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MILITARY STANDARD

ENGINE, GASOLINE: AIR-COOLED, 3 BHP, 4-CYCLE, MILITARY DESIGN, MODEL 2A016, INSTALLATION PROCEDURES

FSC 2805

DEPARTMENT OF DEFENSE

WASHINGTON, DC 20301

Engine, Gasoline: Air-Cooled, 3 BHP, 4-Cycle, Military Design, Model 2A016, Installation Procedures

MIL-STD-1227B

1. This Military Standard is mandatory for use by all Departments and Agencies of the Department of Defense.

2. Recommended corrections, additions or deletions should be addressed to the U. S. Army Mobility Equipment Command, Directorate of Research, Development and Engineering, Fort Belvoir, Virginia 22060.

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1. SCOPE

1.1 Coverage. This standard covers the recommended installation procedures for the model 2A016, 3 hp, military design engine.

1.2 Objective. The objective of this standard is to insure compatibility of the engine and the end item of equipment.

2. REFERENCED DOCUMENTS

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

SPECIFICATIONS

Military

MIL-V-173	- Varnish, Moisture-and-Fungus-Resistant (for Treatment of Communications, Electronic, and Associated Equipment).
MIL-T-704	- Treatment and Painting of Materiel.
MIL-B-11040	- Belt, V; Engine Accessory Drive.
MIL-I-24092	- Insulating Varnish, Electrical, Impregnating.

STANDARDS

Military

MIL-STD-461	- Electromagnetic Interference Characteristics Requirements for Equipment.
MS51009	Spark Plug, Shielded, 18 MM 1-1/4 Inch Well (Other Than Aircraft).
MS51064	- Pulley, Groove; Engine Accessory Drive Belts.
MS51065	- Belts, v: Engine Accessory Drive (0.380 Inch Nominal Width).
MS51066	- Belts, v: Engine Accessory Drive (0.500 Inch Nominal Width).
MS51067	- Belts, v: Engine Accessory Drive (11/16 Inch Nominal Width).
MS51068	- Belts, v: Engine Accessory Drive (3/4-Inch Nominal Width).
MS51069	- Belts, v: Engine Accessory Drive (7/8-Inch Nominal Width).

MS51070	- Belts, v: Engine Accessory Drive (1 Inch Nominal Width).
MS51086	- Filter, Fluid, Pressure-Automotive Fuel (10 GPH, Coarse Filtration).

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

3. DEFINITIONS

3.1 Definition. For the purpose of this standard, the following definition shall apply.

3.1.1 The military design engine model 2A016. A 2-cylinder air-cooled, overhead-valve, 16-cubic-inch-displacement engine having a rating of 3 net continuous horsepower at 3,600 rpm.

3.1.2 Maximum net corrected brake horsepower. The maximum net corrected brake horsepower rating with all accessories (including fan, muffler, and air cleaner) at any engine speed within the operating range is the maximum observed horsepower available from the engine at wide-open throttle corrected to standard atmospheric condition.

3.1.3 Intermittent net brake horsepower. The intermittent net brake horsepower rating is 90 percent of the maximum net corrected brake horsepower.

3.1.4 Continuous net brake horsepower. The continuous net brake horsepower rating is 3.0 horsepower at 3,600 rpm.

4. GENERAL REQUIREMENTS

4.1 Safety. When installed in the end item, rotating or reciprocating parts and parts subject to high temperatures that are so located as to become a hazard to operating personnel and equipment shall be insulated, fully enclosed, or guarded. Exhaust mufflers and piping shall be located to minimize hazard to operating personnel.

4.2 Use conditions. The installation shall withstand shock loads as specified in the end-item specification. The installation shall be such that the engine will not be required to operate in a tilted position of more than 15 degrees from the horizontal in any plane at any time.

4.3 Design simplicity. The design of the end item shall be such that complete removal of the engine from the driven component or the driven component from the engine can be accomplished with minimum disassembly and without the use of special tools.

5. DETAIL REQUIREMENTS

5.1 Power requirements. The maximum horsepower required to drive the end item, including power transmission system, under the environmental extremes specified for the end item, shall not exceed the net continuous horsepower rating of the engine unless intermittent operation is indicated in the end-item specification at which time the intermittent power requirements shall not be exceeded.

5.2 Operational temperature limits. The end item design and location of hoods and other external components shall not cause the engine to exceed the operational temperature limits specified in table I under all operating conditions of load and environmental extremes specified in the end-item specifications.

Table I. Operational Temperature Limits

Location		Maximum temperature, °F.
Ambient air	In the vicinity of the engine.	120
Cylinder head	Under spark plug.	475
Lubricating oil	In the oil sump.	250
Cooling air	At cooling air outlet.	225
Carburetor inlet air	Air cleaner inlet.	150

5.3 Maintainability. The engine installation design shall permit maximum accessibility for replacement, servicing adjustment and repair of the engine with minimum disturbance to adjacent parts of the end item without the use of special tools.

5.3.1 cooling and starting system. Clearance shall be provided for:

(a) Winding the starter rope on the pulley with a gloved (arctic type) hand without interference.
(b) Removal of the flywheel housing and flywheel without removing other components of the end item.

5.3.2 Fuel system. Clearance shall be provided for:

(a) Carburetor adjustments.
(b) Removal of fuel filter.

5.3.3 Induction system. Clearance shall be provided for:

(a) Servicing the air cleaner.
(b) Operation of winterization air control on dry-type air cleaner.

5.3.4 Lubricating system. Clearance shall be provided for:

(a) Removal and insertion of the oil gage rod and for adding oil with or without a removable spout or funnel.
(b) Removal and replacement of the oil drain plug and for draining the oil. The oil shall drain completely and shall not flow over any part of the end item. An extension to the crankcase drain system is permissible.

5.3.5 Governor system. Clearance shall be provided for governor speed and linkage adjustments.

5.3.6 Ignition system. Clearance shall be provided for removing, replacing, and adjusting spark plugs, high tension cables, breaker points, and capacitors.

5.3.7 valves. Clearance shall be provided for removing the rocker arm covers and adjusting valve tappet clearance.

5.4 Engine mounting requirements. Mounting brackets shall be in accordance with figures 1, 2, 3, or 4 unless other means of mounting is approved

by the contracting officer. The mounting brackets shall be furnished by the end item manufacturer and shall be installed in such a manner as to permit assembly without deflection or deformation of brackets or engine mounting pads.

5.4.1 Vibration isolators. Suitable vibration isolators which stress an elastomer in shear or compression or both shear and compression shall be used on all installations when shock mounting is specified in the end-item specification. The method of calculation for determining the maximum allowable spring force of four vibration isolators, equally spaced about the center of gravity of the end item for beam mounting (see figure 5) shall be as specified in 5.4.2.1. When vibration isolators are not equally spaced about the center of gravity, a complete analysis shall be conducted to determine the maximum permissible spring force for each isolator.

5.4.2 Design requirements for direct mounting of end item. The maximum resultant moment that the equipment mounting pads can absorb without deformation is 650 pound-foot. This limiting moment shall not be exceeded. Cantilever mounting of end items to the engine is prohibited. Cantilever mounting of the engine to the end item is permissible provided the applicable end-item specification does not require a free fall test.

5.4.2.1 Method for calculating maximum allowable spring force. The final spring force shall not apply to the weight of the end item a G-magnification factor that will cause a moment exceeding 650 pound-foot, when calculated as shown in figures 6 through 9.

5.4.2.2 Procedure. The following procedure shall be followed in selecting. four vibration mounts to withstand the 18-inch, free-fall, shock load requirements. The following example applies only when isolators are equally spaced about the center of gravity of the entire end item.

(a) Determine weight of equipment;

W_{eq} = 80 pounds

(b) Select a vibration isolator, e.g., k = 3,000 pounds/inch (obtain spring rate from manufacturer).

(c) Calculate the static deflection by the following equation:

$$\delta_o = \frac{W_e + W_{eq}}{4k}$$

Where, δ_o = static deflection in inches
k = spring constant in pound/inch

W_e = weight of engine = 40 pounds
W_{eq} = weight of equipment in pounds

Therefore, δ_o = 0.01 inch

(d) From design chart (see figure 6) determine final spring force

F_s = 1,850 pounds

(e) Determine factor γ (see figure 7) which is a function of L
L = distance of CG of equipment from engine equipment mounting pads, and D = distance of equipment support from engine equipment mounting pads.

Example, L = 8 inches
D = 14 inches

Fact or γ = 2.5

(f) Determine maximum permissible force (see figure 8).

For γ = 2.5
W_{eq} = 80 pounds

Maximum permissible = 5,1OO pounds spring force

Note. This value is higher than the final spring force, and the four shock mounts are suitable if the natural frequency and total deflection of the mounts are within the design specification.

(g) Determine natural frequency and total deflection (see figure 9).

For static deflection δ_o = 0.01 inch
Natural frequency F = 1,880 CPM
The total deflection δ_o = 0.61 inch
F shall not be greater than 70 percent of the engine governed speed.

5.5 Power transmission requirements. The driven unit shall be connected to the engine drive shaft by one of the following methods. Torsional vibration determinations shall be made as specified in 5.5.5.

5.5.1 Rigid-quill coupling. When a rigid quill coupling is used on the driven equipment shaft, the coupling shall be in accordance with figure 10.

5.5.2 Flexible coupling. When a flexible coupling is used between the engine and end item, the coupling shall provide the correct torsional flexibility and a sufficient degree of dampening to insure that the maximum vibration torque does not exceed 4.0 pounds-inch (see 5.5.5.2).

5.5.2.1 Shaft misalinement. The misalinement of the engine shaft and driven equipment shaft shall not exceed the limits shown in figure 11 when a flexible coupling is used between the engine and end item.

5.5.2.2 Coupling installation. The coupling shall be installed on the engine shaft by a taper connection in accordance with figure 12.

5.5.3 Belt drive. V-belts used shall conform to MIL-B-11040. The belt size and pulley dimension shall conform to MS51064 through MS5107O, as applicable.

5.5.3.1 Pulley alinement. The alinement of the pulleys shall be such as to insure optimum belt life and power transmission.

5.5.4 Gear drive. When an independent reduction gear drive is used, it shall be coupled to the engine through a suitable flexible coupling (see 5.5.2) or V-belt drive (see 5.5.3).

5.5.4.1 Direct-mounted gear-reduction drive. When a direct-mounted gear-reduction drive is used, it shall be coupled to the engine power-takeoff shaft as specified in 5.5.5.1.

5.5.5 Method for calculating torsional vibration stresses. The maximum allowable vibration torque shall not exceed 410 pounds-inch for the shaft between the reciprocating masses of the engine and the attachment point of the driven equipment.

5.5.5.1 Procedure for directly connected end item. The following procedure for torsional vibration calculation shall be followed:

(a) Conditions. The characteristics of the directly-connected end item are:

End item inertia J_M = 0.15 pound-inch-second^2 or WR^2 = 57.8 pound-inch^2
Engine speed range 3,500 to 3,750 rpm

(b) Evaluate the critical speeds occurring in the engine speed range of 3,500 to 3,750 rpm from figure 13.

For J_M = 0.15 pound-inch-second^2 the nearest critical speed occurs at N_C = 3,340 rpm for n = 2-1/2.

Note. The engine shall not be operated continuously at any critical speed which will result in a vibratory torque in excess of 410 pound-inch.

(c) Determine the vibratory torque in the shafting from figure 14. For J_M = 0.15 pound-inch-second^2 and n = 2-1/2.

The vibratory torque T_c = 880 pound-inch. Since the critical speed N_c = 3,340 rpm is below the minimum speed range, the actual vibratory torque at N = 3,500 rpm shall be determined.

(d) Calculate speed ratio

$$\frac{N}{N_C} = \frac{3,500}{3,340} = 1.048$$

(e) Determine average torque magnifier from figure 15.

For speed ratio = 1.048, the average torque magnifier T/T_c = 0.12.

thus the vibratory torque at 3.500 rpm T = 0.12 x 880 = 105.6 pound-inch.

This value is within the vibratory torque limits for the crankshaft.

5.5.5.2 Procedure for flexible coupling connected load. The following information shall be determined when a flexible coupling is used:

(a) The inertia of the driven machine (see appendix 10.10).
(b) The stiftiess of the coupling (furnished by the coupling manufacturer) shall not exceed the maximum permissible stiffness (see figure 16).

5.6 Miscellaneous design requirements.

5.6.1 Alteration. The engine shall not be altered in any manner by the end-item manufacturer for assembly or installation purposes.

5.6.2 Fuel tank. The capacity of the fuel tank for the end item may be determined from table III. The location of the fuel tank and maximum allowable length of fuel supply line shall not exceed the limits specified in figure 17.

5.6.3 Cooling-air outlet. Clearance shall be provided for the outlet of cooling air as shown in figure 18.

5.6.4 Noise reduction. In applications where additional noise reduction is required, a secondary muffler shall be directly connected to the muffler outlet; however, the secondary muffler shall be self-supporting.

custodians :

Army-ME
Navy - YD
Air Force -82

Review activities:

Army - GL
Navy - MC

User activities:

Army-EL,AT

Preparing activity:

Army - ME

Project No. 2805-0301

10• APPENDIX

10.1 General description of engine. The model 2A016 military design engine is a vertical two-cylinder, overhead-valve, air-cooled, spark-ignition, four-cycle, gasoline engine. The net continuous brake horsepower rating is 3.0 hp at 3,600 rpn. The engine will develop 85 percent of the maximum brake horsepower specified in the performance charts. The engine is treated and painted in accordance with MIL-T-704.

10.2 Engine accessories. The engine as supplied will be equipped with all accessories as outlined in the installation drawing (see figure 19) and shall be ready for immediate operation after the engine is correctly serviced and reprocessed. The engine has the following features.

10.2.1 Dry-air cleaner. The air cleaner is of the dry (replaceable element) type, with a restriction indicator (see figure 20). Cleaning and servicing instructions are embossed in the air cleaner body.

10.2.2 Fuel filter. The fuel filter consists of a strainer and the sediment bowl. It is provided for use between the fuel supply and the fuel pump l The filter body is tapped for 1/8 inch NPT fuel-line fittings.

10.2.3 Fuel pump. The fuel pump is a single-acting, diaphragm-type pump rated for a static pressure range between 1.5 psi minimum to 3.00 psi maximum, measured at a point 16 inches above fuel pump outlet with pump cam action at 1,800 rpm. The flow pressure head is between 1.75 psi and 3.00 psi with a normal head pressure of 2 psi. The rated capacity of the pump at 1,800 strokes per minute is 5 gallons per hour.

10.2.4 Muffler. The engine exhaust system is comprised of a combination muffler-manifold which is completely housed within the engine shrouding. An external muffler is not required for normal installation to limit the engine noise since the muffler-manifold is capable of attenuating the overall engine noise level to 83 db when measured at a distance of 50 feet. The muffler outlet is a standard two-hole flange (see figure 19) positioned at an angle of 45 degrees to enable the exhaust gases to escape into the atmosphere away from the engine.

10.2.5 Cooling system. A single cooling-heating system is provided to insure operation over the specified temperature range from minus 25° to 120° F. Cooling air is provided by a centrifugal fan integral with the die-cast aluminum flywheel. The cooling air is forced over the top portion of the cylinder barrel and is discharged across the bottom of the engine oil pan. The system will maintain safe engine temperatures over the entire load range. At rated speed, the airflow is 312 cubic feet/minute.

10.3 Engine illustration and installation. Figure 21 is a photograph of the model 2AO16 military design engine illustrating the major components viewed from the rope starter end. Figure 20 is a similar illustration of the same engine viewed from the engine power takeoff shaft. The installation drawings are presented in figure 19, and illustrate the overall dimensions of the engine, the location of the major components and the detailed dimensions of the engine mounting pads, equipment mounting pads, and the power takeoff shaft. The dimensions indicated shall be used to assist in the design of the installation.

10.4 Engine specifications. The engine specifications are as listed in table II:

Table II. Engine Specifications

Military design engine, model 2A016:

A.	Engine:	
	Number of cylinders	2
	Bore, inches	2.25
	Stroke, inches	2.00
	Total displacement, cubic inches	16.00
	Rated continuous horsepower at 3,600 rpm	3.0 bhp
	Maximum horsepower at 3,600 rpm	5.0 bhp
	Maximum torque at 3,600 rpm, lb-ft	7.3
	Compression ratio	6.0:1
	Speed range, rpm (for continuous operation)	3,500-3,800
B.	Fuel system:	
	Fuel pump	diaphragm
	Fuel filter	MS51086
	Fuel consumption at rated load and speed lb/bhp-hr	1.0
C.	Lubrication system:	
	Lubrication system	splash-vapor
	Oil sump capacity, pints	1.60
	Oil consumption, maximum at rated load and speed, lb/bhp-hr	0.025
D.	Ignition:	
	Ignition system	magneto
	Spark plug	MS51009-1
	Electromagnetic compatibility	MIL-STD-461

E. Governor characteristics:	
Speed regulation, percent	3
Rated load and speed, rpm	3,600
No-load speed, rpm (maximum)	3,708
Engine speed stability (at constant value of load), percent	+ 1
Maximum speed surging characteristics:	
Rated load to no load, seconds	6
No load to rated load, seconds	4
Maximum speed change during 6-second surging period, percent	5
Rated load to no load, rpm	180
Maximum speed change during b-second surging period, percent	3
No load to rated load, rpm	108
F. Engine and accessories:	
Air cleaner	dry type
Cranking system	rope
Main bearings	tapered roller
Crankshaft rotation, viewed from drive end	counterclockwise
Dry weight, pounds	46
Life between major overhaul or rebuild hours	1,500
G. Overall dimensions:	
Height, inches	15-5/8
Length, inches	16
Width, inches	15
H. Environmental. extremes:	
Engine operation	+120° to -25° F.
Engine storage	+150° to -80° F.
Engine starting capability without preheat	+1200 to -25° F.
Starting with preheat	-25° to -65° F.
Fungusproofing	MIL-V-173 and MIL-V-1137
Humidity extreme, percent relative humidity	85% at 85° F.
Tilt operation, degrees in any plane (maximum)	15
Maximum elevation for rated power, feet	5,000

10.5 Fuel consumption. The part-throttle fuel consumption characteristics (at 3,600 rpm of the 3.0 BHP military design engine are presented in the following table. There is a 10 percent increase in the fuel consumption at 3,800 rpm and a 10 percent decrease at 3,400 rpm. The effect of altitude is insignificant.

Table III. Fuel Consumption

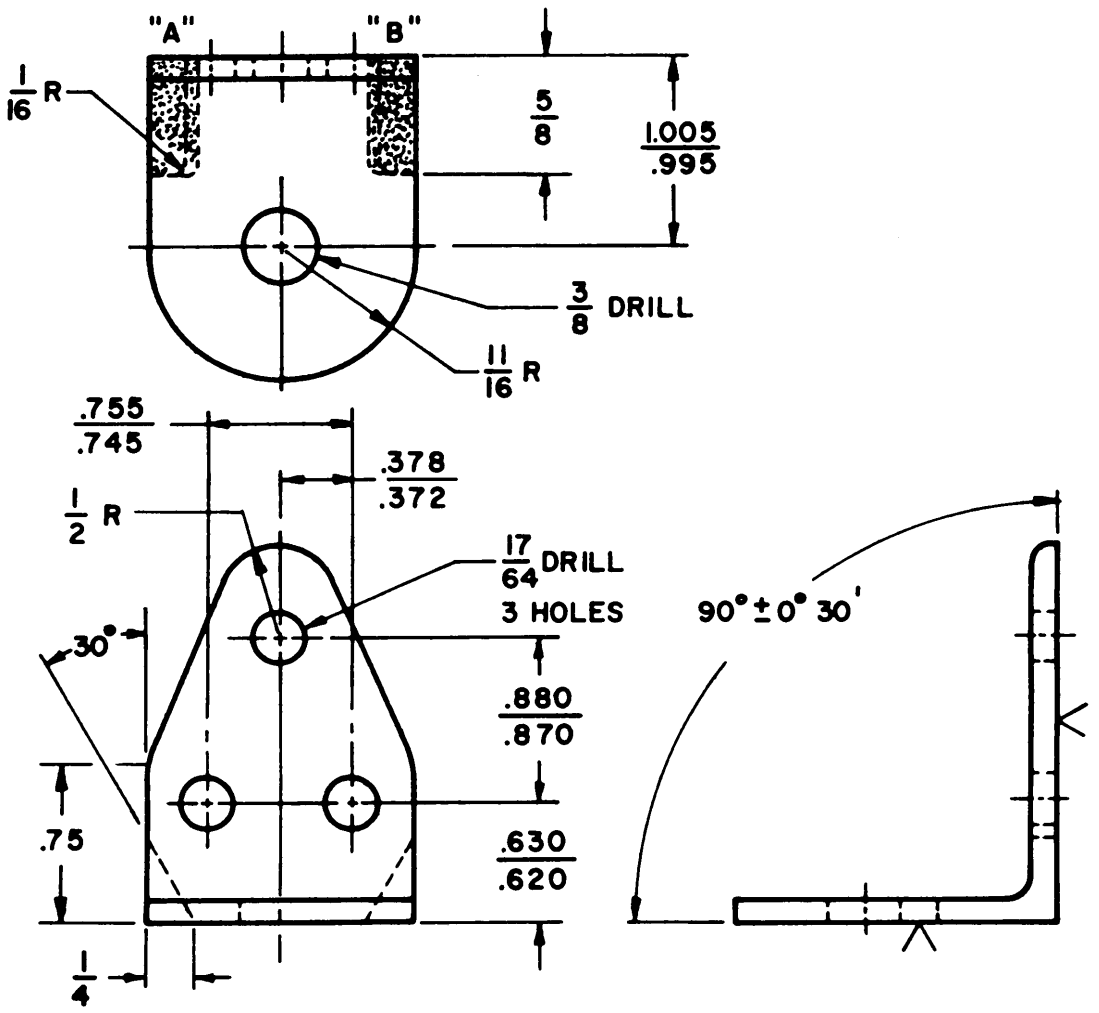
Brake horsepower	1.5	2.0	2.5	3.0	4.0
Fuel consumption, gal/hour	.41	.43	.45	.49	.55

10.6 Moment of inertia of end item. Determine the polar moment of inertia of a balanced pivoted mass which is not removable or easy to handle (such as the rotor of an electric motor) as follows:

(a) Support the rotating mass in a horizontal plane on antifriction bearings or on knife edges.
(b) Attach a known weight, W, to the mass at a distance, L, from the axis of rotation. If the mass is not accessible and the shaft rotates with it, attach the weight to the shaft with a light rigid rod of length L.
(c) Set the system in oscillation at amplitudes of 10 degrees or less and measure the period T.
(d) Determine the moment of inertia, using the following formula:

$$J = WL\left[\left(\frac{T}{2\pi}\right)^2 - \frac{L}{G}\right]$$

Where J = moment of inertia, pound-inch-second^2
W = weight of mass, pounds
L = length of rod, inches
T = second/period
G = acceleration of gravity = 386 inches/second^2

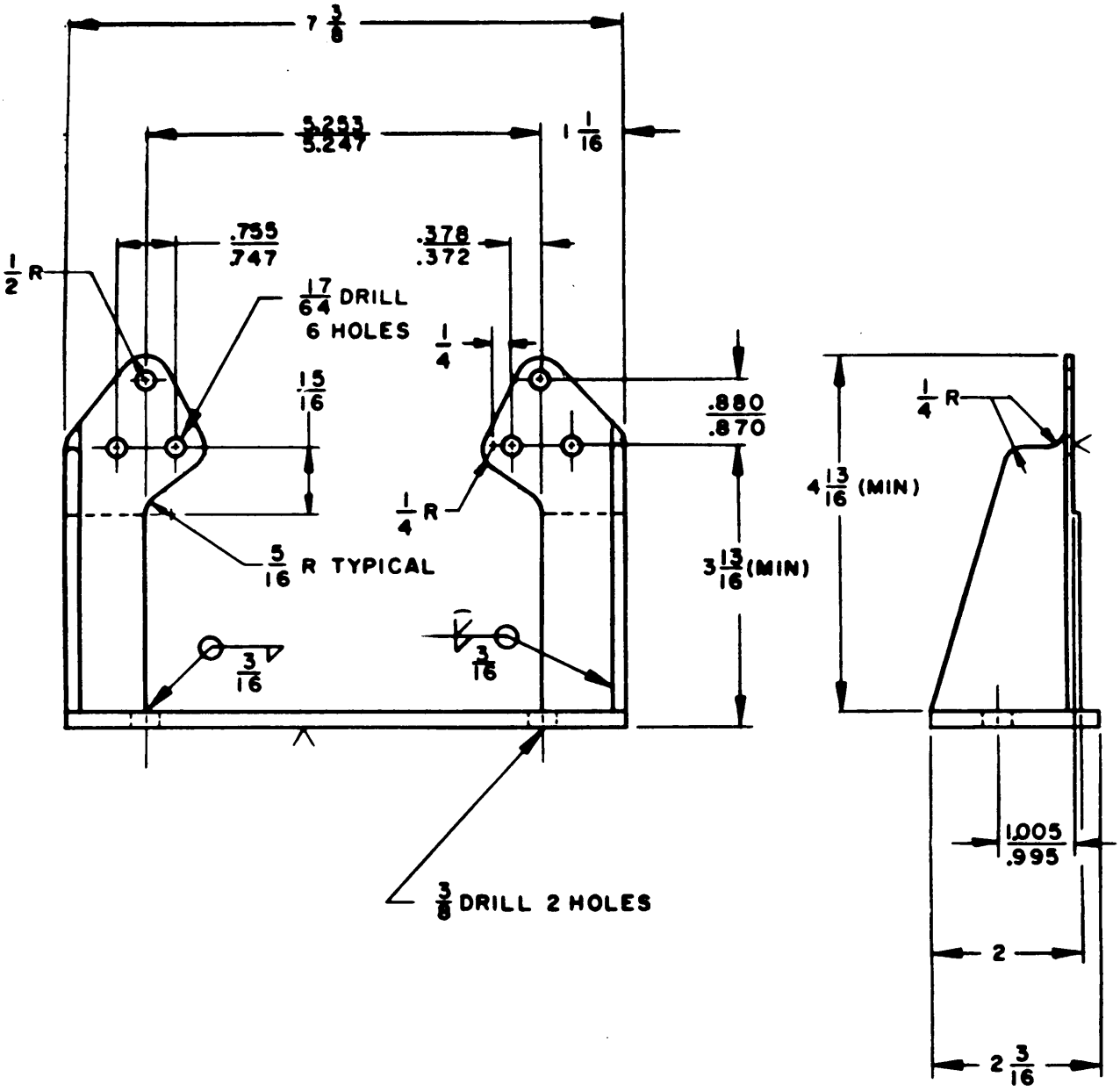


NOTES:

1. MATERIAL: 2 x 2 x 1/8 ANGLE, STEEL (MIN)
2. BLANK OUT SHADED AREAS "A" OR "B" FOR AIR DUCT CLEARANCE (2 ANGLES)
3. FOUR BRACKETS / ENGINE REQUIRED

FIGURE 1. ENGINE MOUNTING BRACKET

CX-423

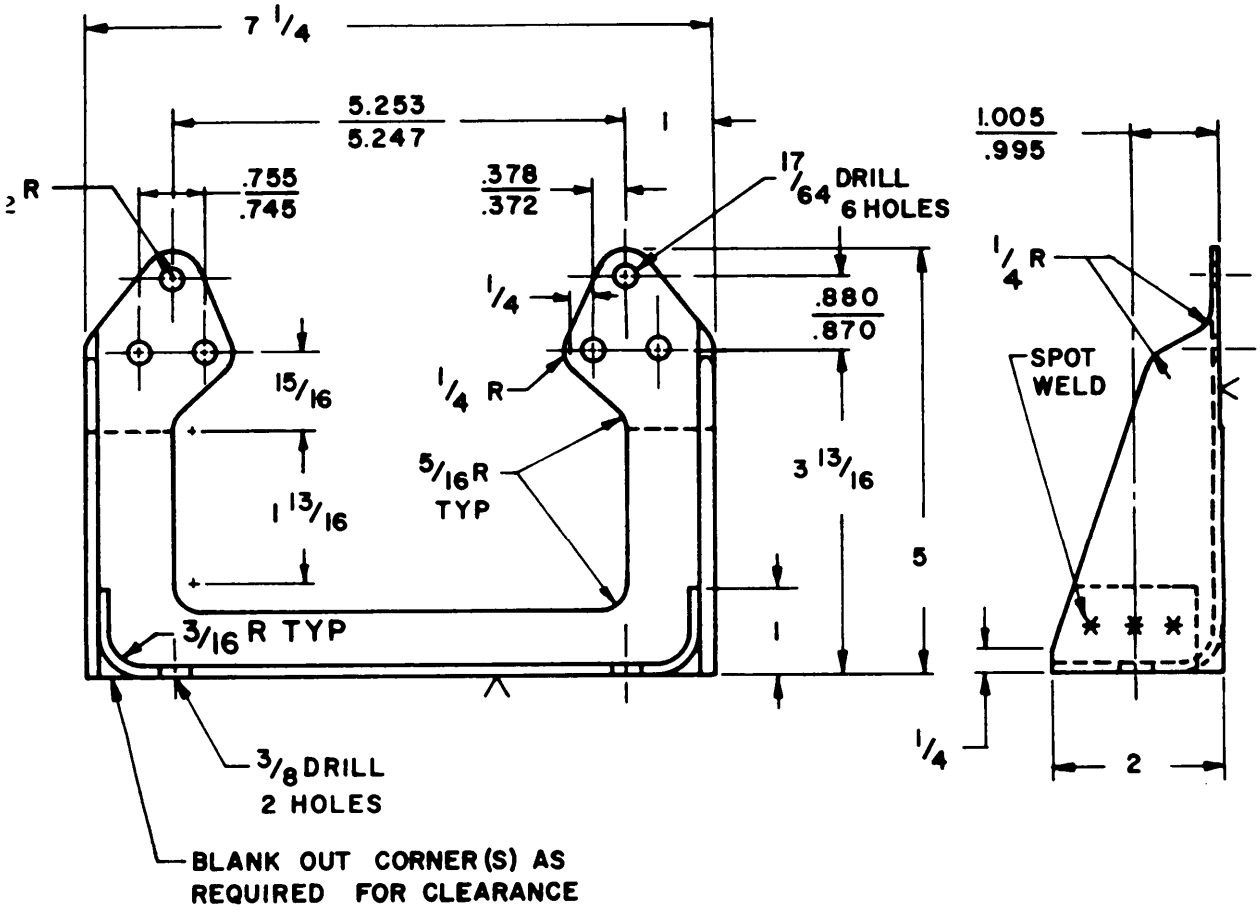


NOTES:

1. MATERIAL: 3/16 STEEL PLATE
2. FRACTION TOLERANCE: ± 1/32
3. NUMBER REQUIRED: 2 / ENGINE
4. "V" SURFACES MUST BE FLAT AND SQUARE WITHIN ± .007 T.I.R.

FIGURE 2 WELDED ENGINE MOUNTING BRACKET

CX-431

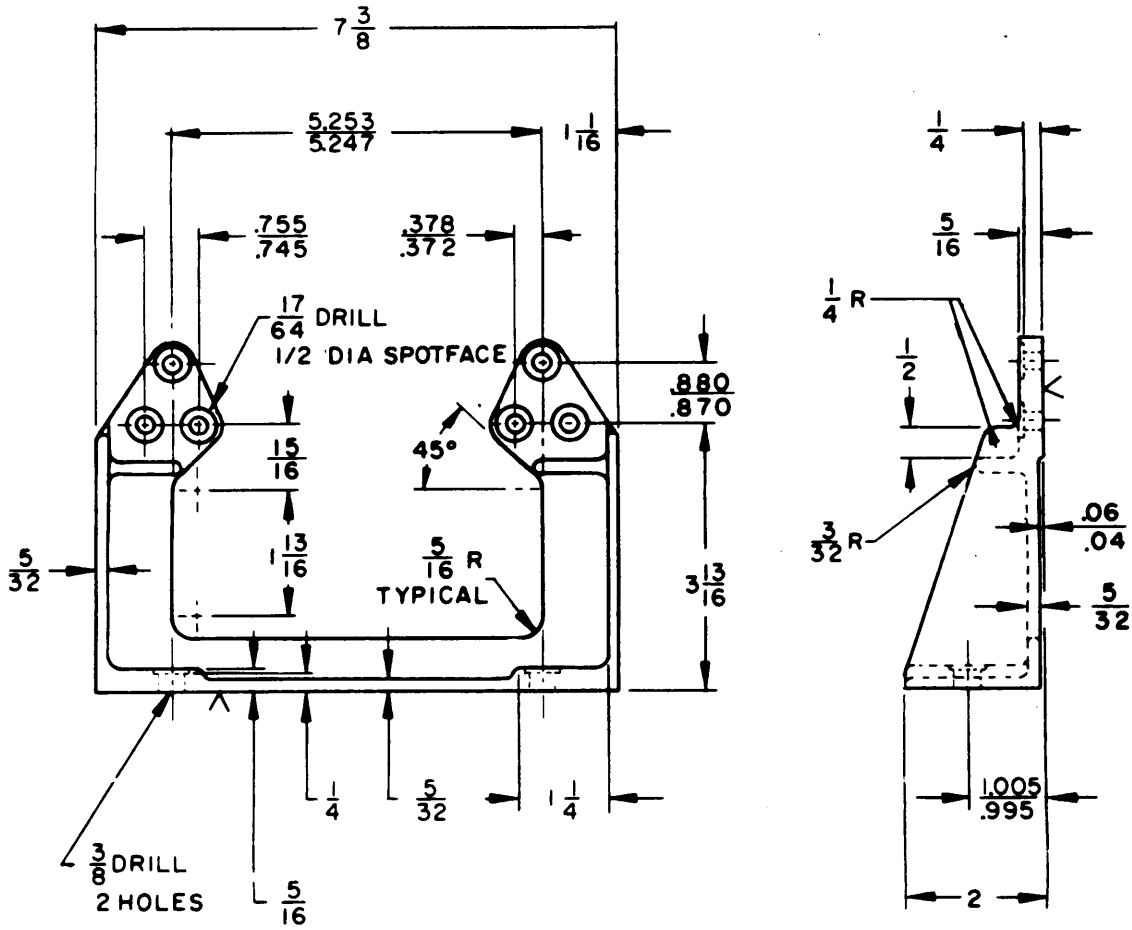


NOTES:

1. MATERIAL: 1/8" STEEL PLATE
2. FRACTIONAL TOLERANCES: ± 1/32"
3. "V" SURFACES TO BE FLAT AND SQUARE TO EACH OTHER WITHIN ±.005 T.I.R.
4. NUMBER REQUIRED: 2 / ENGINE

FIGURE 3. STAMPED ENGINE MOUNTING BRACKET

CX-434



NOTES:

1. MATERIAL: SAE 309 ALUMINUM
2. DRAFT ANGLES: 1°-2°
3. BLEND ALL RADII TO A SMOOTH CONTOUR
4. "V" SURFACES TO BE FLAT AND SQUARE TO EACH OTHER WITHIN ±.005 T.I.R.
5. FRACTIONAL TOLERANCES: ±1/32
6. NUMBER REQUIRED: 2 /ENGINE

FIGURE 4. CAST ENGINE MOUNTING BRACKET

CX-435

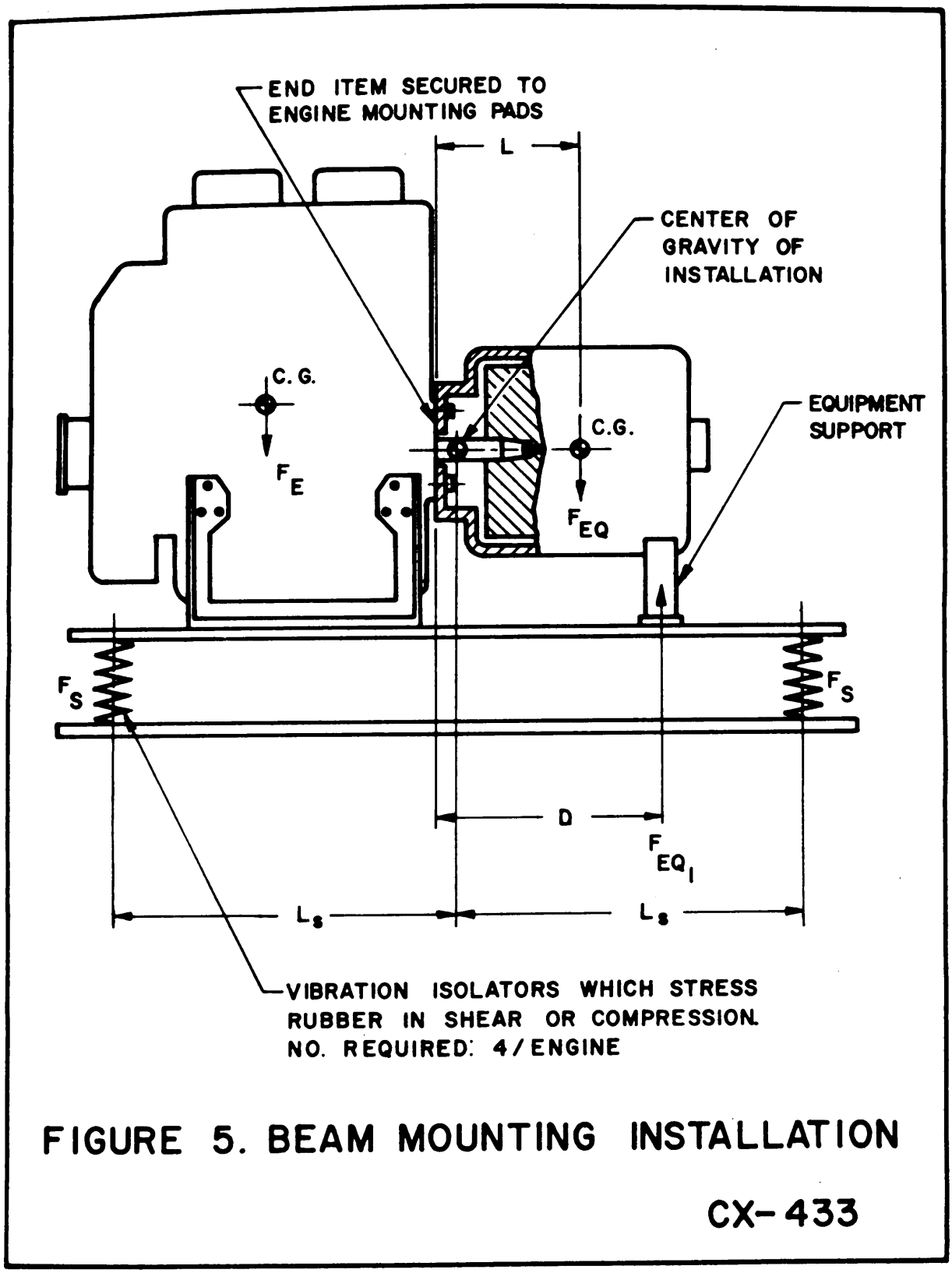


FIGURE 5. BEAM MOUNTING INSTALLATION

CX-433

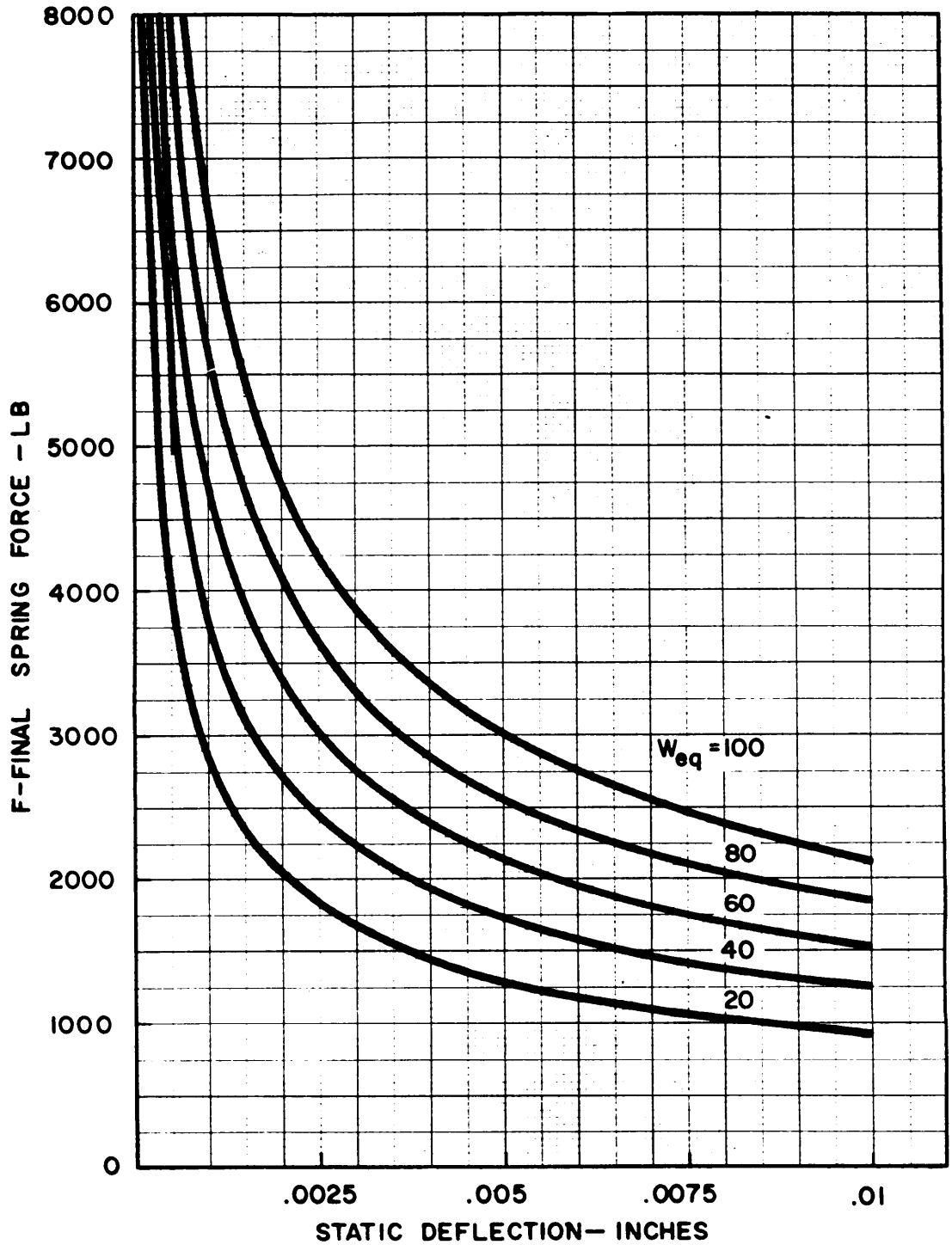


FIGURE 6. FINAL SPRING FORCE (PER SPRING)

CX-436

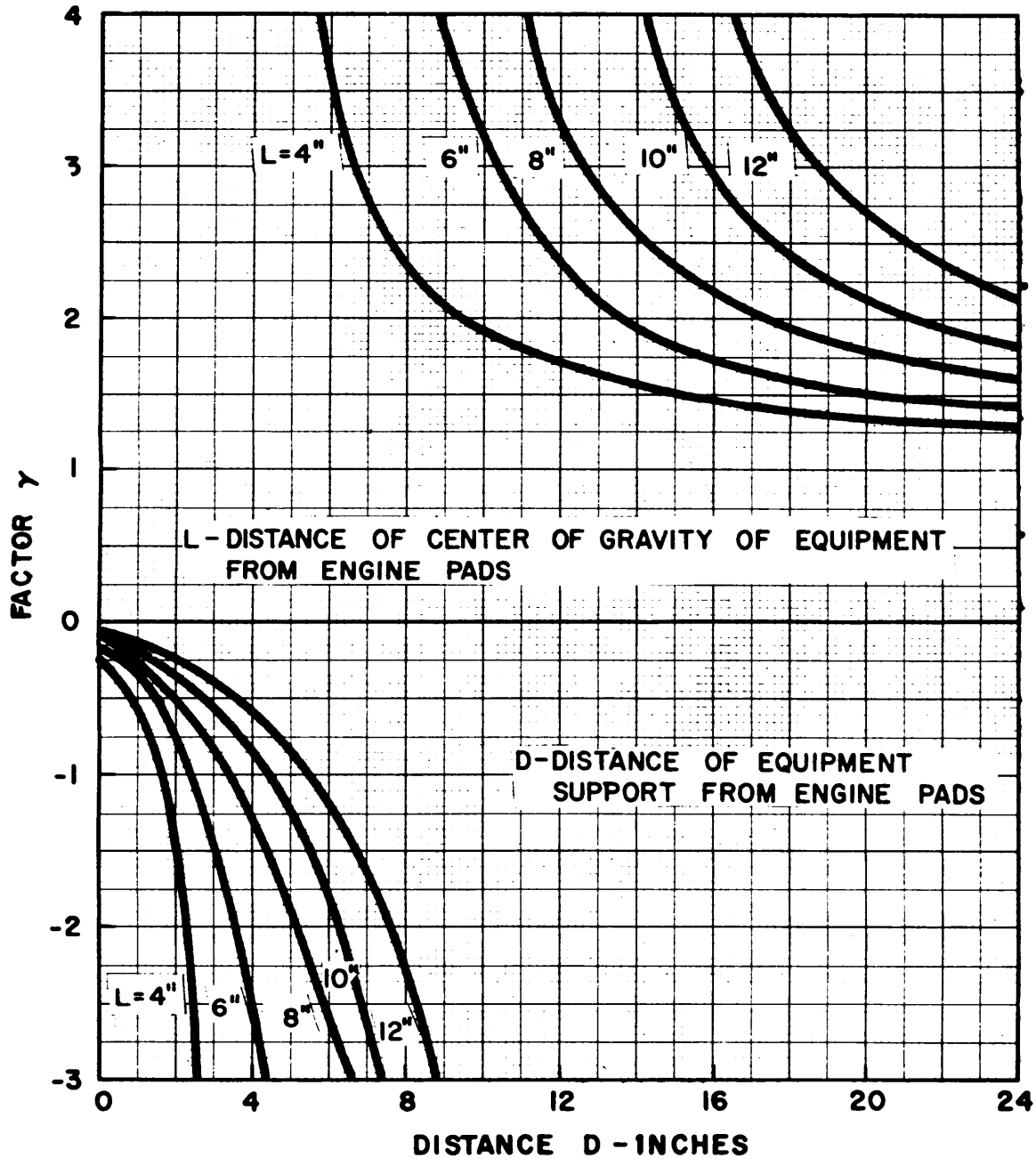


FIGURE 7. FACTOR γ AS A FUNCTION OF L AND D FOR BEAM MOUNTING

CX-446

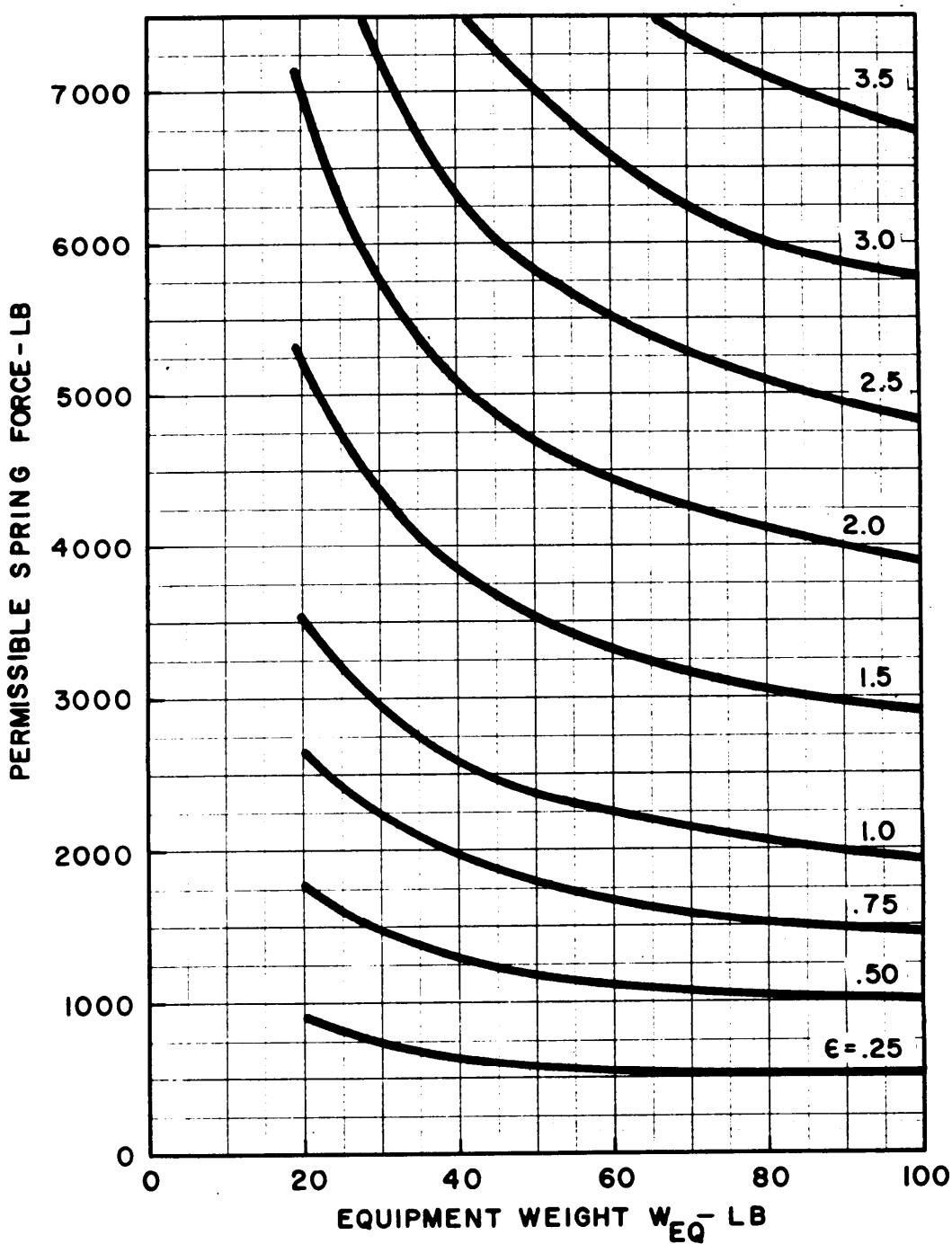


FIGURE 8. PERMISSIBLE SPRING FORCE (PER SPRING) FOR BEAM LOADING

CX-447

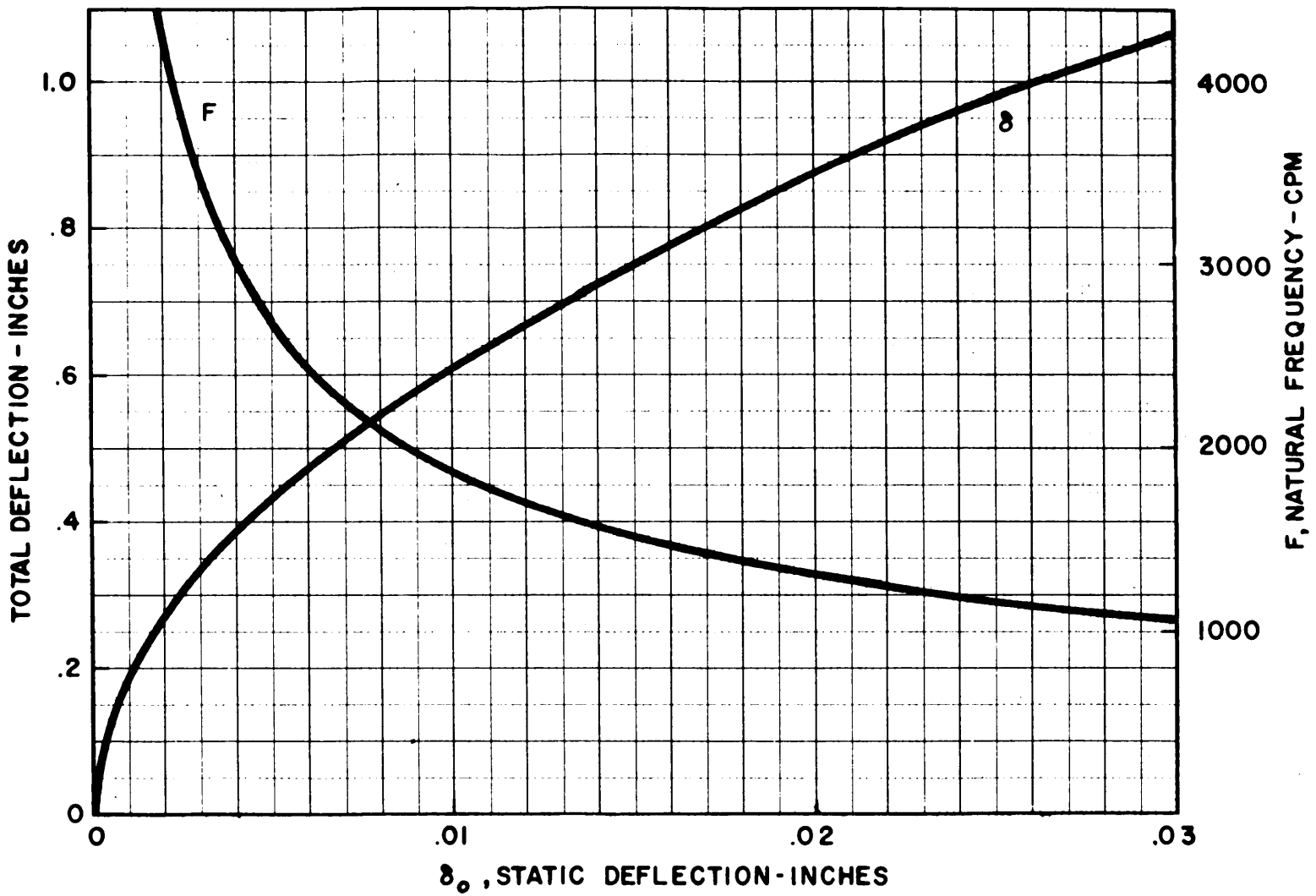


FIGURE 9. TOTAL DEFLECTION AND NATURAL FREQUENCY AS A FUNCTION OF STATIC DEFLECTION

CX-448

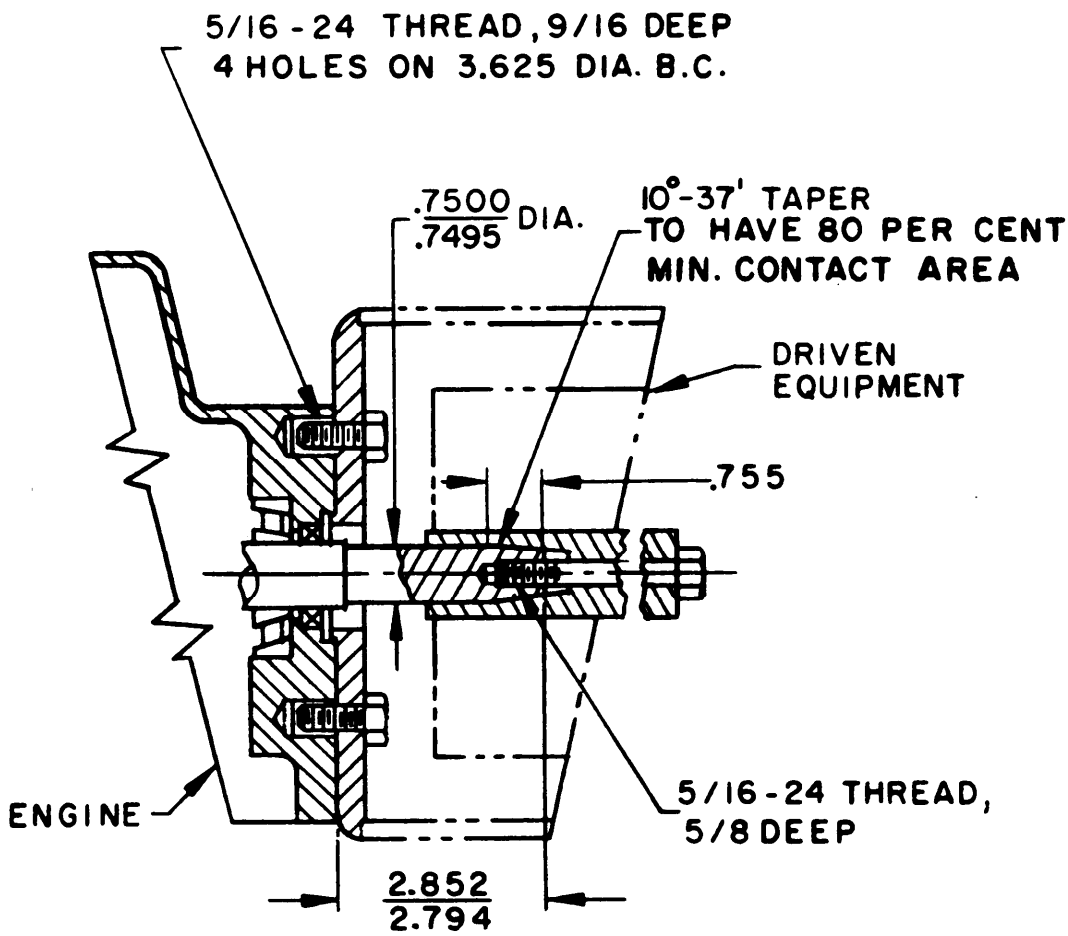


FIGURE 10. RIGID QUILL-TYPE COUPLING

CX-422

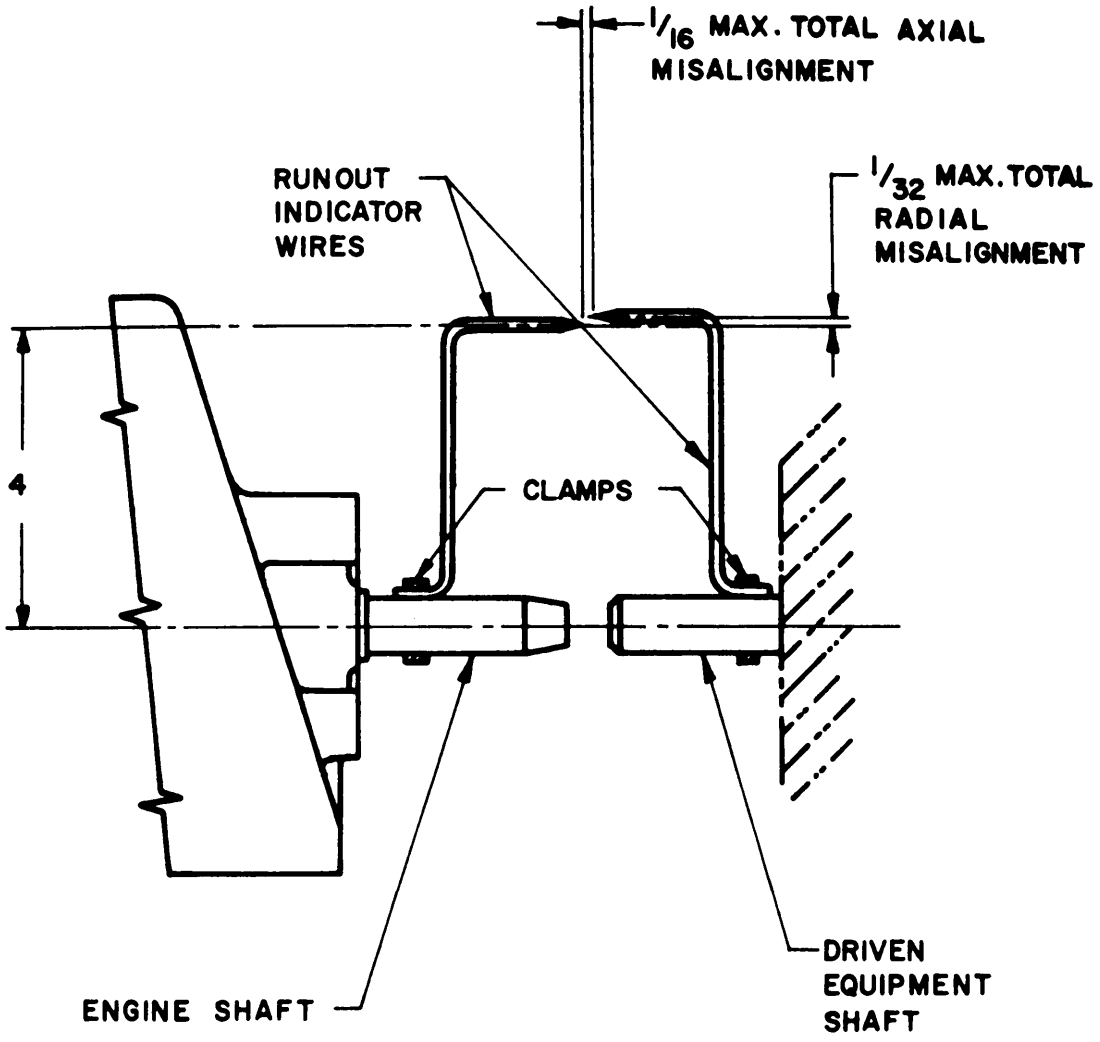


FIGURE 11. ALIGNMENT METHOD

CX-427

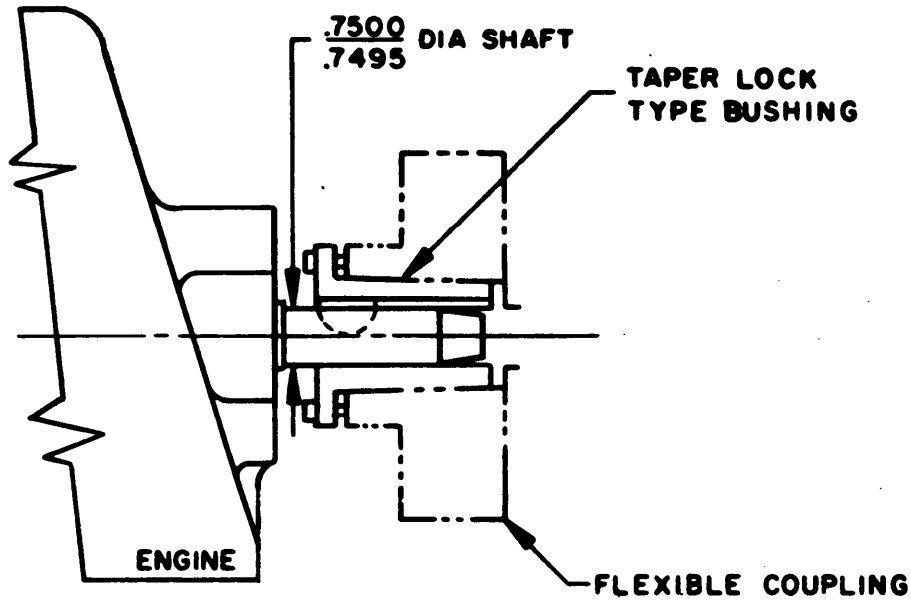


FIGURE 12. FLEXIBLE COUPLING INSTALLATION

CX-429

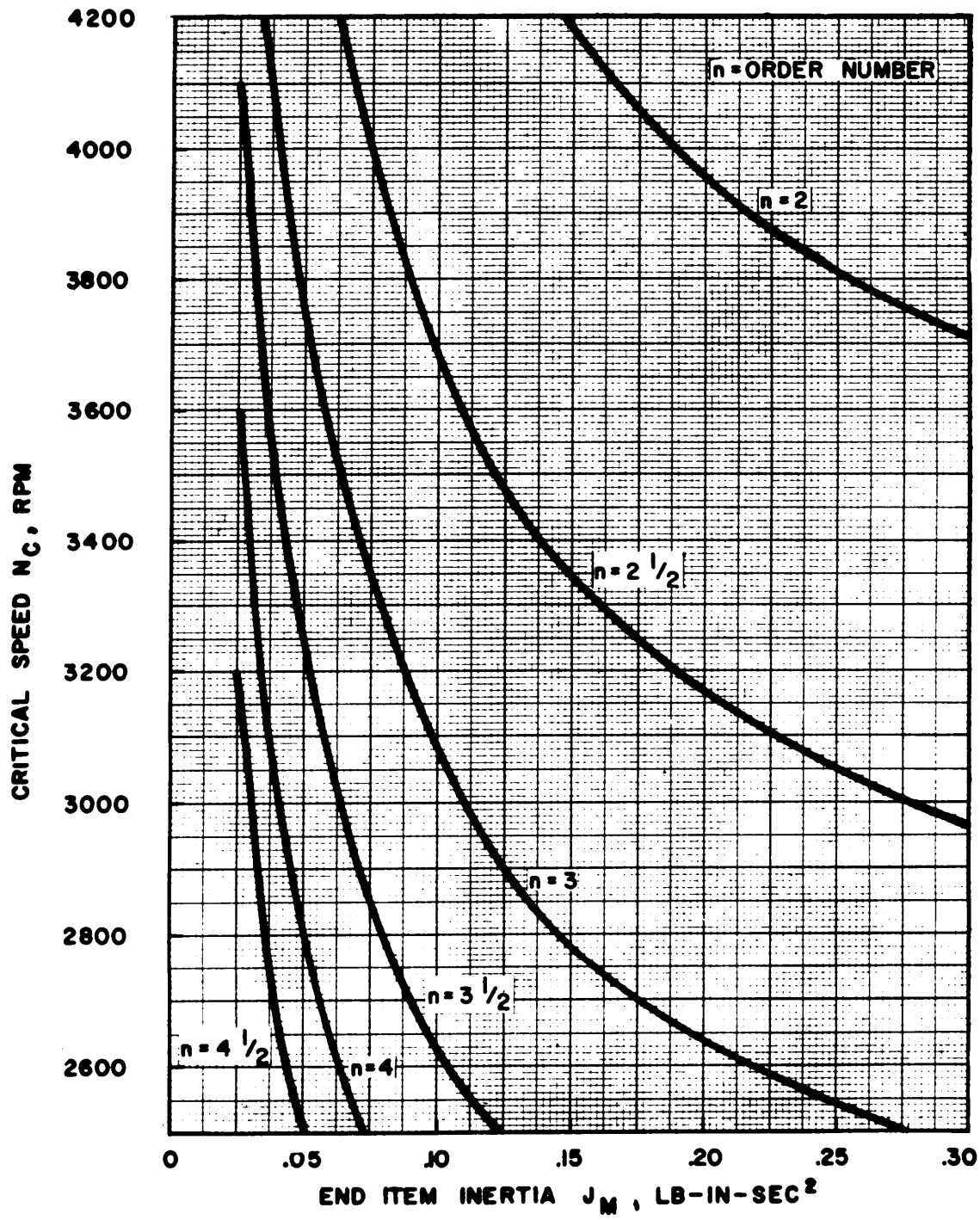


FIGURE 13. CRITICAL SPEEDS FOR DIRECTLY ATTACHED END ITEM

CX-437

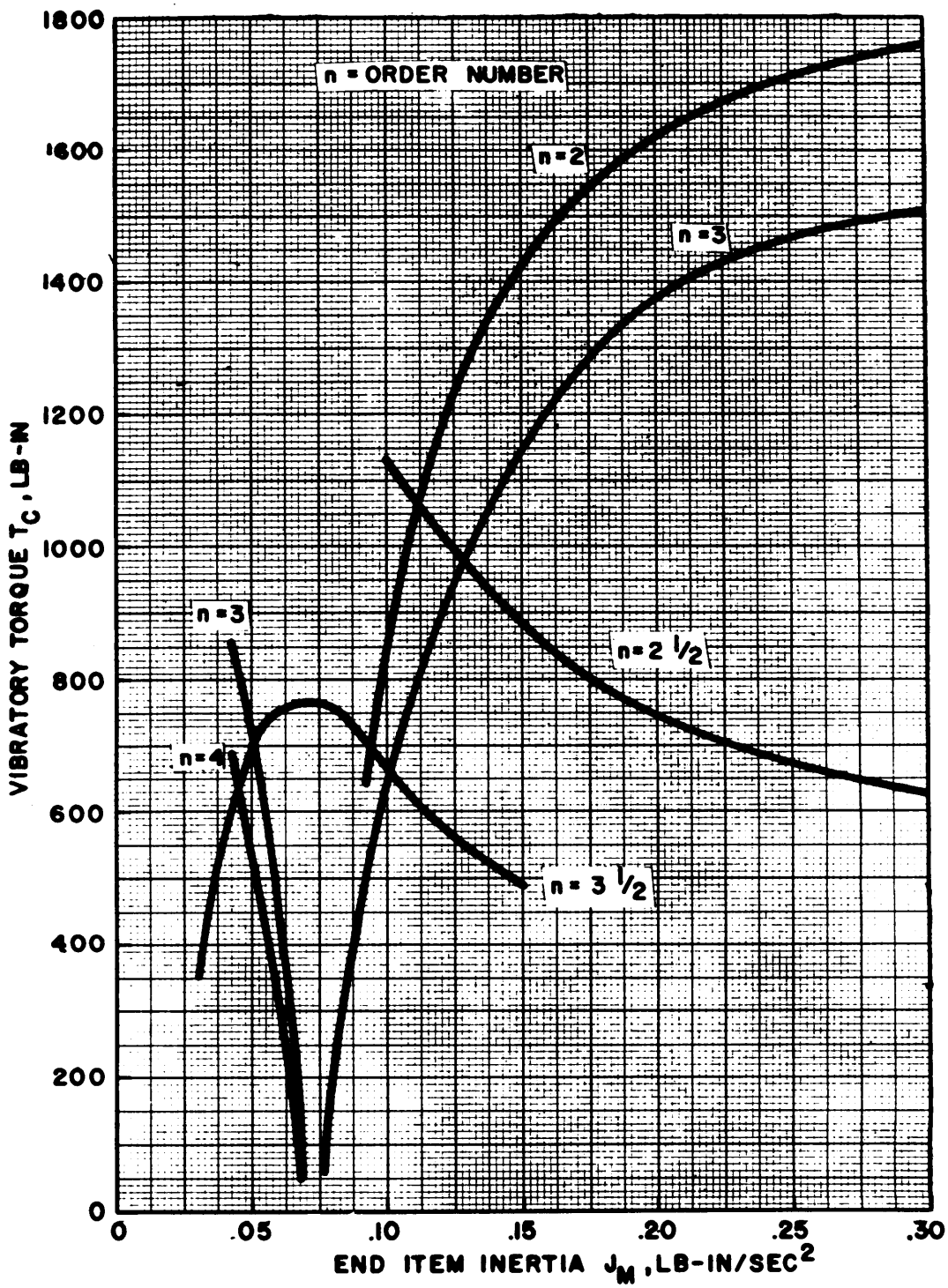


FIGURE 14. VIBRATORY TORQUE AT CRITICAL SPEEDS FOR DIRECTLY ATTACHED END ITEM

CX-438

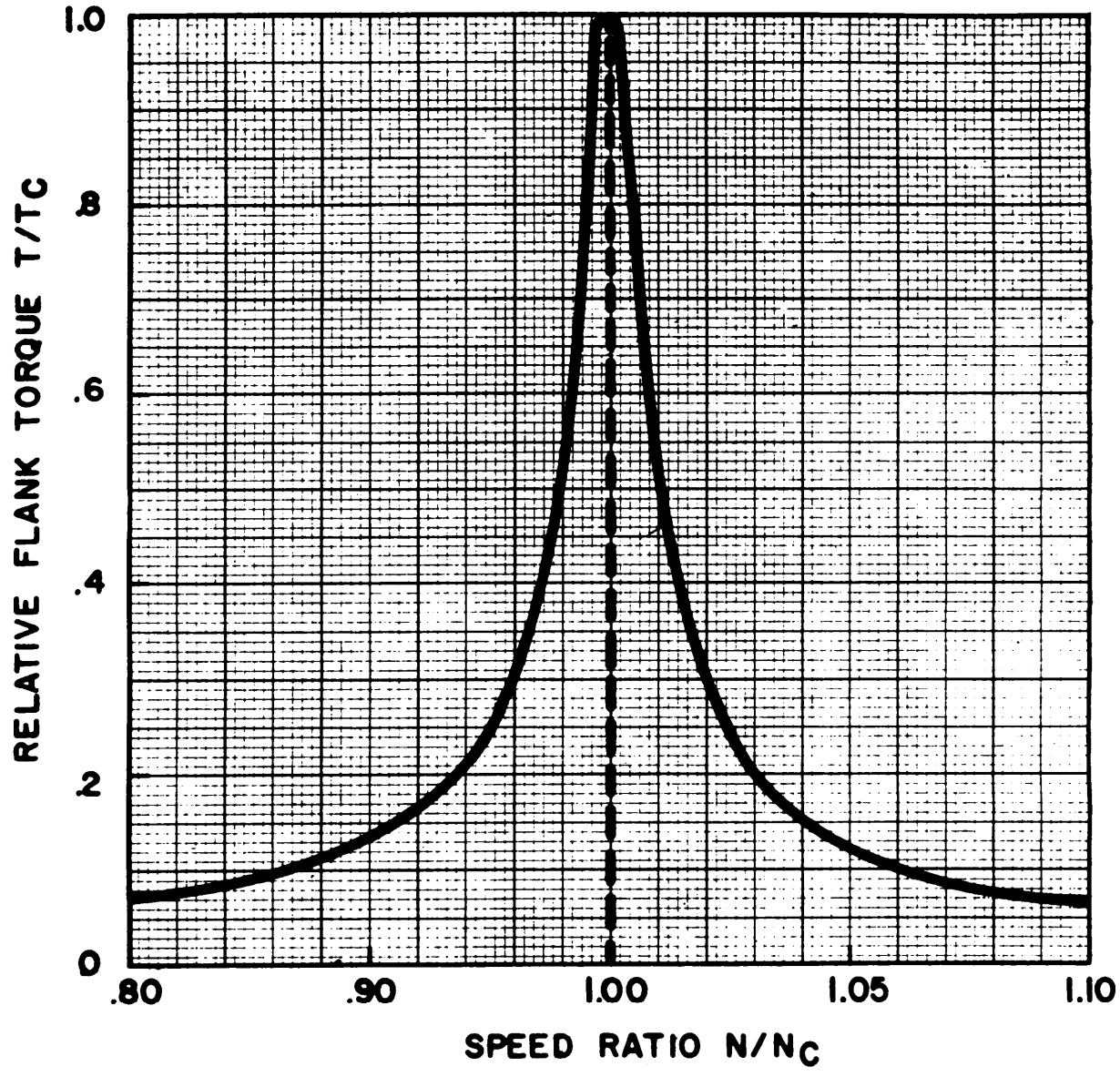


FIGURE 15. AVERAGE TORQUE MAGNIFIER FOR DIRECTLY ATTACHED END ITEM

CX-439

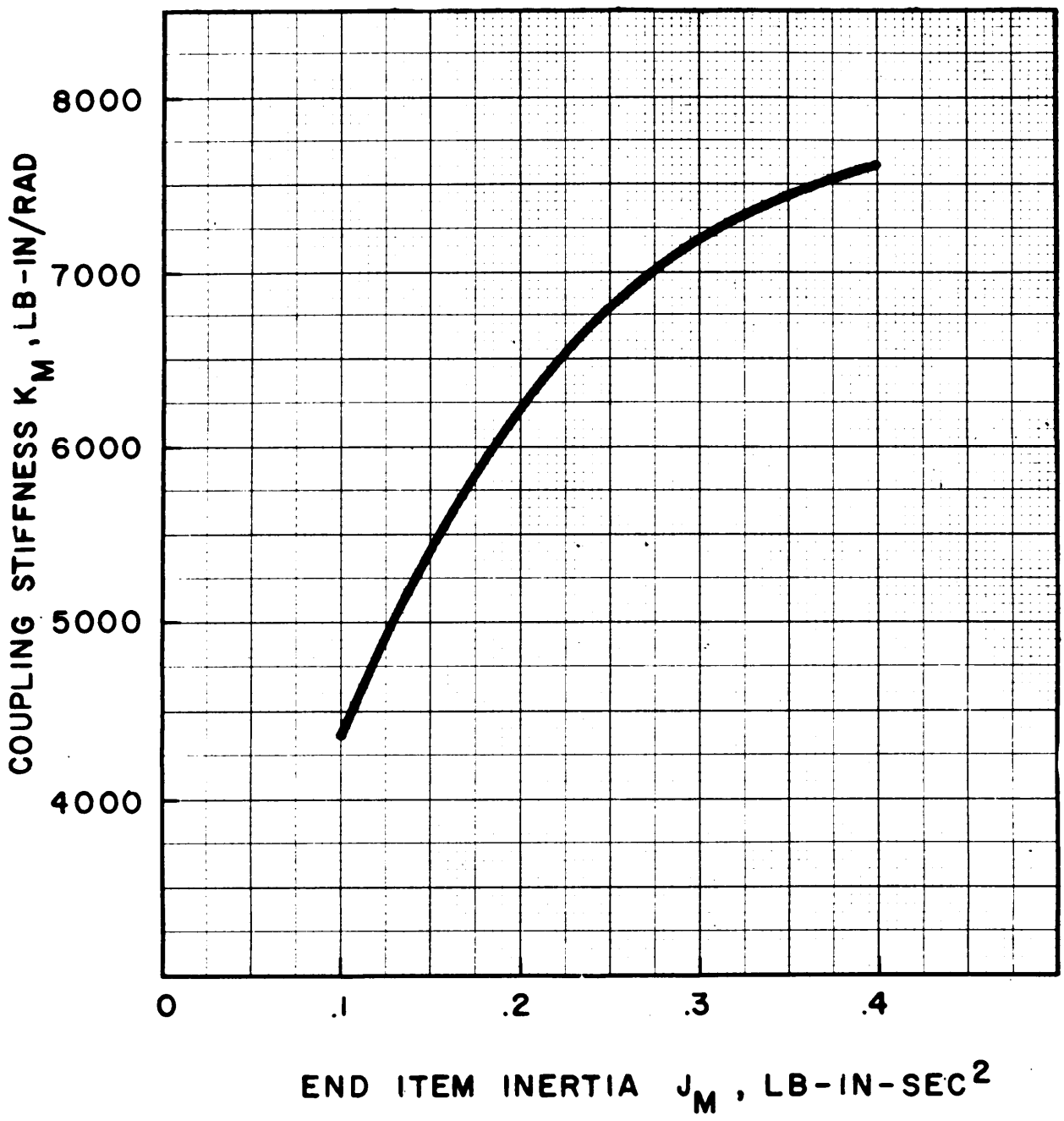


FIGURE 16. MAXIMUM PERMISSIBLE STIFFNESS OF FLEXIBLE COUPLING

CX-440

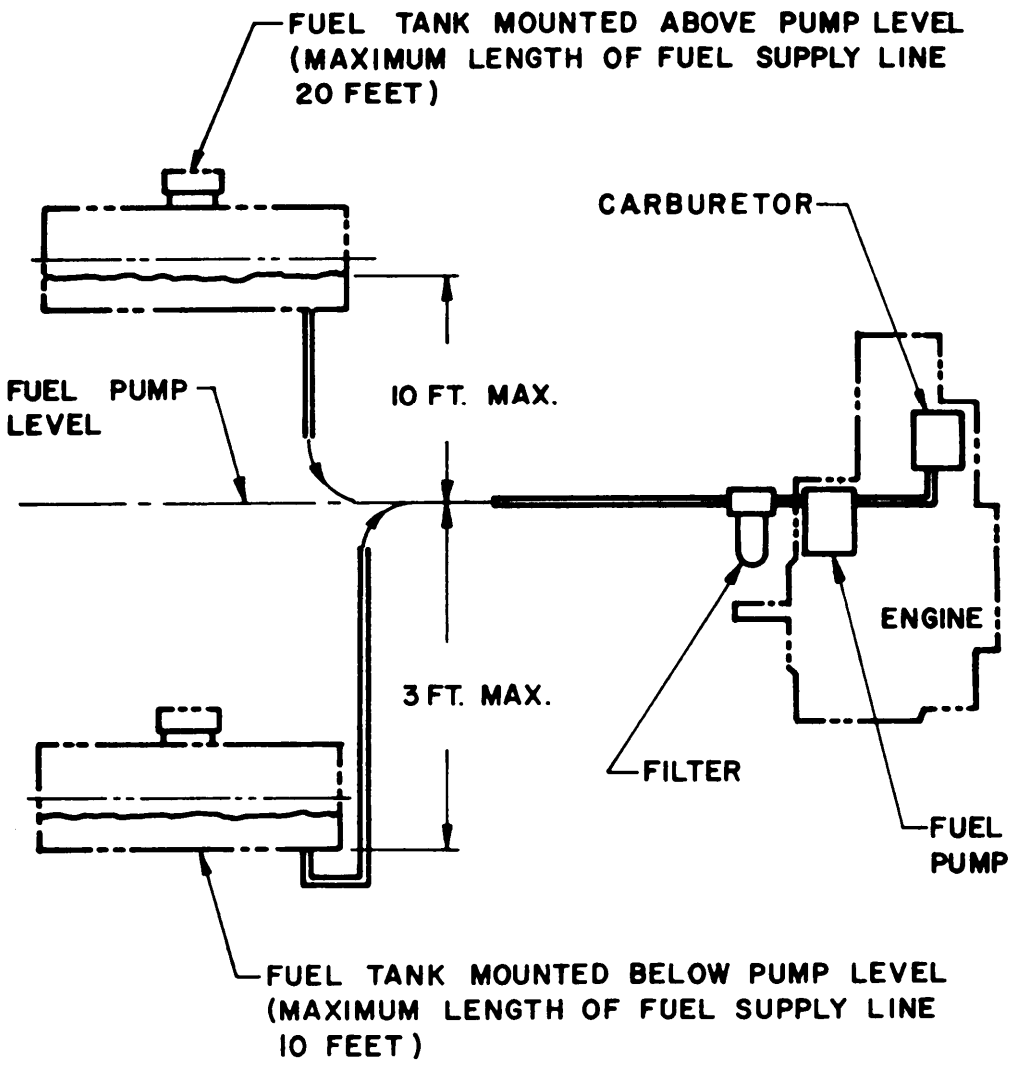
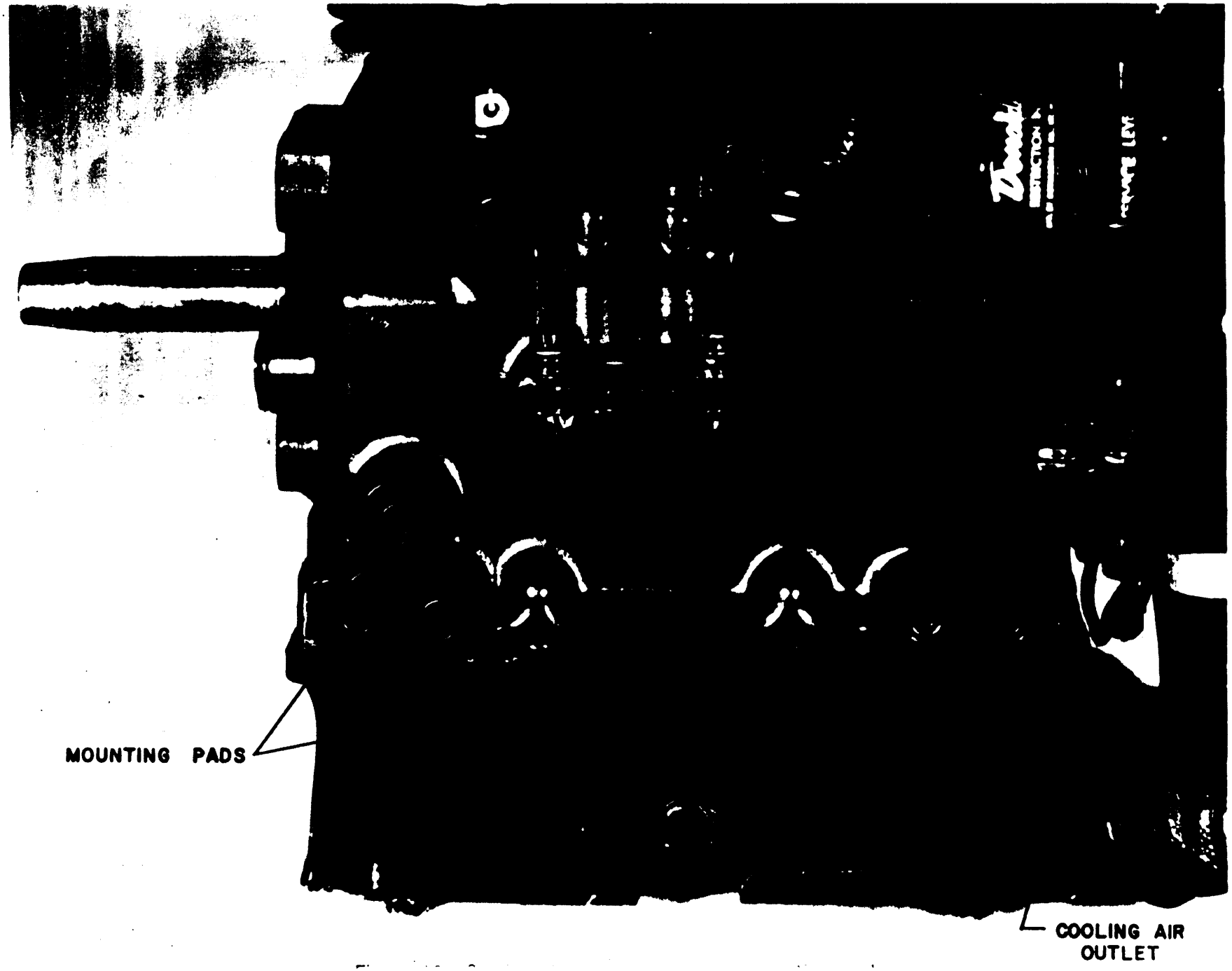
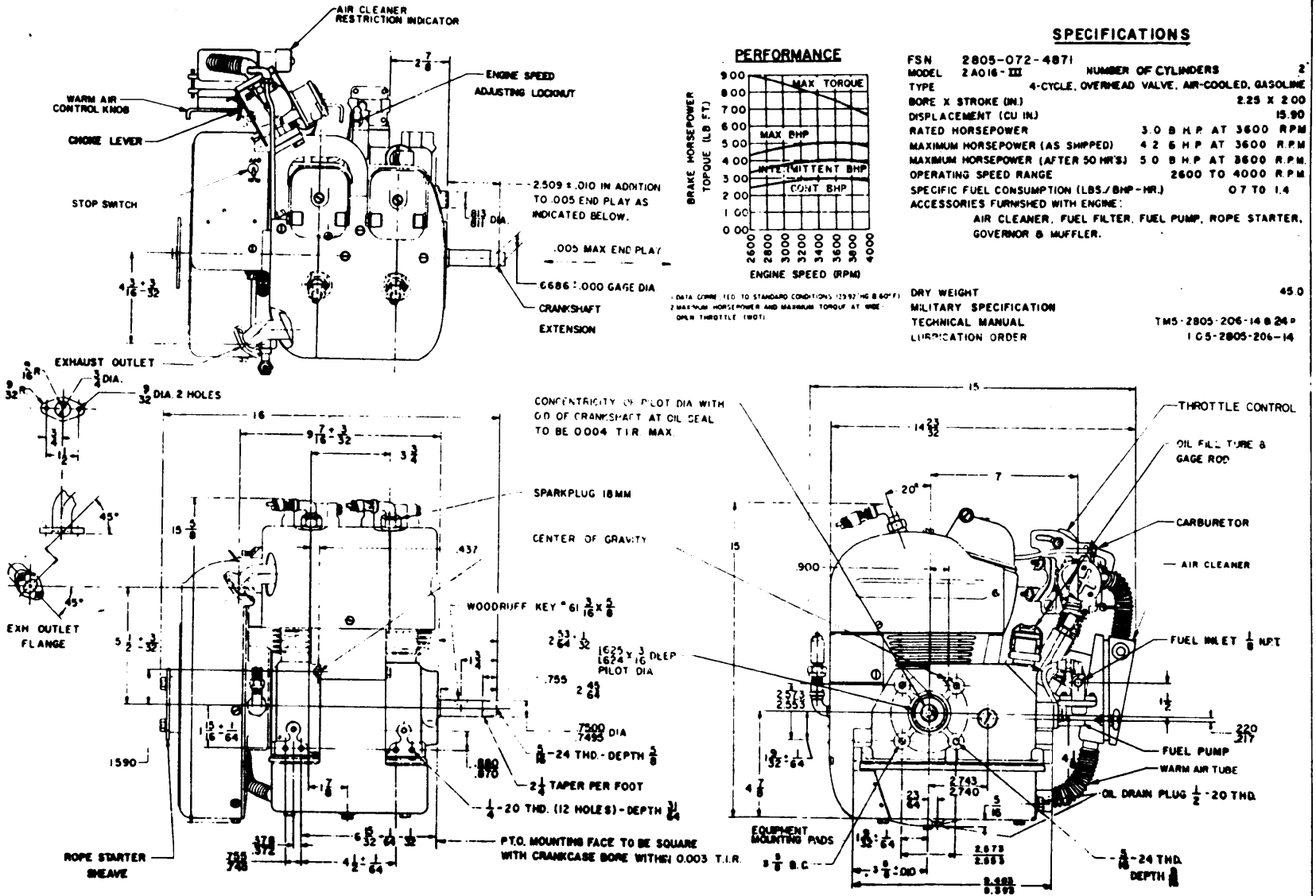


FIGURE 17. MAXIMUM LIMITS FOR FUEL TANK LOCATIONS

CX-428



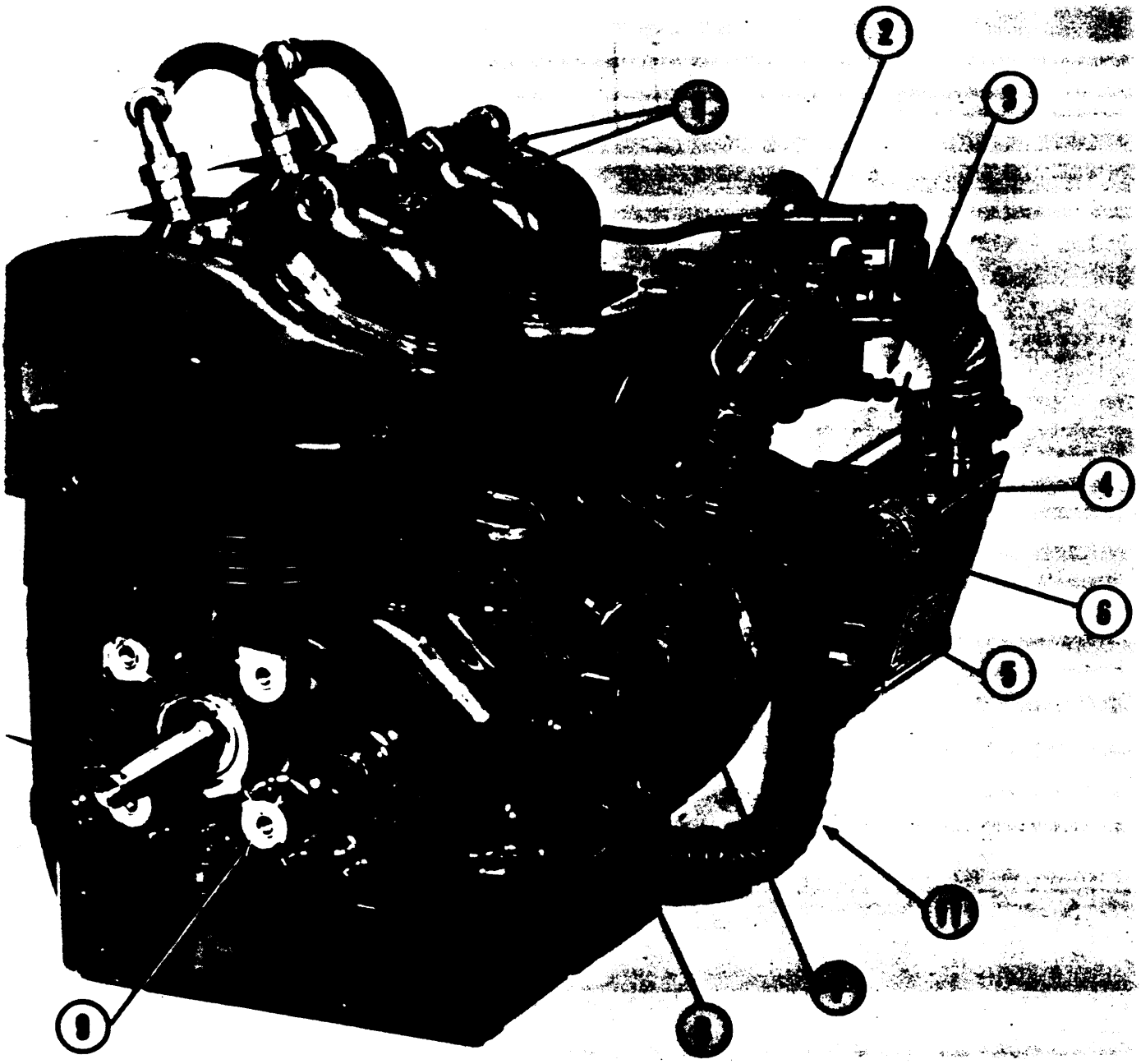


SPECIFICATIONS

FSN	2805-072-4871
MODEL	2A016-III
NUMBER OF CYLINDERS	2
TYPE	4-CYCLE, OVERHEAD VALVE, AIR-COOLED, GASOLINE
BORE X STROKE (IN.)	2.25 X 2.00
DISPLACEMENT (CU IN.)	15.90
RATED HORSEPOWER	3.0 B.H.P. AT 3600 R.P.M.
MAXIMUM HORSEPOWER (AS SHIPPED)	4.2 6 H.P. AT 3600 R.P.M.
MAXIMUM HORSEPOWER (AFTER 50 HR'S.)	5.0 B.H.P. AT 3600 R.P.M.
OPERATING SPEED RANGE	2600 TO 4000 R.P.M.
SPECIFIC FUEL CONSUMPTION (LBS./BHP-HR.)	0.7 TO 1.4
ACCESSORIES FURNISHED WITH ENGINE:	AIR CLEANER, FUEL FILTER, FUEL PUMP, ROPE STARTER, GOVERNOR & MUFFLER.
DRY WEIGHT	45.0
MILITARY SPECIFICATION	
TECHNICAL MANUAL	TM5-2805-206-14 & 24 P
LUBRICATION ORDER	LO5-2805-206-14

Figure 19 MODEL 2A016-III 3 HP MS ENGINE, INSTALLATION DRAWING

13213E1983A

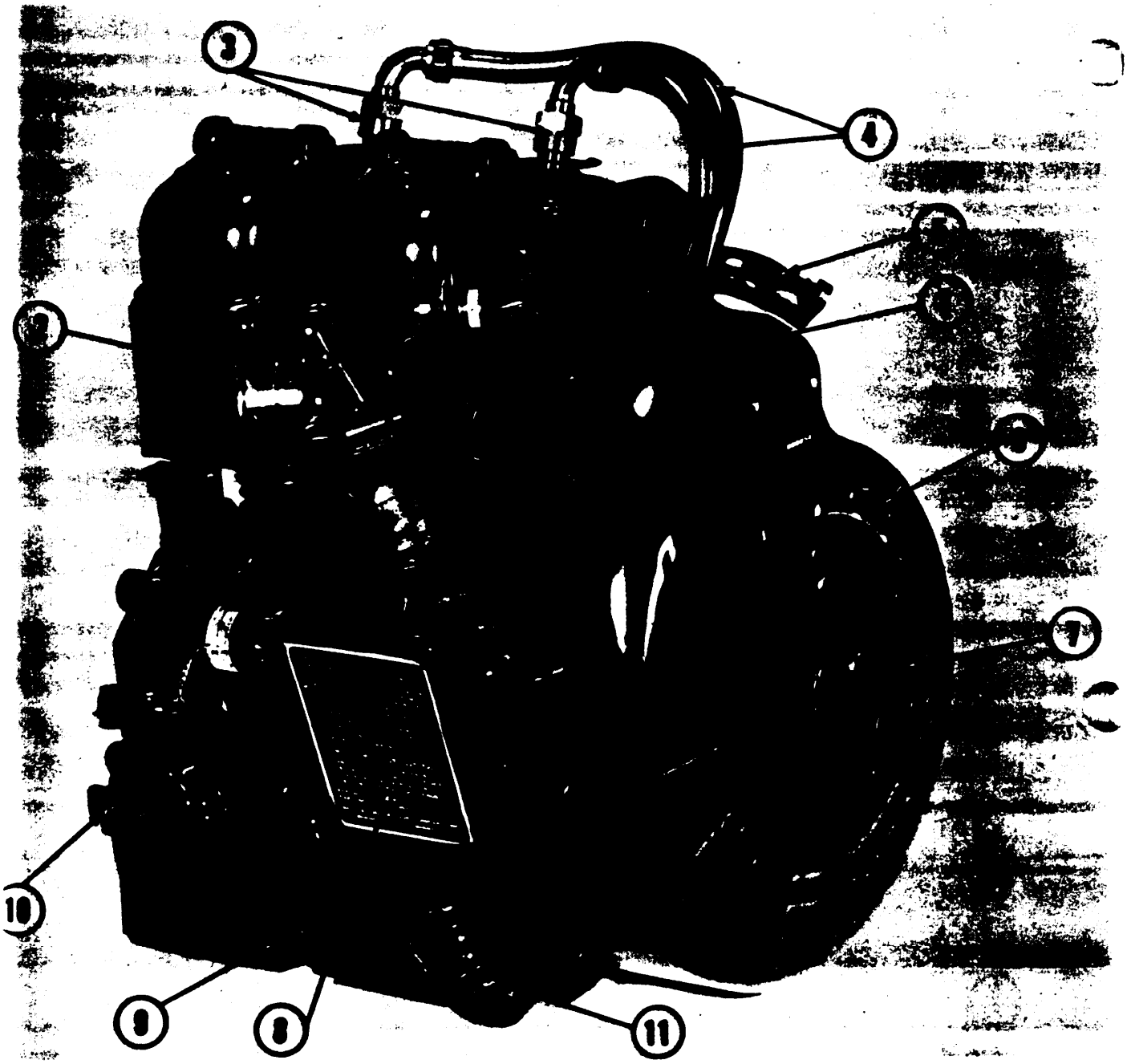


1. Rocker Box Cover
2. Throttle Housing
3. High Speed Mixture Needle
4. Engine Speed Adjusting Locknut
5. Distributor Cover
6. Air Cleaner Restriction Indicator
7. Fuel Pump
8. Oil Filler Tube and Gauge Rod
9. Equipment Mounting Pads
10. Power Takeoff Shaft
11. Warm Air Duct

FIGURE 20

MODEL 2A016 MILITARY DESIGN ENGINE POWER TAKEOFF END

X2238



1. Choke Lever
2. Carburetor
3. Spark Plug
4. High Tension Cable
5. Exhaust Outlet
6. Flywheel Fan Housing
7. Rope Starter Pulley
8. Dry Air Cleaner
9. Oil Drain Plug
10. Engine Mounting Pads
11. Warm Air Duct

FIGURE 21

MODEL 2A016 MILITARY DESIGN ENGINE ROPE STARTER END

X2239

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-STD-1227B - ENGINE, GASOLINE: AIR-COOLED, 3 BHP, 4-CYCLE, MILITARY DESIGN, MODEL 2A016, INSTALLATION PROCEDURES

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

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U. S. ARMY MOBILITY EQUIPMENT COMMAND
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