TM 5-4320-248-15

DEPARTMENT OF THE ARMY TECHNICAL MANUAL

OPERATOR, ORGANIZATIONAL, DIRECT AND GENERAL SUPPORT AND DEPOT MAINTENANCE MANUAL

FUEL SYSTEM, TRANSFER, PORTABLE, PUMP CENTRIFUGAL, 100 GPM; TWO DISCHARGE HOSE ASSEMBLIES; ONE SUCTION HOSE ASSEMBLY; TWO NON-AUTOMATIC NOZZLE ASSEMBLIES; ONE MONITOR GO-NO-GO GAGE, 100 GPM; 3 HP GASOLINE ENGINE; ONE BASKET ASSEMBLY KENCO MODEL 114MX1A FSN 4320-900-8544

HEADQUARTERS, DEPARTMENT OF THE ARMY

OCTOBER 1967

SAFETY INSTRUCTIONS

1. ALWAYS OPERATE THE REFUELING SYSTEM OUT OF DOORS.

2. INSURE THE SYSTEM IS PROPERLY GROUNDED.

3. ALWAYS STOP THE ENGINE BY MOVING THE CHOKE LEVER TO THE FULL CHOKE POSITION. FOR SAFETY REASONS NO SPARK PLUG SHORTING DEVICE IS PROVIDED.

4. DURING REFUELING OPERATIONS CONTINUALLY CHECK FOR LEAKS. IF ANY LEAKAGE IS NOTED, STOP THE ENGINE AND CORRECT THE DEFICIENCY.

5. KEEP THE ENGINE IN PEAK OPERATING CONDITION.

6. CONTINUALLY CHECK THE ENGINE WIRING FOR DETERIORATION OR POSSIBLE SHORT CIRCUITING WHICH COULD CAUSE A SPARK.

7. DO NOT DISCONNECT ANY HOSE OR COUPLER FITTING WHILE THE ENGINE IS RUNNING.

8. DO NOT FILL THE ENGINE FUEL TANK WHILE THE ENGINE IS RUNNING.

9. NEVER OPERATE THE ENGINE WITHOUT MAINTAINING FLUID IN THE PUMP CASING.

***TM 5-4320-248-15**
C4

CHANGE
NO. 4

HEADQUARTERS
DEPARTMENT OF THE ARMY,
WASHINGTON, DC, *7 March 1978*

Operator, Organizational, Direct and General Support and Depot Maintenance Manual

PUMP, CENTRIFUGAL; GASOLINE DRIVEN; BASE MOUNTED; 1-1/2 INCH; 100 GPM; PORTABLE REFUELING SYSTEM (KENCO MODEL 114MX1A) NSN 4320-00-900-8544

TM 5-4320-248-15, 30 October 1967, is changed as follows:

Title page and table of contents page are changed as shown above.

Page 4. The appendixes in the table of contents are superseded as follows:

APPENDIX A. REFERENCES
APPENDIX B. COMPONENTS OF END ITEM LIST
APPENDIX C. ADDITIONAL AUTHORIZATION LIST (Not Used)
APPENDIX D. MAINTENANCE ALLOCATION CHART
APPENDIX E. EXPENDABLE SUPPLIES AND MATERIALS LIST

Page 5. Paragraph 1.2 is superseded as follows:

1.2. FORMS AND RECORDS

a. DA Forms and records used for equipment maintenance will be only those prescribed in TM 38-750.

b. You can help improve this manual. If you find any mistake or if you know of a way to improve the procedure, please let us know. Mail your letter, DA Form 2028 (Recommended Changes to Publications and Blank Forms), or DA Form 2028-2 located in the back of this manual directly to: Commander, U. S. Army Troop Support and Aviation Materiel Readiness Command, ATTN: DRSTS-MTPS, 4300 Goodfellow Boulevard, St. Louis, MO 63120. A reply will be furnished to you.

***Page* 31.** Add figures 13.1 and 13.2 as follows:

*This Change supersedes C1, 2 May 1969 and C2, 3 July 1973.

LUBRICATION ORDER

LO5-4320-248-12

20 JULY 1977 (Supersedes LO5-4320-248-12, 13 October 1967)

FUEL SYSTEM, TRANSFER, PORTABLE, PUMP CENTRIFUGAL, 100 GPM, TWO DISCHARGE HOSE ASSEMBLIES, ONE SUCTION HOSE ASSEMBLY, TWO NON-AUTOMATIC NOZZLE ASSEMBLIES, ONE MONITOR GO-NO-GO GAGE 100 GPM, 3 HP GASOLINE ENGINE, ONE BASKET ASSEMBLY (KENCO MODEL 114 MX1A) W/BRIGGS AND STRATTON ENGINE MODEL 81232 TYPE 9188-01

Reference: C9100-IL

Intervals and related task-hour times are based on normal hours of operation. The task-hour time specified is the time you need to do all the services prescribed for a particular interval. Change the interval if your lubricants are contaminated or if you are operating the equipment under adverse operating conditions, including longer-than-usual operating hours. You may extend the interval during periods of low activity, but you must take adequate preservation precautions.

*The time specified is the time required to perform all services at the particular interval.

Clean fittings before lubricating. Relubricate all areas exposed to water after amphibious operation. Lubricate points indicated by dotted arrow shaft on both sides of equipment. Clean parts with SOLVENT, dry cleaning, or with OIL, fuel, diesel. Dry before lubricating. Drain crankcases when HOT. Fill and check level. The lowest level of maintenance authorized to lubricate a point is indicated by one of the following: (C) operator/crew, or (O) organizational maintenance.

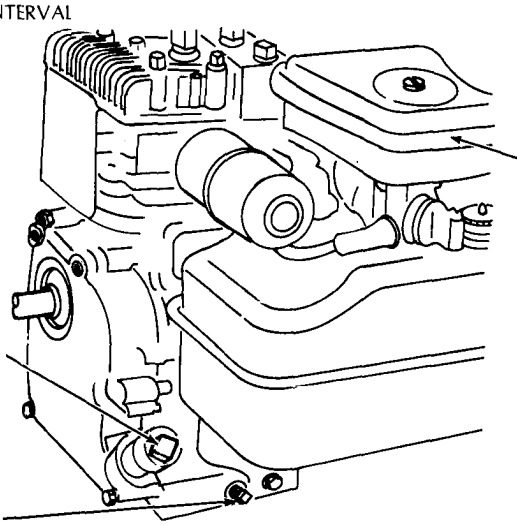
You can improve this publication by calling attention to errors and by recommending improvements and by stating your reasons for the recommendations. Your letter or DA Form 2028 (Recommended Changes to Publications and Forms) should be mailed directly to Commander, U. S. Army Troop Support Command, ATTN: DRSTS-MPP, 4300 Goodfellow Blvd., St. Louis, MO. 63120. A reply will be furnished directly to you.

FOLD

LUBRICANT • INTERVAL

INTERVAL • LUBRICANT

CAUTION: When OEA Oil is used the level will be checked more often



W OE/HDO Air Cleaner (See note 2) (C)

Crankcase Fill and Level (Check Level) (Keep filled to Plug opening) (See key) OE/HDO D (C)

Crankcase Drain (Drain and refill) W (C)

*TOTAL TASK HOURS		*TOTAL TASK HOURS	
INTERVAL	TASK-HOURS	INTERVAL	TASK-HOURS
D	0.5	W	1.5

CARD 1 OF 2

Figure 13.1. Lubrication order.

-KEY-

LUBRICANTS		CAPACITY	EXPECTED TEMPERATURES			For Arctic Operation Refer to TM 9-207	INTERVALS
			Above +32°F Above 0°C	+40°F to -10°F + 5°C to -23°C	0°F to -65°F -18°C to -50°C		
OE/HDO MIL-L-2104	Oil, Engine, Heavy Duty						D- 10 Hours, 100 Miles, or Daily
OE-HDO MIL-L-2104	Engine Crankcase	1 1/4 qt. .591 liters	OE-HDO 30	OEA/APG-PD-1	OEA/APG-PD-1		W- 50 Hours, 500 Miles, or Weekly
OEA/APG-PD-1	Oil, Engine, Subzero						
OEA/APG-PD-1	Oil Can Points						

NOTES:

1. FOR OPERATION OF EQUIPMENT IN PROTRACTED COLD TEMPERATURES BELOW -10° F (-23° C.) Remove lubricants prescribed in the key for temperatures above 10° F (-23° C.) Relubricate with lubricants specified in the key for temperatures below -10° F (-23° C).

2. AIR CLEANER. Every 50 hours, 500 miles, or weekly, disassemble, wash foam element in cleaning solvent (P-D-680), squeeze dry, re-oil with 3 tablespoons of OE/HDO, squeeze to spread oil through the foam, assemble parts and install.

3. OIL CAN POINTS. Every 50 hours, 500 miles, or weekly lubricate all control linkages with OE/HDO.

4. LUBRICANTS. The following is a list of lubricants with the Military Symbols and applicable specification numbers.

OE/HDO MIL-L-2104 OEA/APG-PD-1

Copy of this Lubrication Order will remain with the equipment at all times; instructions contained herein are mandatory.

BY ORDER OF THE SECRETARY OF THE ARMY

BERNARD W. ROGERS
General, United States Army
Chief of Staff

PAUL T. SMITH
Major General, United States Army
The Adjutant General

FOLD FOLD

CARD 2 OF 2

Figure 13.2. Lubrication order (Cont'd).

Page A-1. Appendix A is superseded as follows:

APPENDIX A

REFERENCES

A-1. FORMS AND RECORDS

TM 38-750	The Army Maintenance Management Systems (TAMMS)

A-2. MAINTENANCE

TM 5-4320-248-25P	Organizational, Direct and General Support, and Depot Maintenance Repair Parts and Special Tools List: Fuel System, Transfer, Portable, Pump, Centrifugal, 100 GPM; Two Discharge Hose Assemblies; One Suction, Hose Assembly; Two Non-Automatic Nozzle Assemblies; One Monitor Go-No-Go Gage, 100 GPM; 3 HP Gasoline Engine; One Basket Assembly; Kenco Model 114MX1A, FSN 4320-900-8544

A-3. SHIPMENT AND STORAGE

TM 740-90-1	Administrative Storage of Equipment

A-4. DESTRUCTION

TM 750-244-3	Procedures for Destruction of Equipment to Prevent Enemy Use (Mobility Equipment Command)

Page B-1. Change "APPENDIX B, MAINTENANCE ALLOCATION CHART" to read "APPENDIX D, MAINTENANCE ALLOCATION CHART".

Page B-1. Preceding Appendix D, add Appendix B as follows:

APPENDIX B

COMPONENTS OF END ITEMS LIST

Section I. INTRODUCTION

B-1. Scope

This appendix lists integral components of and basic issue items for the pump to help you inventory items required for safe and efficient operation.

B-2. General

The Components of End Item List is divided into the following sections:

a. Section II--Integral Components of the End Item. These items, when assembled, comprise the pump and must accompany it whenever it is transferred or turned in. These illustrations will help you identify these items.

b. Section III--Basic Issue Items. These are minimum essential items required to place the pump in operation, to operate it, and to perform emergency repairs. Although shipped separately packed they must accompany the pump during operation and whenever it is transferred between accountable officers. The illustrations will assist you with hard-to-identify items. This manual is your authority to requisition replacement BII, based on Table(s) of Organization and Equipment (TOE) /Modification Table of Organization and Equipment (MTOE) authorization of the end item.

B-3. Explanation of Columns

a. Illustration. This column is divided as follows :

(1) Figure Number. Indicates the figure number of the illustration on which the item is shown (if applicable).

(2) Item Number. The number used to identify item called out in the illustration.

b. National Stock Number (NSN). Indicates the National stock number assigned to the item and which will be used for requisitioning.

c. Part Number (P/N). Indicates the primary number used by the manufacturer, which controls the design and characteristics of the item by means of its engineering drawings, specifications, standards, and inspection requirements to identify an item or range of items.

d. Description. Indicates the Federal item name and, if required, a minimum description to identify the item.

e. Location. The physical location of each item listed is given in this column. The lists are designed to inventory all items in one area of the major item before moving on to an adjacent area.

f. Usable on Code. "USABLE ON" codes are included to help you identify which component item are used on the different models (if applicable).

g. Quantity Required (Qty Reqd). This column lists the quantity of each item required for a complete major item.

h. Quantity. This column is left blank for use during inventory. Under the Rcv'd column, list the quantity you actually receive on your major item. The Date columns are for use when you inventory the major item at a later date; such as for shipment to another site.

Section II. INTEGRAL COMPONENTS OF END ITEM

(1) ILLUSTRATION (a) FIGURE NO.	(b) ITEM NO.	(2) NATIONAL STOCK NO.	(3) PART NO. & FSCM	(4) DESCRIPTION	(5) LOCATION	(6) USABLE ON CODE	(7) QTY REQD	(8) QUANTITY RCVD	DATE	DATE	DATE
10		4320-00-432-1654	SX1610 (88795)	Base Assembly			1				
11	1	4720-00-916-1883	SX937 (88795)	Hose Assembly, Discharge			2				
11	2	4720-00-946-9960	SX848 (88795)	Hose Assembly, Suction			1				
13		4320-00-946-9961	SX931A (88795)	Nozzle Assembly			2				
14 & 15		6685-00-837-7828	SX1611 (88795)	Gage Assembly, Go-No-Go			1				

Section III. BASIC ISSUE ITEMS

(1) ILLUSTRATION (a) FIGURE NO.	(b) ITEM NO.	(2) NATIONAL STOCK NO.	(3) PART NO. & FSCM	(4) DESCRIPTION	(5) LOCATION	(6) USABLE ON CODE	(7) QTY REQD	(8) QUANTITY RCVD	DATE	DATE	DATE
				LO 5-4320-248-12			1				
				TM 5-4320-248-15			1				
		5120-00-900-6103		Hammer, Hand			1				
		5120-00-449-8083		Wrench, Open End, Adjustable			1				

Page C-1. Delete Appendix C in its entirety.

Following Appendix D, add Appendix E as follows:

APPENDIX E

EXPENDABLE SUPPLIES AND MATERIALS LIST

Section I. INTRODUCTION

E-1. Scope

This appendix lists expendable supplies and materials you will need to operate and maintain the pump. These items are authorized to you by CTA 50-970, Expendable Items (except Medical, Class V, Repair Parts, and Heraldic Items).

E-2. Explanation of Columns

a. Column l--Item Number. This number is assigned to the entry in the listing and is referenced in the narrative instructions to identify the material (e.g., "Use cleaning compound, Item 5, App. D").

b. Column 2--Level. This column identifies the lowest level of maintenance that requires the listed item.

C - Operator/Crew

c. Column 3--National Stock Number. This is the National stock number assigned to the item; use it to request or requisition the item.

d. Column 4--Description. Indicates the Federal item name and, if required, a description to identify the item. The last line for each item indicates the part number followed by the Federal Supply Code for Manufacturer (FSCM) in parenthesis, if applicable.

e. Column 5--Unit of Measure (U/M). Indicates the measure used in performing the actual maintenance function. This measure is expressed by a two-character alphabetical abbreviation (e.g., ea, in, pr). If the unit of measure differs from the unit of issue, requisition the lowest unit of issue that will satisfy your requirements.

Section II. EXPENDABLE SUPPLIES AND MATERIALS LIST

(1) ITEM NUMBER	(2) LEVEL	(3) NATIONAL STOCK NUMBER	(4) DESCRIPTION	(5) U/M
1	C	6850-00-281-1985	Solvent, Cleaning	gl
2	C	9150-00-402-4478	Oil, Engine, Subzero	qt
3	C	9150-00-186-6681	Oil, Engine, OE-30	qt
4	C	9150-00-160-1818	Gasoline, Combat	bulk

By Order of the Secretary of the Army:

BERNARD W. ROGERS
General, United States Army
Chief of Staff

Official:

J. C. PENNINGTON
Brigadier General, United States Army
The Adjutant General

Distribution:
To be distributed in accordance with DA Form 12-25A, Operator's maintenance requirements for Petroleum Distribution.

★U. S. GOVERNMENT PRINTING OFFICE: 1978--765117/132

RECOMMENDED CHANGES TO EQUIPMENT TECHNICAL MANUALS

SOMETHING WRONG WITH THIS MANUAL?

THEN. . .JOT DOWN THE DOPE ABOUT IT ON THIS FORM, TEAR IT OUT, FOLD IT AND DROP IT IN THE MAIL!

FROM: (YOUR UNIT'S COMPLETE ADDRESS)
PFC JOHN DOE
CoA, 3d ENGINEER BN
FT. LEONARD WOOD MO 63108

DATE 16 DEC 74

PUBLICATION NUMBER	DATE	TITLE
TM5-6115-200-20 AND P	1 APR 72	GENERATOR SET 10 KW NSN 6115-00-231-7286

BE EXACT. . .PIN-POINT WHERE IT IS

PAGE NO.	PARAGRAPH	FIGURE NO.	TABLE NO.
6	2-1 a		
81		4-3	
125	line 20		

IN THIS SPACE TELL WHAT IS WRONG AND WHAT SHOULD BE DONE ABOUT IT:

In line 6 of paragraph 2-1a the manual states the engine has 6 cylinders. The engine on my set only has 4 cylinders. Change the manual to show 4 cylinders

Callout 16 on figure 4-3 is pointing at a bolt. In the key to fig. 4-3, item 16 is called a shim. Please correct one or the other.

I ordered a gasket, item 19 on figure B-16 by NSN 2910-00-762-3001. I got a gaskit but it doesn't fit. Supply says I got what I ordered so the NSN is wrong. Please give me a good NSN

SAMPLE

TYPED NAME, GRADE OR TITLE, AND TELEPHONE NUMBER
JOHN DOE, PFC (268) 317-7111

SIGN HERE:
John Doe

TEAR ALONG DOTTED LINE

DA, FORM 1 AUG 74 2028-2 (TEST)

P.S.—IF YOUR OUTFIT WANTS TO KNOW ABOUT YOUR MANUAL "FIND," MAKE A CARBON COPY OF THIS AND GIVE IT TO YOUR HEADQUARTERS.

FILL IN YOUR UNIT'S ADDRESS

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REVERSE OF DA FORM 2028-2 (TEST)

RECOMMENDED CHANGES TO EQUIPMENT TECHNICAL MANUALS

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FROM: (YOUR UNIT'S COMPLETE ADDRESS)

DATE

PUBLICATION NUMBER	DATE	TITLE
TM 5-4320-248-15	30 OCT 1967	PUMP, CENTRIFUGAL; GASOLINE DRIVEN

BE EXACT. . .PIN-POINT WHERE IT IS

PAGE NO.	PARAGRAPH	FIGURE NO.	TABLE NO.

IN THIS SPACE TELL WHAT IS WRONG AND WHAT SHOULD BE DONE ABOUT IT:

TYPED NAME, GRADE OR TITLE, AND TELEPHONE NUMBER

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FROM: (YOUR UNIT'S COMPLETE ADDRESS)

DATE

PUBLICATION NUMBER	DATE	TITLE
TM 5-4320-248-15	30 OCT 1967	PUMP, CENTRIFUGAL; GASOLINE DRIVEN

BE EXACT. . .PIN-POINT WHERE IT IS

PAGE NO.	PARAGRAPH	FIGURE NO.	TABLE NO.

IN THIS SPACE TELL WHAT IS WRONG AND WHAT SHOULD BE DONE ABOUT IT:

TYPED NAME, GRADE OR TITLE, AND TELEPHONE NUMBER

SIGN HERE:

DA FORM 1 AUG 74 2028-2 *(TEST)*

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4300 Goodfellow Boulevard
St. Louis, MO 63120

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REVERSE OF DA FORM 2028-2 (TEST)

RECOMMENDED CHANGES TO EQUIPMENT TECHNICAL MANUALS

SOMETHING WRONG WITH THIS MANUAL?

THEN. . .JOT DOWN THE DOPE ABOUT IT ON THIS FORM, TEAR IT OUT, FOLD IT AND DROP IT IN THE MAIL!

FROM: (YOUR UNIT'S COMPLETE ADDRESS)

DATE

PUBLICATION NUMBER	DATE	TITLE
TM 5-4320-248-15	30 OCT 1967	PUMP, CENTRIFUGAL; GASOLINE DRIVEN

BE EXACT. . .PIN-POINT WHERE IT IS

PAGE NO.	PARAGRAPH	FIGURE NO.	TABLE NO.

IN THIS SPACE TELL WHAT IS WRONG AND WHAT SHOULD BE DONE ABOUT IT:

TYPED NAME, GRADE OR TITLE, AND TELEPHONE NUMBER

SIGN HERE:

TEAR ALONG DOTTED LINE

DA FORM 1 AUG 74 2028-2 (TEST)

P.S.--IF YOUR OUTFIT WANTS TO KNOW ABOUT YOUR MANUAL "FIND," MAKE A CARBON COPY OF THIS AND GIVE IT TO YOUR HEADQUARTERS.

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REVERSE OF DA FORM 2028-2 (TEST)

Changes in Force: C1, C2, and C3

TM 5-4320-248-15
C 3

CHANGE
No. 3

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, D.C., *28 June 1974*

Operator, Organizational, Direct and General Support and Depot Maintenance Manual

PUMP, CENTRIFUGAL; GASOLINE DRIVEN; BASE MOUNTED; 1-1/2 INCH; 100GPM; PORTABLE REFUELING SYSTEM (KENCO MODEL 114MX1A) FSN 4320-900-8544

TM 5-4320-248-15, 30 October 1967, is changed as follows:
The title is changed as to read as shown above.
Safety Precautions, add the following warnings:

WARNING

Operation of this equipment presents a NOISE HAZARD to personnel in the area. The noise level exceeds the allowable limits for unprotected personnel. Wear earmuffs or ear plugs which were fitted by a trained perfessional.

WARNING

Cleaning solvent, PD-680, is POTENTIALLY DANGEROUS CHEMICAL. Do not use near open flame.

Page 5, Paragraph 1.2, Lines 3 and 4 are changed to read, Commander, US Army Troop Support Command, ATTN: AMSTS-MPP, 4300 Goodfellow Boulevard, St. Louis, MO 63120

Page 22, paragraph 3.8. Add the following warnings:

WARNING

Operation of this equipment presents a NOISE HAZARD to personnel in the area. Wear ear muffs or ear plugs which were fitted by a trained perfessional. Signs conforming to provisions of AR 385-30 will be erected in the operating area to provide notification of noise hazard in accordance with TB MED 251. The sign fhould read:

WARNING

NOISE HAZARDOUS EQUIPMENT. HEARING PROTECTION REQUIRED.

Page 31, paragraph 4.2. Add the following warnings:

WARNING

Dry cleaning solvent, PD-680, used for cleaning is POTENTIALLY DANGEROUS CHEMICAL. Do not use near open flame. Flash point of solvent is 100°F. - 138°F.

By Order of the Secretary of the Army:

CREIGHTON W. ABRAMS
General, United States Army
Chief of Staff

Official:
VERNE L. BOWERS
Major General, United States Army
The Adjutant General

Distribution:

To be distributed in accordance with DA Form 12-25A (qty rqr block No. 154) organizational **maintenance requirements for Petroleum Distribution.**

☆ US GOVERNMENT PRINTING OFFICE: 1974-768119/1966

TM 5-4320-248-15
C 2

Change No. 2

HEADQUARTERS
DEPARTMENT OF THE ARMY
Washington, D.C. *3 July 1973*

Operator, Organizational, Direct and General Support and Depot Maintenance Manual FUEL SYSTEM, TRANSFER, PORTABLE, PUMP, CENTRIFUGAL 100 GPM; TWO DISCHARGE HOSE ASSEMBLIES, ONE SUCTION HOSE ASSEMBLY: TWO NON-AUTOMATIC NOZZLE ASSEMBLE: ONE MONITOR GO-NO-GO GAGE, 100 GPM; 3 HP GASOLINE ENGINE: ONE BASKET ASSEMBLY KENCO MODEL 114MX1A FSN 4320-900-8544

TM 5-4320-248-15, 30 October 1967, is changed as follows

Page A-1. APPENDIX A is superseded as follows

APPENDIX A
BASIC ISSUE-ITEMS-LIST-AND ITEMS TROOP INSTALLED OR AUTHORIZED LIST

Section I. INTRODUCTION

1. scope

This appendix lists items required by the operator for operation of the fuel system transfer.

2. General

This list is divided into the following sections

a. Basic Issue *Items List — Section II.* Not applicable.

b. Items Troop Installed or Authorized List — Section III. A list of items in alphabetical sequence, which at the discretion of the unit commander may accompany the fuel system transfer. These items are NOT SUBJECT TO TURN-IN with the fuel system transfer when evacuated.

3. Explanation of Columns

The following provides an explanation of columns in the tabular list of Basic Issue Items List, Section II, and Items Troop Installed or Authorized List, Section III.

a. Source, Maintenance and Recoverability Code(s) (SMR): (Not applicable).

b. Federal Stock Number. This column indicates the Federal stock number assigned to the item and will be used for requisitioning purposes.

c. Description. This column indicates the Federal item name and any additional description of the item required.

d. Unit of Measure (U/M). A two character alphabetic abbreviation indicating the amount or quantity of the item upon which the allowances are based, e.g., ft, ea, pr, etc.

e. Quantity *Furnished with Equipment (BIIL).* (Not applicable).

f. Quantity Authorized (Items Troop Installed or Authorized). This column indicates the quantity of the item authorized to be used with the equipment.

Section III. ITEMS TROOP INSTALLED OR AUTHORIZED LIST

(1) SMR code	(2) Federal stock No.	(3) Description Ref. No. & Mfr code	Usable on code	(4) Unit of meas	(5) Qty auth
	7520-559-9618	Case, Maintenance		EA	1

By Order of the Secretary of the Army:

CREIGHTON W. ABRAMS
General, United States Army
Chief of Staff

Official:
VERNE L. BOWERS
Major General, United States Army
The Adjutant General

Distribution:
To be distributed in accordance with DA Form 12-25A (qty rqr block No. 154) operator maintenance requirements for Petroleum Distribution.

☆ U.S. GOVERNMENT PRINTING OFFICE: 1973-769620/1028

CHANGE
No. 1

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, D.C., *2 May 1969*

Operator, Organizational, Direct and General Support and Depot Maintenance Manual

FUEL SYSTEM, TRANSFER, PORTABLE, PUMP, CENTRIFUGAL, 100 GPM; TWO DISCHARGE HOSE ASSEMBLIES; ONE SUCTION HOSE ASSEMBLY; TWO NON-AUTOMATIC NOZZLE ASSEMBLIES; ONE MONITOR GO-NO-GO GAGE, 100 GPM; 3 HP GASOLINE ENGINE; ONE BASKET ASSEMBLY KENCO MODEL 114MX1A FSN 4320-900-8544

TM 5-4320-248-15,30 October 1967, is changed as follows:

Page 5. Paragraph 1.2 is changed as follows:

1.2 Forms and Records

a. DA Forms and records used for equipment maintenance will be only those prescribed in TM 38-750.

b. Reporting of errors, omissions, and recommendations for improving this publication by the individual user is encouraged. Reports should be submitted on DA Form 2028 (Recommended Changes to DA Publications) and forwarded direct to Commanding General, U. S. Army Mobility Equipment Command, ATTN: AMSME-MPP, 4300 Goodfellow Boulevard, St. Louis, Mo. 63120.

Page A-1. Paragraph 3 is superseded as follows:

3. Explanation of Columns

The following provides an explanation of columns in the tabular list of Basic Issue Items, Section II:

a. Source, Maintenance, and Recoverability Codes (SMR), Column (1).

(1) Source Code indicates the selection status and source for the listed item. Source code is:

Code	*Explanation*
P	Applied to repair parts which are stocked in or supplied from GSA/DSA Army supply system, and authorized for use at indicated maintenance categories.

(2) Maintenance Code indicates the lowest category of maintenance authorized to install the listed item. Maintenance level code C is Operator/Crew.

(3) Recoverability Code indicates whether unserviceable items should be returned for recovery or salvage. Items not coded are expendable.

b. Federal Stock Number, Column (2). This column indicates the Federal stock number for the item.

c. Description, Column (3). This column indicates the Federal item name and any additional description required. A five-digit manufacturer's or other service code is shown in parentheses followed by the manufacturer's part number. Repair parts quantities included in kits, sets, and assemblies that differ from the actual quantity used in the specific item, are listed in parentheses following the repair part name.

d. Unit of Measure, Column (4). This column indicates the unit used as a basis of issue, e.g., ea, pr, ft, yd, etc.

e. Quantity Incorporated in Unit, Column (5). This column indicates the quantity of the item used in the equipment.

f. Quantity Furnished With Equipment, Column (6). This column indicates the quantity of an item furnished with the equipment in excess of the quantity incorporated in the unit.

g. Illustration, Column (7). This column is divided as follows:

(1) Figure Number, column (7)(A) indi-

cates the figure number of the illustration in which the item is shown.

(2) Item Number, column (7)(B) indicates the callout number used to reference the item in the illustration.

Page A-3. Section II is superseded as follows:

Section II. BASIC ISSUE ITEMS

(1) SMR code	(2) Federal stock number	(3) Description — Ref No. & mfr code / Usable on code	(4) Unit of meas	(5) Qty inc in unit	(6) Qty furn with equip	(7) Illustration (A) Figure No.	(7) Illustration (B) Item No.
		BASIC ISSUE ITEMS, MANUFACTURER OR DEPOT INSTALLED					
PC	7510-889-3494	BINDER, Looseleaf	EA		1		
PC	7520-559-9618	CASE, Operational and Maintenance Publications	EA		1		
PC		DA TECHNICAL MANUAL TM 5-4320-248-15	EA		1		
PC		LUBRICATION ORDER LO 5-4320-248-12	EA		1		

By Order of the Secretary of the Army:

W. C. WESTMORELAND,
General, United States Army,
Chief of Staff.

Official:

KENNETH G. WICKHAM,
Major General, United States Army,
The Adjutant General.

Distribution:

To be distributed in accordance with DA Form 12-25, (qty rqr block No. 246) Section I, Organizational Maintenance requirements for Pumps, Centrifugal, Petroleum.

☆U.S. GOVERNMENT PRINTING OFFICE: 1969-342-017/2937

TECHNICAL MANUAL

NO. 5-4320-248-15

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, D. C., 30 October 1967

Operator, Organizational, Direct and General Support and Depot Maintenance Manual

FUEL SYSTEM, TRANSFER, PORTABLE, PUMP CENTRIFUGAL, 100 GPM; TWO DISCHARGE HOSE ASSEMBLIES; ONE SUCTION HOSE ASSEMBLY; TWO NON-AUTOMATIC NOZZLE ASSEMBLIES; ONE MONITOR GO-NO-GO GAGE, 100 GPM; 3 HP GASOLINE ENGINE; ONE BASKET ASSEMBLY KENCO MODEL 114MX1A

FSN 4320-900-8544

CHAPTER 1 INTRODUCTION

Section I. GENERAL

1.1 Scope. This manual has been prepared for the use of the operator to whom the fuel transfer unit, portable, 100 GPM, Model 114MX1A is issued. It contains information on the operation and maintenance of the unit, together with the description of the major components and their functions.

1.2 Reports. Suggestions for improvement in design, maintenance, safety, and efficiency of operation should be reported through channels to the U. S. Army Mobility Equipment Command, 4300 Goodfellow Blvd. , St. Louis, Mo.

Section II. DESCRIPTION AND DATA

1.3 Use. The Model 114MX1A is a self contained unit, designed to transfer fuel primarily from (500 gallon) collapsible fuel tanks to fuel tanks of aircraft or land vehicles. (See Figures 1 through 6.)

1.4 Identification. An identification plate containing the pump serial number and other pertinent data is affixed to the casing of the pump, just forward from the engine exhaust. The serial number of the engine is located adjacent to the lubrication decal on the engine cylinder baffle. The engine Model Number is also located in the same area.

1.5 Description. The Model 114MX1A refueling system consists of nine major assemblies: A self-priming centrifugal pump, a 3 H.P. gasoline engine, a 100 gallon per minute Go-No-Go gage monitor, a suction hose assembly, two 50 foot discharge hose assemblies, and two non-automatic nozzles. The complete package weighs approximately 195 pounds. (See Figures 2 and 3.)

1.5.1 Pump. The system has a maximum rated pumping capacity of 100 gallons of gasoline per minute. All gaskets and seals are satisfactory for use with petroleum products. It should not be used for pumping solvents, acids or alkalies.

1.5.2 Engine. The engine is a four cycle single cylinder internal combustion engine developing 3 H.P. @ 3600 RPM. Lubrication instructions are as follows:

Use oil classified as "MS"
SAE 30W above 32°F.
SAE 10W below 32°F.
Add oil to engine crankcase before starting
Fill to overflowing
Check every five hours (see par. 5.2.2)

1.5.3 Monitor, Go-No-Go Gage. A Bendix 100 GPM monitor is secured to the base immediately behind the engine by two 6" hose clamps. A short section of suction hose (wire reinforced) joins the discharge of the pump to the inlet of the monitor. A 1-1/2" Tee, equipped with quick coupling fittings, provides a means to couple the discharge hose assemblies to the outlet of the monitor. The monitor is capable of removing the last traces of moisture and foreign material from the fuel pumped through it. When the gage has absorbed all the moisture it can retain, the fuel no longer flows through the gage and the elements must be changed. (see par. 5.2.4)

1.5.4 Suction Hose Assembly. A 10 foot flexible wire reinforced suction hose assemply is provided to transfer fuel from its source to the pump. This hose is equipped with quick coupling fittings which will adapt to the suction of the pump and also will adapt to the discharge fitting from a 500 gallon collapsible fuel tank. (see par. 5.2.3)

1.5.5 Discharge Hose Assemblies. The two 50 foot lightweight discharge hose assemblies are equipped with quick coupling fittings. Because it is not wire reinforced, care should be taken to prevent sharp bends and twists which will reduce pumping capacity of the unit. The hose assembly couples to the outlet of the monitor at one end and the nozzle at the opposite end. (see par. 5.2.3)

1.5.6 Nozzle Assemblies. Two non- automatic 1-1/2" aluminum nozzles are provided, each equipped with a dust cap for the filler tube, 100 mesh screen, and quick coupling fittings to adapt to the discharge hose. (see par. 5.2.3)

1.5.7 Basket Assembly. A carrying basket manufactured from aluminum is provided for field usage. When moving from location to location, the hose and nozzle assemblies may be placed in the carrying basket and the pump-engine-monitor assembly bolted to the top rails. This allows the complete system to be transported by two or more men. Figure 5

Section III. SYSTEM TABULATED DATA

1.6 Capacity.

100 GPM at open flow
94 GPM through monitor and two discharge hoses

1.7 Weights.

114MX1A Pump-Engine-Monitor Assembly	.75#
SX-1077 Hose-Nozzle Package Net.	57#
Commercial Package Weight 114MX1A.	130#
Commercial Package Weight SX-1077	65#
Level "A" Package Weight Total.	251#
Commercial Package Total	l95#

1.8 Cubic Content.

(Commercial Pack) 114MX1A Pump-Engine-Monitor Assy. . . . . .16.7 cu. ft.

(Commercial Pack) 114MX1A and Hose Package SX-1077. . . . . .16.7 cu. ft.

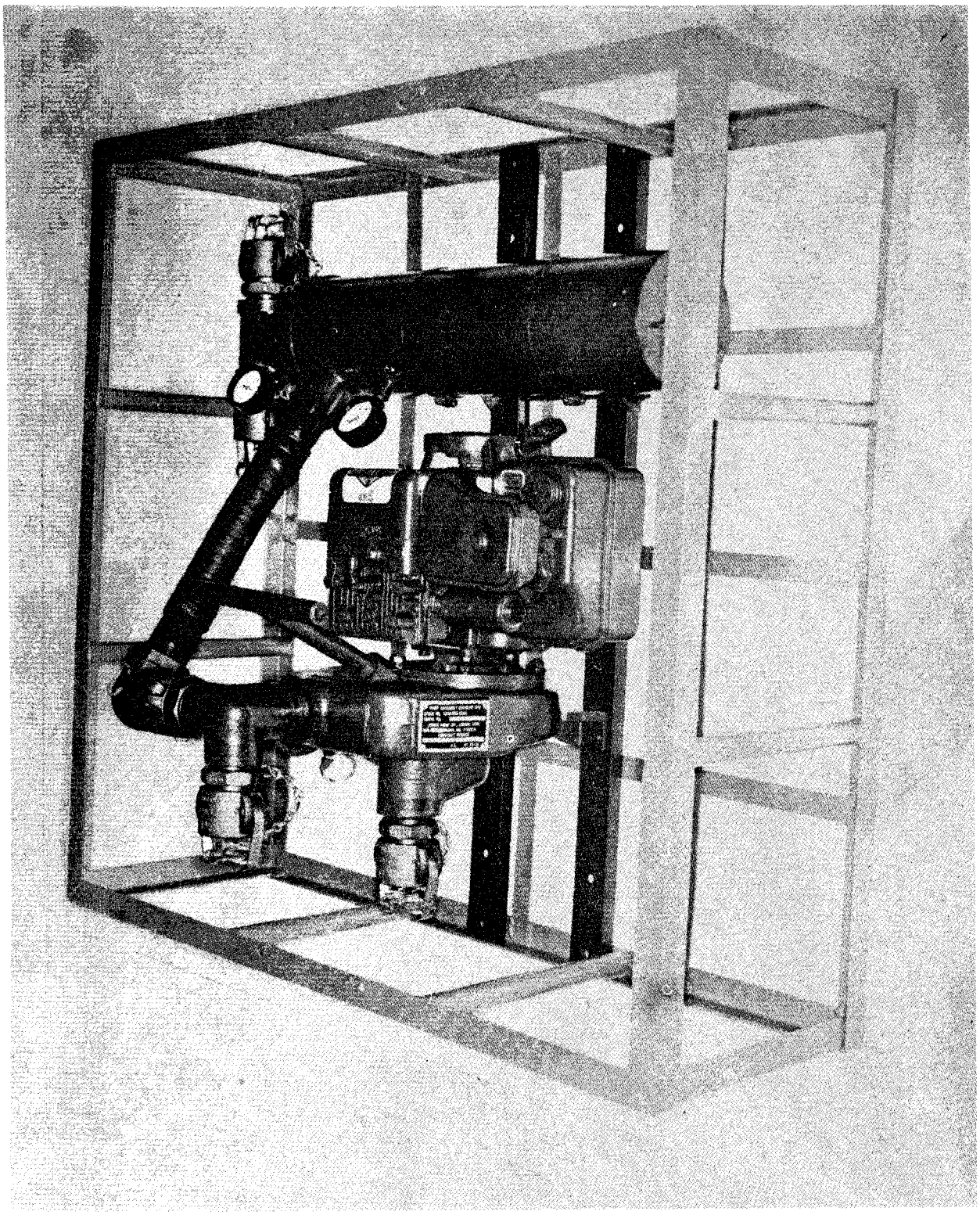
(Level "A" Pack) 114MX1A and Hose Package SX-1077 . . . . . .22 cu. ft.

1.9 Overall Dimensions 114MXlA.

Width	36"
Depth	36"
Height	16"
Height	28-1/2"

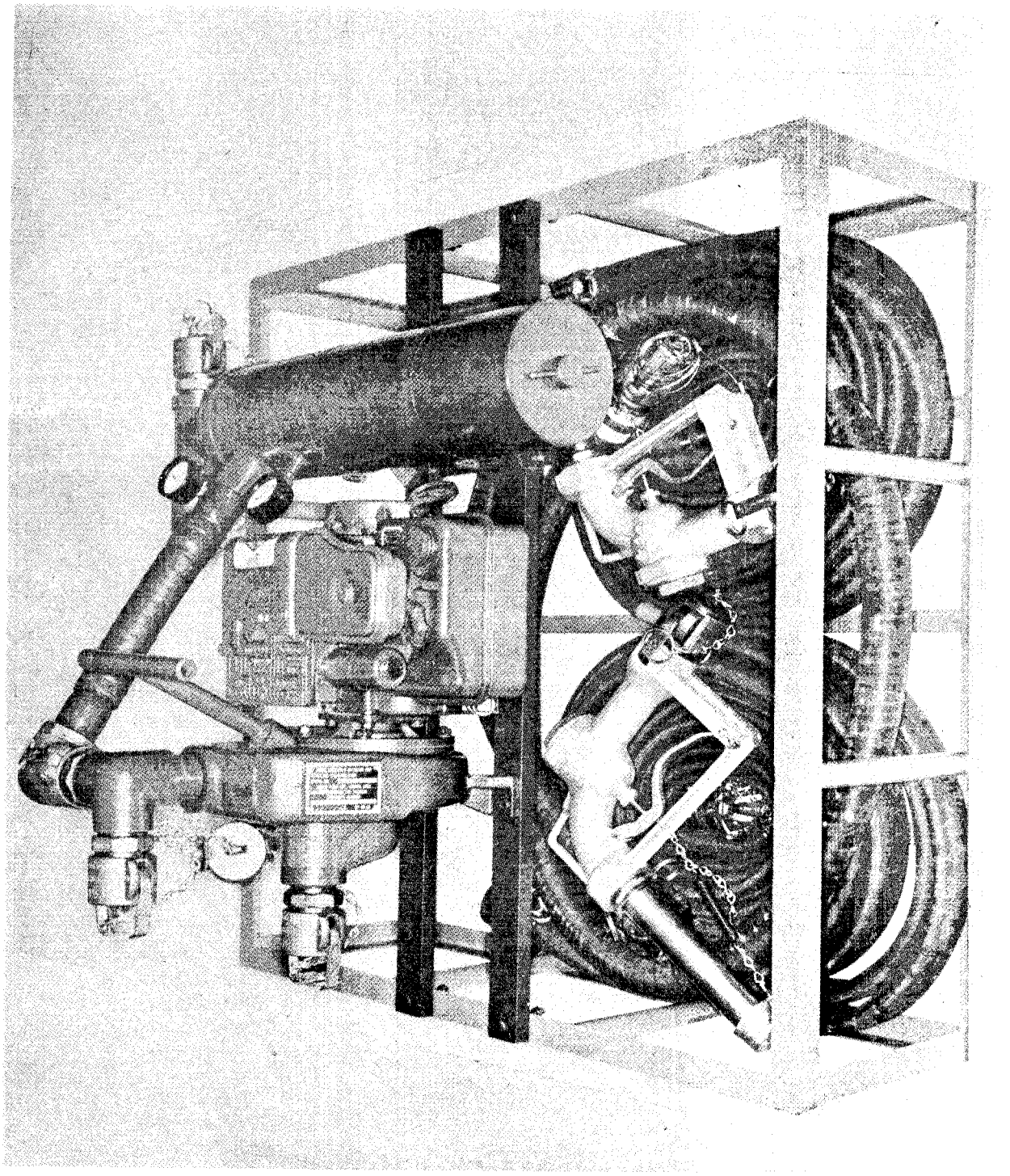
1.10 Pump Data.

Max. Discharge Pressure	45 PSI @ Max. RPM
Max. Suction Lift	25 Ft.
Priming Time 5' Suction Lift	30 Seconds Max.
Priming Time 25' Suction Lift	120 Seconds Max.
Check Valve	None
Priming Chamber Capacity	2 Quarts
Inlet	1-1/2" NPT
Discharge	1-1/2" NPT
Quick-Couple Fitting Size	1-1/2"

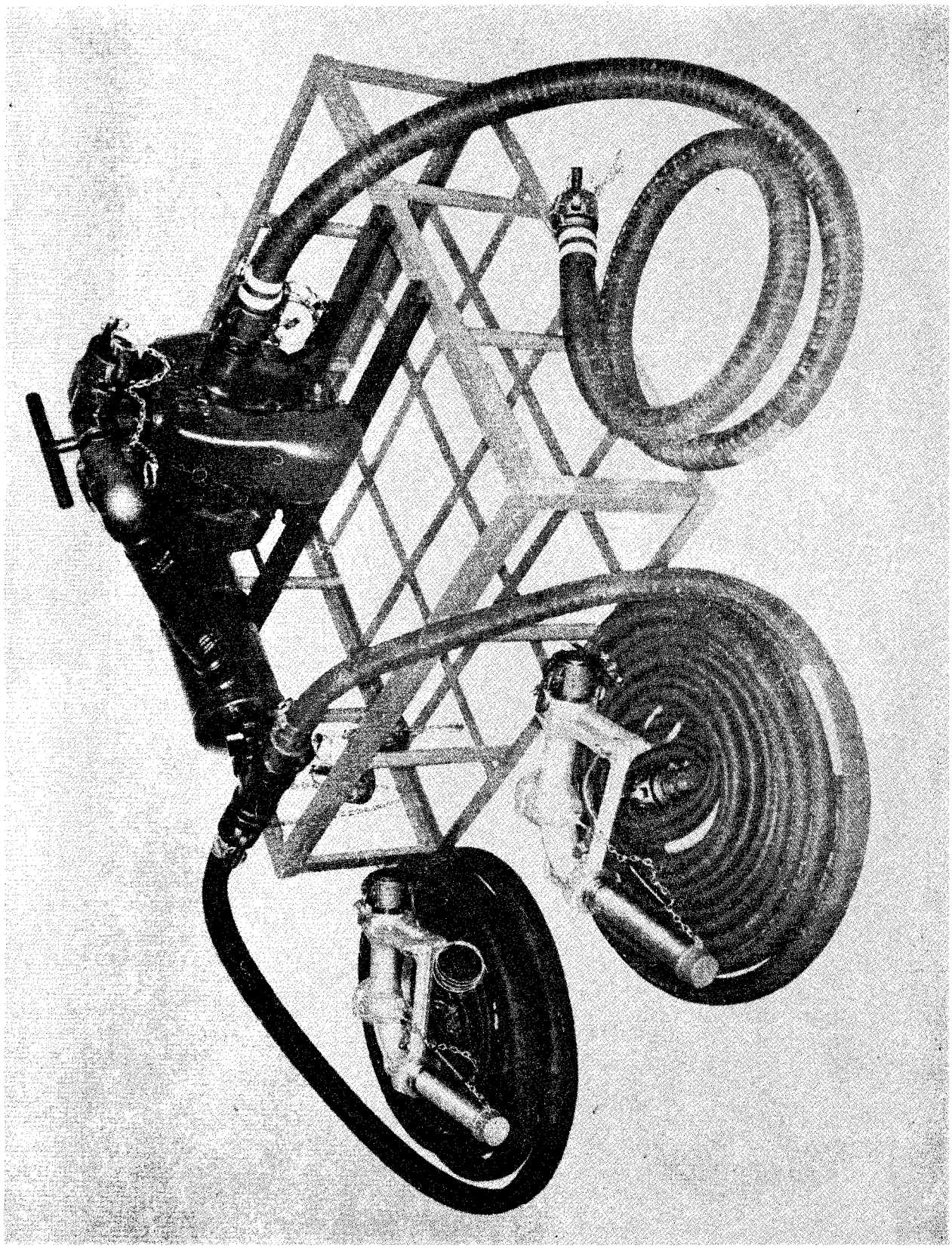


114MX1A ASSEMBLY AS PACKAGED

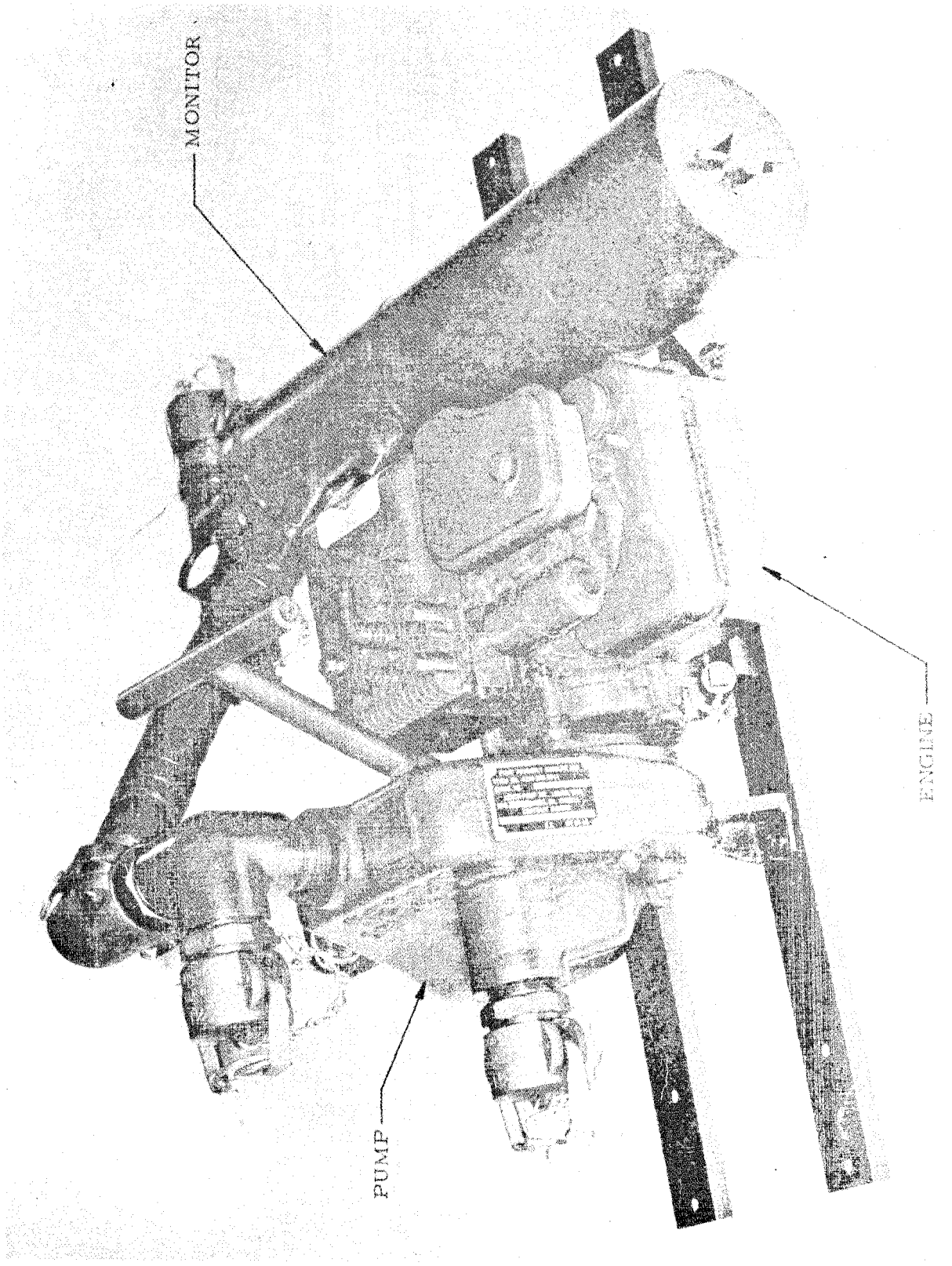
FIGURE NO. 1



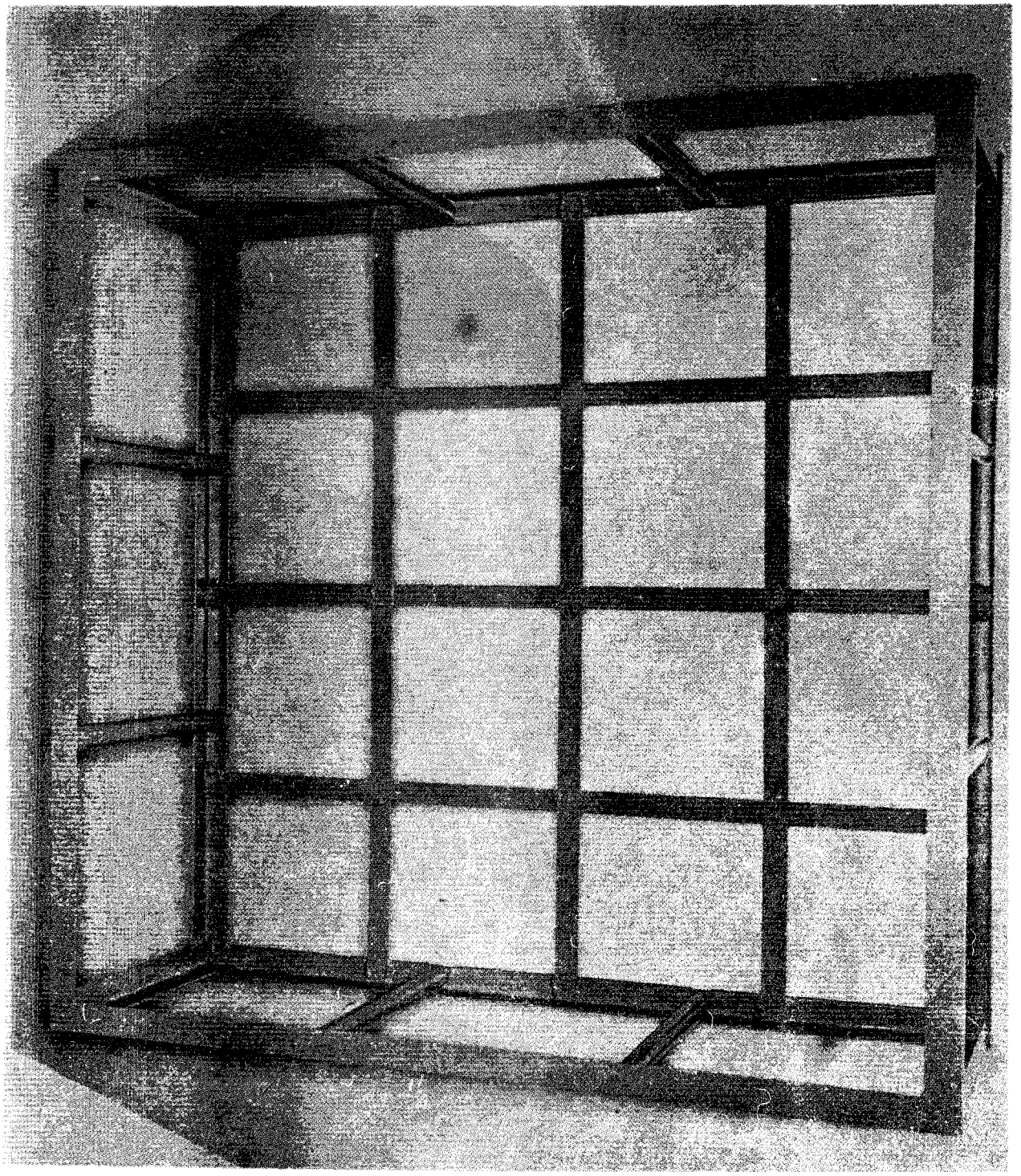
114MX1A FUEL TRANSFER SYSTEM
FIGURE NO. 2



114MX1A - FIELD SET UP
FIGURE NO. 3



114MX1A PUMP-ENGINE-MONITOR ASSEMBLY
FIGURE NO. 4



114MX1A CARRYING BASKET
FIGURE NO. 5

CHAPTER 2 UNPACKAGING AND DEPRESERVATION

Section I. UNPACKAGING

2.1 Description Contents. The same interior corrugated container is used for both Level "A" packaging and commercial packaging. A Level "A" package unit is enclosed in an outer plywood box in accordance with Mil-B-6Olb. The inner corrugated container contains all components. The main carton contains the pump, engine, monitor assembly, plus overpack kit, plus depreservation manual, nozzle assemblies, instruction manual, and, air cleaner assembly, the suction hose assembly, the two discharge hose assemblies, and carrying basket.

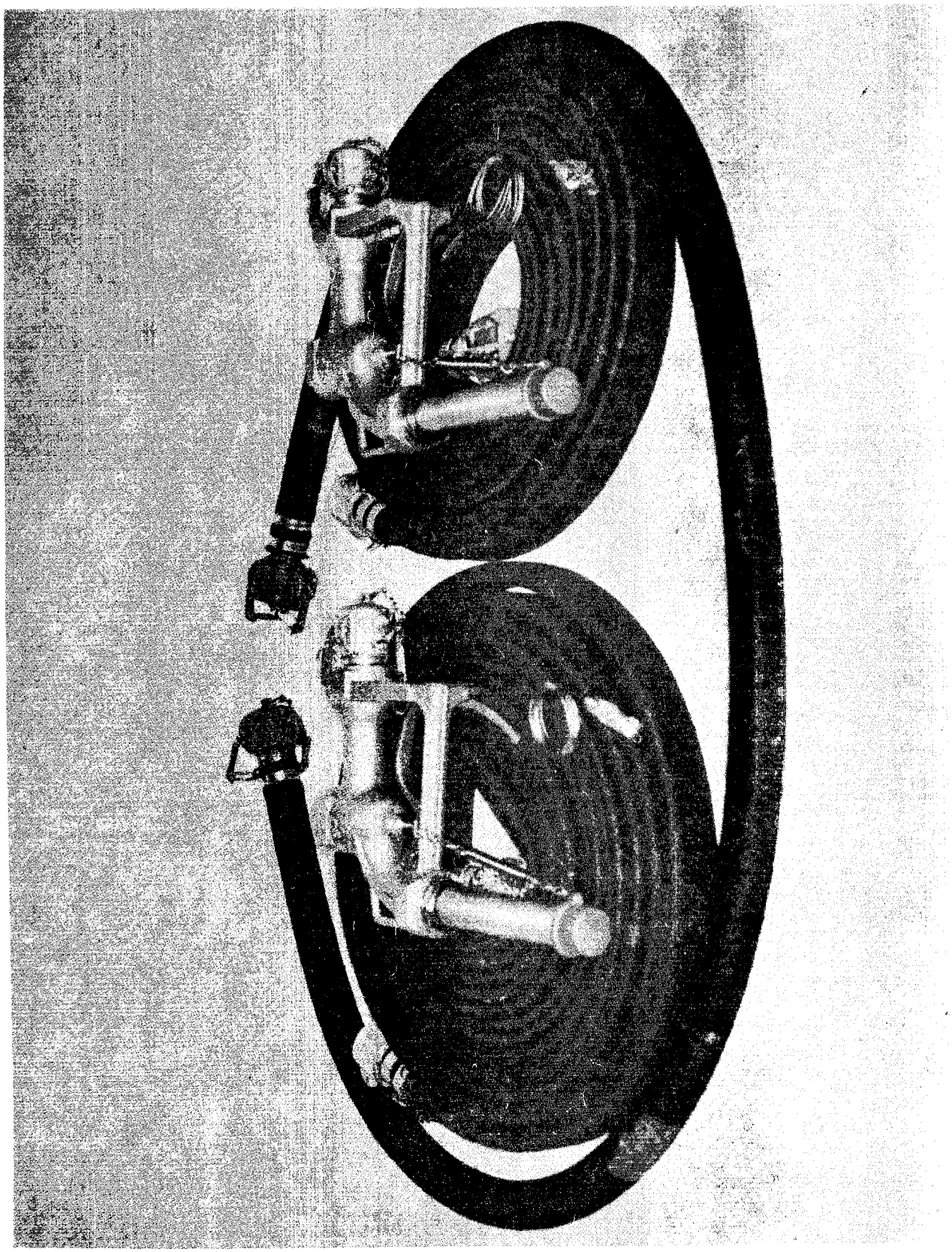
2.2 Installation Air Cleaner. In accordance with the depreservation guide instructions, it is neccssary to remove the tape from the carburetor of the engine and install the air cleaner assembly as illustrated in Figure 7. The air cleaner assembly is made up of two components; the air Cleaner screw and the air cleaner assembly.

2.3 Overpack Kit. Each unit is equipped with a K 214-2 overpack kit, consisting of an extra spark plug, ignition point assembly and condenser, a starter rope. These components are packaged and should be maintained with the unit until use of these components is required. Installation of all components in the engine overpack kit are explained in later portions of this manual. Figure 8

Section II DEPRESERVATION

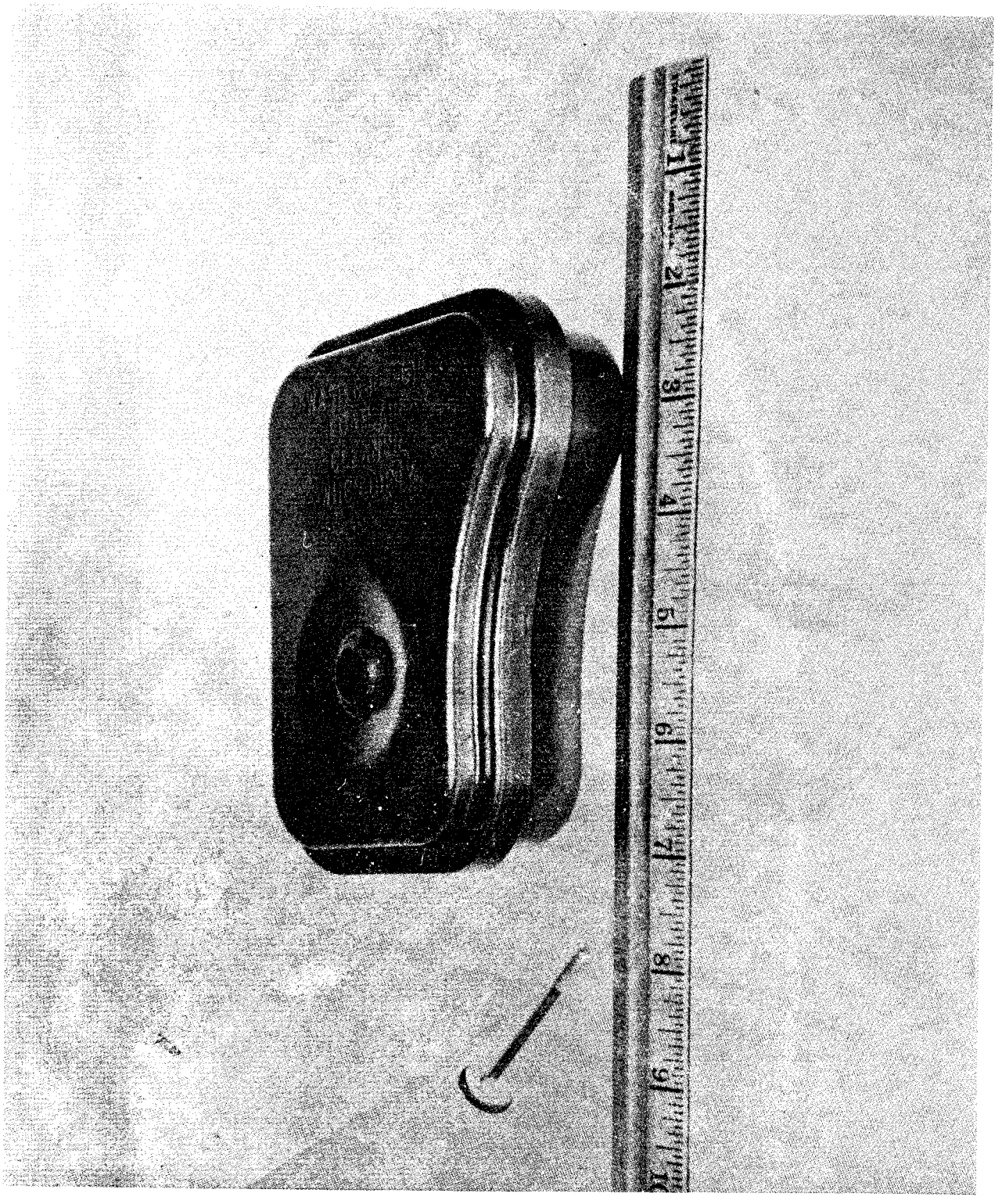
2.4 Engine. The engine has been preserved in accordance with Mil-E-10062B, however, no special depreservation procedures are necessary, While the spark plug has been removed, the engine cylinder sprayed with hot oil and the crankcase coated with preservation oil, it is merely necessary to follow the normal starting procedures as outlined in Chapter 3 after removing the "Do Not Grank" Tag from the starting rope; filling crankcase with Lubricating oil and priming the pump casing.

2.5 Other Equipment. Other than unpackaging and attaching the suction and hose assembly and discharge hose assembly and nozzle as outlined under Chapter 3 , there is no special depreservation procedures required.



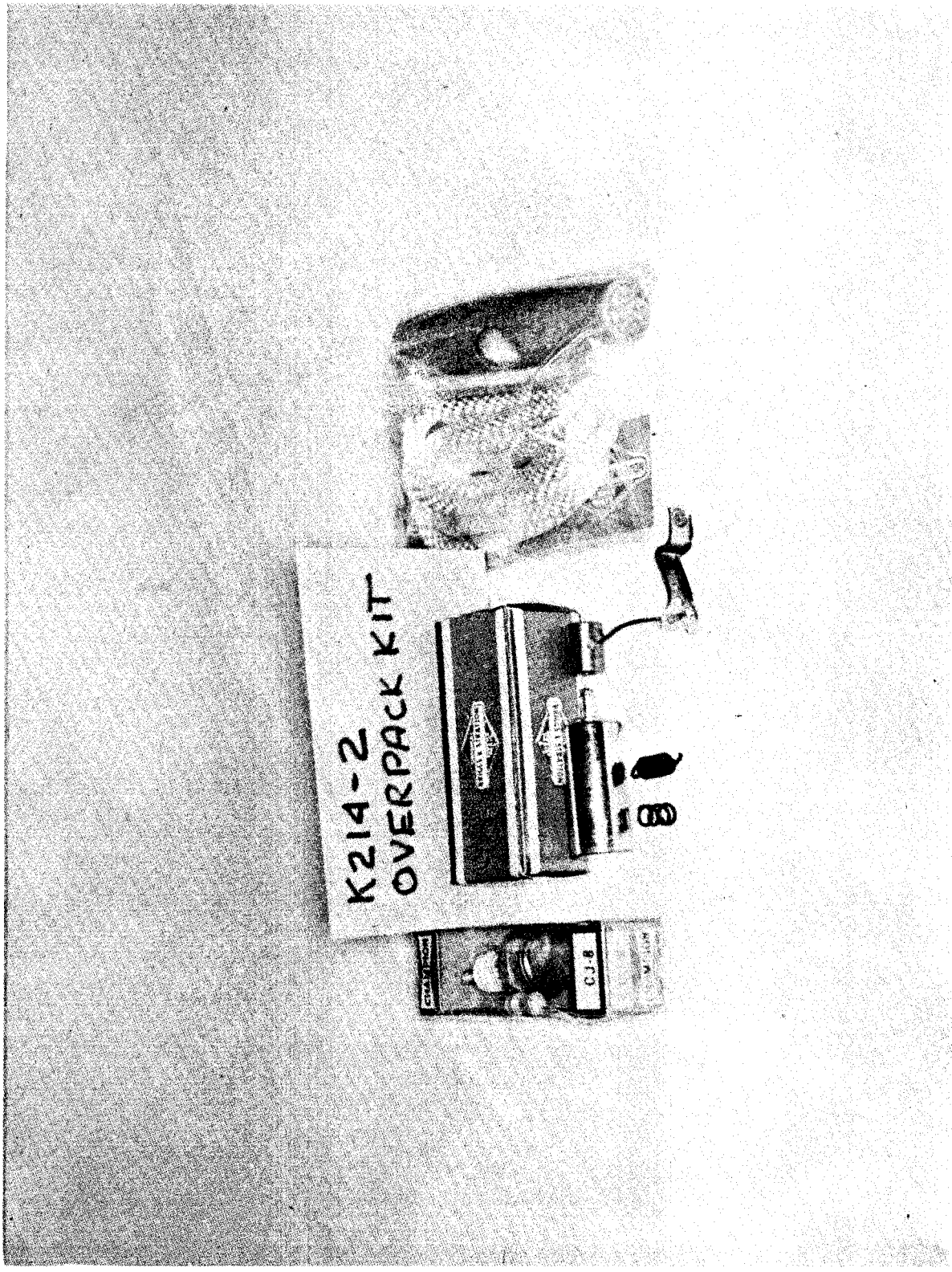
SX-1077 ACCESSORY HOSE & NOZZLE PACKAGE

FIGURE NO. 6



AIR CLEANER ASSEMBLY

FIGURE NO. 7



OVERPACK KIT K 214-2

FIGURE NO. 8

CHAPTER 3 OPERATING INSTRUCTIONS

Section I CONTROLS AND INSTRUMENTS

3.1 General. This section describes, locates, illustrates and furnishes the operator with sufficient information to operate the various controls and instruments of the fuel transfer unit, portable, 100 GPM, Model 114MX1A.

3.2 Controls . There are six controls on the unit. They are the engine starter cord, engine choke, carburetor needle valve, idle adjustment screw, governor control, and the discharge hose nozzle.

3.2.1 Engine Starter Cord. The handle of the engine starter cord is located on the side of the engine opposite the pump assembly. The starter cord is used to crank the engine. The starter cord should be operated with a firm, gentle pull.

3.2.2 Engine Choke. The engine choke control is located directly below the air cleaner. A flange is provided on the end for ease of operation. Choke control must be pulled out to choke. Use the choke to start and stop the engine. See starting and stopping instructions for detailed use of choke. Figure 10 & 11

3.2.3 Carburetor Needle Valve . The carburetor needle valve is mounted on the side of carburetor directly below the fuel tank. This adjustable valve controls the rate of fuel and air entering the engine. Normally the valve will not require adjustment, but different types of fuel may dictate minor adjustments. Figure 10

3.2.4 Governor Control . The governor control adjusting nut is mounted in a bracket supported and secured by one of the head capscrews. Adjustment has been made to govern the engine at 3500 RPM and should only be modified by qualified personnel. Figure 10

3.2.5 Idle Adjustment Screw. The idle adjustment screw is located just above the carburetor needle valve adjustment screw. The idle adjustment screw is not used. Speed of the engine is controlled by the governor control.

3.2.6 Discharge Nozzle Assembles. The discharge nozzle assembly may be readily attached to the outlet end of the discharge hose assembly by means of quick-connect fittings. The nozzle is non-automatic and the lever must be hand depressed to deliver fuel to the aircraft or vehicle. A grounding strap is securely attached to the nozzle assembly and the free end of this ground must be clamped to the aircraft or vehicle prior to inserting the nozzle into the fuel filler tube, to avoid the possibility of static electrical discharge. Figure 12

Section II ENGINE ADJUSTMENTS

3.3 General. CAUTION: NEVER ATTEMPT TO OPERATE THE ENGINE WITHOUT PLACING LIQUID IN THE PUMP HOUSING. This section contains instructions to accomplish minor engine adjustments, which may become necessary for smooth operation of the engine.

3.4 Carburetor Adjustments. NOTE: DO NOT MAKE ANY ADJUSTMENTS WITHOUT FIRST TESTING THE ENGINE OPERATION AT THE FACTORY SETTING. Each unit has been factory tested to assure proper operation at full load. If unusual atmospheric conditions exist or if vibration or tampering prevents smooth engine operation, adjustment may be accomplished as follows:

3.4.1 Initial Adjustment. Close needle valve (turn clockwise) then open 1-1/2 turns (turn counter-clockwise). This initial adjustment will permit the engine to be started and warmed up before making the final adjustment.

3.4.2 Final Adjustment. With engine running at normal operating speed, close the needle valve (turn clockwise) until engine starts to lose speed (lean mixture). Then slowly open needle valve (turn counterclockwise) to the point of smoothest operation. If the engine tends to stall or die out, it usually indicates the mixture is slightly lean and it may be necessary to open the needle valve to provide a richer mixture.

3.5 Governor Control. To increase engine speed, turn speed adjusting screw counterclockwise. To decrease engine speed,

turn speed adjusting screw clockwise. It is recommended that factory setting be tried before attemption any adjustments. Never operate the engine for prolonged periods at wide open governor setting. Normal setting is 3500 **RPM.**

3.6 Tune Up Specifications.

3.6.1 Spark Plug Types.

Mfgr.	Plug #
AC	GC46 *
AL	871*
Champ	CJ8 *

*Upon depletion of stock resistor type plug Champ XJ-S or equal will be provided.

3.6.2 Spark Plug Gap. .025"

3.6.3 Ignition Point Gap. .020"

3.6.4 Intake Valve Clearance. .005" - .007"

3.6.5 Exhaust Valve Clearance. .009" - .011"

3.7 Specifications. ENGINE PART #SX-1086

Horse power . . . . . 3 H.P. @ 3600 RPM

Torque . . . . . 4. 39 Max. @ 3400 RPM

Displacement. . . . . 7.75 Cubic Inches

Stroke . . . . . 1-3/4 Inches

Bore . . . . . 2-3/8 Inches

Fuel . . . . . Engine may be operated on motor gas, aviation gasoline JP4 Fuel (JP4 in emergency conditions only)

Type . . . . . Four Cycle

Cylinder . . . . . Single

3.7 Specifications (Continued).

Cooling . . . . . .Air

Governed Speed. 3500

Fuel Tank Capacity . . . . . 2 Quarts

NOTE: FOR PRACTICAL OPERATION, THE HORSEPOWER SHOULD NEVER EXCEED 85% OF THE ENGINE RATING.

Section III OPERATING INSTRUCTIONS

3.8 General. This section contains instructions for preparing and operating the 114MX1A Refueling System.

CAUTION: *ALWAYS OPERATE THE UNIT OUT OF DOORS AND MAINTAIN STRICT SAFETY PRACTICES 'TO AVOID FIRE.

CHECK CRANKCASE OIL LEVEL BEFORE STARTING ENGINE.

*NEVER OPERATE THE ENGINE WITHOUT FLUID IN THE PUMP CHAMBER. SHAFT SEAL DAMAGE COULD OCCUR IN SECONDS WITHOUT FLUID IN THE PUMP CHAMBER.

*NEVER STOP ENGINE BY SHORTING SPARK PLUG OR IGNITION SYSTEM ---- CHOKE ENGINE TO STOP.

3.9 Preparation of' Unit for Use. Locate the pumping unit as close as possible to the supply tank or drum. Uncoil suction and discharge hose assemblies and arrange them in a position consistent with desired operation.

3.9.1 Prime Pump Casing. Remove the dust cap from the suction port of the pump casing. Pour approximately two quarts of the fluid to be pumped into the suction port as illustrated in Figure 13. Once primed, it is not necessary to reprime the pump casing until the casing has been intentionally drained or the priming fluid has been accidentally spilled. Priming fluid should be of the same material to be transferred.

3.9.2 Fueling the Engine. Fill tank with two quarts of motor or aviation gasoline. DO NOT USE A FUEL-OIL MIXTURE.

3.9.3 Discharge Hose Connections. Connect the male quick-connect of the discharge hose assembly to the nozzle assembly. Connect the female quick-connect fitting of the discharge hose assembly to the male quick-connect fitting at the Go-No-Go Gage (monitor). Couple the loose dust caps and plugs together to prevent collection of dirt and foreign material.

3.9.4 Suction Hose Connections. Connect the female coupling of the suction hose to the suction fitting at the pump. Connect the opposite end of the suction hose to the fuel supply container. Couple the loose dust caps and plugs together to prevent collection of dirt and foreign material.

3.10 Starting a Cold Engine. Initial starting on cold engine procedures:

3.10.1 Pull choke out to full choke position.

3.10.2 Grasp starter grip and pull starter cord with firm, gentle pull, (approximately 3 feet) two times.

3.10.3 Push choke into "No Choke" position.

3.10.4 Pull starter cord again to start engine. If engine fails to start, pull choke lever out approximately 1/4 of full travel.

3.10.5 Crank engine again. Push choke in after engine warms gradually, until engine runs smoothly.

3.11 Starting a Warm Engine. To restart the engine after a short shut-down (for refueling purposes, etc.) follow this procedure:

3.11.1 Do not choke. Crank engine with starter rope.

3.11.2 If engine fails to start, pull choke out slightly and repeat cranking procedure.

3.11.3 After engine starts, slowly return choke lever to No Choke position.

3.12 Stopping the Engine. The engine is not equipped with a shorting bar to reduce fire hazards. The engine may be stopped by moving the choke lever to "Choke". This method will not harm the engine nor make it difficult to restart. A correctly adjusted engine will not continue to run at "choke", the needle valve adjustment is far too lean for satisfactory operation in the "open" position.

Section IV TROUBLESHOOTING HINTS The following table lists the more common reasons for engine and pump field problems.

3.13 Engine Fails to Start.

Possible Cause	Remedy
a. No Fuel	a. Check fuel level of gas tank and refill.
b. Engine Flooded	b. Move choke lever to "open" and crank engine until the engine has cleared.
c. Fuel Tank Vent. Clogged	c. Clean or replace fuel tank cap.
d. Fouled Spark Plug	d. Clean and regap to .02.5" or replace.
e. Ignition Faulty	e. Refer to engine instructions.
f. Governor Faulty	f. Check governor linkage and adjustment.

3.14 Engine Starts but Fails to Continue to Run.

a. Engine Overheating	a. Check blower housing openings for clogging. Check needle valve for excessively lean setting.

3.14 Engine Starts but Fails to Continue to Run (Continued).

b.	Improper Breaker Gap	b. Check and reset to .020".
c.	Carburetor Setting T'oo Lean	c. Readjust per instructions to proper setting.
d.	Air Cleaner Clogged	d. Clean and reoil.
e.	Improper Fuel	e. Dump fuel from tank and refill with aviation gas or motor gas
f.	Muffler Clogged	f. Clean or replace.

3.15 Engine Functions Properly but Pump Fails to Prime.

a.	Insufficient Priming Fluid in Pump Casing	a. Fill casing with 2 quarts of fluid to be transferred and replace suction hose.
b.	Air Leak in Suction Line	b. Check Suction Hose Assembly and quick-coupling fittings for tightness.
c.	Engine Speed Too Low	c. Refer to engine instructions and readjust or correct governor setting.
d.	Worn Shaft Seal	d. Replace with K 214-5 Kit.
e.	Nozzle Closed	e. Open nozzle for faster prime.

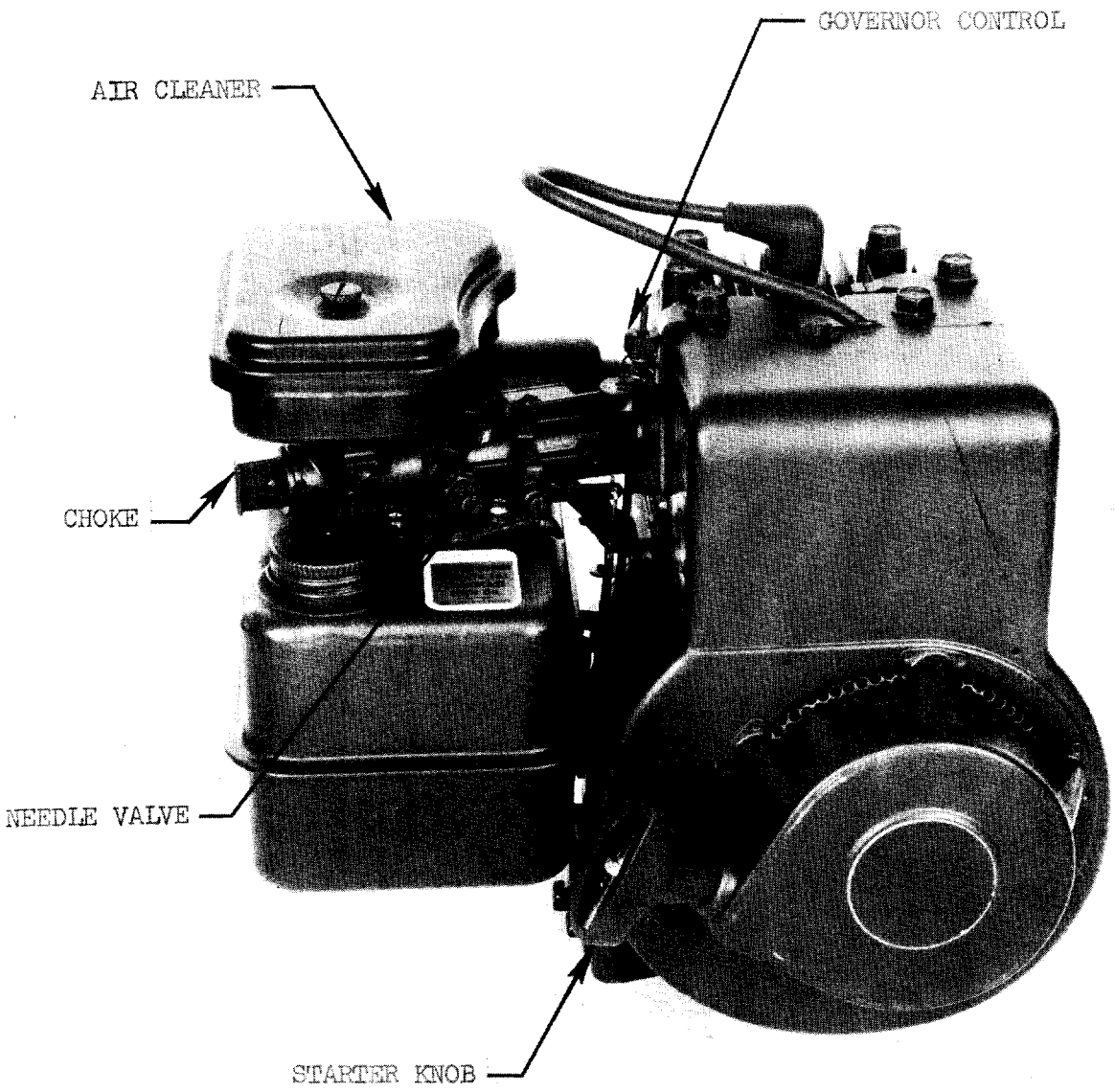
3.16 Pump Primes but Fails to Deliver Proper Capacity.

a.	Partially Clogged Suction Hose	a. Clean and reinstall.
b.	Total Pressure Head Too Great	b. Check Monitor Fuses - replace. Reduce discharge hose length. Check and

3.16 Pump Primes but Fails to Deliver Proper Capacity (Continued).

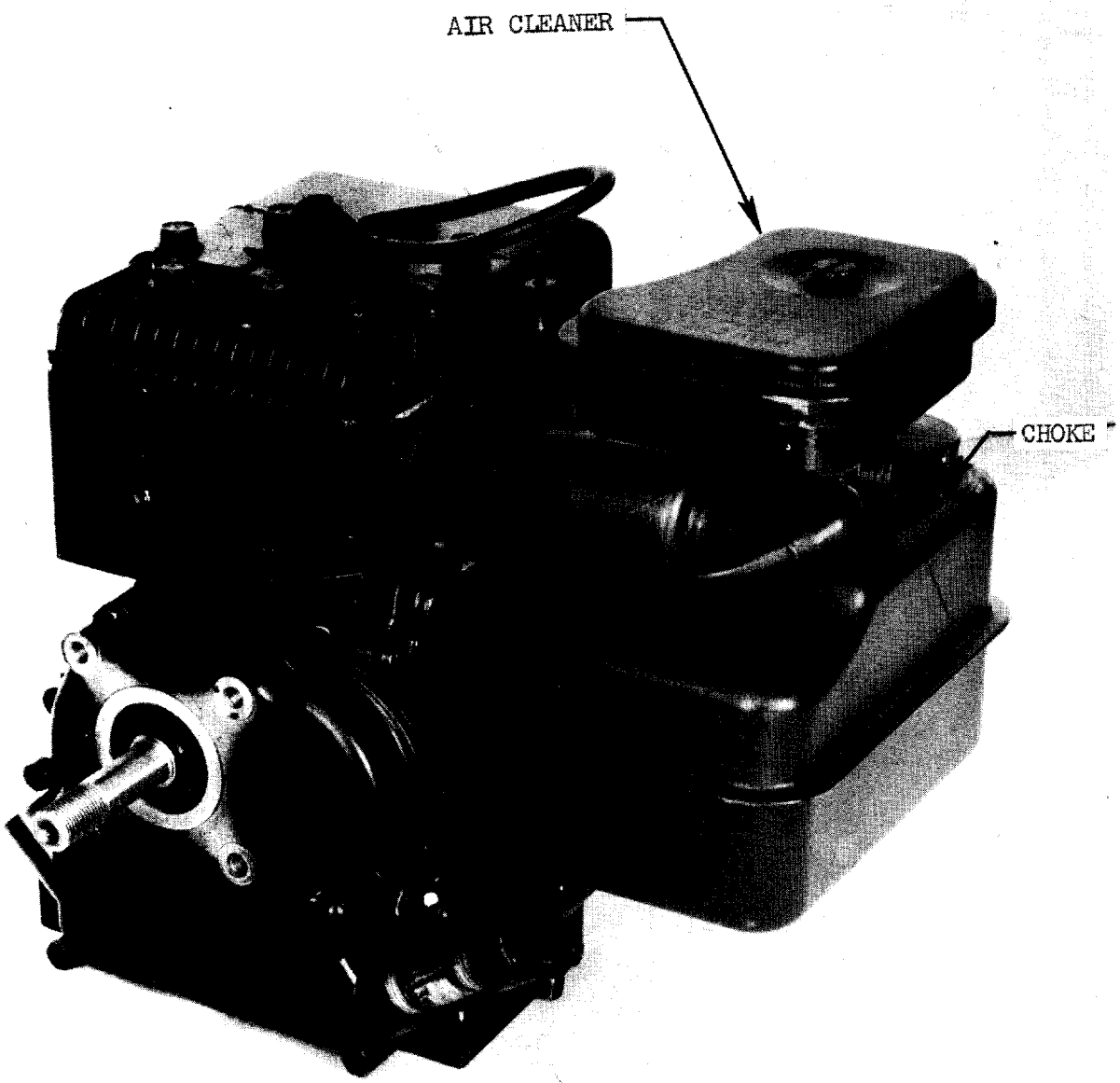
		clean nozzle screen. Check discharge line for kinks or twists.
c.	Pump Partially Primed	c. Reprime and test.
d.	Discharge Nozzle Clogged or Defective	d. Check and repair or replace.
e.	Engine Speed Too Slow	e. Check governor setting and correct.

Figure NO. 9 (NOT USED)



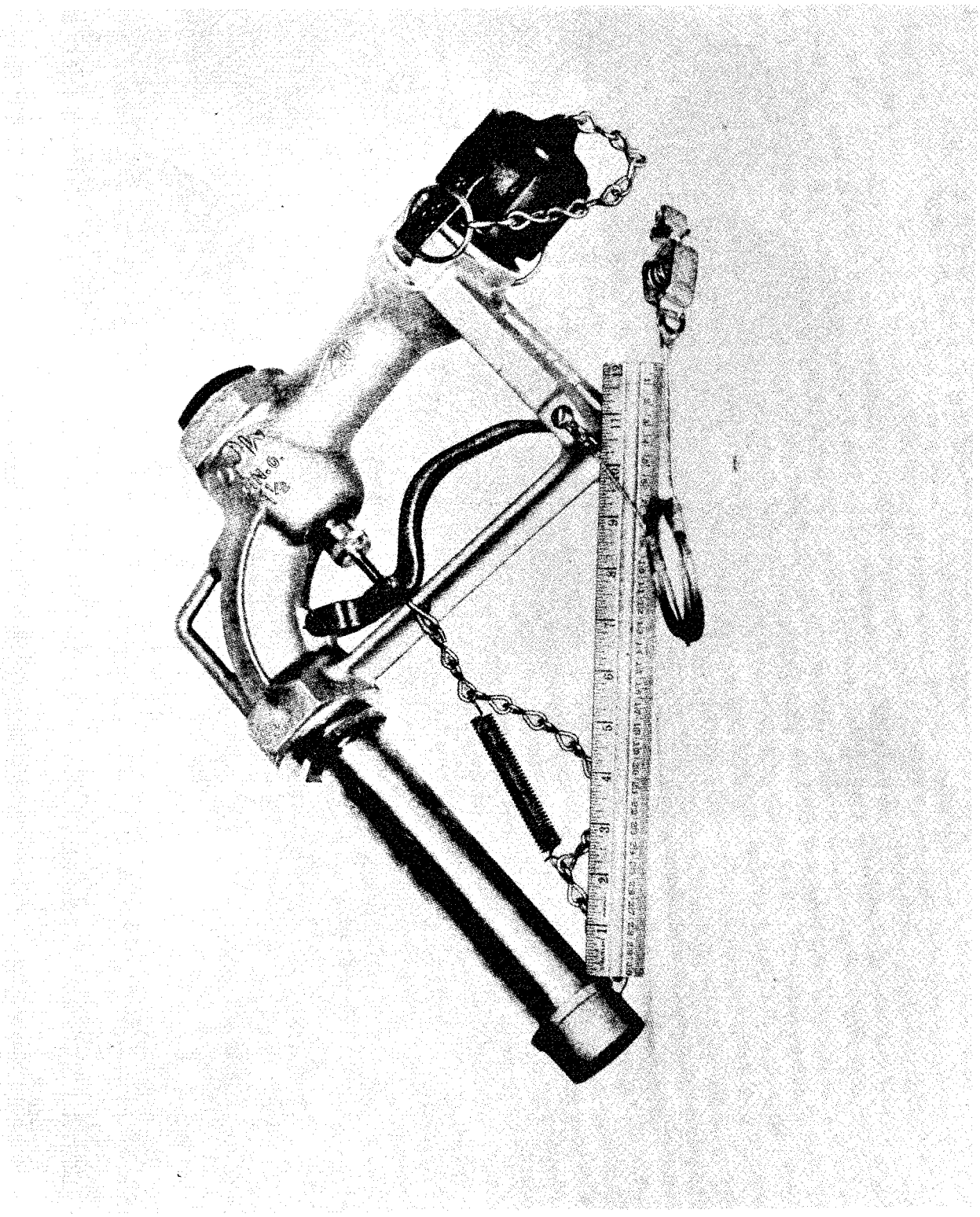
CONTROL LOCATION, ENGINE SX-1086
(Rear View)

FIGURE NO. 10



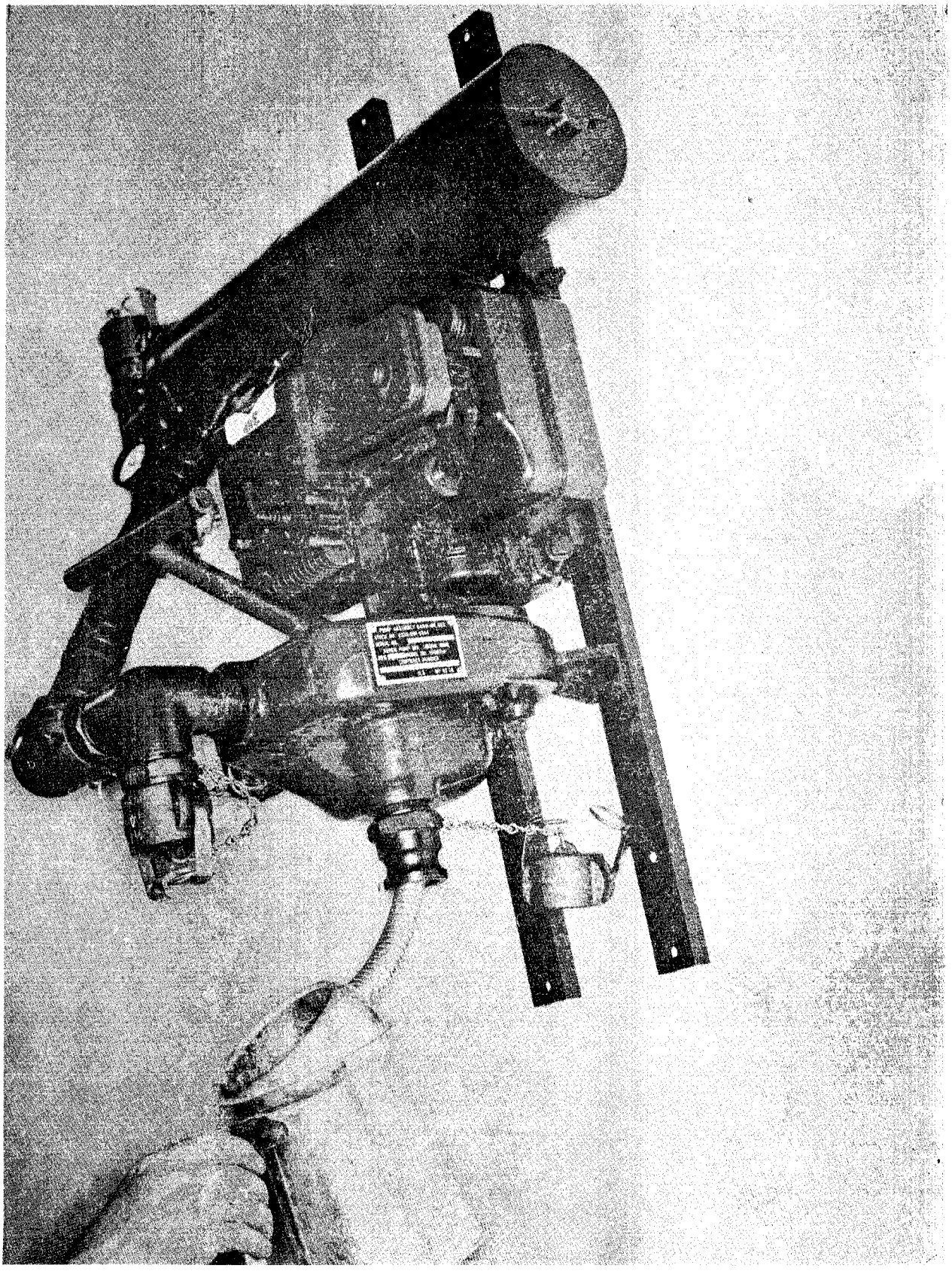
CONTROL LOCATION, ENGINE SX-1086
(Front View)

FIGURE NO. 11



NOZZLE ASSEMBLY SX-931A

FIGURE NO. 12



PRIMING THE PUMP

FIGURE NO. 13

CHAPTER 4 OPERATOR' S MAINTENANCE INSTRUCTIONS

Section I SPECIAL ORGANIZATIONAL TOOLS AND EQUIPMENT

4.1 Special Tools. No special tools or equipment are required to maintain the refueling system.

Section II LUBRICATION

4.2 Engine Lubrication Procedures.

4.2.1 Remove the oil filler cap.

4.2.2 Place engine in a level position.

4.2.3 Fill crankcase to overflowing (Pour slowly).

4.2.4 Nothing should be added to recommended oils.

4.2.5 Replace filler cap.

4.2.6 Check oil level regularly (At least every 5 hours).

4.3 Engine Oil Change.

4.3.1 Change oil after first 5 hours of operation. Thereafter, change oil every 25 hours of operation.

4.3.2 Remove drain plug and drain oil while engine is warm.

4.3.3 Replace drain plug.

4.3.4 Remove oil filler cap and refill with new oil of proper grade.

4.3.5 Replace filler cap.

4.4 Air Cleaner Service (Oil-Foam Type).

4.4.1 Remove thumb screw.

4.4.2 Lift air cleaner from carburetor.

4.4.3 Take air cleaner apart.

4.4 Air Cleaner Service (Oil Foam Type)(Continued).

4.4.4 Wash foam element in kerosene or solvent.

4.4.5 Squeeze dry and re-oil with three tablespoons of engine oil.

4.4.6 Squeeze again to spread oil throughout foam.

4.4.7 Assemble parts and replace air cleaner.

Section III STORAGE

4.5 Engine. Engines to be stored over 30 days should be completely drained of fuel to prevent gum deposits from forming on essential carburetor parts, fuel filter, fuel line, and tank. Remove fuel from the tank and run engine until it stalls from lack of fuel. Remove the spark plug and pour 1 ounce of SAE 30 oil into cylinder and crank slowly to distribute the oil. Replace the spark plug loosely. Clean exterior of the engine.

4.6 Monitor. Drain all remaining fuel from the monitor and install dust cap on the discharge port.

4.7 Pump. Drain all remaining fuel from the pump chamber. (This may be accomplished simultaneously with draining the monitor.) Install dust cap over pump suction port.

4.8 Hoses and Nozzles. Drain remaining fuel from the suction and discharge assemblies and install dust caps and plugs. Coil neatly. Install dust cap and dust plug over nozzle opening.

Section IV PUMP DISASSEMBLY AND INSPECTION

4.9 Caution. The pump should not be disassembled unless there is an indication that it is not functioning properly or that spare parts replacement is necessary.

4.10 Pump Disassembly. If disassembly is required to service the internal portions of the pump, utilize the following procedure.

4.10.1 Drain casing completely.

4.10.2 Drain Bendix Monitor completely.

4.10.3 Disconnect quick coupling elbow at pump discharge - apply dust caps and plugs. This disconnects the monitor.

4.10.4 Disconnect suction hose and apply dust caps and plugs.

4.10.5 Remove two bolts securing pump to base channels.

4.10.6 Loosen but do not remove engine mounting bolts (4).

4.10.7 Remove nuts from casing studs (3/8 - 16) which connect casing to adapter casting.

4.10.8 Tap casing lightly with soft mallet to break adherance of gasket. Pull casing straight away from engine and adapter.

4.10.9 The impeller is now exposed for removal and service of the shaft seal. To remove impeller, tap counterclockwise with hardwood drift and unscrew.

4.10.10 Remove sleeve assembly which contains rotating portion of shaft seal.

4.10.11 Remove adapter casting to replace seal seat.

4.10.12 In replacing shaft seal seat, lubricate seal seat and shaft seal with engine oil.

4.10.13 Replace all components in reverse order. Note position and relation of all components.

4.10.14 To replace wear plate, remove dome nuts on suction side of pump casing and remove carriage bolts which secure it to pump casing.

4.10.15 Always replace casing gasket when disassembling pump casing from adapter.

CAUTION: CARBON NOSE OF SHAFT SEAL MUST RIDE AGAINST THE LAPPED SURFACE OF NI-RESIST SEAL SEAT.

4.11 Removal of Engine. To remove engine from pump and base assembly, follow the below procedure.

4.11.1 Remove pump casing and adapter (4.10.1 -- 4.10.11).

4.11.2 Remove engine from base by removing 4 mounting bolts previously loosened.

4.11.3 Lift engine from base.

4.11.4 Replace in reverse order.

Section V REPLACEMENT OF MONITOR ELMENTS The monitor elements may be replaced without disassembling any other component of the system. (Naturally, it is recommended that the monitor and pump be drained of fuel and all hoses removed from the unit.)

a. Unscrew locking handle at the rear of the monitor (turn counterclockwise). This will force the rear cover of the monitor off.

b. Elements (fuses) may then be removed by pulling each straight out of the cylinder.

c. Re-insert new elements by hand. Five are required.

d. Replace the "O" ring sealing the rear cover assembly.

e. Lubricate the "O" ring with SAE 30 motor oil.

f. Install the rear cover, using caution not to pinch or cut the "O" ring. IT IS IMPORTANT THAT THE REAR COVER BE REPLACED GRADUALLY BY ALTERNATE TAPPING OF COVER AND TURNING THE LOCKING HANDLE TO PREVENT DAMAGE OF THE "O" RING OR MISALIGNMENT OF THE COVER.

CHAPTER 5 MINOR REPAIRS

Section I. GENERAL

5.1. SPECIAL TOOLS AND EQUIPMENT

5.1.1. No special tools and equipment are, required at operational level to maintain the fuel transfer system.

5.2. SERVICE AND MAINTENANCE DATA

5.2.1. This portion provides data for the 114MX1A portable Fuel Transfer System (Pump-Engine-Monitor) plus detailed instructions for the Pump Service Kit K 214-5 (see par. 4.10 for pump disassembly).

5.2.2. This portion provides data for 3 HP engine components plus detailed maintenance and tear-down instructions.

5.2.3. This portion provides an illustration of the hose and nozzle accessory package SX-1077.

5.2.4. This portion provides an illustration for the Monitor Assembly (100 GPM Go-No-Go Gage) (see Chapter 4, Section V for replacement of monitor elements).

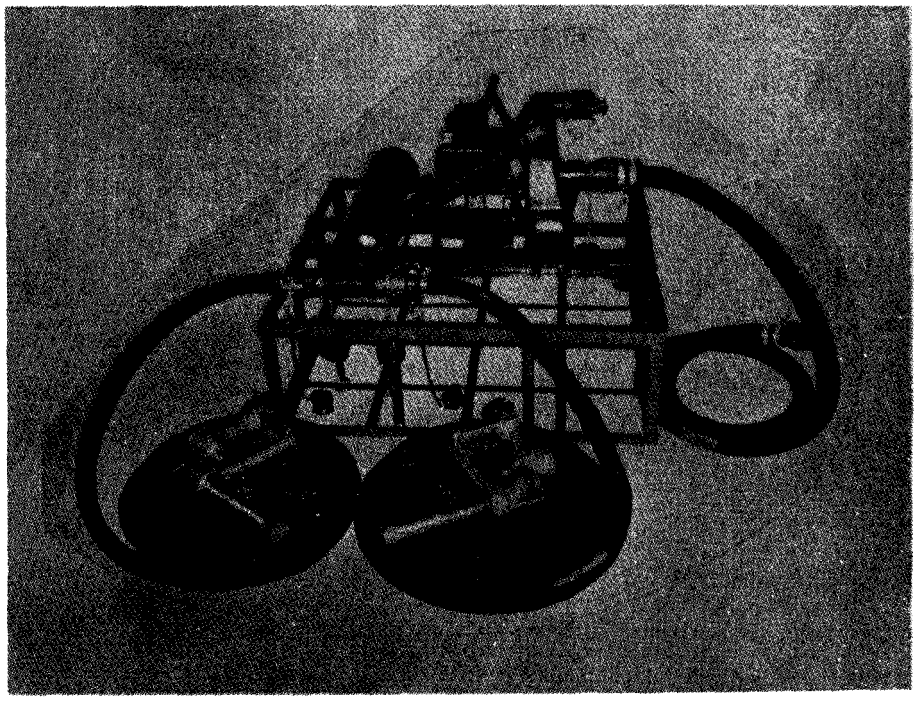
5.2.1. SERVICE AND MAINTENANCE DATA FOR 114MX1A PORTABLE FUEL TRANSFER SYSTEM (PUMP-ENGINE-MONITOR)

Figure 14. Fuel transfer pump assembly.

(Located in back of manual)

Figure 15. (Not used)

K 214-5
FIELD SERVICE KIT
FOR
MODEL 114MX1A
PORTABLE, FUEL TRANSFER SYSTEM



5.2.1.1 Replacement of Shaft Seal-Sleeve-Seal Seat,

To remove the seal assembly, follow these steps:

1. Remove four 3/8" nuts securing pump casing to pump adapter and engine. Also remove cap screws securing pump casing to base.

2. Remove pump casing thereby exposing impeller and seal assembly.

3. Slightly tap (Figure A) impeller vanes (Counter-clockwise) with block and hammer to free it on shaft, Now, impeller may be turned off. The removal of the impeller then will allow removal of the shaft seal, sleeve, and access to the seal seat.

5.2.1.2 Installation Instructions (Figure B).

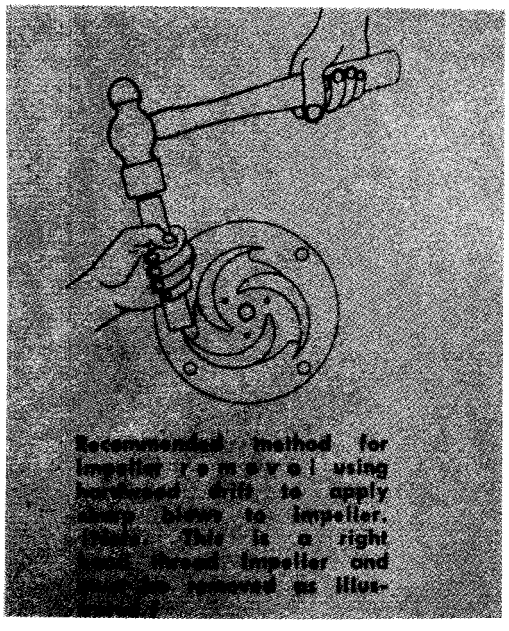
1. Lubricate seal seat "O" Ring with oil prior to installation of seat.

2. Insert seat (Item 2) into adapter (Item 4) so highly polished surface of seat is exposed to mate with carbon nose of seal.

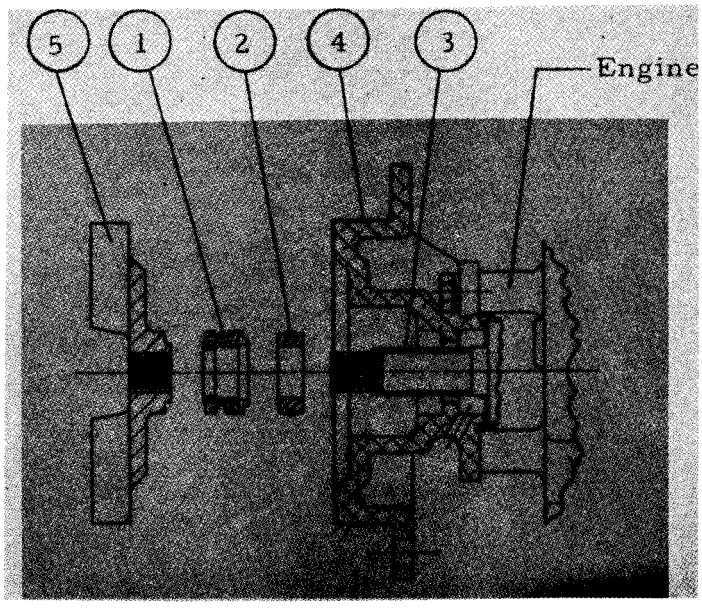
3. Install sleeve (Item 3) and seal (Item 1) so carbon nose of seal mates with polished surface of seat and inside radius of sleeve is towards engine.

4. Thread on impeller (Item 5).

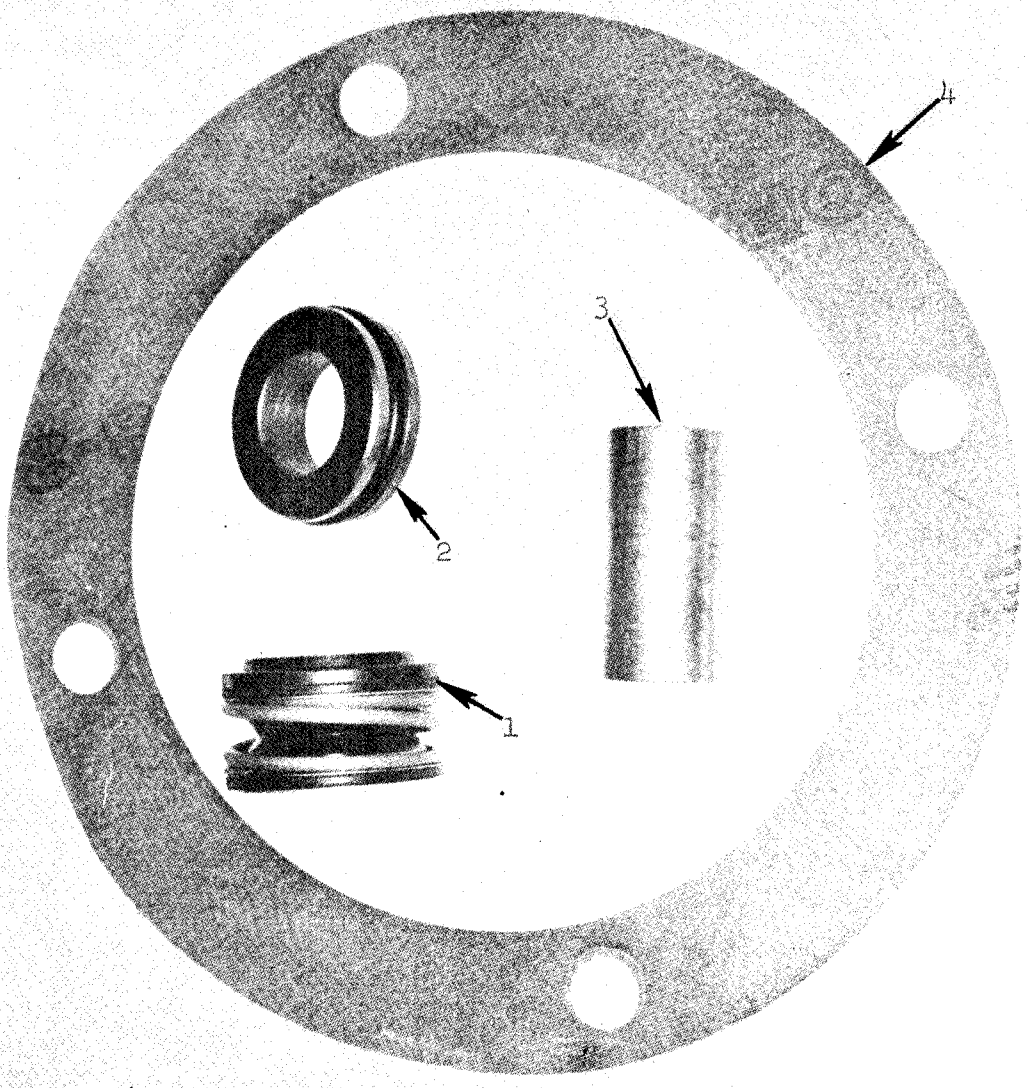
5. Replace gasket on adapter flange. Always install new gasket (NOT SHOWN).



(Figure A)



(Figure B)



LEGEND

1 Shaft seal
2 Seal seat
3 Sleeve
4 Casing gasket

5.2.2. SERVICE AND MAINTENANCE DATA FOR 3 HP ENGINE COMPONENTS

5.2.2.1 Maintenance & Teardown Instructions.

5.2.2.1.1 Check-Up.

Most complaints concerning engine operation can be classified as one or a combination of the following:

1. Will not start
2. Hard starting
3. Kicks back when starting
4. Lack of power
5. Vibration
6. Erratic operation
7. Overheating
8. High oil consumption

When the cause of malfunction is not readily apparent, perform a check-up of the Compression, Ignition, and Carburetion System. This check-up performed in a systematic manner can usually be done in a matter of minutes. It is the quickest, surest method of determining cause of failure and will point up possible cause of future failures, which can be corrected at the time. The basic check-up procedure is the same for all engine models, while any variation by model will be shown under the subject heading.

NOTE: WHAT APPEARS TO BE AN ENGINE MALFUNCTION MAY BE A FAULT OF THE POWERED EQUIPMENT RATHER THAN THE ENGINE. IF EQUIPMENT IS SUSPECT

5.2.2.l.2 Check Compression.

Spin the flywheel against compression. It should rebound sharply.

NOTE: IF ENGINE IS EQUIPPED WITH "EASY-SPIN" STARTING SYSTEM, SPIN FLYWHEEL IN REVERSE ROTATION (COUNTERCLOCKWISE) TO OBTAIN ACCURATE COMPRESSION CHECK.

If compression is poor, look for:

1. Loose spark plug
2. Loose cylinder head bolts
3. Blown head gasket
4. Burnt valves and/or seats
5. Insufficient tappet clearance
6. Warped cylinder head

7. Warped valve stems
8. Worn bore and/or rings
9. Broken connecting rod

5.2.2.1.3 Check Ignition.

Remove the spark plug. Spin the flywheel rapidly. If spark jumps the .166", you may assume the ignition system is functioning satisfactorily. Try a new spark plug. This test can be made by holding the ignition cable 1/8" away from the head,

If spark does not occur, look for:

1. Incorrect armature air gap
2. Worn bearings and/or shaft on flywheel side
3. Sheared flywheel key
4. Incorrect breaker point gap
5. Dirty or burned breaker points
6. Breaker plunger stuck or worn
7. Shorted ground wire (when so equipped)
8. Shorted stop switch (when so equipped)
9. Condenser failure
10. Armature failure

5.2.2.1.4 Check Carburetion.

Before making a carburetion check, be sure the fuel tank has an ample supply of fresh, clean gasoline. On all models, inspect and adjust the needle valves. Check to see that the choke closes completely. If engine will not start, remove and inspect the spark plug.

If plug is wet, look for:

1. Overcooking
2. Excessively rich fuel mixture
3. Water in fuel

If plug is dry, look for:

1. Leaking carburetor mounting gaskets
2. Gummy or dirty screen or check valve
3. Inoperative pump (Pulse-Jet carburetors)

A simple check to determine if the fuel is getting to the combustion chamber through the carburetor is to remove the spark plug and pour a small

quantity of gasoline through the spark plug hole. Replace the plug. If the engine fires a few times and then quits, look for the same condition as for a dry plug.

5.2.2.1.5 Equipment. - Effecting Engine Operation.

Frequently, what appears to be a problem with engine operations, such as bad starting, vibration, etc. , may be the fault of the equipment powered rather than the engine itself.

5.2.2.2 Compression.

5.2.2.2.1 Remove Cylinder Head and Shield.

Always note the position of the different cylinder head screws so that they may be properly reassembled. If a screw is used in the wrong position, it may be too short and not engage enough threads or it may be too long and bottom on a fin, either breaking the fin or leaving the cylinder head loose.

5.2.2.2.2 Install Cylinder Head and Shield.

Assemble the cylinder head with new head gasket, cylinder head shield, and washers in their proper place. Do not use shellac or other sealer on cylinder head gaskets. Tighten the screws down evenly by hand in rotation, until they are snug against the washer or cylinder head. Use a 1/2" socket wrench with a handle not over 6" long and tighten screws about 1/4 turn. Do not turn one screw down completely before the others, as it may cause a warped cylinder head. Run the engine 2 to 5 minutes. Then tighten all screws snugly, (which will normally be about 1/4 turn). See Figure 16

5.2.2.2.3 To Reface Valves and Seats.

Faces on valves and valve seats should be resurfaced with a valve grinder or cutter, to an angle of 45°. Valve and seat should then be lapped with a fine lapping compound to remove grinding marks and assure a good seat. Valve seat width should be 3/64" to 1/16". If the seat is wider, a narrowing stone or cutter should be used. If either the seat or valve is badly burned, it should be replaced. Replace valve if margin is 1/64" or less after refacing.

5.2.2.2.4 To Check and Adjust Tappet Clearance.

Insert the valves in their respective positions in the cylinder. Turn the crankshaft until one of the valves is at its highest position. Then turn the crankshaft one revolution. Check clearance with feeler gauge. See Table 1. Repeat for other valve. Grind off the end of the valve stem if necessary to obtain proper clearance.

NOTE: CHECK CLEARANCE COLD.

5.2.2.2.5 To Install Valves,

Some engine's use the same spring for intake and exhaust side, while others use a heavier spring on the exhaust side. Compare springs before installing

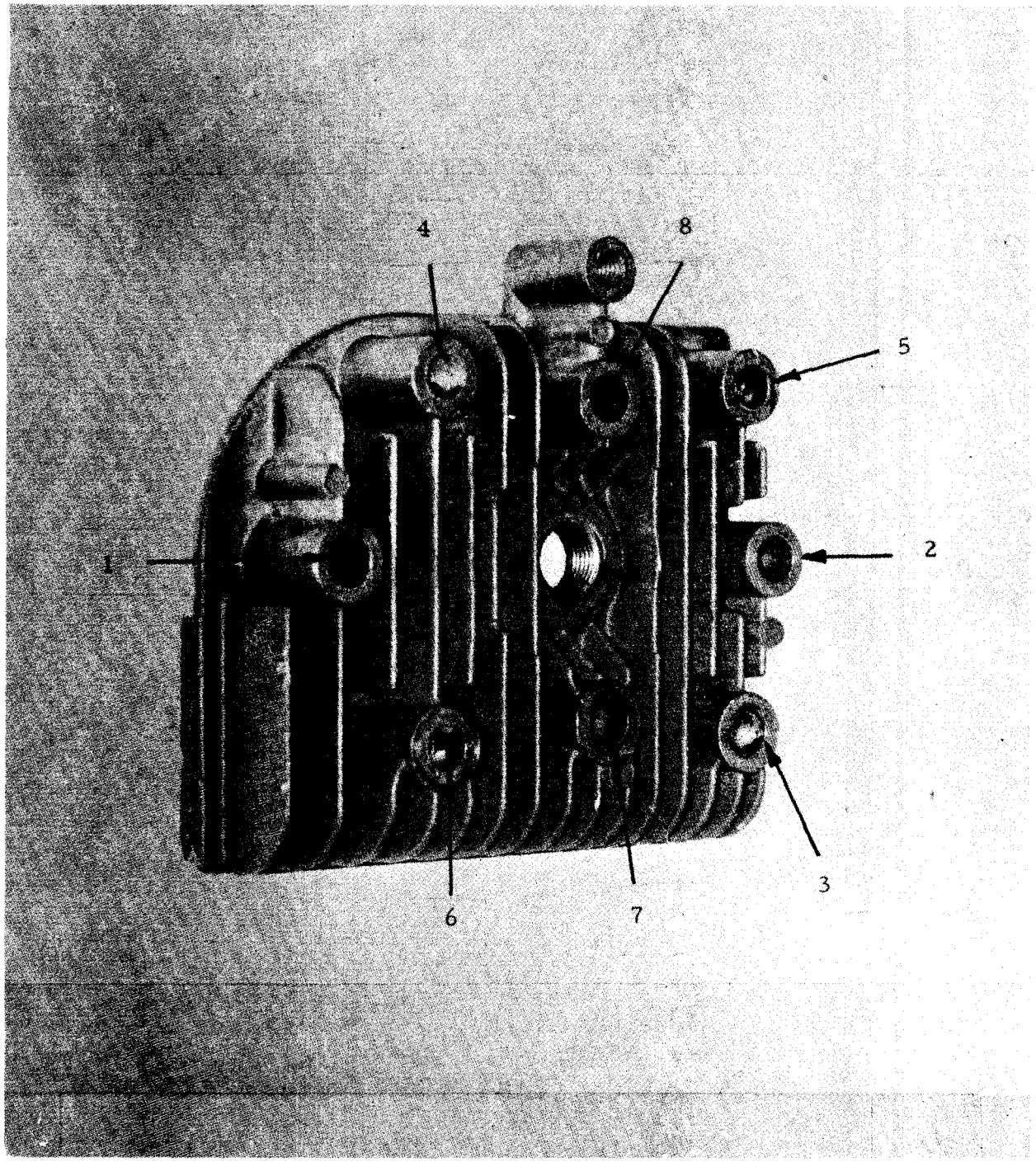


FIGURE 16 HEAD TIGHTENING SEQUENCE

If self-lock retainer is used, compress retainer and spring with compressor SX-1561. Large diameter of retainer should be toward front of valve chamber. Insert compressed spring and retainer into valve chamber. Drop the valve stem through larger area of retainer slot and move the compressor so as to center the small area of the valve retainer slot onto the valve stem shoulder. Release the spring tension and remove the compressor. Figure 17 & 18

TABLE 1
VALVE TAPPET CLEARANCE

Engine Model Series	INTAKE		EXHAUST	
	Max.	Min.	Max.	Min.
SX-1086	.007	.005	.011	.009

5.2.2.2.6 Valve Guides - SX-1086.

If the flat end of valve guide plug gauge, SX-1569, can be inserted into the valve guide for a distance of 5/16", the valve guide is worn and should be rebushed in the following manner:

Use reamer SX-1562 to ream the worn guide. Ream only to 1/16" deeper than valve guid bushing SX-1563. Do not ream all the way through the guide.

Press in valve guide bushing SX-1563 until top end of bushing is flush with top end of valve guide. Use a soft metal driver(brass, copper, etc.) so top end of bushing is not peened over.

Finish reaming the bushing with reamer SX-1564. The guide is now rebushed and a standard valve can be used.

5.2.2.2.7 Valve Seat Inserts.

Aluminum alloy cylinder models are equipped with inserts on exhaust and intake side. Figures 19 through 22

5.2.2.2.8 To Remove Valve Seat Insert.

Use valve seat puller SX-1565 and select the proper puller nut. Be sure the puller body does not rest on the valve seat insert. Turn the 5/16" bolt with a wrench until the insert is pulled out of the cylinder. Figures 19 & 20

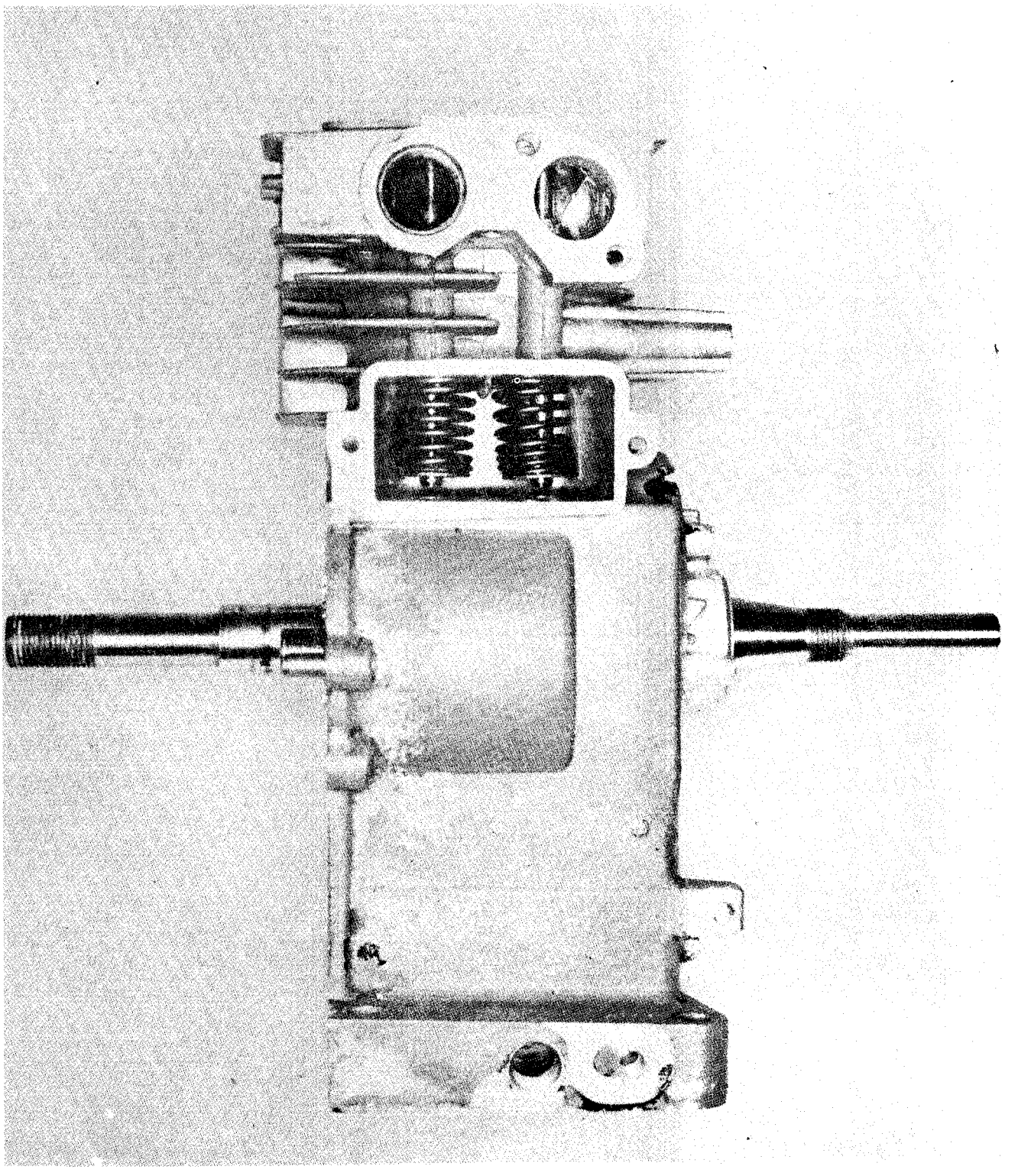


FIGURE 17 VALVE SPRING LOCATION

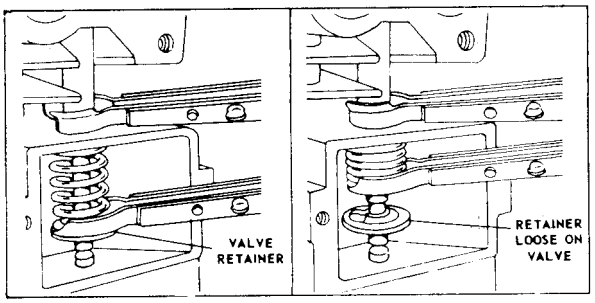


FIGURE 18 VALVE SPRING REMOVAL

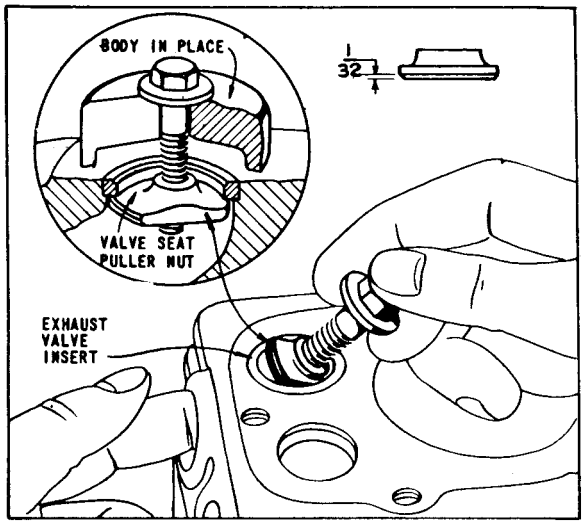


FIGURE 19 VALVE INSERT REMOVAL

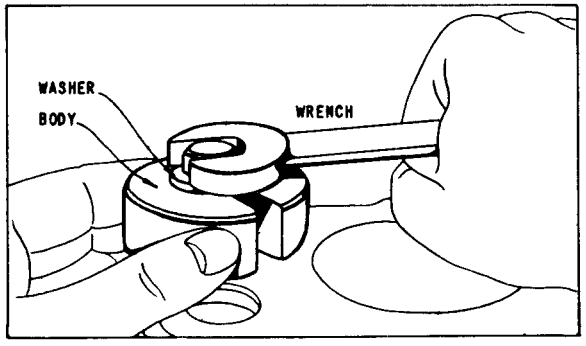


FIGURE 20 VALVE INSERT REMOVAL

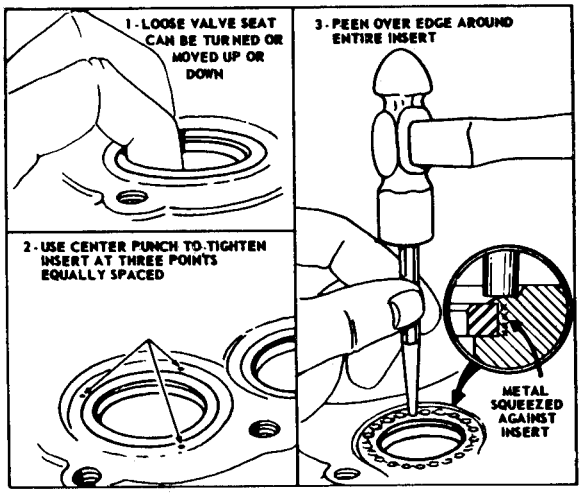


FIGURE 21 VALVE SEAT INSTALLATION

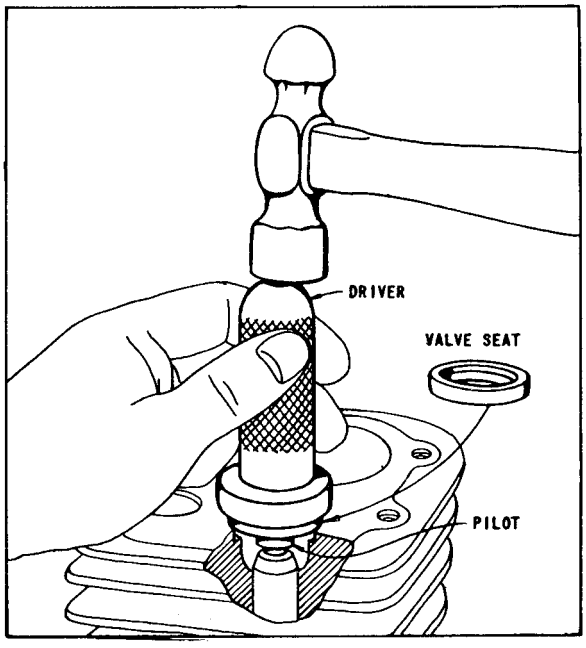


FIGURE 22 VALVE SEAT INSTALLATION

NOTE: ON ALUMINUM ALLOY CYLINDER MODELS, IT MAY BE NECESSARY TO GRIND THE PULLER NUT UNTIL THE EDGE IS 1/32" THICK IN ORDER TO GET THE PULLER NUT UNDER THE VALVE INSERT.

5.2.2.2.9 To Drive in New Valve Seat Insert.

Select the proper valve seat insert and the correct pilot and driver, according to Table 2. You will note that one side of the seat insert is chamfered at the outer edge. This side should go down into the cylinder. Figure 21 & 22

Insert the pilot into the valve guide, then drive the valve insert into place with the driver. The seat should then be ground lightly and the valves and seats lapped lightly with grinding compound. Clean thoroughly.

NOTE: ALUMINUM ALLOY CYLINDER MODELS - Use the old insert as a spacer between the driver and the new insert. Drive the new insert until it bottoms. Top of insert will be slightly below cylinder head gasket surface. Then peen around the insert.

TABLE 2
TOOLS & VALVE SEAT INSERTS

Model Series	Insert Puller	Puller Nut	VALVE SEAT INSERT			Pilot	Driver
			Intake	Exhaust	Stellite		
SX-1086	SX-1565	SX-1570	SX-1571	SX-1572	SX-1573	SX-1574	SX-1575

5.2.2.3 Ignition.

5.2.2.3.1 Spark Plug.

The plugs recommended for the engine are Champion CJ-8, Auto-Lite A-71, or AC-GC46. If resistor type spark plugs are desirable to decrease radio interference, use Champion XJ-8 or equivalent.

5.2.2.3.2 Spark Plug Cleaning.

Clean spark plug with a pen knife or wire brush and solvent and set gap at .025 for all models. If electrodes are burned away, or the porcelain is cracked, replace with a new plug. Do not use abrasive cleaning machines.

5.2.2.3.3 Flywheel.

The flywheel is located on the crankshaft with a soft metal key. It is held in. place by a nut or starter clutch. The flywheel key must be in good condition “to insure proper location of the flywheel for ignition purposes. DO NOT use a steel key under any circumstances. Use only the soft metal key, as originally supplied.

The keyway in both flywheel and crankshaft should not be distorted. The flywheel is made of cast iron.

5.2.2.3.4 Remove Flywheel Nut or Starter Clutch.

On flywheels of 6-3/4 inch diameter or less, use flywheel holder SX-1566, to keep flywheel from turning. Starter clutch used on rewind starter has a right hand thread. Use SX-1567 starter clutch wrench. Refer to page 21 for list of special tools used on the SX-1086 engine.

For flywheels of larger diameter, place a block of wood under flywheel fin to prevent flywheel turning while loosening nut on starter clutch.

5.2.2.3.5 Remove Flywheel.

Small cast iron flywheels do not require a flywheel puller.

5.2.2.3.6 Install Flywheel, Nut and/or Starter Clutch.

Remove all oil or grease, clean flywheel hole and tapered end of crankshaft before assembling flywheel to shaft. Insert soft metal key into keyways. Slip

spring washer over crankshaft with hollow side toward flywheel. To tighten flywheel nut or starter clutch, reverse removal operation. See Remove Flywheel Nut or Starter Clutch.

5.2.2.3.7 Breaker Points.

Breaker point gap on all models equipped with flywheel ignition is .020. Breaker points should be checked for contact, and for signs of burning or pitting. Points set too wide will advance spark timing and may cause kick back when starting. Points gapped too close retards spark timing and decreases engine power.

5.2.2.3.8 Remove Breaker Points.

Breaker points assemblies are removed by loosening the screw holding the post. The condenser on these models also includes the breaker point. The condenser is removed by loosening the screw holding the condenser clamp. See Figure 23

5.2.2.3.9 Install Breaker Points.

Insert breaker plunger into the plunger hole in cylinder. Breaker points are installed by placing the mounting post of the breaker arm into the recess in the cylinder so that the groove in the post fits the notch in the recess. Tighten the mounting screw securely. Use a 1/4" spinner wrench if available. Slip the open loop of breaker arm, spring through the two holes in the arm, then hook closed loop of spring over the small post protruding from the cylinder. Push flat end of the breaker arm into the groove in the mounting post. This puts a tension on the spring and pulls arm against the plunger. If condenser post is threaded, attach the coil primary wire (and ground wire if furnished) with the lock washer and nut. If primary wire is fastened to condenser with spring fastener, compress spring, and slip primary wire. (and ground wire where furnished] into hole in condenser post. Release spring. Lay the condenser in place and tighten the condenser clamp securely. Install spring in breaker arm. Figures 23 through 26

When installing breaker point assemblies, be sure the small boss on the magneto plate enters the hole in the point bracket. Mount points to magneto plate or cylinder with lock screw. Fasten the armature lead wire and condenser lead wire to the breaker points with the clip and screw. If these lead wires do not have terminals, the bare end of the wires can be inserted into the clip and screw tightened to make a good. connection. Do not let the ends of the wire touch the point bracket or the magneto plate or the circuit will be shorted.

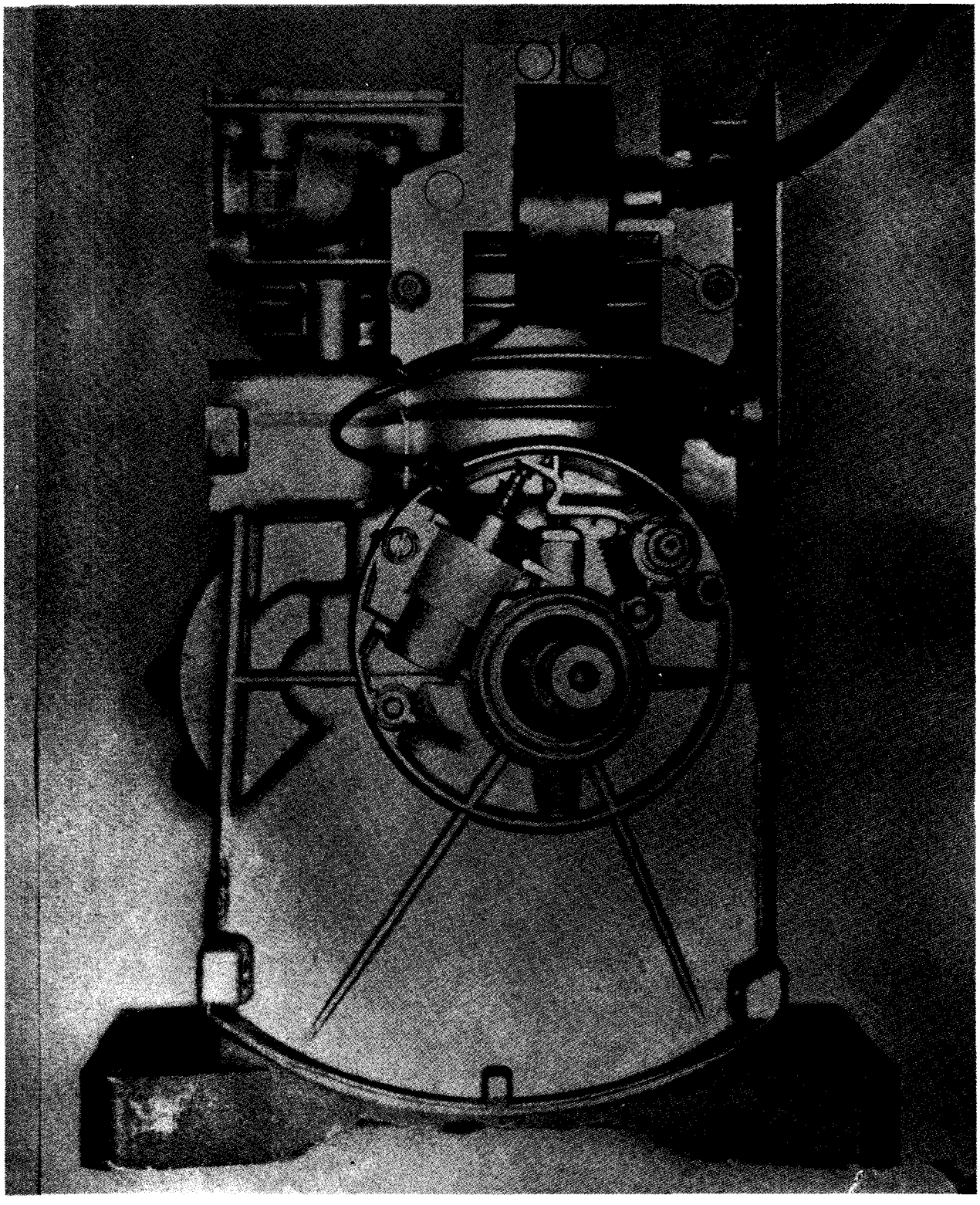


FIGURE 23 BREAKER POINT SERVICE

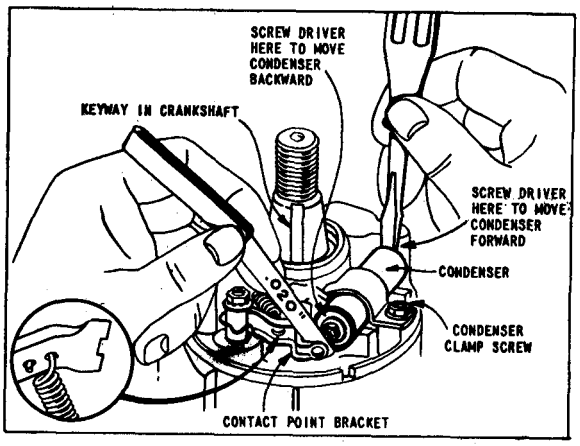


FIGURE 24 BREAKER POINT ADJUSTMENT

FIGURE 25 (NOT USED)

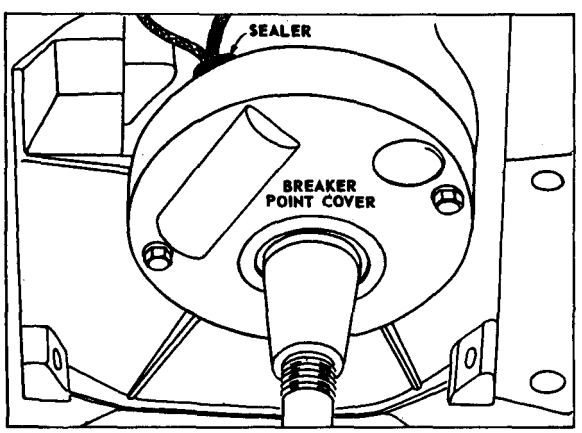


FIGURE 26 BREAKER POINT COVER INSTALLATION

NOTE: ALWAYS CLEAN BREAKER POINTS AFTER ADJUSTMENT. OPEN THE POINTS AND INSERT A PIECE OF LINTLESS PAPER. DRAW THE PAPER THROUGH BETWEEN THE POINTS. OPEN POINTS WHEN REMOVING PAPER SO IT WILL NOT TEAR, LEAVING PAPER BETWEEN THE POINTS.

5.2.2.3.10 Adjusting Breaker Point Gap.

Turn crankshaft until points open to widest gap. When adjusting breaker point assemblies, move condenser forward or backward with a screw driver until a gap of .020" is obtained.

5.2.2.3.11 Breaker Point Cover.

The breaker point cover protects the points from dirt. The opening for the primary and/or ground wire should be sealed with Permatex or similar sealer to prevent dirt from getting on the breaker points. Cover should not be distorted so as to lose its seal around the outer edge. Replace if damaged.

5.2.2.3.12 Install Armature.

Install governor blade, armature, and coil shield (when used). The mounting holes in the armature laminations are slotted. Push armature up as far as possible, and tighten one mounting screw to hold armature in place.

5.2.2.3.13 Adjust Armature Air Gap.

Set air gap between the flywheel and armature. Shown in Table 3. With armature up as far as possible, and one screw tightened, slip the proper gauge between armature and flywheel. Turn flywheel until magnets are directly below the armature. Loosen the one mounting screw and the magnets should pull the armature down firmly against the thickness gauge. Then tighten the mounting screws.

TABLE 3
ARMATURE AIR GAP

Model Series	Air Gap
SX-1086	.006" - .010"

TABLE 4
FLYWHEEL PULLERS

Model Series	Puller
SX-1086	none required

5.2.2.4 Carburetion.

5.2.2.4.1 Air Cleaners.

A properly serviced air cleaner protects the internal parts of the engine from dust particles in the air. If the air cleaner instructions are not carefully followed, the dirt and dust which should be collected in the cleaner will either be drawn into the engine and become a part of the oil film, or will choke the engine, causing an excessively rich mixture. Either condition is very detrimental to engine life; dirt in the oil forms an abrasive mixture which wears the moving parts instead of protecting them. No engine can stand up under the grinding action which takes place when this occurs. A choked off air cleaner can cause raw gasoline to wash oil off the cylinder walls, thereby causing poor lubrication. The air cleaner on every engine brought in for a check up or repair should be examined and serviced. If the cleaner shows signs of neglect, show it to the customer before cleaning and instruct him on proper care to assure long engine life.

NOTE: REPLACE AIR CLEANER GASKETS AND MOUNTING GASKETS THAT ARE WORN OR DAMAGED, TO PREVENT DIRT AND DUST EN - TERING ENGINE THROUGH IMPROPER SEALING. STRAIGHTEN OR REPLACE BENT MOUNTING STUDS.

5.2.2.4.2 Cleaning Fuel System.

Gummy or dirty fuel tanks, lines and carburetors should be cleaned in a carburetor cleaner, such as Bendix. Do not use acetone or soak parts for extended periods. Do no soak diaphragms or plastic parts in cleaner.

5.2.2.4.3 Carburetors.

Before removing any carburetor for repair, look for signs of air leakage of mounting gaskets that are loose, have deteriorated, or otherwise damaged.

Note position of governor springs, governor link, remote control, or other attachments to facilitate reassembly. Do no bend the links or stretch the spring.

5.2.2.4.4 Carburetor and Tank Assembly.

Remove the carburetor and fuel tank as one unit, being careful not to bend the governor linkage. After removal of the carburetor from the fuel tank, inspect the tank for deposits of dirt and/or varnish.

5.2.2.4.5 Throttle.

New style throttles are removed by using a Phillips screw driver to remove the throttle valve screw. After removal of the valve, the throttle may be lifted out. Reverse procedure to install.

5.2.2.4.6 Fuel Pipe.

Check balls are not used in these fuel pipes, The screen housing or pipe must be replaced if the screen cannot be satisfactorily cleaned. The long pipe supplies fuel from the tank to the pump. The short pipe supplies fuel from the tank cup to the carburetor. Fuel pipes are nylon or brass. Nylon pipes are removed and replaced by using a socket, or open end wrench. Where brass pipes are used, the screen housing only is replaced. Clamp the fuel pipe in a vise (Do not over-tighten). Drive off the housing with a screw driver. The new housing is installed by tapping it on the pipe with a soft hammer.

5.2.2.4.7 Needle Valve and Seat.

Remove needle valve to inspect. If carburetor is gummy or dirty, remove seat to allow better cleaning of metering holes.

5.2.2.4.8 Pump Disassembly and Repair.

Remove fuel pump cover, diaphragm, spring and cup. Inspect diaphragm for punctures, cracks, and fatigue. Replace if damaged. On early models, the spring cap is solid. On later models, the cap has a hole in it. New style supersedes the old style. When installing the pump cover, tighten the screws evenly to insure a good seal.

5.2.2.4.9 Carburetor Adjustment.

The initial setting of the needle valve is made by turning the needle valve all the way in, then turning out 1-1/2 turns. Final adjustment is made with the engine running. With the engine running at approximately 3000 RPM, turn the needle valve in until the engine starts to lose speed (lean mixture) then slowly open needle valve past the point of smoothest operation, until engine just begins to run unevenly. This mixture will give best performance under load.

Hold throttle in idle position. Turn idle speed adjusting screw until 1750 RPM idle speed is obtained. If engine tends to stall or die out under load, open needle valve slightly. This richer mixture may cause a slight unevenness in idling.

NOTE: WHEN STARTING A PULSA-JET ENGINE FOR THE FIRST TIME, IT W-ILL BE NECESSARY TO PRIME THE SUPPLY CUP, SINCE FUEL FROM THE TANK WILL NOT AUTOMATICALLY FLOW INTO THE CUP. TO PRIME, CLOSE THE CHOKE VALVE AND PULL THE STARTER CORD AT LEAST THREE TIMES.

5.2.2.5 Fuel Pump.

5.2.2.5.1 To Replace Pump Diagram.

Remove pump from cylinder and then remove four screws to separate pump head from pump body.

With a narrow punch, drive lever pin out until pump lever is loose. Pin may then be driven in either direction, but need not. be removed entirely. Remove old diaphragm, but leave diaphragm spring in pump body.

Place new diaphragm into pump body with the slot in shaft at right angles to the pump lever. Diaphragm spring should fit into the cup under the diaphragm. Without the lever spring, insert the pump lever into body holding the diaphragm down. Fit the hook at the end of lever into the slot in diaphragm shaft.

5.2.2.6 Cylinders.

5.2.2.6.1 Inspection - All Models.

Always inspect the cylinder after the engine has been disassembled. Visual inspection will show if there are any cracks, stripped bolt holes, broken fins, or if the cylinder wall is scored. Use an inside micrometer, or telescoping gauge and micrometer to determine the size of the cylinder bore. Measure at right angles. Table No. 5 lists the standard cylinder bore sizes.

If the cylinder bore is more than .003" oversize, or .0025" out of round on lightweight cylinders, it must be resized.

5.2.2.6.2 Resizing (Resize Cylinder Bore to Next Oversize).

Always resize to exactly .010", or .020", or .030" over standard size as shown in Table No. 1. If this is done accurately, the stock oversize rings and pistons will fit perfectly and proper clearances will be maintained. See Table No. 1. The lightweight cylinder can be quickly resized with a good hone. Use the stones recommended by the manufacturers in order to product the correct cylinder wall finish.

If a boring bar is used, a hone should be used after the boring operation to produce the proper cylinder wall finish.

Honing can be done with a portable electric drill, but is usually easier to use a drill press.

5.2.2.6.3 To set up for Honing.

Clean cylinder at top and bottom to remove burrs and pieces of base and head gaskets. Fasten cylinder to heavy iron plate. Some cylinders require shims. Use a level to align drill press spindle with bore.

Oil surface of drill press table liberally. Set plate and cylinder on drill press table. (Do not anchor to drill press table.) If using portable drill, set plate and cylinder on floor. Place hone drive shaft in chuck of drill or portable drill.

Slip hone into cylinder, connect drive shaft to hone and set stop on drill press so hone can only extend 3/4" to 1" from top or bottom of cylinder.

If using a portable drill, cut a wood block to place inside of cylinder as a stop for hone. Disconnect drive shaft from hone and raise it out of way.

5.2.2.6.4 To Hone Cylinder.

Place hone in middle of cylinder bore. Tighten adjusting knob with finger or small screw driver until stones fit snugly against cylinder wall. DO NOT FORCE. Hone should operate at 300 to 700 RPM.

Connect drive shaft to hone. Be sure that cylinder and hone are centered and aligned with drive shaft and drill spindle. Start drill and, as hone spins, move it up and down at lower end of cylinder. The cylinder is not worn at the bottom but is round so it will guide the hone to straighten cylinder bore. As the bottom of the cylinder increases diameter gradually increase strokes until hone travels full length of bore, but do not extend hone more than 3/4" to 1" at either end of cylinder bore.

As cutting tension decreases, stop hone and tighten adjusting knob. Check cylinder bore frequently with an accurate micrometer. Hone about .0005" large to allow for shrinkage when cylinder cools.

Change from rough stone to finishing stone when within .0015" of desired size, then use finishing stones. Always bore .010", .020". or .030" above the standard dimensions given in Table No. 1.

5.2.2.6.5 Cylinder Finish and Cleaning.

The finish resized cylinder should have a crosshatch appearance. Proper stones, lubrication and spindle speed, along with rapid movement of hone within the cylinder. during the last few strokes will produce this finish. Crosshatching will allow proper lubrication and ring break-in.

It is most important that the cylinder be thoroughly cleaned after honing to eliminate all grit. Wash the cylinder carefully in a solvent such as kerosene. The cylinder bore should be cleaned with a brush, soap, and water.

TABLE 5
BORE DIMENSIONS

Engine Model or Series	Standard Bore Size Diameter	
	Maximum	Minimum
SX-1086	2.375	2.374

5.2.2.7 Pistons - Rings - Rods.

5.2.2.7.1 Remove Piston and Connecting Rod.

To remove the piston and connecting rod from the engine, bend down connecting rod lock. Remove the connecting rod cap. Remove any carbon or ridge at the top of the cylinder bore, this will prevent breaking of the rings. Push the piston and rod out through the top of the cylinder.

The pistons used in the sleeve bore aluminum alloy engines are marked with an "L" on top of the piston. These pistons are tin plated and use an expander with the oil ring.

5.2.2.7.2 Remove Connecting Rod.

To remove connecting rod from piston, remove piston pin lock with thin nose pliers. One end of the pin is drilled to facilitate removal of the lock.

Remove rings one at a time, slipping them over the ring lands. Use a ring expander to prevent damage to rings and piston.

5.2.2.7.3 Check Piston.

If the cylinder is to be resized, there is no reason to check the piston, since a new oversizer piston assembly will be used.

If, however, the cylinder is not to be resized, and the piston shows no signs of wear or scoring, the piston should be checked.

To do so, clean carbon from top ring groove. Place a NEW ring on the groove, check the remaining space in the groove with a feeler gauge. If a .005" feeler gauge can be inserted, the piston is worn and should be replaced.

5.2.2.7.4 Check Rings.

To check rings, first clean all carbon from the ends of the rings and from the cylinder bore. Insert old rings, one at a time, one inch down into the cylinder. Check gap with feeler gauge. If ring gap is greater than shown in Table No. 6, the ring should be rejected.

NOTE: CHROME RING SETS ARE AVAILABLE FOR 2.375" BORE - MODEL SERIES SX-1086.

TABLE 6
RING GAP REJECTION SIZE

Model Series	Ring Gap Comp. Ring	Oil Ring
SX-1086	.035"	.045"

5.2.2.7.5 Check Connection Rod,

If the crankpin bearing in the rod is scored, the rod must be replaced. Rejection sizes of crankpin bearing hole and piston pin bearing hole are shown in Table No. 7. Piston. pins .005" oversize are available in case the connecting rod and piston are worn at the piston pin bearing. If, however, the crankpin bearing in the connecting rod is worn, the rod should be replaced. Do not attempt to "file" or "fit" the rod.

TABLE 7
CONNECTING ROD

Engine Model Series	Replace at These or Larger Sizes	
	Crankpin Bearing	Piston Pin Bearing
SX-1086	1.0013	.4913

5.2.2.7.6 Check Piston Pin.

If the piston pin is worn .0005" out of round or below the rejection sizes listed below, it should be replaced. Table No. 8.

5.2.2.7.7 Assemble Piston and Connecting Rod.

This piston pin is a push fit in both piston and connecting rod. On models using a solid piston pin, one end is flat, the other end is recessed. Other models use a hollow pin.

Place a pin lock in the groove at one side of the piston. From the opposite side of the piston, insert the piston pin, flat end first with solid pin, either end with hollow pins, until it stops against the pin lock. Use a thin nose pliers to assemble the pin lock in the recessed end of the piston. Be sure the locks are firmly set in the grooves.

5.2.2.7.8 Assembly Rings to Piston.

Note the various rings and the proper position of each, especially the center compression ring. The scraper groove should always be down toward the piston skirt. Be sure the oil return holes are clean and carbon is removed from all grooves. Install expander under oil ring in sleeve bore aluminum alloy engines.

Oil the rings and piston skirt, then compress rings with ring compressor.

On all aluminum engines, use compressor.

Turn the piston and compressor upside down on the bench and push downward, so the piston head and edge of compressor band are even while tightening the compressor. Draw the compressor up tight to fully compress the rings, then loosen the compressor very slightly.

NOTE: DO NOT ATTEMPT TO INSTALL PISTON AND RING ASSEMBLY WITHOUT RING COMPRESSOR.

5.2.2.7.9 Install Piston and Rod Assembly.

Place the connecting rod and piston assembly with rings compressed into the cylinder bore. Push piston and rod down into the cylinder. Oil the crankpin of the crankshaft. Pull the connecting rod against the crankpin and assemble the rod cap so assembly marks align.

NOTE: SOME RODS DO NOT HAVE ASSEMBLY MARKS AS ROD AND CAP WILL FIT ONLY IN ONE POSITION.

Assemble the cap screws and screw locks with oil dipper (if used). Tighten cap screws to torque shown in Table No. 9. Rotate the crankshaft two revolutions to be sure rod is correctly installed. If rod strikes, connecting rod has been installed wrong or cam gear is out of time. If crankshaft operates freely, bend screw locks against screw heads.

TABLE 9
CONNECTING ROD CAP SCREW TORQUE

Model Series	Minimum Inch Lbs.	Maximum Inch Lbs.
SX-1086	90	110

NOTE: TIGHTEN ROD SCREWS SECURELY. AFTER TIGHTENING ROD SCREWS, ROD SHOULD BE ABLE TO MOVE SIDEWAYS ON CRANKPIN OF SHAFT . IF NOT, ADJUST. A TORQUE WRENCH SHOULD BE USED TO

PREVENT LOOSE OR OVERTIGHT CAP SCREWS WHICH RESULTS IN BREAKAGE AND/OR SCORING

5.2.2.8 Crankshafts and Camgears.

5.2.2.8.1 Removal (Aluminum Cylinder Engines).

To remove the crankshaft from aluminum alloy engines, remove rust or burrs from the power take-off end of the crankshaft. Remove crankcase cover or sump. If sump or cover sticks, tap lightly on alternate sides near dowel. Turn crankshaft to align the crankshaft and camgear timing marks, lift out the camgear, then remove the crankshaft. On the SX-1086 model, the crankshaft and camgear must be removed together.

5.2.2.8.2 Checking Crankshaft.

Table No. 10 shows the rejection sizes of the various wear points of the crankshaft. Discard crankshaft if worn smaller than the size shown. Keyways should be checked to be sure they are not worn or spread. Remove burrs from keyway edges to prevent scratching the bearing.

TABLE 10

ENGINE MODEL	Replace at these or Smaller Sizes		
	Crankshaft		
	Mag. Journal	Drive Journal	Crankpin
SX-1086	.8725	.8725	.9936

5.2.2.9 Common Specifications for Model SX-1086 Engines:

1.	Spark Plug Gap	.025
2.	Condenser Capacity	.18 to .24 Microfarads
3.	Contact Point Gap	.020 Gap
4.	Top Operating Speed	3600 - 4000 RPM
5.	Idle Speed	1750 RPM
6.	Armature Air Gap	See Ignition
7.	Valve Clearance (Intake)	.005 - .007
8.	Valve Clearance (Exhaust)	.009 - .011
9.	Cylinder Bore Std. Diameter *	2.375 - 2.374
10.	Reject Size (Mag. & P.T.O.)	.878
11.	Crankshaft Reject Size (Mag. Journal)	.8725
	(Crankpin)	.9936
	(P. T. O. Journal)	.8725
12.	Crankshaft End Play	.002 - .008

*Resize if .003 or more wear or .0015 out of round.

5.2.2.9.2 Checking Cam Gear.

Inspect gear teeth for wear and nicks. Cam shaft and cam gear journals and lobe rejection sizes are shown in Table No. 11. Figure 27

Check automatic spark advance on models equipped with "Magna-Matic". Place cam gear in normal operating position with the movable weight down. Press the weight down. Release. The spring should lift the weight. If not, the spring is stretched or the weight is binding.

TABLE 11

Engine Model	Replace at These or Smaller Sizes Camshaft (Cam Gear Journals) and Lobe	
	Camshaft or Cam Gear Journals	Lobe
SX-1086	.4985	.883

5.2.2.9.3 Ball Bearings

5.2.2.9.3.1 To Remove,

The ball bearing is a press fit on the crankshaft. If either bearing or crankshaft is to be removed, use an arbor press.

5.2.2.9.3.2 To Install.

Heat bearing in hot oil (325° max.). Bearing must not rest on the bottom of the pan in which it is heated. Place crankshaft in vise with bearing side up. When bearing is quite hot, it will become a slip fit on the bearing journal. Grasp bearing with the shield down and thrust it down on the crankshaft. The bearing will tighten on the shaft while cooling. DO NOT QUENCH.

5.2.2.9.3.3 Aluminum Alloy Engines - Ball Bearing.

On crankshafts with ball bearings, the gear teeth are not visible for alignment of the timing marks, therefore, the timing mark is on the counterweight. On ball bearing equipped models, the tappets are installed first. The crankshaft and cam gear must be inserted together, align timing marks and insert crankshaft and cam gear.

5.2.2.9.3.4 Crankcase Cover and Crankshaft End Play.

The crankshaft end play on all models, plain and ball bearing, should be .002" to .008". The method of obtaining the correct end play varies, however, between cast iron, aluminum, plain and ball bearing models. New gasket sets

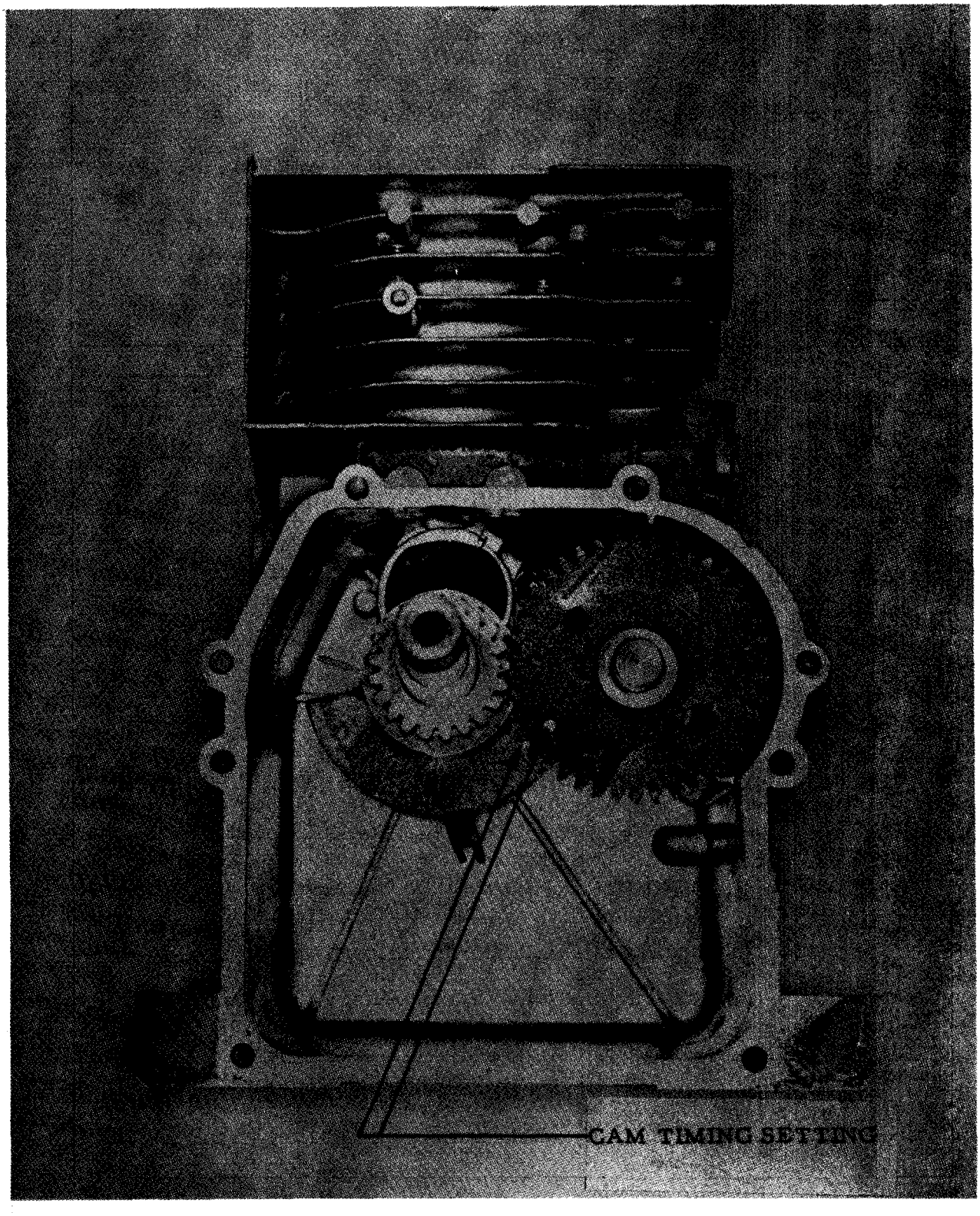


FIGURE 27

include three crankcase cover or bearing support gaskets - .005", .009", and .015" thick,

5.2.2.9.3.5 Aluminum Engines - Ball Bearing.

The metal shim is added to the magneto end of the crankshaft instead of the power take-off end. To protect the oil seal while assembling the crankcase cover, put oil or grease on the sealing edge of the oil seal. Wrap a piece of thin cardboard around the crankshaft so the seal will slide easily over the shoulder of crankshaft. If the sharp edge of the oil seal is cut or bent under, the seal may leak.

5.2.2.9.3.6 Checking End Play.

On models with a removable base, the end play can be checked with a feeler gauge between the crankshaft thrust face and the bearing support on plain bearing engines. On other models, the end play may be checked by assembling a dial indicator on the crankshaft with the pointer against the crankcase. Move the crankshaft in and out. The indicator will show the end play. The other method is to assemble a pulley to the crankshaft and measure the end play with a feeler gauge.

5.2.2.10 Bearings.

5.2.2.10.1 Ball Bearing.

The bearing is a press fit on the crankshaft.

If either bearing or crankshaft is to be replaced, the bearing should be removed in an arbor press.

To install, heat bearing in hot (325° max.) oil. Place crankshaft in a vise with bearing side up. When bearing is hot, it will be a slip fit on crankshaft journal. Grasp bearing with the shield down and thrust it on the crankshaft. The bearing will tighten on while cooling. DO NOT QUENCH.

TABLE 12
MAIN BEARING REJECT SIZE CHART

Engine Model	Reject Size	
	Magneto	P. T. O.
SX- 1086	.878	.878

5.2.2.10.2 Replacing Magneto Bearing (Aluminum Cylinder Engines).

There is no removable bearing in these models, so the cylinder must be reamed out so a replacement bushing can be installed.

Place guide bushing in the sump bearing with flange of guide bushing toward inside of sump.

Assemble sump on cylinder. Be careful that guide bushing does not fall out of place. Place guide bushing into the oil seal recess in the cylinder. This guide bushing will center the counterbore reamer even though old bearing might be badly worn.

Place counterbore reamer on pilot and insert into cylinder until the tip of the pilot enters the guide bushing in the sump.

Turn reamer clockwise with a steady even pressure until it is completely through the bearing. Ream dry.

Remove sump and pull reamer out without backing it through the bearing. Clean out reaming chips. Remove guide bushing from oil seal recess.

Hold the new bushing against the outer end of the reamed out bearing, with the notch in bushing aligned with the notch in the cylinder. Note the position of the split in the bushing. At a point in the outer edge of the reamed out

bearing, opposite to the split in the bushing, make a notch in the cylinder hub at a 45° angle to the bearing surface. Use a chisel or screw driver and hammer.

Press in the new bushing, being careful to align the oil notches, with driver and crankcase support until the outer end of the bushing is flush with the end of the reamed out cylinder hub.

With a blunt chisel or screw driver, drive a portion of the bushing into the notch previously made in the cylinder. This is called staking and is done to prevent the bushing from turning.

Reassemble sump to cylinder with guide bushing in the sump bearing.

Place reamer on pilot and insert the pilot into the cylinder bearing until the tip of the pilot enters the guide bushings in the sump bearing.

Lubricate the reamer with kerosene, fuel oil, or Stoddard Solvent, then ream the bushing, turning the reamer clockwise with a steady, even pressure until reamer is completely through the bearing. Improper lubricants will produce a rough bearing surface. Remove sump, reamer, guide bushing, and clean out all reaming chips.

5.2.2.11 Starters.

Repair procedure is as indicated. Refer to Figure 28.

Cut knot at starter pulley to remove rope. With rope removed, grasp outer end of starter spring with pliers and pull out of housing as far as possible. Bend one of the bumper tangs up and lift out starter pulley, disconnecting spring. Replace nylon bumpers, if worn.

Clean starter spring in a solvent. Wipe clean by pulling spring through a cloth. Straighten spring to allow easier installation and restore tension.

Insert end of spring with straight hook through housing above slot.

Hook end of spring into pulley slot. Push spring retainer into place with split portion of retainer opposite spring end. Place a dab of grease on pulley. Set pulley into housing and bend bumper tang down.

Clean starter spring in solvent. Wipe clean by pulling through a cloth. Straighten spring to allow easier installation and restore tension. Insert either end into blower housing slot and hook into pulley.

Place a dab of grease on pulley. Set pulley into housing and bend bumper tang down.

Place a 3/4" square piece of stock into center of pulley hub. Grasping stock with a wrench, wind pulley 13-1/4 turns counterclockwise, until hole in pulley for rope knot and eyelet in blower housing are in alignment.

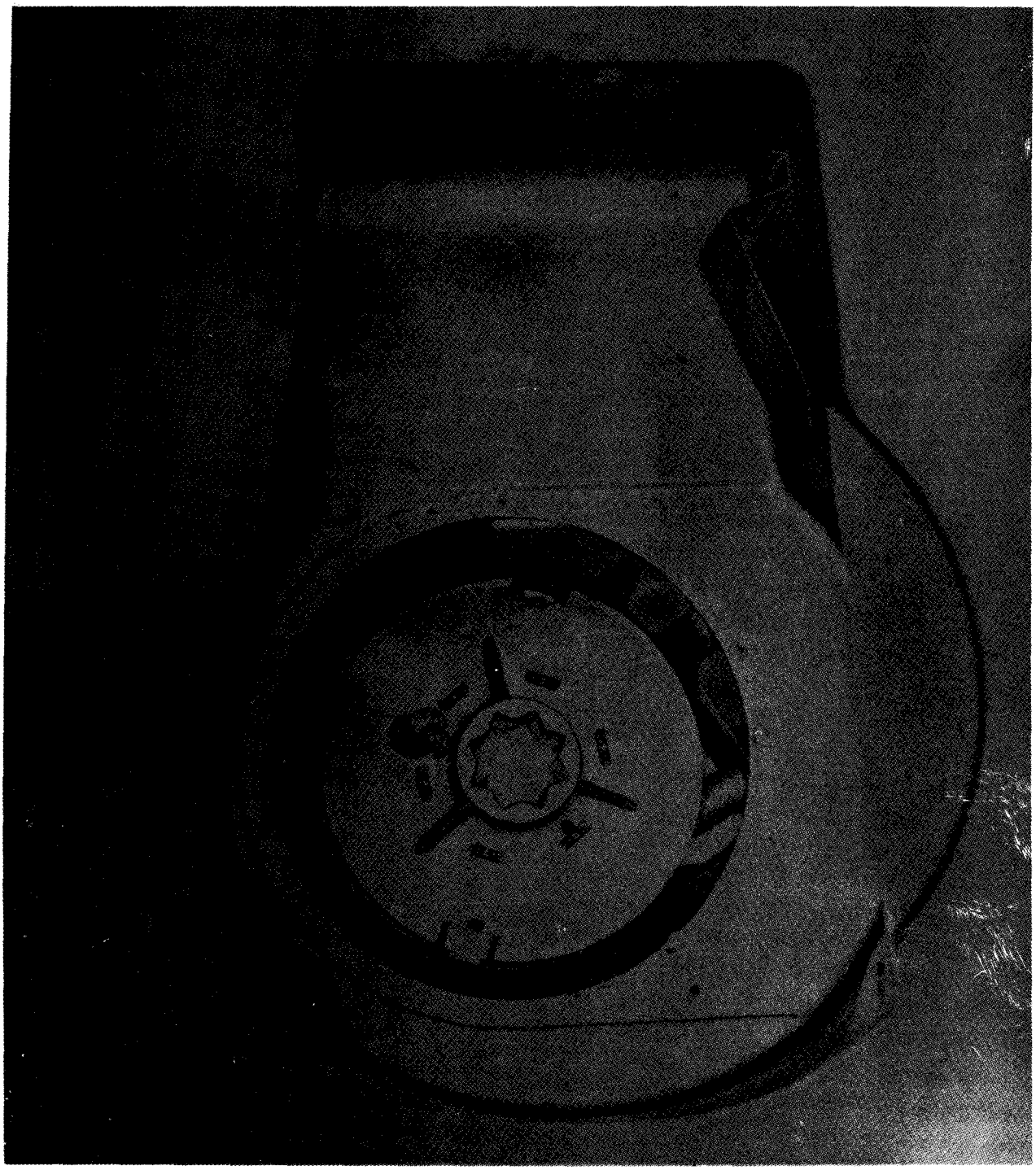
Spring should be securely locked in slot in housing, or into smaller portion of tapered hole.

Inspect rope. Replace if frayed. Insert rope through the handle and tie a "figure 8" knot. Insert pin through knot and pull tightly into handle.

If re-using old rope, burn cut end with a match. Wipe. with waste cloth while it is still hot to prevent swelling and unraveling.

Insert a stiff wire through opposite end of rope as near to the end as possible.

Thread wire and rope through rope eyelet in housing, to inside of guide lug and out pulley hole. Tie a knot in rope and pull tight. Make sure knot in pulley does not contact bumper tangs. Make sure wire is removed.



BLOWER HOUSING & STARTER

FIGURE 28

5.2.2.12 Lubrication.

Oil has four purposes. It cools, cleans, seals, and lubricates. These engines are lubricated with a gear driven splash oil slinger, a connecting rod dipper or a gear driven open spray pump.

Use a high quality detergent oil have the AMERICAN PETROLEUM INSTITUTE (API) classification. (For Service MS). Detergent oils keep the engine clean and retard the formation of gum and varnish deposits.

For operating temperatures above 40°F. use S. A. E. 30 or S. A. E. 10W-30. For operating temperature below 40°F. use S. A. E. 5W-20.

NOTE: NOTHING SHOULD BE ADDED TO THE RECOMMENDED OILS.

5.2.2.12.2.1 Oil Dipper (Aluminum Alloy and Cast Iron Engines).

In the splash system, the dipper dips into the oil reservoir in base of engine. It has no pump or moving parts. Install connecting rod and dipper per engine model.

5.2.2.13 Governor.

5.2.2.13.1 Mechanical Governor.

The purpose of the governor is to automatically maintain a desired engine speed while under a fluctuating work load. Centrifugal force created by the spinning fly-weights actuates a series of mechanical linkages and tends to close the carburetor throttle. The governor spring counteracts the fly-weight action and tends to open the throttle. The engine speed at which these two forces balance is referred to as the governed speed.

5.2.2.13.2 Inspection and Adjustment of Mechanical Governor.

The governor controlled mechanical linkage must be in alignment and operate freely throughout its entire travel. Check for clearance of all linkages in governor control train. It maybe necessary to slightly bend rods or levers to achieve bind free movement.

The engine speed setting is controlled by the knurled nut threaded on top of the control rod. To increase engine speed, turn speed adjustment nut counterclockwise. To reduce engine speed, turn speed adjustment nut clockwise. If desired engine speed within the prescribed limits cannot be obtained by adjustment of the knurled nut, check spring hooked in governor lever to determine if it is stretched, distorted or fatigued. Replace with a new spring if defective, and adjust for correct engine speed.

NOTE : SPRING LOOP SHOULD BE HOOKED IN NO. 4 HOLE OF GOVERNOR LEVER. FOR CLOSER GOVERNING, MOVE SPRING LOOP TO NO. 3, 2, OR 1 HOLES IN GOVERNOR LEVER.

TABLE OF TOOLS AND DESCRIPTION

KENCO PART NO.	DESCRIPTION	B&S PART NO.
SX-1562	Reamer-Valve Guide	19064
SX-1563	Valve Guide Bushing	63709
SX-1564	Finish Reamer-Bushing	19066
SX-1565	Valve Seat Puller	19138
SX-1566	Flywheel Holder	19167
SX-1567	Starter Clutch Wrench	19114
SX-1569	Valve Guide Plug Gage	19122
SX-1570	Puller Nut	19182
SX-1571	Intake Valve Seat Insert	210879
SX-1572	Exhaust Valve Seat Insert	210194
SX-1573	Stellite Valve Seat Insert	210452
SX-1574	Pilot, Valve Seat Insert	19126
SX-1575	Driver, Valve Seat Insert	19136

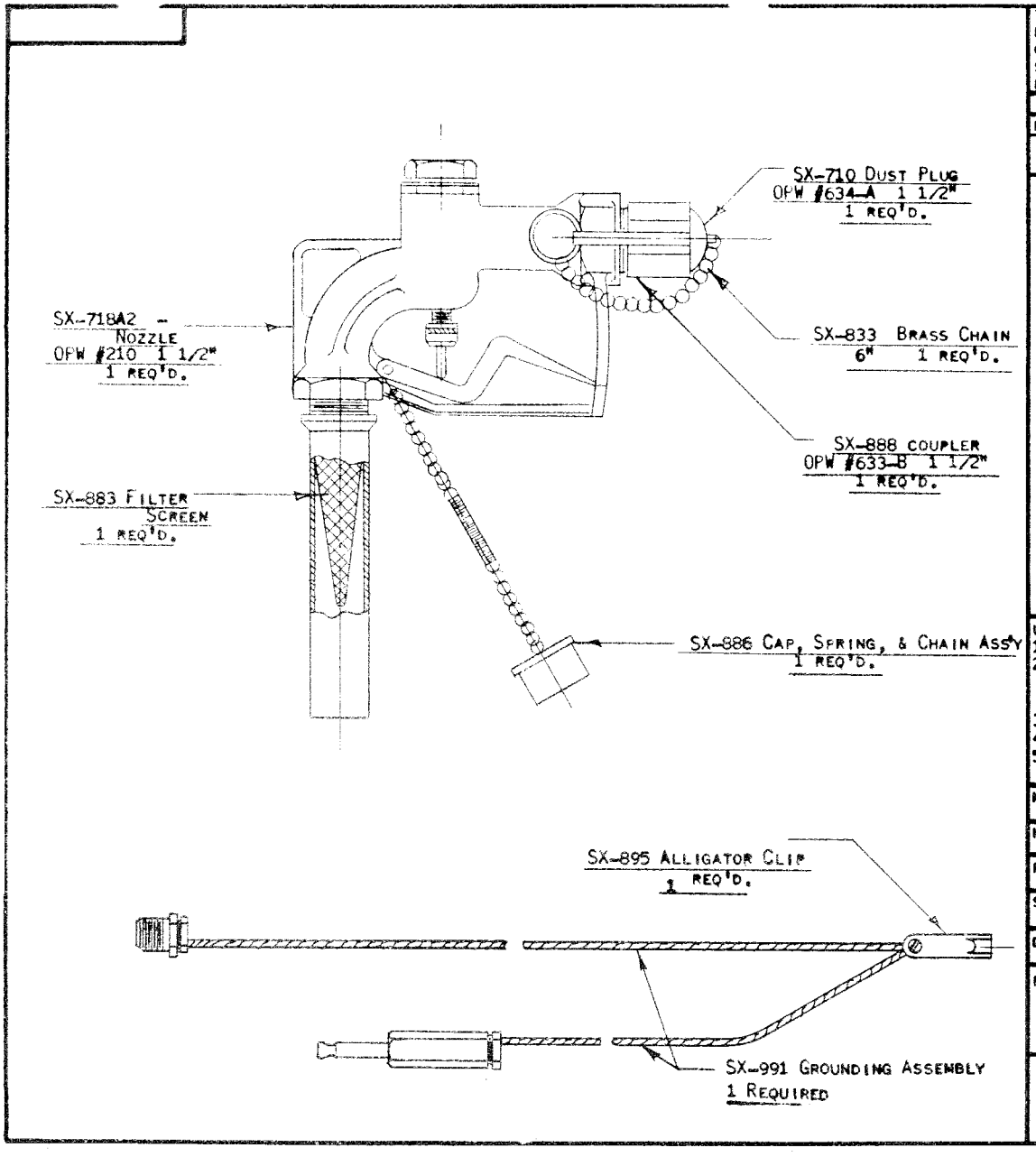
5.2.3. SERVICE AND MAINTENANCE DATA FOR ACCESSORY HOSE AND NOZZLE PACKAGE

Figure 29. Discharge hose assembly SX-937.

(Located in back of manual)

Figure 30. Suction hose assembly SX-848.

(Located in back of manual)



REVISIONS

NO	DATE	BY	E/O	DESCRIPTION
1	7-66	RM		Revision to Ground Cable Assembly - Same P/N

UNLESS OTHERWISE SPECIFIED:
1. REMOVE ALL BURRS AND SHARP EDGES.
2. TOLERANCES: CAST DIMENSIONS ± 1/32", FRACTIONAL ±.010", DECIMAL ±.005", ANGULAR DIMENSIONS ± 1/2°.
3. RADII ARE 1/32".
4. ALLOW 1/16" FOR FINISH.
5. X SURFACES MUST BE NORMAL, FLAT, PARALLEL (AS APPLICABLE) WITHIN .005".

MATERIAL:

HEAT TREAT:	FINISH:
ROUGH WEIGHT:	FINISH WEIGHT:
SCALE: 1" = 4"	APPROVED BY:
DRAWN BY: JJS	DATE: 2-26-65

PART NAME: NOZZLE ASSEMBLY - #210

DRAWING NO. SX- 931A

FIGURE NO. 31 NOZZLE ASSEMBLY SX-931A

5.2.4. SERVICE AND MAINTENANCE DATA FOR MONITOR ASSEMBLY (100 GPM GO-NO-GO GAGE)

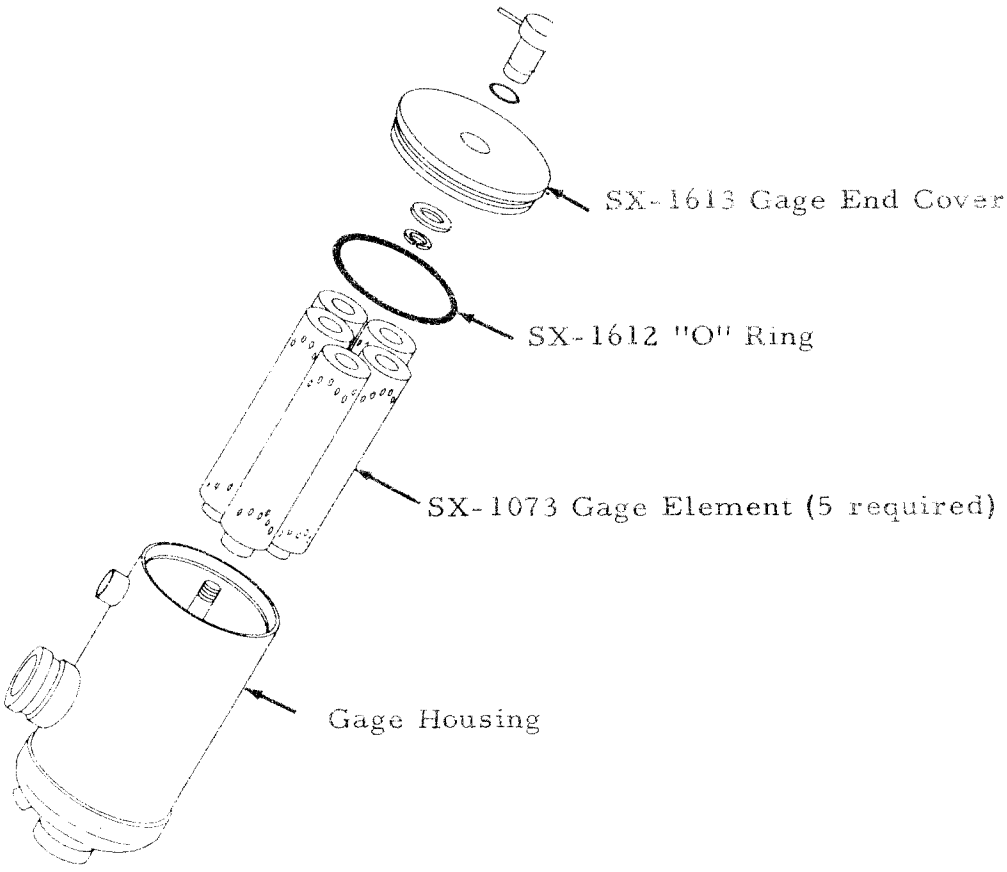
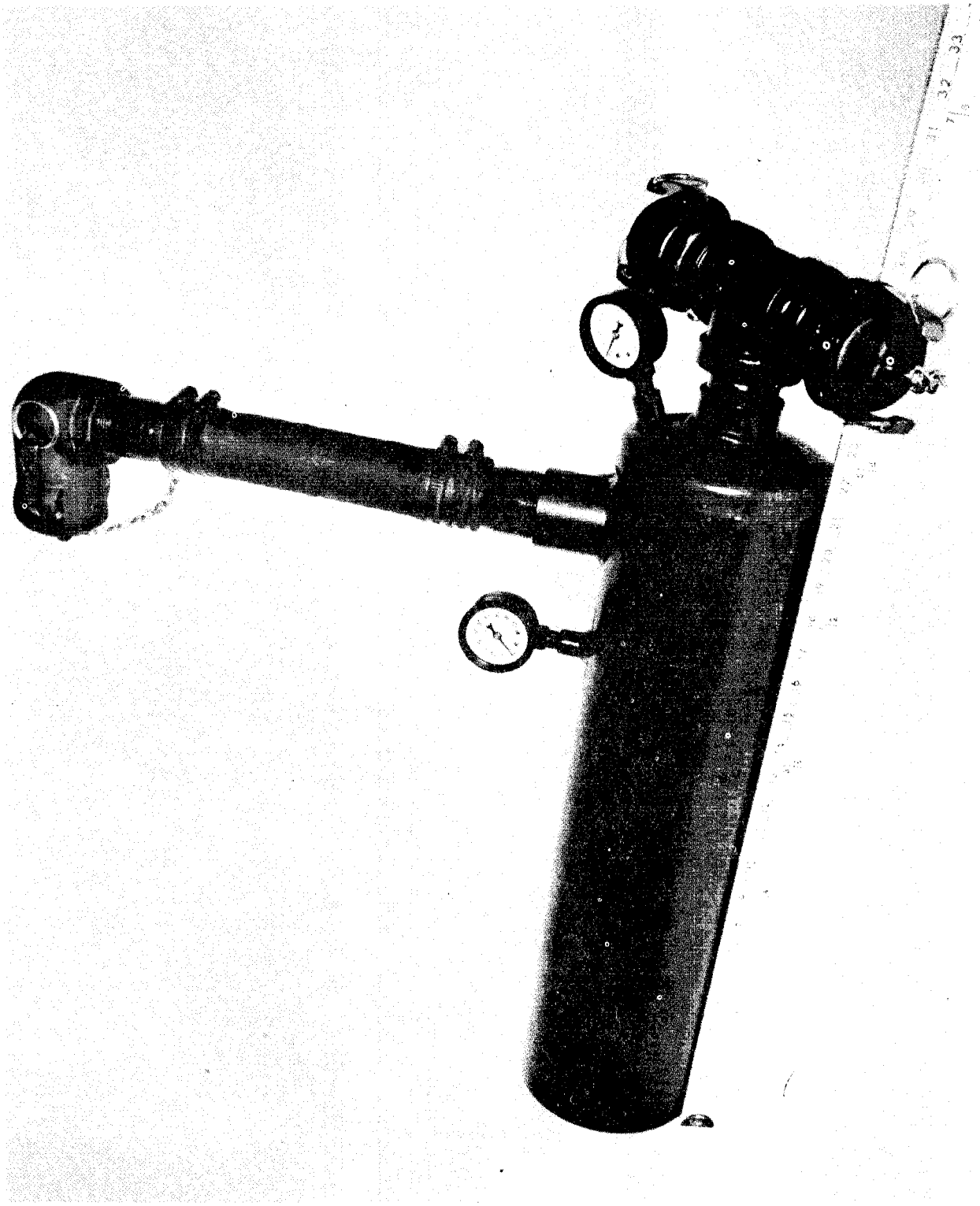
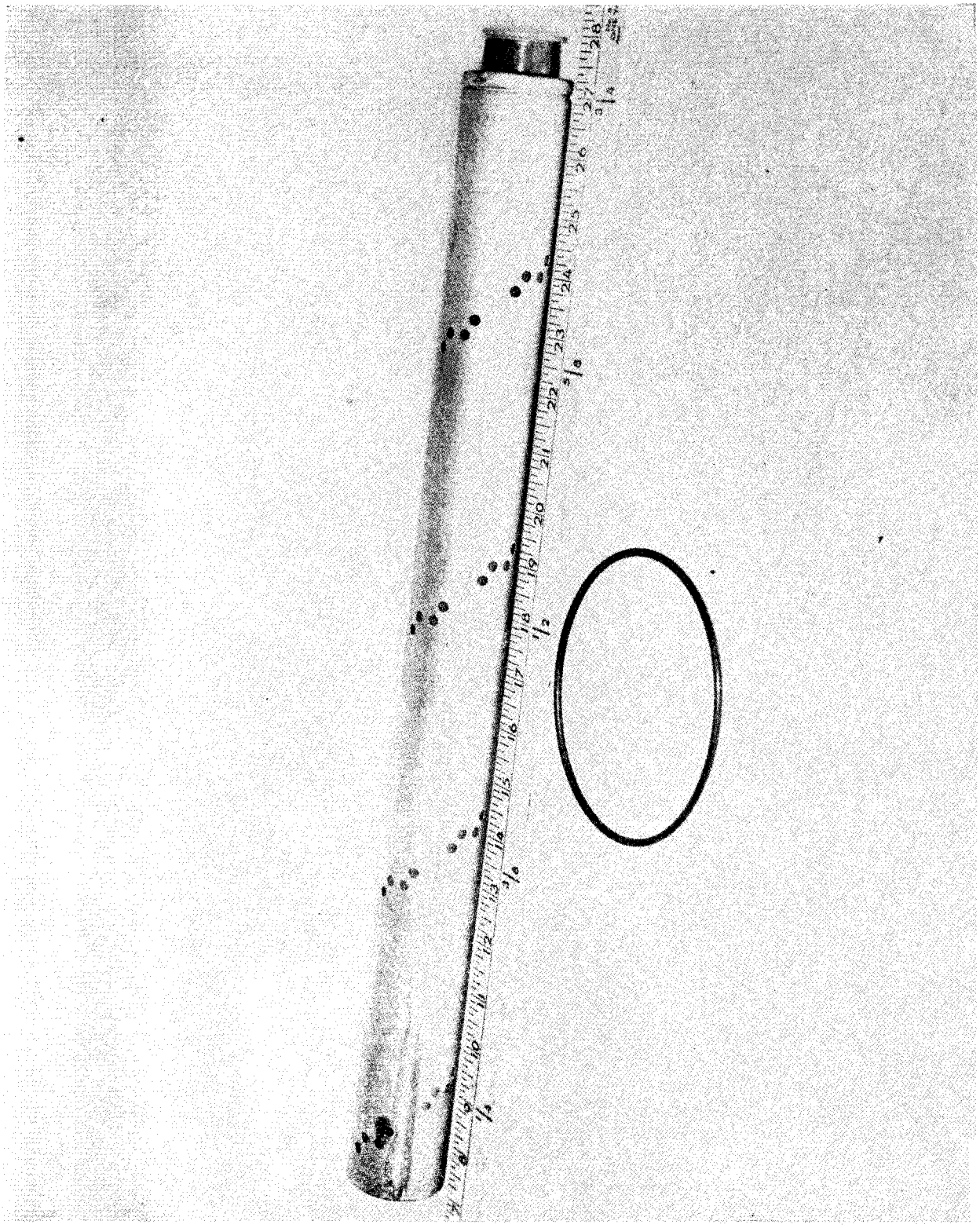


FIGURE NO. 32 GAGE ASSWBLY SX-706



BENDIX GAGE ASSEMBLY

FIGURE NO. 33



BENDIX GAGE ELEMENT
(Eploded View)

FIGURE NO. 34

APPENDIX A

BASIC ISSUE ITEMS LIST

Section I. INTRODUCTION

1. Scope

This appendix lists items which accompany the FUEL SYSTEM or are required for installation, operation, or operator's maintenance.

2. General

This Basic Issue Items List is divided into the following sections:

a. Basic Issue Items-Section II. This section is a listing of accessories, repair parts, tools, and publications required for operator's maintenance and operation, initially issued with, or authorized for the Fuel System.

b. Maintenance and Operating Supplies-Section III. This section is a listing of maintenance and operating supplies required for initial operation.

3. Explanation of Columns

The following provides an explanation of columns in Section II:

a. Source, Maintenance, and Recoueratbility Codes (SMR), Column 1:

(1) Source Code indicates the selection status and source for the listed item. Source code is:

Code	*Explanation*
P	Applied to repair parts which are stocked in or supplied from GSA/DSA Army supply system, and authorized for use at indicated maintenance categories.

(2) Maintenance Code indicates the lowest category of maintenance authorized to install the listed item. The maintenance level code is :

Code	*Explanation*
C	Operator/crew.

(3) Recoverability Code indicates whether unserviceable items should be returned for recovery or salvage. Items not coded are expendable. Recoverability codes are:

Code	*Explanation*
R	Applied to repair parts and assemblies which are economically reparable at DSU and GSU activities and are normally furnished by supply on an exchange basis.
T	Applied to high dollar value recoverable repair parts which are subject to special handling and are issued on an exchange basis. Such repair parts are normally repaired or overhauled at depot maintenance activities.
U	Applied to repair parts specifically selected for salvage by reclamation units because of precious metal content, critical materials, high dollar value reusable castings and castings.

b. Federal Stock Number, Column 2. This column indicates the Federal Stock Number for the item.

c. Description, Column 3. This column indicates the Federal item name and any additional description required. A five-digit manufacturer's or other service code is shown in parentheses followed by the manufacturer's part number. Repair parts quantities included in kits, sets, and assemblies that differ from the actual quantity used in the specific item, are listed in parentheses following the repair part name.

d. Unit of Issue, Column 4. This column indicates the unit used as a basis of issue, e.g., ea, pr, ft, yd, etc.

e. Quantity Incorporated in Unit Pack, Column 5. This column indicates the actual quantity contained in the unit pack.

f. Quantity Incorporated in Unit, Column 6. This column indicates the quantity of the item used in the equipment.

g. Quantity Furnished With Equipment, Column 7. This column indicates the quantity of an item furnished with the equipment in excess of the quantity incorporated in the unit.

h. Quantity Authorized, Column 8. This column indicates the quantity of an item authorized the operator/crew to have on hand or to obtain as required. As required items are indicated with an asterisk.

i. Illustration, Column 9. This column is di- ided as follows :

(1) Figure Number, column 9a, indicates the figure number of the illustration in which the item is shown.

(2) Item Number, column 9b, indicates the callout number used to reference the item in the illustration.

4. Explanation of Columns in the Tabular List of Maintenance and Operating Supplies–Section III

a. Item, Column 1. This column contains numerical sequence item numbers assigned to each component application to facilitate reference.

b. Component Application, Column 2. This column identifies the component application of each maintenance or operating supply item.

c. Federal Stock Number, Column 3. This column indicates the Federal Stock Number for the item and will he used for requisitioning purposes.

d. Description, Column 4. This column indicates the item and a brief description.

e. Quantity Required for Initial Operation, Column 5. This column indications the quantity of each maintenance or operating supply item required for initial operation of the equipment

f. Quantity Required for 8 Hours Operation, Column 6. This column indicates the estimated (quantities requuired for an average eight hours of operation.

g. Notes, Column 7. This column indicates informative notes keyed to data appearing in a peceding column.

Section II. BASIC ISSUE ITEMS LIST

(1) Source. Maint, and Recov Code (A) S	(B) M	(C) R	(2) Federal stock No.	(3) Description	(4) Unit of issue	(5) Qty inc in unit pack	(6) Qty inc in unit	(7) Qty furn with equip	(8) Qty auth	(9) Illustration (A) Fig No.	(B) Item No.
				GROUP 31—BASIC ISSUE ITEM MANUFACTURER INSTALLED							
				3100—Basic Issue Item, Manufacturer or Depot Installed							
P	O		7520-559-9618	CASE Maintenance and Operating Manuals: Cotton duck: water repellant and mildew resistant Department of the Army Operation Organizational Direct and General Support Maintenance Manual TM 5-4320-248-15	EA		1	1			
P	O		4210-881-0531	Extinguisher, Fire Model K-S hand portable, cartridge operated	EA		1	1			
			2920-391-3756	Overpack Kit consists of the following:	EA		1	1			
P	O		2920-294-3747	Spark Plug	EA		1	1			
P	O		2990-142-0080	Starter Rope	EA		1	1			
P	O		2805-624-0284	Points and Condenser Set	EA		1	1			

Section III. MAINTENANCE AND OPERATING SUPPLIES

(1) Item	(2) Component application	(3) Federal stock number	(4) Description	(5) Quantity required f/initial operation	(6) Quantity required f/8 hrs operation	(7) Notes
1	0101-CRANKCASE (1)		OIL, LUBRICATING: 1 qt cans as follows:			
		9150-265-9433	OE-30	4/5 qt	(3)	(1) Includes quantity of oil to fill engine oil system as follows: 1 qt-Crankcase
		9150-265-9425	OE-10		(3)	(2) See C9100-IL for additional data and requisitioning procedure.
		9150-242-7602	OES		(3)	
2	0304-AIR CLEANER (4)					(3) See current LO for grade application and replenishment intervals.
3	FUEL-GASOLINE as required	9130-160-1817	GASOLINE, AUTOMOTIVE 91 octane, 5 gal can			(4) Use oil as described in item 1 above.

APPENDIX B

MAINTENANCE ALLOCATION CHART

Section I.INTRODUCTION

1. General

a. This section provides a general explanation of all maintenance and repair functions authorized at various maintenance levels.

b. Section II designates overall responsibility for the performance of maintenance f unctions on the identified end item or component. The implementation of the maintenance f unctions upon the end item or component will be consistent with the assigned maintenance functions.

2. Explanation of Columns in Section II

a. *Group Number. Column 1*. The functional group is a numerical group setup on a functional basis. The applicable functional grouping indexes (obtained from TB 750-93-1, Functional Grouping Codes) are listed on the MAC in the appropriate numerical sequence. These indexes are normally set up in accordance with their function and proximity to each other.

b. *Functional Group. Column 2*. This column contains a brief description of the components of each functional group.

c. *Maintenance Functions. Column 3*. This column lists the various maintenance functions (A through K) and indicates the lowest maintenance category authorized to perform these functions. The symbol designations for the various maintenance categories are as follows :

C-Operator or crew

O-Organizational maintenance

F-Direct support maintenance

H-General support maintenance

D-Depot maintenance

The maintenance functions are defined as follows :

A-INSPECT.
To determine serviceability of an item by comparing its physical, mechanical, and electrical characteristics with established standards.

B-TEST.
To verify serviceability and to detect electrical or mechanical failure by use of test equipment

C-SERVICE.
To clean, to preserve, to charge, to paint, and to add fuel, lubricants, cooling agents, and air.

D-ADJUST.
To rectify to the extent necessary to bring into proper operating range.

E-ALIGN.
To adjust specified variable elements of an item to bring to optimum performance.

F-CALIBRATE.
To determine the corrections to be made in the readings of instruments or test equipment used in precise measurement. Consists of the comparisons of two instruments, one of which is a certified standard of known accuracy, to detect and adjust any discrepancy in the accuracy of the instrument being compared with the certified standard.

G-INSTALL.
To set up for use in an operational environment such as an emplacement site, or vehicle.

H-REPLACE.
To replace unserviceable items with serviceable assemblies, subassemblies, or parts.

I-REPAIR.
To restore an item to serviceable condition. This includes, but is not limited to, inspection, cleaning, preserv-

ing, adjusting, replacing, welding, riveting, and strengthening.

J-OVERHAUL.

To restore an item to a completely serviceable condition as prescribed by maintenance serviceability standards using the Inspect and Repair Only as Necessary (IROAN) technique.

K-REBUILD.

To restore an item to a standard as nearly as possible to original or new condition in appearance, performance, and life expectancy. This is accomplished through complete disassembly of the item, inspection of all parts or components, repair or replacement of worn or unserviceable elements (items) using original manufacturing tolerances and specifications, and subsequent reassembly of the item.

d. Tools and Equipment. Column 4. This column is provided for referencing by code the special tools and test equipment, required to perform the maintenance functions (Section II).

e. Remarks. Column 5. This column is provided for referencing by code the remarks pertinent to the maintenance functions.

Section II. MAINTENANCE ALLOCATION CHART

(1) Group No.	(2) Functional group	(3) Maintenance Functions A Inspect	B Test	C Service	D Adjust	E Align	F Calibrate	G Install	H Replace	I Repair	J Overhaul	K Rebuild	(4) Tools and equipment	(5) Remarks
01	ENGINE													
0100	Engine Assembly													
	Engine, Gasoline	..	O	....	..	..	..	..	F	H	H			
0107	Engine Starting System													
	Starter Rope	..	..	....	..	..	..	..	O					
03	FUEL SYSTEM													
0301	Carburetor													
	Carburetor:	..	..	....	O	..	..	..	..	F				
	Diaphragm, Primer Ass'y	..	..	....	..	..	..	..	..	F				
0306	Tanks, Lines, and Fittings:													
	Tank	..	..	O	..	..	..	..	O					
	Cap	..	..	....	..	..	..	..	O					
	Lines and Fittings	..	..	....	..	..	..	..	O					
04	EXHAUST SYSTEM													
0401	Muffler and Pipes:													
	Muffler	..	..	O	..	..	..	..	O					
	Exhaust Ports	..	..	O										
05	COOLING SYSTEM													
0502	Shrouds:													
	Shrouds	..	..	....	..	..	..	..	O					
06	ELECTRICAL SYSTEM													
0605	Ignition Components													
	Magneto	..	..	....	..	..	..	..	O	..	F			
	Point Assembly	..	..	....	..	..	..	..	O					
	Condenser	..	..	....	..	..	..	..	O					
	Spark Plug	..	O	O	O	..	..	..	O					
15	FRAME													
1501	Frame Assembly													
	Frame	..	..	....	..	..	..	..	..	O				
22	BODY CHASSIS OR HULL AND ACCESSORY ITEMS													
2202	Accessory Items													
	Hoses	..	..	....	..	..	..	..	O					
2210	Data Plates and Instruction Holders:													
	Plates, Instructions	..	..	....	..	..	..	..	O					
72	DISPENSING AND SERVICING EQUIPMENT COMPONENTS													
7202	Pumps and Meters													
	Pumps	..	..	O	..	..	..	..	O	F				
7203	Valves, Fittings													
	Nozzles	..	O	....	..	..	..	..	O	F				
7204	Miscellaneous Parts and Accessories													
	Go-No-Go Gage	O	..	O/C	..	..	..	..	O	F				

LUBRICATION ORDER

LO 5-4320-248-12

13 OCTOBER 1967

FUEL SYSTEM, TRANSFER, PORTABLE, PUMP CENTRIFUGAL, 100 GPM, TWO DISCHARGE HOSE ASSEMBLIES, ONE SUCTION HOSE ASSEMBLY, TWO NON-AUTOMATIC NOZZLE ASSEMBLIES, ONE MONITOR GO-NO-GO GAGE 100 GPM, 3 HP GASOLINE ENGINE, ONE BASKET ASSEMBLY (KENCO MODEL 114 MX1A) W/BRIGGS AND STRATTON ENGINE MODEL 81232 TYPE 9188-01

Reference C9100-IL

Intervals are based on normal hours of operation. Adjust to compensate for abnormal operation and severe conditions. During inactive periods sufficient lubrication must be performed for adequate preservation .

Clean fittings before lubricating.

Clean parts with SOLVENT, dry-cleaning, or with OIL, fuel, Diesel. Dry before lubricating.

Drain crankcase and gearcase when hot. Fill and check level.

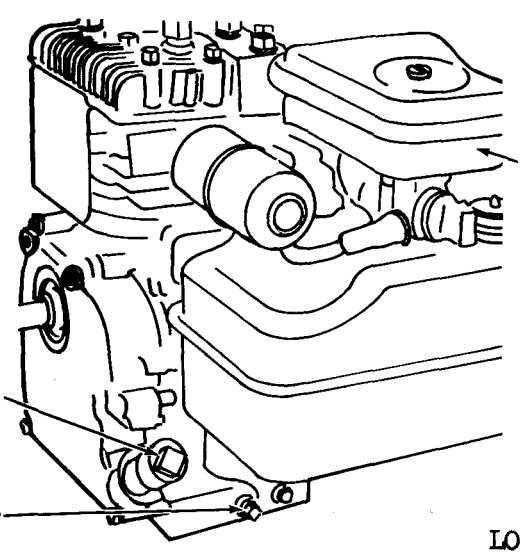
FOLD FOLD

— KEY —

LUBRICANTS	CAPACITY	EXPECTED TEMPERATURES			INTERVALS
		Above +32°F	+40°F to −10°F	0°F to −65°F	
OE-OIL, Engine, Heavy Duty		**OE** 30	**OE** 10	**OES**	Intervals given are in hours of normal operation.
Engine Crankcase					
OES-OIL, Engine, Subzero					
Oil Can Points					

LUBRICANT ● INTERVAL INTERVAL ● LUBRICANT

CAUTION: When OES Oil is used the level will checked more often.



LO 5-4320-248-12 (1)

NOTES:

1. FOR OPERATION OF EQUIPMENT IN PROTRACTED COLD TEMPERATURES BELOW -10°F. Remove lubricants prescribed in the key for temperatures above -10°F. Relubricate with lubricants specified in the key for temperatures below -10°F.

2. AIR CLEANER. Disassemble, wash foam element in kerosene or solvent, squeeze dry, re-oil with 3 tablespoons of OE, squeeze to spread oil through the foam, assemble parts and install

3. OIL CAN POINTS. Every 50 hours lubricate all control linkages with OE.

4. LUBRICANTS. The following is a list of lubricants with the Military Symbols and applicable Specification numbers.
OE-MIL-L-2104 OES-MIL-L-10295

Copy of this lubrication Order will remain with the equipment at all times; instructions contained herein are mandatory.

BY ORDER OF THE SECRETARY OF THE ARMY:

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

OFFICIAL:

KENNETH G. WICKHAM
Major General, United States Army,
The Adjutant General.

FOLD FOLD

LO 5-4320-248(2)

Lubrication Order — Continued.

By Order of the Secretary of the Army:

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

Official:

KENNETH G. WICKHAM,
Major General, United States Army,
The Adjutant General.

Distribution:

Active Army:

USASA (2)
ACSI (1)
DCSLOG (1)
CNGB (1)
TSG (1)
CofEngrs (3)
CC-E (1)
Dir of Trans (1)
CofSptS (1)
USAMB (1)
USA Arty Bd (2)
USA Armor Bd (2)
USAIB (2)
USARADBD (2)
USAAESWBD (2)
USAAVNTBD (2)
USCONARC (3)
OS Maj Comd (5) except
USARJ (1)
USASETAF (2)
USAMC (1)
USAMECOM (46)
USACDCEC (10)
MDW (1)
Armies (2)
Corps (2)
USAC (1)
Div (2)
Engr Bde (1)
USMA (2)
Svc Colleges (2)
Br Svc Sch (2) except
USAES (3)
Gen Dep (10)
Engr Dep (10)
Army Dep (2) except
TOAD (3)
USA Tml Cored (2)
Army Tml (1)
Div Engr (2)
Engr Dist (2)
Engr Cen (5)
USA Engr R&D Lab (3)
Engr FLDMS (2)
Ft Knox FLDMS (10)
AMS (3)
MAAG (1)
JBUSMC (1)
Army Attaches (1)
Mil Msn (1)
USACOMZEUR (2)
Fld Cored, DASA (8)
USAREUR Engr Proc Cen (2)
USAREUR Engr Sup Con Agcy (10)
Units org under fol TOE :—2 ea UNOINDC
1-102
1-165
1-259
5-48
5-237 (5)
5-262 (5)
5-267 (1)
5-278 (5)
5-279
10-201
10-202
10-206
10-377
10-458
10-475
10-476
10-477
29-95
55-258
55-405
6 7
7 7

NG : None.

USAR: Same as Active Army except allowance is one (1) copy for each unit.

For explanation of abbreviations used, see AR 320-50.

1 Pump assembly
2 3 H. P. engine
3 Casing assembly
4 Casing pump
5 Stud 3/8 - 16 NC
6 Handle pump
7 Identification plate
8 Drive screw
9 Wear plate
10 Carriage bolt
11 Cap nut 3/8 - 16
12 pipe plug 1/2" NPT
13 Nipple 1½" alum. 2" lg.
14 El-side outlet
15 Adapter 1½"
16 Dust cap assembly
17 Dust cap
18 Finger ring
19 Gasket
20 Chain brass
21 Adapter assembly
22 Pump adapter
23 Casing gasket
24 Seal seat 3/4"
25 "0" ring
26 Lockwasher
27 Bolt 5/16-24 X 3/4" lg.
28 Shaft sleeve
29 Shaft seal 3/4"
30 Impeller
31 Lockwasher 3/8"
32 Hex nut 3/8-16 NC
33 Bolt 5/16-18 x 1 ½" lg.
34 Bolt 5/16-18 x 5/8" lg.
35 Bolt 5/16-18 x 1" lg.
36 Washer plain 5/16"
37 Nut hex 5/16-18
38 Base assembly
39 Base
40 Base spacer
41 Bolt 3/8-16 x 9" lg.
42 Filter support
43 Stop nut 3/8
44 Gage ass'y. Go-No-Go 100 GPM
45 Gage Go-No-Go 100 GPM
46 Element 100 GPM
47 End cover 100 GPM gage
48 "0" ring 100 GPM gage
49 Pressure gage
50 Nipple l½" alum 2" lg.
51 Hose adapter
52 Hose gage connecting
53 Hose clamp
54 Alum. tee 1½ x 1½ x 1½
55 Adapter l ½
56 Dust cap assembly
57 Dust cap
58 Finger ring
59 Gasket
60 Brass chain security
61 Elbow coupler
62 Finger ring
63 Gasket
64 Dust plug assembly
65 Dust plug
66 Brass chain
67 Anti-seize compound
68 Hose clamp
69 Carrying basket
70 Wing nut
71 Manual
72 Envelope
73 Cardboard carton
74 Wood l x 6 x 36
75 Carriage bolt
76 Wrought washer
77 Hex nut 5/16 - 18
78 Shipping case

Figure 14. Fuel transfer pump assembly.

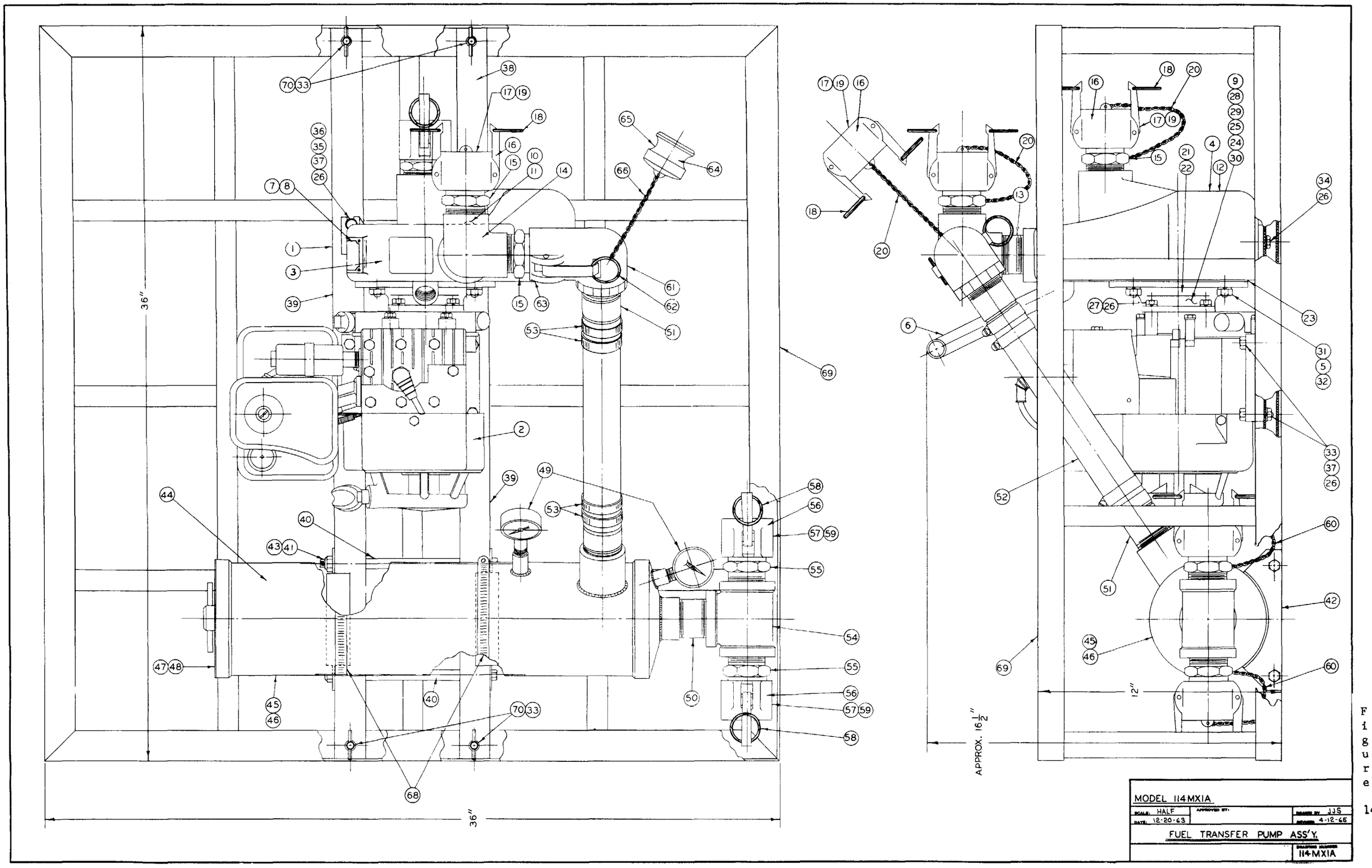
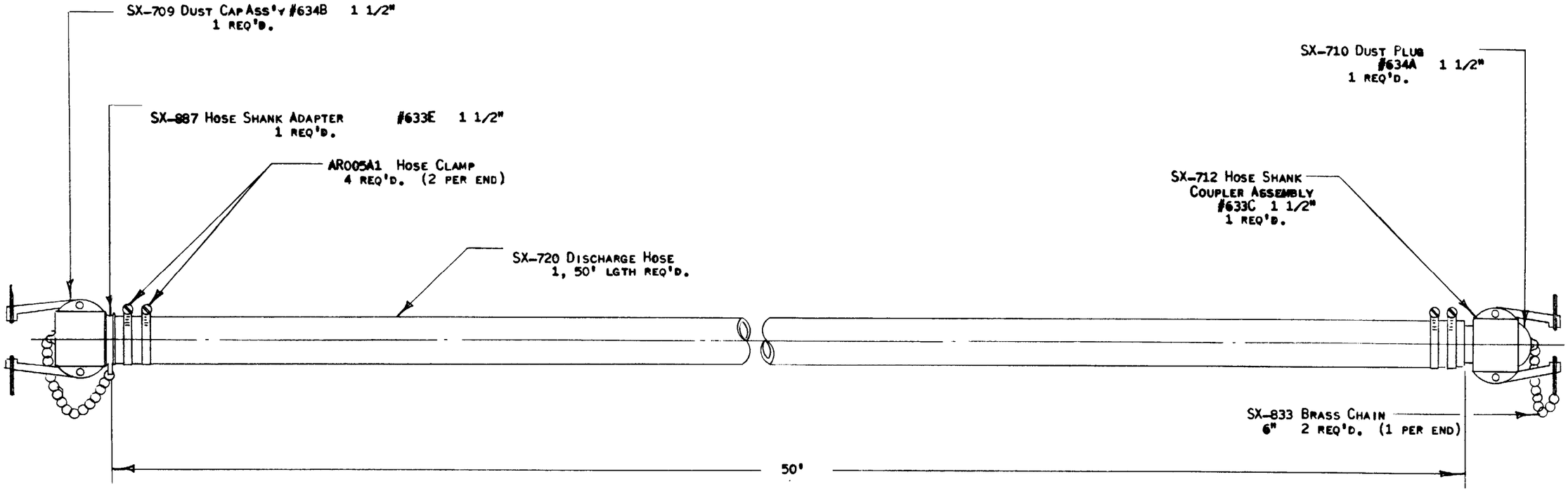


FIGURE NO. 14 FUEL TRANSFER PUMP ASSEMBLY

Figure 14

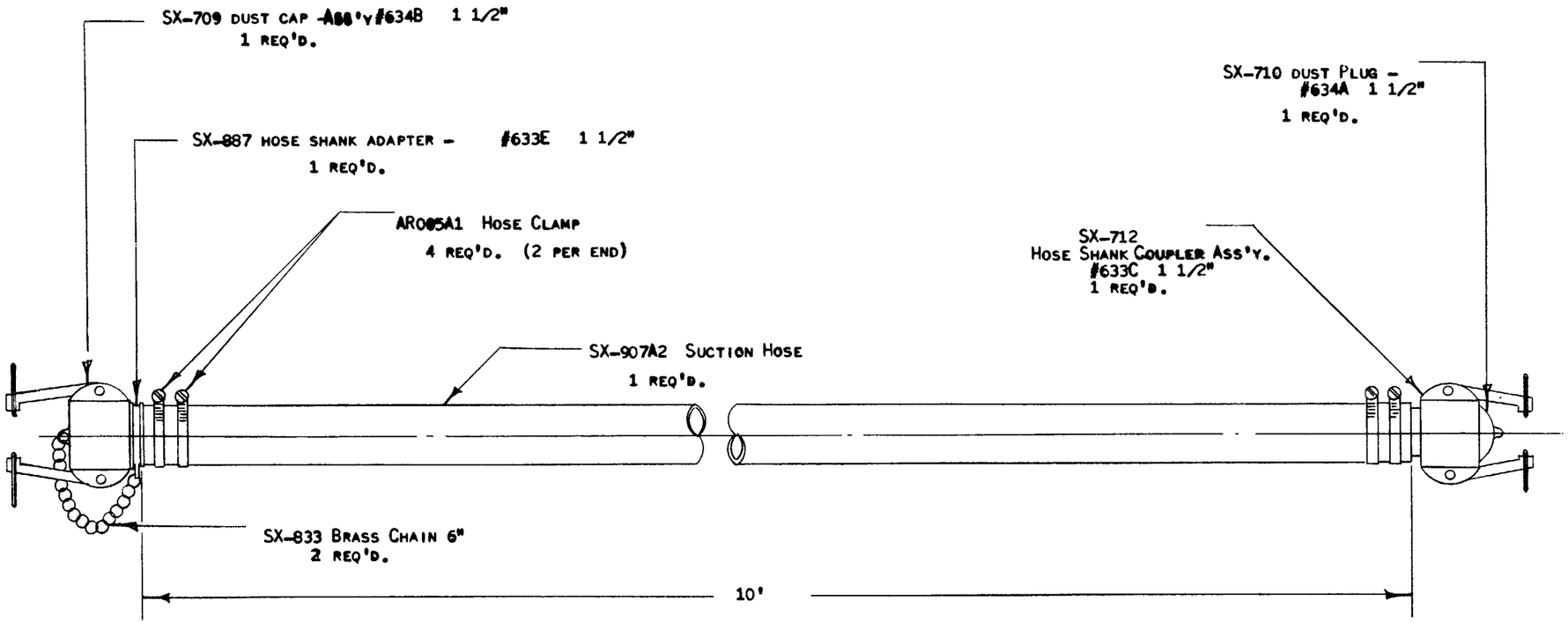


NOTE:
COMPLETE HOSE MUST PASS HYDROSTATIC TEST
OF 50 P.S.I MINIMUM AFTER ASSEMBLY.

SCALE: 1" = 4"	APPROVED BY:	DRAWN BY JJS
DATE: 10-23-64		REVISED TAR 9-28-65
DISCHARGE HOSE ASSEMBLY		
		DRAWING NUMBER SX- 937

Figure 29

FIGURE NO. 29 DISCHARGE HOSE ASSEMBLY SX-937



NOTE:

COMPLETE HOSE MUST PASS HYDROSTATIC TEST OF 50 P.S.I. MINIMUM AFTER ASSEMBLY.

REVISIONS

NO	DATE	BY	E/O	DESCRIPTION
1	9/28 65	TR		NOTE ADDED
2	4-66	W	1308	QUANTITY OF BRASS CHAINS WAS CHANGED FROM 1 TO 2

UNLESS OTHERWISE SPECIFIED:
1. REMOVE ALL BURRS AND SHARP EDGES.
2. TOLERANCES: CAST DIMENSIONS ± 1/32", FRACTIONAL ±.010", DECIMAL ±.005", ANGULAR DIMENSIONS ± 1/2°.
3. RADII ARE 1/32".
4. ALLOW 1/16" FOR FINISH.
5. X SURFACES MUST BE NORMAL, FLAT, PARALLEL (AS APPLICABLE) WITHIN .005".

MATERIAL:

HEAT TREAT:	FINISH:
ROUGH WEIGHT:	FINISH WEIGHT:
SCALE: 1" = 4"	APPROVED BY:
DRAWN BY: JJS 3-1-65	CUSTOMER APPROVAL:

PART NAME:

SUCTION HOSE ASSEMBLY

DRAWING NUMBER

SX- 848

Figure 30

FIGURE NO. 30 SUCTION HOSE ASSEMBLY SX-848