

DEPARTMENT OF THE ARMY TECHNICAL MANUAL

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OPERATOR'S MANUAL  
TESTER CYLINDER COMPRESSION  
(BACHARACH INDUSTRIAL INSTRUMENT CO., MODEL YUF)  
(4910-808-4300)

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Headquarters, Department of the Army, Washington D. C.

11 June 1965

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Change }  
 No. 1 }

HEADQUARTERS  
 DEPARTMENT OF THE ARMY  
 Washington, D.C., 5 October 1972

**Operator's Manual**  
**TESTER, CYLINDER COMPRESSION**  
**(BACHARACH INDUSTRIAL INSTRUMENT CO., MODEL YUF)**  
**(4910-808-4300)**

This change is current *as of* 18 September 1972.

TM 9-4910-430-10, 11 June 1965, is changed as follows:

The items in the following table, formerly included as part of the Basic Issue Items List on pages 7 and 8, are to be added to the manual as pages 5A and 5B. They are now designated a component or part of the item configuration. All items are manufactured by Bacharach Industrial Instrument Company, Pittsburgh, Pa. (Manufacturer's Code 05083).

PART	PART NUMBER
ADAPTER, COMPRESSION INDICATOR: for Buda Diesel engine models D1 and Hercules and Waukesha using American Bosch R and S nozzle 35 to 95 mm lg	D-505
ADAPTER, COMPRESSION INDICATOR for Buds Diesel engine model DH and other engines using American Beech 95 mm lg	D-510
ADAPTER, COMPRESSION INDICATOR for Caterpillar Diesel engine models D2, D4, and D6 Tractor	D-514
ADAPTER, COMPRESSION INDICATOR: for Caterpillar Diesel engine models D2, D4 and D6 w/4-1/4 bore	D-508
ADAPTER, COMPRESSION INDICATOR: for Caterpillar Diesel engine models D7 and D8800	D-502
ADAPTER, COMPRESSION INDICATOR: for Caterpillar Diesel engine models D1300G, D17000, D4, D7, and D8	D-509
ADAPTER, COMPRESSION INDICATOR: for Cetrac, Hercules, Kermath, Lathrop, and Red Wing Diesel engines	D-529
ADAPTER, COMPRESSION INDICATOR for Continental Diesel engine models 87C and 87-C18	D-523
ADAPTER, COMPRESSION INDICATOR: for Cummins Diesel engine models A, JS, and JB	D-528
ADAPTER, COMPRESSION INDICATOR: for Cummins Diesel engine models H, HR, NH, HVH, and NFHS	D-501

PART	PART NUMBER
ADAPTER, COMPRESSION INDICATOR: for Cummins Diesel engine models K, L, and I, R	D-530
ADAPTER, COMPRESSION INDICATOR: for General Motors Diesel engine model 71	D-500
ADAPTER, COMPRESSION INDICATOR: for General Motors Diesel engine model 110	D-520
ADAPTER, COMPRESSION INDICATOR for International Harvester Diesel engine model D282	D-539
ADAPTER, COMPRESSION INDICATOR for International Harvester Diesel engine model TD-6A	D-521
ADAPTER, COMPRESSION INDICATOR: for International Harvester Diesel engine models TD-9A, TD-14A, and TD-18A	D-511
ADAPTER, COMPRESSION INDICATOR: for International Harvester Diesel engine model TD-24	D-515
ADAPTER, COMPRESSION INDICATOR for International Harvester Diesel engine models UD, TD-14, and TD-18	D-503
ADAPTER, COMPRESSION INDICATOR: for Murry Diesel engine model ME650	D-512
ADAPTER, COMPRESSION INDICATOR for Waukesha-Hasselman Diesel engine models 130 HS, 140 HK, and 140 HS	D-504
CARRYING CASE: w/space for 10 adapters and hex socket wrench, 15½ x 12½ x 2¼	70-248
MOTORITE DIESEL COMPRESSION TESTER: (Issued only as a component of the major combination.)	

Page 5. Change page heading from "Appendix I" to "Appendix".

Page 6. Delete Paragraph 3c.

Pages 7, 8. Appendix, Section II is amended to read as follows

**Section II**  
**BASIC ISSUE ITEMS LIST**

(1) Source. maint. and reprov. cod			(2) Federal astock no.	(3) Description	(4) Unit of issue	(5) Qty. inc. in unit
(a) Source	(b) Maint.	(c) Reprov.				
C	O/C	—	5120-293-2241	<b>TOOLS AND EQUIPMENT FOR:            TESTER, CYLINDER COMPRESSION            (4910-508-4300)</b> <b>KEY, SOCKET HEAD SCREW: hex type, L-type hdl,            1/8 in. w across flats, 2 in. lg arm</b>	EA	2

By Order of the secretary of the Army

**BRUCE PALMER, JR.**  
General, U.S. Army  
Acting Chief of Staff

Official:

**VERNE L. BOWERS,**  
Major General, U.S. Army,  
*The Adjutant General*

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Engr Dep (10)	5-146 29-447
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MOTBA (1)	5-237 55-99
MOTBY (1)	2-262 55-127
MOTKI (1)	5-267 55-128
MOTSU (1)	2-278 55-187
Div Engr (2)	5-279 55-500
Engr Distr (2)	5-420 55-510

NG: State AG (3)

USAR: Same as Active Army, except allowance is one (1) copy to each unit. For explanation of abbreviation, see AR 310-50.



**INSTRUCTIONS**  
**on use and care of**  
**MOTORITE Diesel Compression Tester**  
**Model YUF**

**GENERAL**

The MOTORITE Diesel Compression Tester Model YUF is an instrument for measuring cylinder compression pressures of Diesel engines. Its operation is based on principle of trapping gases from cylinder of a running engine by means of a trapping valve and measuring the trapped pressure with a pressure gauge. Cylinder compression pressures of any make of Diesel engine may be checked by mounting trapping valve element (or cartridge) in an appropriate adapter fitting designed to replace the fuel injector employed by particular engine involved.

**OPERATING PROCEDURE**

**Before Mounting on Engine**

Screw CARTRIDGE (1) into ADAPTER SHANK (2), tightening snugly by using light wrench force on flate of cartridge. Screw ADAPTER HEAD (3) tightly into adapter shank. Then screw assembled adapter into UNION NUT (4) of CHECK VALVE ASSEMBLY (5).

Remove injector from engine cylinder. Turn engine over several revolutions to clear passageway.

On certain compression-ignition engines, access to combustion chamber may be had without disturbing injector, by using some other connection. In latter event, all fuel lines to cylinder under test must be disconnected. On spark ignition engines, where passageway other than spark plug hole is used, ignition wire must be disconnected. Temperatures and pressures developed under firing conditions are too high for MOTORITE and Bacharach Industrial Instrument Company disclaims responsibility for damage or inaccuracy resulting from such improper use.

**Attaching to Engine**

Install adapter in cylinder in such a position as to keep hose and gauge assembly

clear of moving engine parts. When installing HOSE (6) care should be taken to avoid sharp bends. Union nut (4) can be loosened to facilitate installation of adapter and positioning of hose and gauge assembly, then retightened. If gasket is required at bottom of adapter fitting, be sure that it is in good condition and properly installed. Clamp or screw adapter fitting securely in place.

When using MOTORITE on Diesel engines which start on gasoline, engine should be first started up before installing Tester. After warming up engine, install MOTORITE as instructed above and disconnect spark plug wire of cylinder being checked. Restart (running engine on remaining cylinders) and shift engine to Diesel cycle promptly. Then check cylinder compression pressure using instructions given below.

**Taking Readings**

Run engine at cranking or idling speed unless other speed is recommended by engine manufacturer. Read maximum cylinder pressure from GAUGE (7). Additional pressure readings can be taken by depressing BUTTON (8) on VENT VALVE ASSEMBLY (9) then releasing and allowing pointer of gauge to read maximum deflection.

**Venting After Use**

Before removing MOTORITE from engine, vent the Tester by depressing BUTTON (8).

**MAINTENANCE PROCEDURE**

MOTORITE should be maintained in a pressure-tight condition, since excessive leakage affects accuracy. Unnecessary dismantling should therefore be avoided.

To check leakage, trap pressure in excess of 300 psi in MOTORITE by running MOTORITE on engine until gauge reads engine cylinder. Unscrew CHECK VALVE ASSEMBLY (5) from ADAPTER SHANK (2) one turn. Depress BUTTON (8) for an instant to reduce pressure to region of 300 psi. If gauge pointer drops less than 10 psi in 15 seconds from 300 psi, leakage rate of assembly above check valve

SEAT(10) and DISK(H) is within satisfactory limits. If gauge pointer drops more than 10 psi in 15 seconds, point of leakage should be found and corrected. If leakage is from bottom of SEAT (10) then CHECK VALVE (11) is nut seating tightly or SEAT (10) is not screwed in tightly. Soapy water applied with small brush will be found an effective expedient for finding points of leakage.

Leakage rate of assembly below check valve SEAT (10) and CHECK VALVE (11) should be checked using following procedure: Remove CHECK VALVE ASSEMBLY (5) from ADAPTER SHANK (2) and unscrew check valve SEAT (10) one turn using Allen wrench provided. Re-assemble check valve assembly and adapter shank snugly. Trap pressure in excess of 300 psi in MOTORITE by running MOTORITE on engine. Quickly stop engine, loosen adapter in engine cylinder and observe rate at which gauge pointer drops. If gauge pointer drops less than 80 psi in 15 seconds from 300 psi, leakage rate is within satisfactory limits. Again remove check valve assembly from adapter and tighten check valve seat with Allen wrench provided. Re-assemble check valve assembly and adapter shank snugly.

If gauge pointer drops more than 80 psi in 15 seconds from 300 psi, excessive leakage is indicated, which must be located and corrected. If leakage is from hole at bottom of ADAPTER HEAD (3), CARTRIDGE (1) should be cleaned or replaced. To remove cartridge, mount adapter head in vise and remove ADAPTER SHANK (2) from adapter head. Unscrew cartridge from adapter shank. To clean, soak and agitate cartridge in solvent such as fuel oil or acetone to dissolve internal carbon deposits. Blow with compressed air. Reinstall cartridge, tightening snugly in place, using light wrench force on flats of cartridge. Re-assemble adapter shank tightly with adapter head. Retest assembly for leakage as previously outlined. If now satisfactory. CHECK VALVE SEAT (10) must be tightened and reassembly completed as outlined above; if not satisfactory, replace with new cartridge.

Normally, gauge pointer should move from zero to maximum reading within 30 seconds after depressing and releasing BUTTON (8). Slow response exceeding 30 seconds indicates plugging. To locate and correct

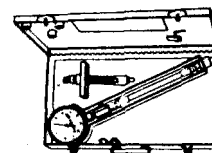
slow response install MOTORITE on engine, remove CHECK VALVE ASSEMBLY (5), run engine at idling speed and observe that gas pulses strongly from end of ADAPTER SHANK (2); if no or weak pulse is observed remove ADAPTER HEAD (3) and clean passageway in adapter shank with compressed air (square filler wire is easily driven out using Allen wrench as a punch). Re-assemble; if still plugged, replace CARTRIDGE (1). If gas pulses strongly from adapter shank, dismantle and clean check valve assembly as follows: Hold check valve BODY (12) by means of flats provided and remove check valve SEAT (10) using Allen wrench. Remove CHECK VALVE (11), SPRING (13) and grooved pulsation dampener DISK (14). Clean all parts. Do not use gasoline or any other solvent on rubber check valve. Reassemble parts, being careful to insert spring in check valve body with grooved pulsation dampener disk first and with rubber side of check valve toward check valve seat. While installing seat, long end of Allen wrench should be pushed lightly against check valve so as to prevent check valve from being jammed between the threads or shoulder in check valve body and check valve seat. Tighten seat snugly in place.

If gauge pointer zero deviates from line marked on gauge scale, pointer should be adjusted by removing gauge cover and turning screw in center of pointer. When turning this screw to adjust to zero gauge reading, clamp long end of pointer to gauge face with thumb while supporting gauge case in palm of same hand.

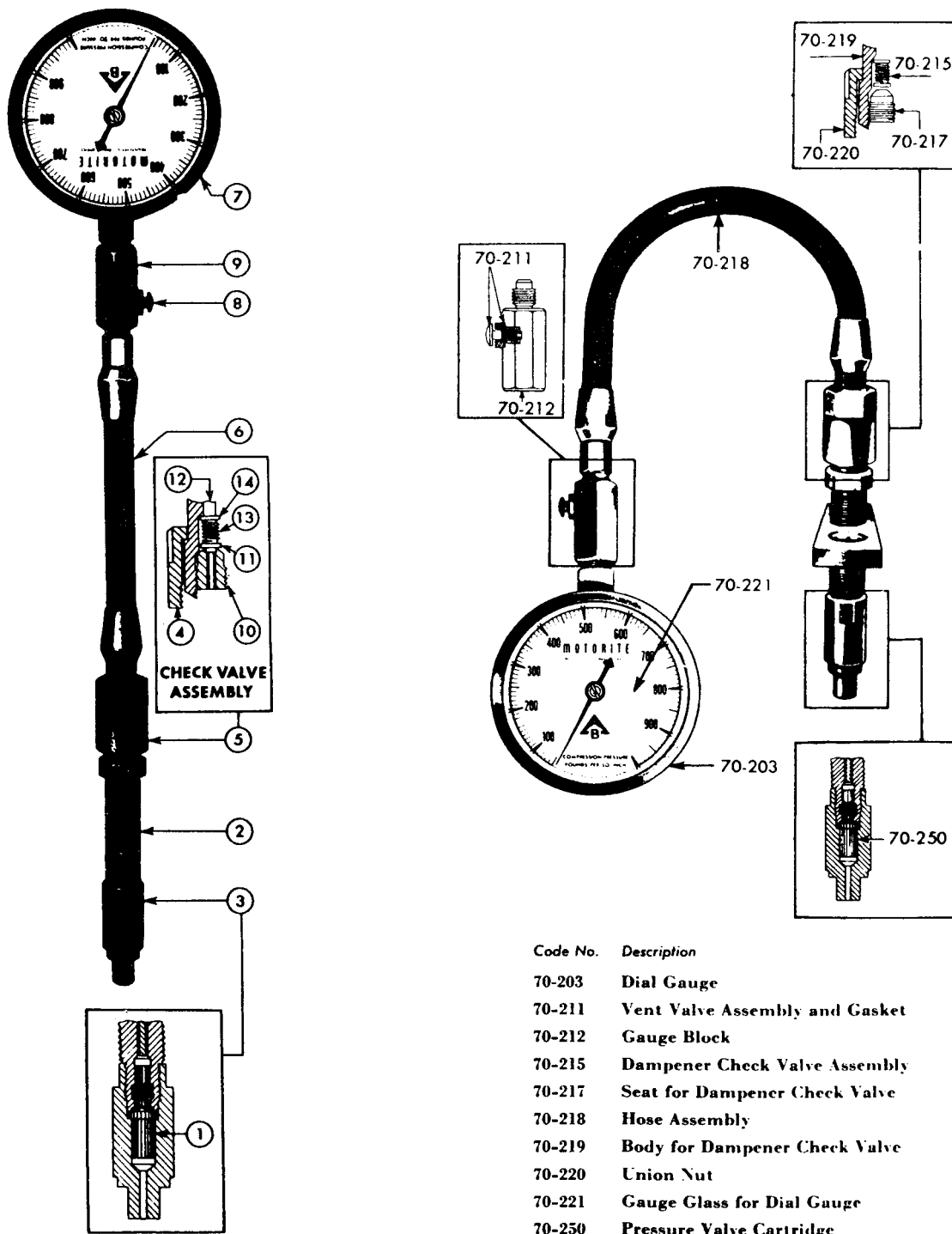
Caution: Pressure gauge will not calibrate on an oil dead weight tester. Gauge has been carefully set at factory to compensate for Compression Tester design characteristics and will give correct cylinder pressure readings if zero is adjusted as prescribed above.

Pressure should always be vented from MOTORITE when not in use.

Protect Tester when not in use by storing in metal case, as shown,



Parts List for  
Motorite Diesel Compression Tester



Code No.	Description
70-203	Dial Gauge
70-211	Vent Valve Assembly and Gasket
70-212	Gauge Block
70-215	Dampener Check Valve Assembly
70-217	Seat for Dampener Check Valve
70-218	Hose Assembly
70-219	Body for Dampener Check Valve
70-220	Union Nut
70-221	Gauge Glass for Dial Gauge
70-250	Pressure Valve Cartridge



**APPENDIX I**  
**BASIC ISSUE ITEMS LIST**

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**Section I. PREFACE**

**1. General**

This appendix is a list of basic issue items. It is composed of those items which make up the major end item of equipment and the operator's tools and equipment that are issued with the equipment and are required for stockage.

**2. Requisitioning a part to which FSN has not been assigned.**

When requisitioning a C source (local procurement) item identified only by a manufacturer's part number, it is mandatory that the following information be furnished the supply officer:

- (1) Manufacturer's code number (5 digit number preceding the colon in the descriptive column.
- (2) Manufacturer's part number (the number, and sometimes letters, following the talon, (i) above). Dashes, commas, or other marks must be included exactly as listed.
- (3) Nomenclature exactly as listed herein, including dimensions if necessary.
- (4) Name of manufacturer of end item (from cover of TM or manufacturer's name plate).
- (5) Federal stock number of end item (from TM).
- (6) Manufacturer's model number (from TM or name/data plate, preferably name/data plate),
- (7) Manufacturer's serial number (from name/data plate).
- (8) Any other information such as type, frame number, and electrical characteristics, if applicable.

(9) If DD Form 1348 (DOD Single Line Items Requisition System Document (manual)) is used, fill in all blocks except 4, 5, 6, and Remarks field, in accordance with AR 725-50. Complete form as follows:

- (a) In blocks 4, 5, and 6, list manufacturer's part number (as listed in description column).
- (b) In Remarks field, list noun name (repair part), end item application (FSN of end item), manufacturer, model number (end item), serial number (end item), and any other pertinent information such as frame number, type, etc.

**3. Explanation of Columns**

**a. Source, Maintenance, and Recoverability Code (Col. 1).**

- (1) Materiel numerical codes (col. 1a). This column not required.
- (2) Source (col. 1b). This column indicates the selection status and source for the listed item. Source code used in this list is:

<u>Code</u>	<u>Explanation</u>
c	Obtain through local procurement. If not obtainable from local procurement, requisition through normal supply channels with a supporting statement of non-availability from local procurement.

(3) Maintenance level (col. 1c). This column indicates the category of maintenance authorized to install the listed item. Maintenance level code used in this list is:

<u>Code</u>	<u>Explanation</u>
O/C	Operator or crew maintenance.

(4) Recoverability (col. 1d). This column indicates whether unserviceable items should be returned for recovery or salvage. When no code is indicated the item will be considered expendable. Recoverability code used in this list is:

<u>Code</u>	<u>Explanation</u>
R	Items which are economically repairable at direct and general support maintenance activities and are normally furnished by supply on an exchange basis.

b. Federal Stock Number (Col. 2).  
Self explanatory.

c. Description (Col. 3). The following manufacturer's code is included in this column.

<u>Code</u>	<u>Explanation</u>
05083	Bacharach Industrial Instrument Co., Pittsburgh, Pa,

d. Unit of Issue (Col. 4), Quantity Authorized (Col. 5), and Illustration (Col. 6).  
Self explanatory.

4. Abbreviations

<u>Abbreviation</u>	<u>Explanation</u>
hdl -----	handle
mm -----	millimeter(s)
w -----	wide
w/ -----	with

5. Errors, Comments, and/or Suggestions.

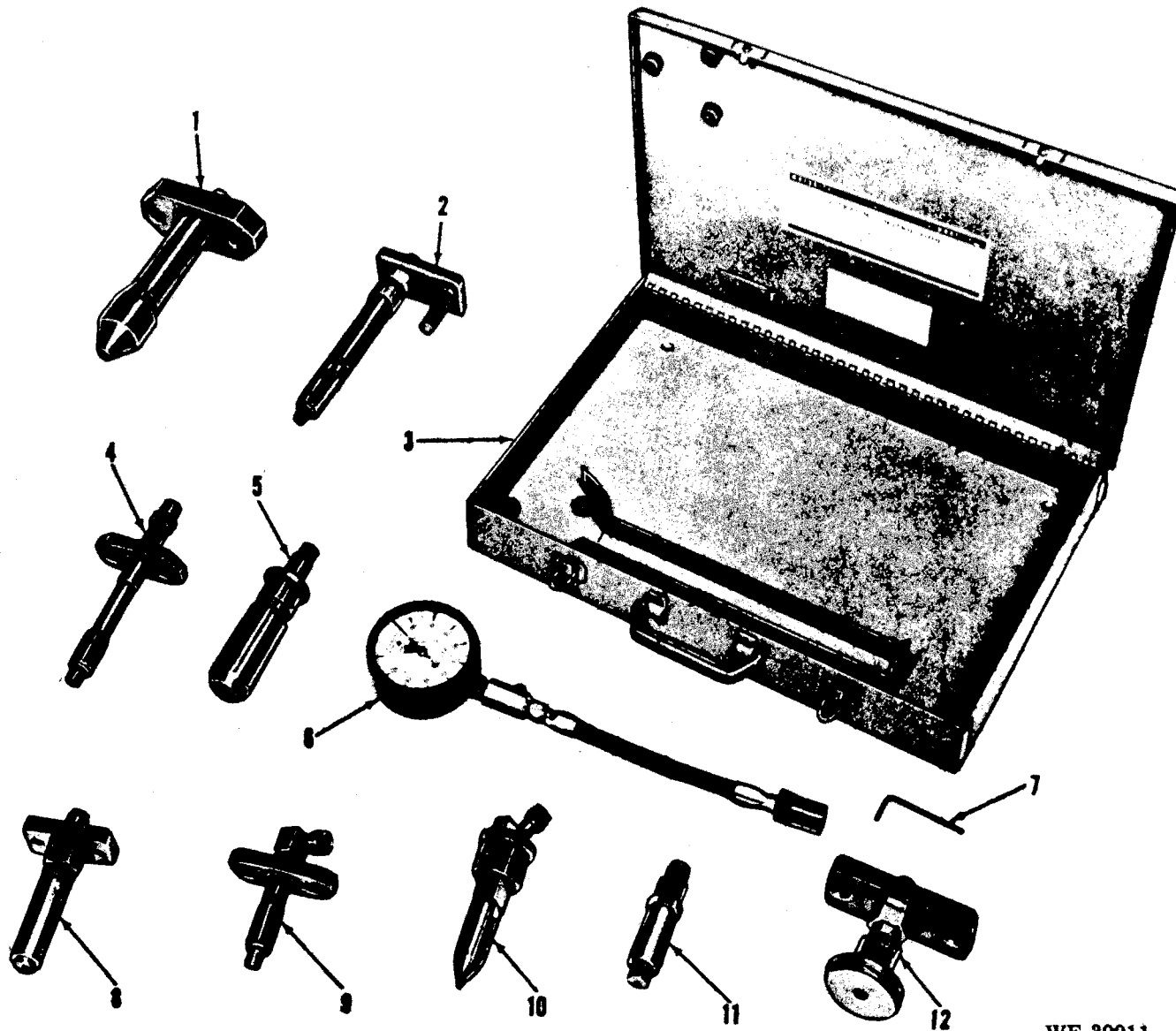
Reports of errors, comments, and suggestions are encouraged. They should be reported on DA Form 2028 and forwarded directly to: Commanding General, Headquarters, U. S. Army Weapons Command, ATTN: AMSWE-SMM-P, Rock Island Arsenal, Rock Island, Illinois 61202.

Section II. BASIC ISSUE ITEMS

(1) SOURCE MAINTENANCE, AND RECOVERABILITY CODE				(2)	(3)	(4)	(5)	(6) ILLUSTRATION	
MATERIAL CODE	SOURCE	MAINTENANCE LEVEL	RECOVERABILITY	FEDERAL STOCK NUMBER	DESCRIPTION	UNIT OF ISSUE	QUANTITY AUTHORIZED	(a)	(b)
								FIGURE NUMBER	ITEM NUMBER
	-	-	R	4910-808-4300	<p><b>MAJOR COMBINATION</b></p> <p>The following item is to be requisitioned for initial issue only.</p> <p><b>TESTER, CYLINDER COMPRESSION:</b> with equipment (05083:YUF)</p> <p><b>COMPONENTS OF MAJOR COMBINATION</b></p> <p>None authorized.</p> <p><b>REPAIR PARTS</b></p> <p>None authorized.</p> <p><b>TOOLS AND EQUIPMENT FOR:</b></p> <p><b>TESTER, CYLINDER COMPRESSION:</b> (05083:YUF)</p>	ea		1 and 2	
C	O/C	-			ADAPTER, COMPRESSION INDICATOR: for Buda Diesel engines model D1 and Hercules and Waukesha using American Bosch Pand S nozzles 35 to 95 mm lg (05083:D-505)	ea	1	2	2
C	O/C	-			ADAPTER, COMPRESSION INDICATOR: for Buda Diesel engines model DH and other engines using American Bosch 95 mm lg (05083:D-510)	ea	1	2	1
C	O/C	-		6620-693-4497	ADAPTER, COMPRESSION INDICATOR: for Caterpillar Diesel engines model D2, D4, and D6 Tractor (05083:D-514)	ea	1	2	7
C	O/C	-			ADAPTER, COMPRESSION INDICATOR: for Caterpillar Diesel engines model D2, D4, and D6 w/4-1/4 bore (05083:D-508)	ea	1	2	5
C	O/C	-			ADAPTER, COMPRESSION INDICATOR: for Caterpillar Diesel engines model D7 and D8800 (05083:D-502)	ea	1	2	4
C	O/C	-			ADAPTER, COMPRESSION INDICATOR: for Caterpillar Diesel engines model D13000, D17000, D4, D7, and D8 (05083:D-509)	ea	1	1	5
C	O/C	-		---	ADAPTER, COMPRESSION INDICATOR: for Cetrac, Hercules, Kermath, Lathrop, and Red Wing Diesel engines (05083:D-529)	ea	1	1	9
C	O/C	-		---	ADAPTER, COMPRESSION INDICATOR: for Continental Diesel engines model 87C and 87-C18 (05083:D-523)	ea	1	1	4
C	O/C	-		---	ADAPTER, COMPRESSION INDICATOR: for Cummins Diesel engines model A, JS, and JB (05083:D-528)	ea	1	2	9
C	O/C	-			ADAPTER, COMPRESSION INDICATOR: for Cummins Diesel engines model H, HR, NH, HVH, and NFHS (05083:D-501)	ea	1	2	13

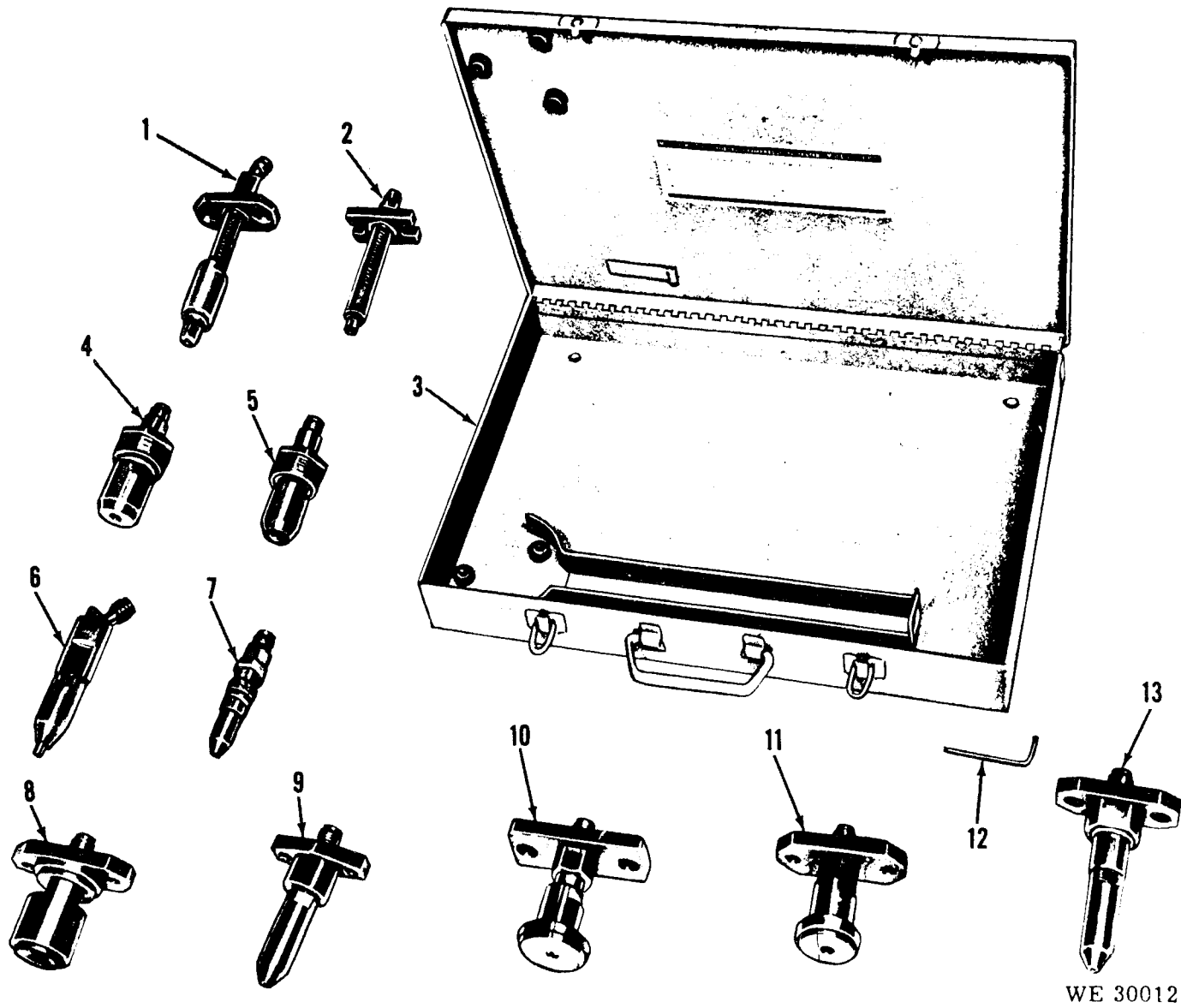
Section II. BASIC ISSUE ITEMS.

(1) SOURCE MAINTENANCE AND RECOVERABILITY CODE				(2)	(3)	(4)	(5)	(6) ILLUSTRATION	
MATERIAL CODE	SOURCE	MAINTENANCE LEVEL	RECOVERABILITY	FEDERAL STOCK NUMBER	DESCRIPTION	UNIT OF ISSUE	QUANTITY AUTHORIZED	(a)	(b)
								FIGURE NUMBER	ITEM NUMBER
					TOOLS AND EQUIPMENT FOR - Continued				
					TESTER, CYLINDER COMPRESSION - Continued:				
	C	O/C	-	---	ADAPTER, COMPRESSION INDICATOR: for Diesel engines model K, L, LR (05083:D-530)	ea	1	1	1
	C	O/C	-		ADAPTER, COMPRESSION INDICATOR: for General Motors Diesel engine model 71 (05083:D-500)	ea	1	2	6
	C	O/C	-	6620-693-4499	ADAPTER, COMPRESSION INDICATOR: for General Motors Diesel engine model 110 (05083:D-520)	ea	1	1	10
	C	O/C	-	---	ADAPTER, COMPRESSION INDICATOR: for International Harvester Diesel engine model D282 (05083:D-539)	ea	1	2	8
	C	O/C	-	6620-693-4500	ADAPTER, COMPRESSION INDICATOR: for International Harvester Diesel engine model TD-6A (05083:D-521)	ea	1	1	12
	C	O/C	-	6620-693-4496	ADAPTER, COMPRESSION INDICATOR: for International Harvester Diesel engines model TD-9A, TD-14A, and TD-18A (05083:D-511)	ea	1	2	11
	C	O/C	-	6620-693-4498	ADAPTER, COMPRESSION INDICATOR: for International Harvester Diesel engine model TD-24 (05083:D-515)	ea	1	2	10
	C	O/C	-		ADAPTER, COMPRESSION INDICATOR: for International Harvester Diesel engines model UD, TD-14, and TD-18 (05083:D-503)	ea	1	1	8
	C	O/C	-		ADAPTER, COMPRESSION INDICATOR: for Murry Diesel engine model ME650 (05083:D-512)	ea	1	1	2
	C	O/C	-		ADAPTER, COMPRESSION INDICATOR: for Waukesha-Hasselman Diesel engines model 130 HS, 140 HK, and 140 HS (05083:D-504)	ea	1	1	11
	C	O/C	-	---	CARRYING CASE: w/space for 10 adapters and hex socket wrench, 15-1/2 x 12-1/2 x 2-1/4 (05083:70-248)	ea	2	1 and 2	3
	C	O/C	-	5120-293-2241	KEY, SOCKET HEAD SCREW: hex-type, L-type hdl, 1/8 in. w across flats, 2 in. lg. arm	ea	2	1 and 2	7 12
	-	O/C	-	---	MOTORITE DIESEL COMPRESSION TESTER (issued only as a component of the major combination).	ea	1	1	6



WE 30011

Figure 1. Tools and Equipment.



WE 30012

Figure 2. Tools and Equipment.

By Order of the Secretary of the Army:

HAROLD K. JOHNSON,  
General, United States Army,  
Chief of Staff.

Official:

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Major General, United States Army,  
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TSG (1)	Chicago Proc Ofc (10)
CofEngrs (3)	Engr Fld Maint Shopa (2)
CC-E (1)	Fld Comd, DASA (8)
Dir of Trans (1)	AMS (3)
CofSpts (1)	USACOMZEUR (2)
USAMB (1)	MAAG (1)
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USAARMBD (2)	Units org under fol TOE:
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USAAESWBD (2)	5-6 5-426
USAAVNBD (2)	5-15 5-500
USCONARC (3)	5-16 5-600
OS Maj Comd (5) except	5-25 5-625
USASETAF (2)	5-26 5-626
USARJ (10)	5-35 5-615
USAMOCOM (2)	5-36 29-1
USASMC (1)	5-45 29-11
USAWECOM (10)	5-46 29-15
MDW (1)	5-48 29-21
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Corps (2)	5-64 29-35
USAC (1)	5-78 29-51
Div (2)	5-115 26-55
Engr Bde (1)	5-117 29-61
Svc Colleges (2)	5-145 29-445
Br Svc Sch (2) except	5-146 29-447
USAES (10)	5-155 39-61
USAARMS (4)	5-156 55-38
USMA (2)	5-177 55-89
GENDEP (10)	5-237 55-99
Engr Dep (10)	5-262 55-127
Army Dep (2)	5-267 55-128
USA Tml Cored (2)	5-278 55-187
Army Tml (1)	5-279 55-500
Div Engr (2)	5-420 55-510
Engr Dist (2)	

NG: State AG (3).

USAR: Same as active Army except allowance is one copy to each unit.

For explanation of abbreviations used, see AR 320-60.

