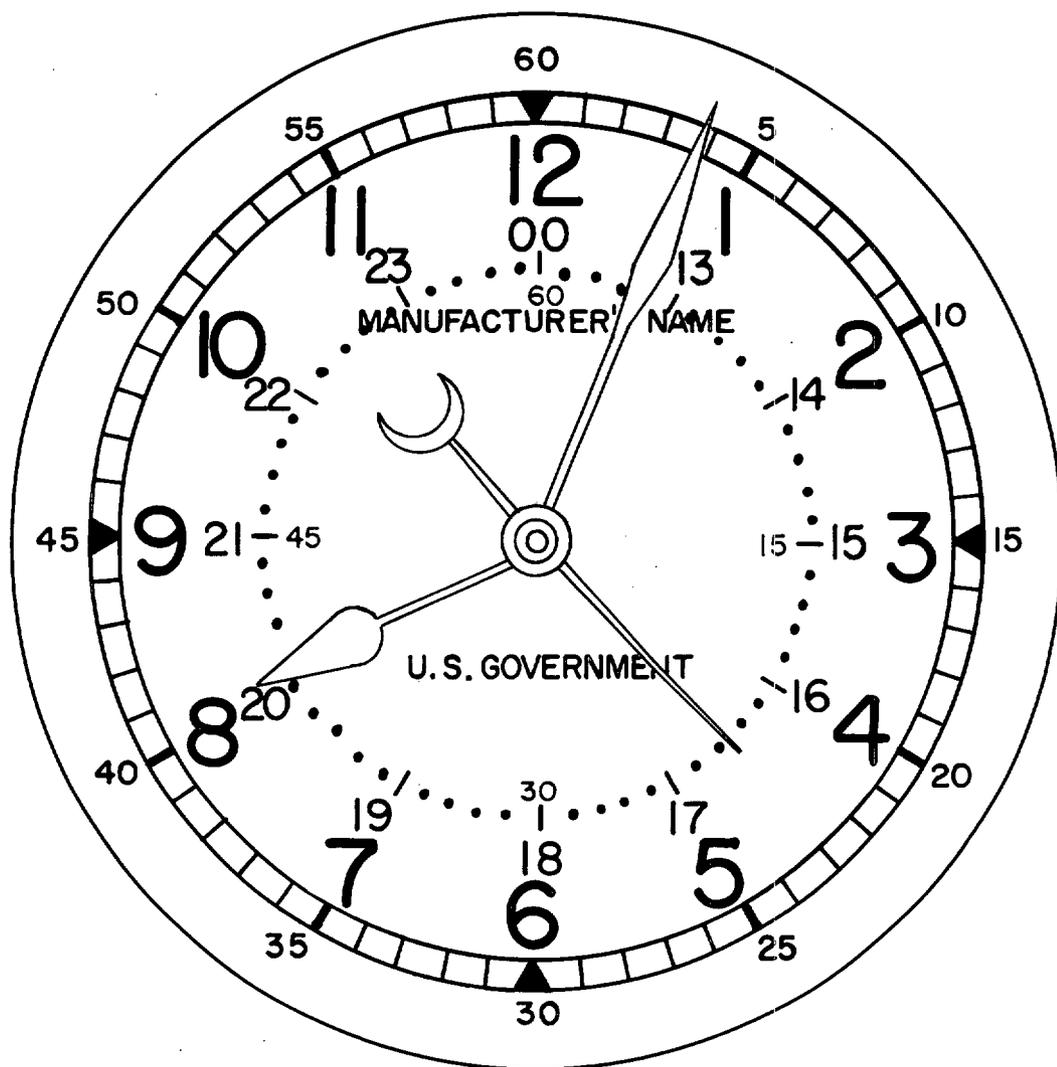


SH 12149

- NOTES:
1. Dial to be white, color no. 37875, in accordance with FED-STD-595.
 2. Numerals, letters and graduations to be black, color no. 37038, in accordance with FED-STD-595.

FIGURE 2. Twelve hour dial, type B, 6 inch.

MIL-C-1194D

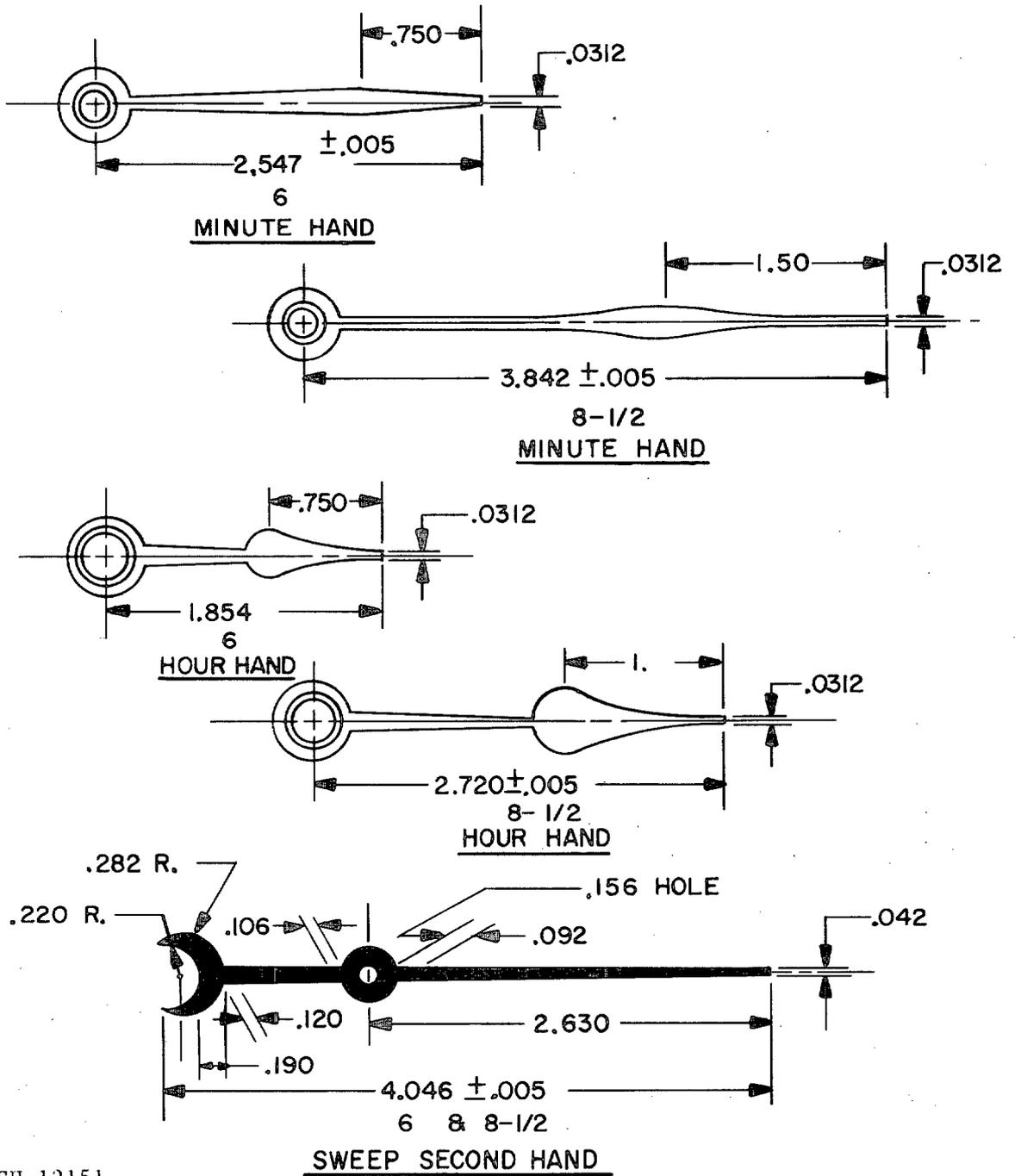


SH 12150

- NOTES: 1. Dial to be white, color no. 37875, in accordance with FED-STD-595.
2. Numerals, letters and graduations to be black, color no. 37038, in accordance with FED-STD-595.

FIGURE 3. Twelve hour dial, type B, 8-1/2 inch.

MIL-C-1194D



SH 12151

- NOTES: 1. Hour and minute hands to be brass, color black no. 37038 of FED-STD-595.
 2. Sweep second hand to be aluminum, color black no. 37038 of FED-STD-595.

Dimensions in inches.

Tolerances plus or minus 0.010 unless otherwise specified.

FIGURE 4. Hand details.

