

MIL-S-20708/25A(NORD)  
25 November 1959  
SUPERSEDING  
MIL-S-20708/25(NORD)  
31 March 1959

## MILITARY SPECIFICATION

### SYNCHRO, CONTROL TRANSFORMER, TYPE 16CTB4b

#### 1. SCOPE

1.1 This specification covers the detail requirements for control transformer synchro, type 16CTB4b, 90 volt, 400 cycle.

#### 2. APPLICABLE DOCUMENTS

2.1 The following specifications, standards, and drawings of the issue in effect on date of invitation for bids form a part of this specification.

#### SPECIFICATION

##### MILITARY

MIL-I-16557 - Ink, Marking, quick-drying (for non-porous surfaces)  
MIL-S-20708 - Synchros, 60 and 400 cycles, General Specifications for

#### DRAWINGS

##### BUREAU OF ORDNANCE

643019 - Clamp Assembly  
643090 - Washer, Drive  
644594 - Nut  
LD 255268 - Stock Material for Precision Instrument Components  
SA 2412503 - Gage, Spline

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

#### 3. REQUIREMENTS

3.1 Qualification. - Except as specified in par. 3.1.1, synchros covered by this specification shall be a product which has been tested and qualified in accordance with Specification MIL-S-20708.

FSC 5990

3.1.1 Preproduction sample. - Pending issuance of a Qualified Products List (Q.P.L.), a sample (see 4.1.1.1) of the synchros to be furnished under this specification shall be subjected to the preproduction tests as specified in Specification MIL-S-20708.

3.2 Requirements. - All requirements shall be in accordance with Specification MIL-S-20708 except as otherwise specified herein.

3.2.1 Salt spray requirement. - Not applicable.

3.2.2 Design and construction. - The synchro shall be of the design, construction, and physical dimensions specified in Figure 1, and shall be complete, including all hardware shown and identified thereon.

3.2.3 Performance requirements. - The values applicable to the synchro shall be as specified in Table I.

Table I. - Synchro, Control Transformer, Type 16CTB4b

Requirement	Unit	Value
Frequency	Cycles	400
Primary voltage (nominal)	Volts	90
Primary current (maximum)	Milliamps	24
Primary power (maximum)	Watts	0.35
Transformation ratio $\pm 2\%$		0.735
Electrical error (maximum)	Minutes	10
Null voltage total (maximum)	Millivolts	60
Fundamental component of null voltage (maximum)	Millivolts	40
Friction torque (maximum)	Ounce-inches	0.05
Phase shift	Degrees	8.0 (lead)
Primary impedance ( $Z_p$ )	Ohms	$\frac{1}{/}$
Secondary impedance ( $Z_s$ )	Ohms	$\frac{1}{/}$

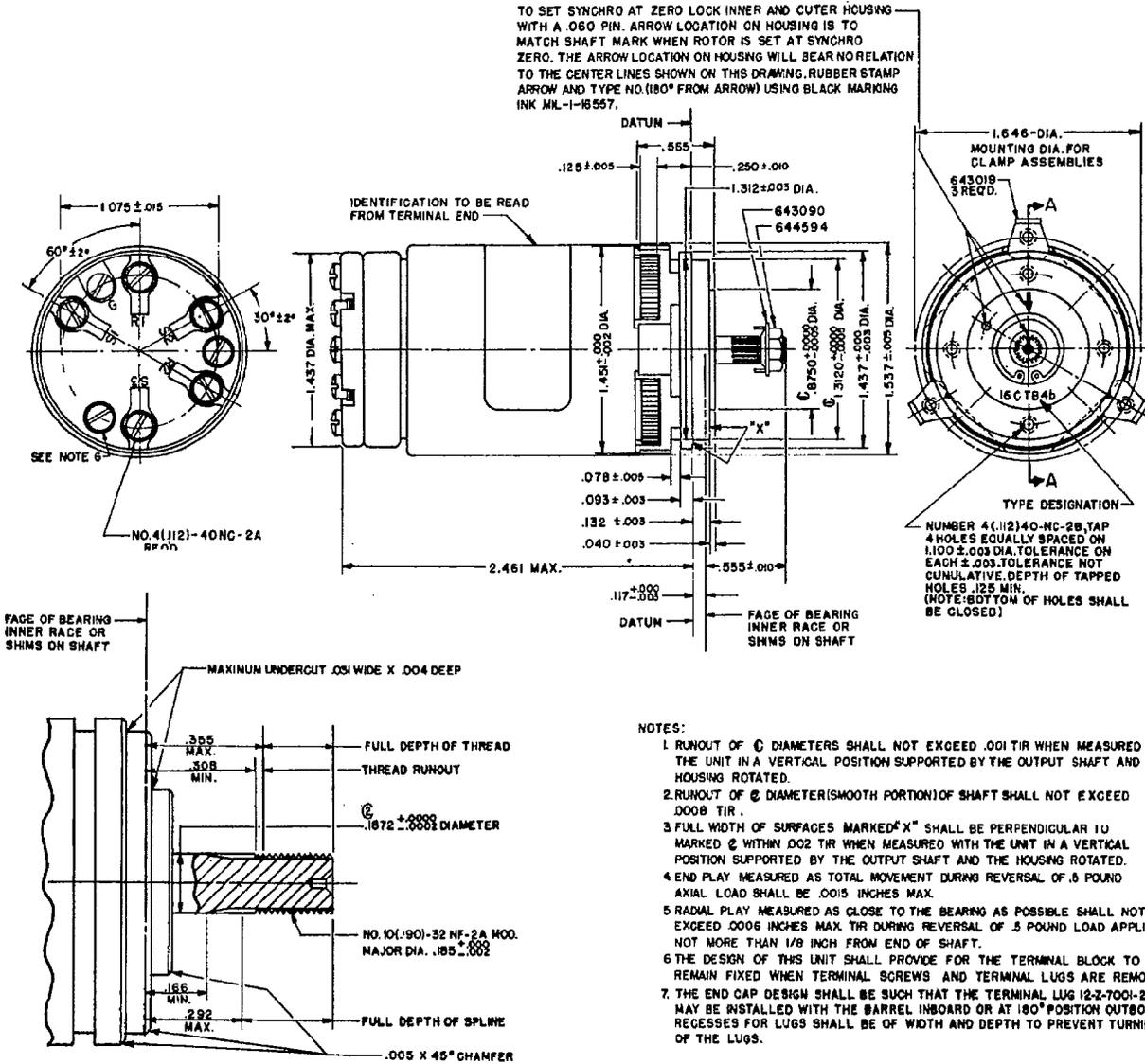
1/ As specified by the Bureau of Ordnance (see 6.1).

SPLINE DATA	
TEETH	21
PITCH	120
PITCH DIAMETER	.175 <sup>+0.000</sup> / <sub>-.002</sub>
OUTSIDE DIAMETER	.1872 <sup>+0.000</sup> / <sub>-.002</sub>
PRESSURE ANGLE	20°
ROOT DIAMETER MAX.	.155
TOOTH FORM	FULL DEPTH INVOLUTE

NOTE: THE END FUNCTION OF THIS SPLINE IS FOR POSITIVE ROTATION. FASTENINGS IT IS NOT TO BE USED AS A GEAR. THIS SPLINE SHALL BE INSPECTED BY GO, NO GO SPLINE RING GAGE SA2412503

GEAR DATA	
TEETH	96
PITCH	72
PITCH DIAMETER	1.3333 <sup>+0.000</sup> / <sub>-.002</sub>
OUTSIDE DIAMETER	1.3811 <sup>+0.000</sup> / <sub>-.002</sub>
PRESSURE ANGLE	20°
ROOT DIAMETER MAX.	1.2959
TOOTH FORM	FULL DEPTH INVOLUTE

NOTE: O.D. OF GEAR TO BE CONCENTRIC TO 1.3120 DIA. COLLAR WITHIN .0015 (SHAFT TO BE LOCKED TO OUTER HOUSING AND SHAFT MARK TO BE IN LINE WITH OUTER HOUSING ARROW).



PARTIAL SECTION A-A

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES TOLERANCES ON FRACTIONS  $\pm \frac{1}{100}$  DECIMALS  $\pm .005$  ANGLES  $\pm 1^\circ$

FIGURE I- SYNCHRO, CONTROL TRANSFORMER TYPE 16CTB4b

#### 4. QUALITY ASSURANCE PROVISIONS AND TEST REQUIREMENTS

##### 4.1 Sampling, inspection, and tests. -

4.1.1 Sampling. - Except as specified in 4.1.1.1, sampling shall be in accordance with the requirements of Specification MIL-S-20708.

4.1.1.1 Preproduction samples. - Unless otherwise specified (see 4.1.1.1.1) and pending the issuance of a Q.P.L. (see 3.1.1), four (4) synchros shall be furnished by the contractor to the procuring activity for preproduction testing in accordance with Specification MIL-S-20708. Further production of the item by the contractor prior to the approval of the procuring activity shall be at the contractor's risk. Accepted preproduction samples will become the property of the procuring activity and will be included in the quantity of synchros called for in the contract or order.

4.1.1.1.1 Preproduction sample for a subsequent contract. - If a contractor has delivered synchros previously in accordance with the requirements of this specification and his product has been found to be satisfactory, the preproduction sample for any subsequent contract or order may be waived at the discretion of the procuring activity (see 6.1).

4.1.2 Inspection and tests. - Inspection and tests shall be conducted in accordance with the requirements of Specification MIL-S-20708 except as otherwise specified herein.

4.1.2.1 Salt spray test. - Not applicable.

4.1.2.2 Preproduction rejection criteria. - Failure of any preproduction sample synchro in any test or requirement shall be cause for withholding approval (see 4.1.1.1).

#### 5. PREPARATION FOR DELIVERY

5.1 Preparation for delivery shall be in accordance with the requirements of Specification MIL-S-20708 except as otherwise specified herein.

5.2 Hardware. - All loose hardware (see 3.2.2) shall be packaged in a ventilated envelope made of material having a PH value of 6-8 that is compatible with the weight of the contents. The packaged hardware shall be placed in the unit synchro package.

6. NOTES

6.1 All notes specified in Specification MIL-S-20708 are applicable to this specification and in addition, under ordering data, should specify the following:

- a. If preproduction samples are not required (see 4.1.1.1).
- b. Impedance (see Table I).

6.2 Stock material. - Miscellaneous stock materials not shown on Figure 1 which may be required for use with synchros, should be selected from LD 255268.

Notice. - When Government drawings, specifications, or other data are used for any purpose other than in connection with a definitely related Government procurement operation, the United States Government thereby incurs no responsibility nor any obligation whatsoever; and the fact that the Government may have formulated, furnished, or in any way supplied the said drawings, specifications, or other data is not to be regarded by implication or otherwise as in any manner licensing the holder or any other person or corporation, or conveying any rights or permission to manufacture, use, or sell any patented invention that may in any way be related thereto.