

MIL-T-19383A(OS)  
28 February 1968  
Superseding  
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21 March 1956

MILITARY SPECIFICATION

TEST SET, SYNCHRO TRANSMITTER

MK 312 MOD 0

(For Torpedo Mk 37 Mods 0, 0(M), 1, 2, and 3)

This specification has been approved  
by the Naval Ordnance Systems Command,  
Department of the Navy

1. SCOPE

1.1 Scope. This specification describes the requirements for the procurement of a synchro transmitter test set, LD 482753 and Drawing 1583207, capable of replacing and simulating the functions of the course gyro of Torpedo Mk 37 Type in system tests performed on the torpedo. The synchro transmitter is required to simulate any given angular position of the course gyro spin axis relative to the torpedo longitudinal axis and to present on the concentric dial assembly a precise indication of this angular position in degrees and minutes. The test set front panel also presents an indication of the course gyro caged condition.

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 specification to the extent specified herein.

SPECIFICATIONS

MILITARY

MIL-T-945	Test Equipment, For Use With Electronic Equipment General Specification
MIL-E-17555	Electronic and Electrical Equipment and Associated Repair Parts; Preparation for Delivery of

FSC 6625



### 3. REQUIREMENTS

3.1 Description. The synchro transmitter is a portable test set consisting primarily of a synchro, a concentric dial assembly, hand wheel, pilot light, and a 14-pin connector. The synchro transmitter is electrically identical to the synchro in Gyro Mk 39 Mod 0, and when connected to the torpedo during a test, it simulates the synchro output of Gyro Mk 39 Mod 0 and its caging-circuit functions. The synchro transmitter can be positioned at any heading by means of the hand wheel, with the dial assembly indicating the heading. The fine dial is calibrated from 0 to 10 degrees in 10 minute graduations, the course dial is calibrated from 0 to 360 degrees in 10 degree graduations. External electrical connections to the test set are made through a single cable 8 feet in length, terminating in a male connector with mating surface pin arrangement and polarity identical to that of the course gyro which it replaces.

#### 3.2 General requirements

3.2.1 Contractor-furnished data. Data required by this specification or by applicable documents referenced in Section 2 need not be furnished unless specified in the contract or order (see 6.2).

3.2.2 Preproduction samples. Unless otherwise specified in the contract or order preproduction samples of the synchro transmitter shall be manufactured using the methods and procedures proposed for the production lot. These samples will be tested as specified in Section 4 herein and are for the purpose of determining that the production item meets the requirements of this specification and the design. See 4.2.1.

3.2.3 Materials. Unless otherwise specified in the contract, requisition, or order, all materials and purchased parts entering into the final assembly of the synchro transmitter shall conform strictly to the detailed requirements indicated on the drawings and specifications listed in LD 482753.

3.2.4 Finishes, coating, construction, and dimensions. Finishes, coating, construction, and dimensions for the synchro transmitter shall be strictly in accordance with the applicable drawings, specifications, and publications listed in LD 482753.

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3.2.5 Moisture, fungus, and corrosion. The synchro transmitter shall be rendered moisture, fungus, and corrosion resistant as required by NAVORD OS 6341.

3.2.6 Marking. Marking of assemblies, subassemblies, and parts shall conform to the applicable drawings listed in LD 482753.

3.2.7 Interchangeability. Care should be exercised in the fabrication of component parts to obtain proper sizes and to ensure proper fitting and interchangeable assembly of such parts without interference, binding, or misalignment and without resorting to selection or selective fitting. When required by the design, interference fits will be detailed on the applicable drawings.

3.2.8 Gages. The contractor shall provide himself with whatever gages are necessary and adequate to ensure that the material to which this specification applies will meet the dimensional requirements shown on the applicable drawings. If so stipulated in the contract, order, or requisition, the government will furnish drawings of pertinent Navy Final Inspection Gages for guidance in the design of the contractor's inspection gages. However, such procedure shall not serve to relieve the contractor of his responsibility in the design and manufacture of such gages as may be required for the satisfactory fulfillment of the contract requirements, but is intended to facilitate acceptance of all components and assemblies by Navy Final Inspection Gages.

3.2.9 Threads. Unless otherwise specified, all threads shall be in accordance with National Bureau of Standards Handbook H28. The class or fit for threads shall be as specified on the applicable drawings.

3.2.10 Conflicting requirements. Conflicting requirements arising between this specification or any specifications, publications, or drawings listed herein shall be referred in writing to the procuring agency or appointed agent for interpretation, clarification, and resolution (or correction).

3.3 Definitions. Definitions applicable to environmental requirements of this specification are defined in MIL-T-945.

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3.4 Performance and product characteristics. The synchro transmitter shall meet the following performance and product characteristics:

3.4.1 The synchro transmitter shall be capable of indicating gyro angle at the zero heading within an accuracy of  $\pm 10$  minutes.

3.4.2 Initial resistance of the equivalent gyro caging circuit shall be  $7.5 \pm 1$  ohms. Upon application of 25 volts dc to the equivalent gyro caging circuit, the line current shall be  $1.4 \pm 0.2$  amps. Application of caging voltage shall be indicated at the test set panel by a green lamp.

3.4.3 The insulation resistance between all circuit components and the chassis of the test set shall be not less than 10 megohms.

3.4.4 Operating life. The synchro transmitter shall be capable of meeting operating life requirements as specified in section 3.41.5 of MIL-T-945.

3.5 Environmental requirements. The synchro transmitter shall be capable of meeting the performance and product characteristics specified herein when tested as defined in Section 4.

3.5.1 Vibration. The synchro transmitter, mounted on a vibration device in accordance with MIL-T-945, shall be subjected to vibrations as specified in MIL-T-945 and be capable of meeting all specification requirements.

3.5.2 Shock. The synchro transmitter, placed in a snock testing device in accordance with MIL-T-945, shall be subjected to snock tests as specified in MIL-T-945 and be capable of meeting all specification requirements.

3.5.3 Temperature. The synchro transmitter shall be capable of meeting the following temperature requirements.

3.5.3.1 Synchro transmitter operating. Continuous operation over the range of  $-2.2^{\circ}\text{C}$  to  $+54.4^{\circ}\text{C}$  ( $+28^{\circ}\text{F}$  to  $130^{\circ}\text{F}$ ).

3.5.3.2 Synchro transmitter nonoperating. Ranging from  $-40^{\circ}\text{C}$  to  $+85^{\circ}\text{C}$  ( $-40^{\circ}\text{F}$  to  $+185^{\circ}\text{F}$ ) for extended periods.

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3.5.4 Humidity. The synchro transmitter shall be capable of meeting humidity requirements as specified in Section 4 of MIL-T-945.

3.5.5 Tropical environment. The synchro transmitter shall be capable of meeting fungus resistance requirements as specified in Section 4 of MIL-T-945.

3.5.6 Marine environment. The synchro transmitter shall be tested by exposure to the weather deck conditions described in 4.6.5. At the conclusion of the test the synchro transmitter shall be capable of meeting all performance requirements of this specification.

3.5.7 Storage life. Synchro transmitters, after a storage period of ten years in the prescribed shipping container and five years in the unpackaged condition, both periods to run consecutively, shall be capable of meeting all performance requirements of this specification.

3.6 Cleanup. Prior to and after final assembly all parts, components, and the assembly shall be thoroughly cleaned of loose, spattered, or excess solder metal chips and other foreign matter. Burrs and sharp edges as well as rosin flash shall be removed.

3.7 Workmanship. The equipment, including all parts and accessories, shall be constructed and finished in a manner to ensure compliance with all requirements of this specification. Particular attention shall be paid to neatness and thoroughness of soldering, wiring, welding, brazing, and freedom of parts from burrs and sharp edges. The standards of workmanship exhibited in any approved preproduction sample, subject to any qualification stated in the Government's notice of approval, shall be determinative of the requirements of the contract relative to workmanship insofar as not specifically covered by applicable specifications.

**4. QUALITY ASSURANCE PROVISIONS**

4.1 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, the supplier may utilize his own facilities or any commercial laboratory acceptable to 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 ensure that supplies and services conform to prescribed requirements.

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4.2 Sampling. Unless otherwise specified, and when applicable, the sampling plans and procedures used by the Government inspector in the determination of the acceptability of products submitted by a supplier for government inspections shall be in accordance with the provisions set forth in MIL-STD-105.

4.2.1 Preproduction samples. Unless otherwise specified for each contract or order, a representative sample of three synchro transmitters shall be manufactured using the methods and procedures proposed for the production lot. These shall be submitted to the government inspector for preproduction tests at an activity designated in the contract or by the Naval Ordnance Systems Command for purposes of determining compliance with the requirements of the contract, specifications, and drawings. Further production of the synchro transmitters by the contractor prior to approval of the contracting activity or the completion of tests on the preproduction samples shall be at the contractor's risk. Preproduction samples accepted will be applied as part of the quantity specified by the contract or order.

4.2.2 Lot size. As applied to government inspection of units of product, the term "lot" shall mean "inspection lot," i.e., a collection of units of product submitted by a supplier for government inspection. Unless otherwise specified, the number of units of product in "inspection lots" will be as determined by the government inspector and may differ from the quantity designated in the contract or order as a lot for production, shipment, or other purpose.

4.2.3 Periodic production samples. From each succeeding lot or grand lot of 100 or less, a random sample of three synchro transmitters will be selected by the Government inspector for submission to a Naval Ordnance Systems Command assigned activity to determine compliance of the samples with the requirements of the contract, specification, and drawings. The synchro transmitter shall be considered satisfactory if it meets all specifications and pertinent drawing requirements, and withstands the tests specified in 4.5 and 4.6 inclusive.

4.3 Classification of tests. The inspection and testing of the synchro transmitter shall be classified as follows

4.3.1 Quality conformance tests. These tests are to be accomplished on sample synchro transmitters randomly selected from inspection lots. Quality conformance tests shall be performed by the manufacturer. These tests are detailed in 4.5.

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4.3.2 Preproduction and periodic production tests.

Preproduction and periodic production tests are those which are accomplished on samples selected as specified in 4.2.1 and 4.2.3 which are representative of the production of the synchro transmitter after the award of the contract to determine that the design and the production meet the requirements of this specification. These tests are detailed in 4.6. Acceptance shall be based on no defects in the sample. Failure of a sample to comply with these requirements will result in the rejection of the lot, or the cessation of production as determined by the procuring activity.

4.4 Classification of characteristics. The characteristics verified by the tests and examinations herein are classified as Critical, Major, or Minor in accordance with WR-43. Tests and examinations that verify critical characteristics are identified by the symbol (C), and those that verify major characteristics are identified by the symbol (M). The number following the classification symbol indicates the serial number of the test or examination. Tests and examinations which are not annotated with a classification code are classified minor.

4.5 Quality conformance tests. The contractor shall conduct quality conformance tests as specified in 4.3.1 to ensure that each synchro transmitter is in compliance with the requirements of Sections 3.2 and 3.4 and paragraphs 3.6 and 3.7.

4.5.1 Test conditions. Unless otherwise specified, the synchro transmitter shall be subjected to quality conformance tests under the following conditions:

4.5.1.1 Temperature. Room ambient 18°C to 35°C (65°F to 95°F).

4.5.1.2 Altitude. Normal ground.

4.5.1.3 Vibration None.

4.5.1.4 Humidity. Room ambient to 95% relative maximum.

4.5.2 Test and inspection equipment and facilities. The manufacturer shall furnish and maintain all necessary test equipment and facilities and shall provide personnel for performing all quality conformance tests. The test equipment shall be adequate in quantity and, unless definite

requirements are specified, shall be of sufficient accuracy and quality to permit performance of the required tests.

4.5.3 Test equipment. The following items of test equipment are required to perform the quality conformance tests set forth in this specification.

4.5.3.1 A 500-volt megohmmeter with a full scale of not less than 100 megohms.

4.5.3.2 A dc ammeter reading 0 to 5 amps with a maximum error of  $\pm 2\%$  at midscale.

4.5.3.3 A 25-volt 5 amp dc power supply.

4.5.3.4 A 115-volt 1/2 ampere 400 cycle single phase power source.

4.5.3.5 An ac voltmeter reading 0 to 200 volts with an accuracy of  $\pm 10\%$  at full scale.

4.5.3.6 An ac voltmeter with a scale of 0 to 5 volts with an accuracy of  $\pm 10\%$  at full scale.

4.5.3.7 An ohmmeter capable of reading 0 to 50  $\pm 3\%$  ohms.

#### 4.5.4 Test procedure

4.5.4.1 Insulation test (M101). Connect cable W101 to the chassis. Short all pins on plug P102 together. With no power applied to the synchro transmitter, measure the insulation resistance between plug P102 and the chassis. The resistance reading shall be not less than 10 megohms. Remove all connections from plug P102

#### 4.5.4.2 Electrical zero test

4.5.4.2.1 Zero the dial assembly by means of the hand wheel. Connect pin "C" to pin "L" on plug P102. Connect the 200-volt ac voltmeter across pin "E" and pin "N" on plug P102. Apply the 115-volt 400 cycle ac power across pin "B" and pin "C". The voltmeter should read approximately 37 volts. Remove all connections from plug P102.

4.5.4.2.2 Connect the voltmeter specified in 4.5.3.6 across pin "H" and pin "L" of plug P102. Apply the 115-volt 400 cycle ac power supply across pins "B" and "C". Turn the hand wheel slowly until a null voltage is obtained.

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**4.5.4.3 Repeatability test (M102).** The purpose of this test is to check the repeatability of the dial, gearing, and synchro assembly. Turn the hand wheel in a clockwise direction until the voltmeter reads approximately 2 volts, then rotate the hand wheel in the reverse direction slowly until the null voltage is obtained. The dial shall read between  $359^{\circ}50'$  and  $0^{\circ}10'$ . Turn the hand wheel slowly in a counterclockwise direction until the voltmeter reads approximately 2 volts, then turn the hand wheel in the reverse direction slowly until the null voltage is obtained. The dial shall read between  $359^{\circ}50'$  and  $0^{\circ}10'$ . The difference between the readings shall not exceed 10 minutes.

**4.5.4.4 Caging circuit test**

**4.5.4.4.1 (M103)** With no power applied to the synchro transmitter measure the resistance between pin "M" and pin "P" of plug P102. The resistance should read  $7.5 \pm 1$  ohms.

**4.5.4.4.2 (M104)** Connect the ammeter specified in 4.5.3.2 in series with one terminal of the dc power source specified in 4.5.4.3 and pin "M" of plug P101. Connect the other terminal of the dc power source to pin "P" of plug P102. Energize the power supply. The relay should actuate and the green indicator lamp should light. The ammeter should read  $1.4 \pm 0.2$  amps.

**4.5.4.5** Disconnect all auxiliary test equipment and power sources from the synchro transmitter

**4.5.4.6 Visual and dimensional examination.** Each synchro transmitter shall be examined to determine conformance with the requirements for workmanship and dimensions.

**4.5.4.7 Packaging and packing.** The synchro transmitter packaging shall be examined to ensure that it complies fully with the requirements of Section 5.

**4.6 Preproduction and periodic production inspection (M105).** The preproduction and periodic production samples after satisfactorily passing the quality conformance inspections detailed in 4.5 shall be subjected to the following tests and examinations. Certified inspection data covering the results of preproduction and periodic production inspections shall be forwarded to the Naval Ordnance Systems Command (see 6.2). Failure to meet any requirement specified herein shall be considered cause for rejection of the lot represented and units tested.

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4.6.1 Vibration. The synchro transmitter, mounted as specified in 3.5.1, shall be subjected to vibration testing as specified in MIL-T-945. At the conclusion of the test the synchro transmitter shall meet the performance and other requirements of this specification.

4.6.2 Shock. The synchro transmitter, mounted as specified in 3.5.2, shall be subjected to shock testing as specified in MIL-T-945. At the conclusion of the test the synchro transmitter shall meet the performance and other requirements of this specification.

4.6.3 Temperature and humidity. The synchro transmitter shall be subjected to temperature and humidity testing as specified in MIL-T-945, except that the temperature and operation shall be as specified in 3.5.3 of this specification and barometric pressure shall be ambient. At the conclusion of the test the synchro transmitter shall meet the performance and other requirements of this specification.

4.6.4 Tropical environment. The synchro transmitter shall be fungus tested in accordance with MIL-T-945. At the conclusion of the test the synchro transmitter shall meet the performance and other requirements specified in this specification.

4.6.5 Marine environment. The synchro transmitter shall be exposed to a sea atmosphere as encountered on the weather deck of a ship for 10 ± 1 days, protected from rain, spray, or snow by a shelter which permits free air circulation around the synchro transmitter. The synchro transmitter will be subjected continuously to the sea atmosphere that exists below decks on board ship. At the conclusion of the test the synchro transmitter shall meet the performance and other requirements specified in this specification.

4.7 Failure criteria. Failure of the lot representing the material under consideration to meet any of the requirements and tests of this specification shall be considered cause for rejection.

## 5. PREPARATION FOR DELIVERY

### 5.1 Packaging and Packing

5.1.1 Domestic shipment. Unless otherwise specified in the order or contract, packaging and packing for domestic shipment shall be in accordance with MIL-E-17555, Level A (see 6.2).

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5.1.2 Domestic shipment and storage. Unless otherwise specified in the order or contract, packaging and packing for domestic shipment and storage shall be in accordance with MIL-E-17555, Level B, Packaging Method IIId (see 6.2).

5.1.3 Overseas shipment. Unless otherwise specified in the order or contract, packaging and packing for overseas shipment shall be in accordance with MIL-E-17555, Level C, Packaging Method IIId (see 6.2).

5.2 Labeling and marking. Unless otherwise specified, labeling and marking of all shipping containers shall be in accordance with MIL-E-17555.

## 6. NOTES

6.1 Intended use. Test Set, Synchro Transmitter, Mk 312 Mod 0 is intended for use as a gyro simulator for Torpedo Mk 37 Mods 0, 0(M), 1, 2, and 3

6.2 Ordering data. Procurement documents should specify the following:

- (a) Title, number, and date of this specification.
- (b) Any exceptions to this specification.
- (c) Required level of preservation and packaging
- (d) Required level of packing.
- (e) Assigned activity for preproduction and periodic production tests.
- (f) Data required.
- (g) That all additional samples required shall be provided and inspected at the expense of the supplier, when such additional samples are required because of failure of any sample(s) to pass the prescribed inspections.
- (h) That certified inspection data covering the results of preproduction and periodic production inspections shall be forwarded to the Naval Ordnance Systems Command when testing is accomplished at other than a Government activity.

6.3 Preparation for delivery criteria. Criteria for use of the proper level of preservation, packaging, and packing shall be as follows:

Level A. This level shall be used for those items which are to be shipped to indeterminate destinations or stored under indeterminate conditions for redistribution anywhere.

Level B. This level shall be used only when it is definitely known that the item will be held in covered storage in overseas locations for six months or less or in domestic locations for an indefinite period.

Level C. This level shall be used only when it is definitely known that the packaged items are to be shipped to domestic installations for immediate use at the first receiving activity.

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Naval Ordnance Systems Command  
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SPECIFICATION ANALYSIS SHEET		Form Approved Budget Bureau No 119-R004
<b>INSTRUCTIONS</b>		
This sheet is to be filled out by personnel either Government or contractor, involved in the use of the specification in procurement of products for ultimate use by the Department of Defense. This sheet is provided for obtaining information on the use of this specification which will insure that suitable products can be procured with a minimum amount of delay and at the least cost. Comments and the return of this form will be appreciated. Fold on lines on reverse side, staple in corner, and send to preparing activity (as indicated on reverse hereof).		
SPECIFICATION MIL-T-19383A(OS) TEST SET, SYNCHRO TRANSMITTER MK 312 MOD 0 (For Torpedo Mk 37 Mod 0, O(M), 1,2, and 3)		
ORGANIZATION (of submitter)		CITY AND STATE
CONTRACT NO	QUANTITY OF ITEMS PROCURED	DOLLAR AMOUNT \$
MATERIAL PROCURED UNDER A <input type="checkbox"/> DIRECT GOVERNMENT CONTRACT <input type="checkbox"/> SUBCONTRACT		
1 HAS ANY PART OF THE SPECIFICATION CREATED PROBLEMS OR REQUIRED INTERPRETATION IN PROCUREMENT USE? A GIVE PARAGRAPH NUMBER AND WORDING		
B RECOMMENDATIONS FOR CORRECTING THE DEFICIENCIES		
2 COMMENTS ON ANY SPECIFICATION REQUIREMENT CONSIDERED TOO RIGID		
3 IS THE SPECIFICATION RESTRICTIVE? <input type="checkbox"/> YES <input type="checkbox"/> NO. IF "YES", IN WHAT WAY?		
4 REMARKS (Attach any pertinent data which may be of use in improving this specification. If there are additional papers, attach to form and place both in an envelope addressed to preparing activity)		
SUBMITTED BY (Printed or typed name and activity)		DATE