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MIL-T-46719B(AT)
10 September 1968
SUPERSEDING
MIL-T-46719A(ORD)
8 August 1962

MILITARY SPECIFICATION

TRANSMISSION, HYDRAULIC:

MODEL 305 MC

1. SCOPE

1.1 This specification covers one type of hydraulically operated, full torque shifting automatic transmission for use in military combat or tactical transport vehicles.

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-L-2104	- Lubricating Oil, Internal Combustion Engine (Heavy Duty).
MIL-L-10295	- Lubricating Oil, Internal Combustion Engine, Sub-Zero.
MIL-E-46716	- Engine, Gasoline: 8-Cylinder, V-Type, Liquid-Cooled, 160 H.P.

STANDARDS

Military

MIL-STD-105	- Sampling Procedures and Tables for Inspection by Attributes.
MIL-STD-129	- Marking for Shipment and Storage.
MIL-STD-130	- Identification Marking of U. S. Military Property.
MIL-STD-193	- Painting Procedures, Tactical Vehicles (Tracked and Wheeled).

FSC 2520

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ARMY DRAWINGS

F10914940 - Transmission (Commercial).

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

3. REQUIREMENTS

3.1 First article. A first article of the transmissions to be furnished under this specification shall be produced prior to the manufacture of this item in production quantity. The first article consisting of one transmission shall be submitted to the Government for first article inspection to determine conformance to the quality assurance provisions of this specification (see 4.2). The first article submitted by a contractor shall be fully representative of the transmissions to be supplied from production facilities and tooling.

3.2 Construction. Construction and assembly shall conform to Army Drawing F10914940.

3.3 Oil. The transmission shall function as specified herein using oil in accordance with the following specifications:

Expected temperature	Grade	Specification
Above + 32°F.	30	MIL-L-2104
-10° to + 40°F.	10	MIL-L-2104
Below 0°F.	Arctic	MIL-L-10295

During initial and final acceptance on manufacturing production test stand, oil specification will be waived. Manufacturer may use transmission oil current with his commercial production system.

3.4 Performance.

3.4.1 Operating temperature. The transmission shall function dependably in all ambient temperatures from + 115° to - 65°F. When operating at full load, the oil temperature in transmission sump shall not exceed 260°F. Requirements of 3.4.2.1 through 3.4.8 apply only under these temperature conditions. Ambient temperature and maximum sump temperature shall be applicable when transmission is coupled to the approved engine and installed in an approved vehicle.

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3.4.2 Production break-in run. Each transmission shall be installed in combination with a dynamometer or other variable-loading device and shall be operated in accordance with procedure A or procedure B below to stabilize and assure proper functioning of clutch packs, servo bands, and bearings before heavy loads are applied. This light-load phase shall continue for not less than 10 minutes. The loading shall be such as to apply 100 ft.-lb. of torque on output shaft on 4th gear. Following this light load run, a full load run shall be performed in accordance with 3.4.2.1.

Procedure A. - Cycling through drive range shift pattern 1-2-3-4-3-2-1.
Procedure B. - Cycling through drive range shift pattern 2-3-2.

3.4.2.1 Full load run. Transmission shall be operated as specified in 3.4.2 except that: (a) operation shall be for not less than 20 minutes, (b) loading shall be maximum obtainable under existing operating conditions by an engine that yields 224 ft.-lb. of torque under standard atmospheric conditions (see 6.3), and (c) operation shall include not less than 5 minutes cycling in accordance with each of the procedures specified in 3.4.2. There shall be no malfunction.

3.4.3 Shift points. The transmission shall shift and hold as specified in schedules A and B of table I. The control valve body assembly shall shift as specified in schedules C and D of table I when tested as a subassembly prior to installation in transmission.

Table I. Schedule A.

Drive range	Zero throttle position	
	Output rpm	Engine rpm
1-2	350-450	1450-1850
2-3	500-700	1300-1850
3-4	1125-1300	1750-2025
4-3	750-900	750-900
3-2	450-600	700-930
2-1	200-300	525-800

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Table I. Schedule B.

Drive range	Full throttle position (18° 8')	
	Output rpm	Engine rpm
1-2	1000-1100	4100-4450
2-3	1575-1720	4150-4500
3-4	2620-2890	4100-4475
4-3	2300-2600	2300-2600
3-2	1420-1630	2200-2550
2-1	915-1040	2400-2750

Table I. Schedule C.

Drive range	1-2 range or intermediate range (any throttle)	
	Output rpm	Input rpm
1-2	1000-1100	4100-4450
2-3	1900-2020	5000-5350
3-4	3175-3360	4900-5200
4-3	2850-3200	2850-3200
3-2	1850-2000	2900-3100
2-1	915-1040	2400-2750

Table I. Schedule D.

Drive range	Low range or hold range (any throttle)	
	Output rpm	Input rpm
1-2	1200-1300	5000-5300
2-3	1900-2020	5000-5350
3-4	3175-3360	4900-5200
4-3	2850-3200	2850-3200
3-2	1850-2000	2900-3100
2-1	1120-1250	3000-3300

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3.4.4 Oil line pressures. Oil line pressures shall be not less than 65 pounds per square inch (psi) when operating at an idle speed of 400 rpm in neutral or drive. (The max. difference neutral to drive shall be 20 psi.). At 1,200 rpm, in 4th gear the pressure shall be not less than 105 psi, and at 2,000 rpm, in reverse gear the pressure shall be not less than 180 nor more than 220 psi. The line pressure must not drop below 80 psi during full throttle shift.

3.4.5 Sliptime. Sliptime during shifting shall not exceed 2 seconds during each shift 1-2, 2-1, 3-4, or 4-3 and not more than 3 seconds during each shift 2-3 or 3-2.

3.4.6 Pump. The rear pump shall hold 50 psi minimum at 450 output rpm with the input stopped and the transmission in neutral.

3.4.7 Reverse shifting. Under full load, the oil line pressures in reverse gear operation shall be as specified in 3.4.4. The reverse blocker shall prevent reverse engagement at more than 575 output rpm. There shall be no malfunction when transmission is operated in reverse range.

3.4.8 Seal leakage. The complete transmission assembly, with test fixtures installed, shall have a seal tightness that shall retain a 4 psi internal air pressure for a 3-minute period with a pressure drop of not more than 1 3/4 psi.

3.5 Painting. Unless otherwise specified (see 6.2), the transmission shall be painted in accordance with MIL-STD-193. Machined mating surfaces shall not be painted. When furnished to the Government assembled to an engine (see 6.4), transmission shall be painted in the manner and color specified for the engine.

3.6 Marking. Transmission assemblies shall be marked in accordance with the requirements for subassemblies and assemblies of MIL-STD-130, except that manufacturers nameplate as shown on Drawing DTD-8620205, a detail of Army Drawing F10914940, shall be used. The identifying number shall be "305 MC" plus a serial number. Nomenclature and manufacturers identification shall be manufacturer's practice. Stock number shall not be required on transmission assembly, but shall be marked on shipping container of spare transmissions in the manner specified in MIL-STD-129. Service parts shall be marked in accordance with the requirements for parts of MIL-STD-130.

3.7 Workmanship. Workmanship shall be such as to assure a product free of the defects listed in table II, and shall meet all requirements of this specification.

4. QUALITY ASSURANCE PROVISIONS

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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 in the contract or order, the supplier 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.

4.1.1 Component and material inspection. The supplier is responsible for assuring that components and materials used are examined and tested in accordance with the requirements of referenced documents to the extent specified herein.

4.2 First article inspection. First article inspection shall be conducted by the Government, at a place designated by the procuring activity (see 6.2), and shall consist of examination for the defects specified in 4.3.2.2 and testing as specified in table III.

4.2.1 Failure. Failure of a first article to pass any examination or test specified herein may be cause, at the option of the Government, for refusal to conduct additional testing until the faults revealed by the test have been corrected.

4.3 Quality conformance inspection.

4.3.1 Sampling.

4.3.1.1 Lot formation. A lot shall consist of all transmissions of one type from an identifiable 8 hour production period or a day production, from one manufacturer, submitted at one time for acceptance.

4.3.1.2 Sampling for examination. Samples for quality conformance examination shall be selected in accordance with inspection level II of MIL-STD-105.

4.3.1.3 Sampling for testing. Samples for quality conformance testing shall be selected in accordance with inspection level S-3 of MIL-STD-105.

4.3.2 Quality conformance examination.

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4.3.2.1 Acceptable quality level. Each transmission selected in accordance with 4.3.1.2 shall be examined for conformance to the following acceptable quality levels (AQL), on the basis of percent defective:

Classification	AQL
Major	1.0
Minor	2.5

4.3.2.2 Classification of defects. For examination purposes, defects shall be classified as specified in table II:

Table II. Classification of defects.

Categories	Defects	Method of inspection
Critical	None defined.	
Major:		
101. External dimensions	Dimensional nonconformance affecting interchangeability.	Visual/gage
102. Assembly	Improperly assembled.	Visual/functional
103. Components	Parts damaged affecting their serviceability.	Visual/functional
104. Leakage	Oil leakage (external).	Functional
105. Sliptime	Exceeds requirement in 3.4.5	Functional
106. Sump oil temperature	Exceeds requirement in 3.4.1	Temp. gauge
Minor:		
201. Identification	Illegible or incorrect.	Visual
202. External dimensions	Dimensional nonconformance not affecting interchangeability.	Visual/gauge
203. Finish of painted surfaces	Paint peeling, blistered or scaling	Visual
204. Workmanship	Poor quality.	Visual

4.3.3 Testing.

4.3.3.1 Quality conformance tests. Samples selected in accordance with 4.3.1.3 shall be subjected to the tests specified in table III, in the order specified. (Failure of any test shall be cause for rejection of the lot represented by the sample.)

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Table III. Test schedule.

Paragraph	Test	First article	Quality conformance	Control
4.5.1	Break-in run	X	X	
4.5.2	Shift point	X	X	
4.5.3	Oil pressure	X	X	
4.5.4	Pump	X	X	
4.5.5	Reverse shift	X	X	
4.5.6	Seal leakage	X		X

4.4 Control tests.

4.4.1 Sampling for control tests. Transmissions shall be selected at the rate of 1 per month when production is 100 units per month or less, and at the rate of 2 per month when production is greater than 100 units per month. Transmissions shall be identified as to production period.

4.4.2 Test schedule. Each transmission selected in accordance with 4.4.1 shall have completed the examination specified in 4.3.2, the tests specified in 4.3.3.1, and shall be subjected to the control test specified in table III.

4.4.3 Failure. Failure of a control test sample to pass any specified examination or test may be cause for the Government to refuse to accept subsequent lots until it has been proved to the satisfaction of the Government that the faults revealed by the test have been corrected.

4.5 Test procedure.

4.5.1 Tear down inspection. At the conclusion of the break-in run (see 3.4.2 and 3.4.2.1), the contractor, in the presence of the Government inspector, shall disassemble and inspect the first 10 transmissions, and every second transmission of the next 10 of any contract except overlapping contracts. Disassembly shall be accomplished to the extent required to perform the following inspection:

(a) Oil contamination.
(b) Dirt, chips or foreign matter in the transmission oil pan.
(c) Any evidence of damage or malfunction in clutches, bearings, planetary gears, pumps, etc.

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4.5.1.1 Corrections and reassembly. Should there be evidence of any condition of transmission or parts requiring correction, such corrections shall be made by the contractor prior to reassembly of the transmission and resubmission to the full load run (see 3.4.2.1). In addition, the contractor shall submit objective evidence to the Government that corrective action has been taken in production to eliminate any deficiency disclosed. Failure of the contractor to submit such evidence shall be cause for refusal by the Government to continue acceptance of subsequent transmissions. After reassembly, the transmission shall be subjected to the quality conformance tests (see 4.3.3.1), and if accepted, may be shipped as a regular production item.

4.5.2 Shift point test. The transmission, attached to a loading device, shall be operated to determine conformance to schedules A and B of table I (see 3.4.3).

4.5.2.1 Control valve body. Control valve body assembly shall be tested as a subassembly, prior to installation in transmission, to determine conformance to schedules C and D of table I (see 3.4.3).

4.5.3 Oil pressure test. Gages shall be placed in oil lines and the transmission shall be operated to determine conformance to 3.4.4.

4.5.4 Rear pump test. The rear pump shall be tested to determine conformance to 3.4.6.

4.5.5 Reverse shift test. The transmission shall be tested to determine conformance to 3.4.7.

4.5.6 Seal leakage test. The transmission, with test fixtures installed, shall be submerged in a tank of water, and while submerged an internal air pressure of 4 psi shall be applied. When air pressure is stabilized, the air inlet valve shall be closed. The air pressure drop shall be observed to determine conformance to 3.4.8.

4.6 Inspection of preparation for delivery. The preservation, packaging, packing, and marking of the transmissions shall be examined to determine compliance with the requirements of section 5 of this specification.

5. PREPARATION FOR DELIVERY

5.1 Preservation, packaging, packing, and marking. Preservation, packaging, packing, and marking shall be in accordance with the applicable packaging standard or packaging data sheet as specified by the procuring activity (see [illegible]).

6. NOTES

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6.1 Intended use. The transmissions covered by this specification are intended for production use, as spares, or replacements in military tactical and transport vehicles; including Carrier, Cargo, Amphibious, M116 and Carrier, Personnel, M114.

6.2 Ordering data. Procurement documents should specify the following:

(a) Title, number, and date of this specification.
(b) Number, date, and title of applicable drawing.
(c) Color of transmission if other than specified (see 3.5).
(d) Where first article samples shall be sent (see 4.2).
(e) Selection of applicable packaging standard or packaging data sheet (see 5.1).

6.3 Standard atmospheric conditions. Values of torque and horsepower of engine should be corrected for standard atmospheric conditions as follows:

$$\text{corrected BHP} = \text{observed BHP} \times \frac{29.92}{B-E} \times \frac{460 + T}{520}$$

$$\text{corrected torque} = \frac{\text{Corrected BHP} \times 5252}{\text{RPM}}$$

B = true barometer, In. Hg.
E = water vapor pressure (from humidity), In. Hg.
T = intake air temperature, °F. at the inlet to the air cleaner.
BHP = brake horsepower.

6.4 Engine. The engine with which this transmission is designed to be used is covered by MIL-E-46716(AT).

Custodian:
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Preparing activity:
Army - AT

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SPECIFICATION ANALYSIS SHEET

Form Approved
Budget Bureau No. 22-R255

INSTRUCTIONS: 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. Comments and suggestions submitted on this form do not constitute or imply authorization to waive any portion of the referenced document(s) or serve to amend contractual requirements.

SPECIFICATION

MIL-T-46719B(AT)

ORGANIZATION

CITY AND STATE

CONTRACT NUMBER

MATERIAL PROCURED UNDER A

☐ DIRECT GOVERNMENT CONTRACT ☐ 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?

☐ YES ☐ 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 - Optional)*

DATE

DD FORM 1 JAN 66 1426

REPLACES EDITION OF 1 OCT 64 WHICH MAY BE USED.