DEPARTMENT OF THE ARMY TECHNICAL MANUAL

OPERATOR'S AND

ORGANIZATIONAL MAINTENANCE MANUAL

SPRAYER, HERBICIDE, HELICOPTER MOUNTED

(AGRICULTURAL AVIATION ENG. CO. MODEL 3090-3)

FSN 3740-131-4599

SPRAYER, PESTICIDE, HELICOPTER MOUNTED

(AGRICULTURAL AVIATION ENG. CO. MODEL 3090)

FSN 3740-999-2405

HEADQUARTERS, DEPARTMENT OF THE ARMY
12 SEPTEMBER 1969

SAFETY PRECAUTIONS AND EMERGENCY PROCEDURES

(1) Never exceed air speed of 120 knots.

(2) If booms noticeably vibrate or misalign during flight, reduce speed gradually, land and adjust tension of cables.

(3) If a leak develops in flight within the aircraft, apply pump brake immediately and discontinue operation.

(4) If fan blade becomes damaged in flight and causes vibration, apply pump brake immediately and discontinue operation.

(5) If spray does not stop when valve control has been actuated, apply pump brake as an alternate method of control.

(6) Do not attempt to lift by booms or braces. Lift by designated handles only.

(7) Tank must be drained before installation or removal.

(8) In event of contamination by chemicals, wash with soap and water.

(9) Do not fill pump engine tank with gasoline when the engine is running as this may cause a fire.

Change in force: C2

CHANGE

NO. 2

HEADQUARTERS
DEPARTMENT OF THE ARMY,
WASHINGTON, D C, 31 March 1978

Operator's and Organizational Maintenance Manual

SPRAYER, HERBICIDE, HELICOPTER MOUNTED
(AGRICULTURAL AVIATION ENG. CO. MODEL 3090-3)
NSN 3740-00-131-4599
SPRAYER, PESTICIDE, HELICOPTER MOUNTED
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NSN 3740-00-999-2405

TM 5-3740-210-12, 12 September 1969, is changed as follows:

Cover and Table of Contents pages are changed to read as shown above.

Table of Contents page. Immediately after the title, add the following:

Reporting of Errors and Recommending Improvements. You can help improve this manual. If you find any mistakes or if you know of a way to improve the procedures, 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, direct to: Commander, U. S. Army Troop Support and Aviation Materiel Readiness Commend, ATTN: DRSTS-MTPS, 4300 Goodfellow Boulevard, St. Louis, MO 63120. A reply will be furnished to you.

Page ii. Appendix B is deleted.

Page ii, Bottom of Page. The Appendices are changed to read as follows:
APPENDIX A. Not applicable
APPENDIX B. Components of End Item List
APPENDIX C. Maintenance Allocation Chart
APPENDIX D. Expendable Supplies and Materials List

Page 2. Paragraph 1-3 is deleted in its entirety. Renumber paragraphs 1-4 and 1-5 to read 1-3 and 1-4.

Page 18. Paragraph 3-4, subparagraph (17) is added:

(17) Maintenance and Operating Supplies required for initial 8 hours of operation for the sprayer are contained in Table 0.1.

Table 0.1. Maintenance and Operating Supplies

(1)	(2)	(3)	(4)	(5)	(6)
Component application	**National stock number**	**Description**	**Quantity required F/initial operation**	**Quantity required F/8 hrs operation**	**Note**
FUEL TANK	9130-00-160-1818	91A, Gasoline Automotive Bulk	1 qt	1 gal	1:16 ratio of SAE 30 motor oil to regular gasoline.
	9150-00-265-9433	OE 30, Oil Engine, 1 qt can	1/8 pt		

*This Change supersedes C1, dated 17 April 1973.

Appendix B is superseded as follows:

APPENDIX B

COMPONENTS OF END ITEM LIST

Section I. INTRODUCTION

B-1. Scope

This appendix lists Integral Components of and Basic Issue Items (BII) for the Herbicide and Pesticide Sprayer to help you inventory items required for safe and efficient operation.

B-2. General

The components of end item lists are divided into the following sections:

a. Section II, Integral Components of the End Item. These items, when assembled, comprise the Herbicide and Pesticide Sprayer 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 Herbicide and Pesticide Sprayer in operation, to operate it and to perform emergency repairs. Although shipped separately packed, they must accompany the Herbicide and Pesticide Sprayer 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 end item 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. Not applicable.

g. Quantity Required (Qty Req.). 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 received 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.	(1) ILLUSTRATION (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	(8) QUANTITY DATE	(8) QUANTITY DATE	(8) QUANTITY DATE
		4320-00-168-2097	XLS1-1-2XS (29201)	Pump and Engine Assy.			1				
		4730-00-168. 2088	4164P30 (22065)	Strainer Pump			1				
		4730-00-168-2084	AVHC24-24-FV (78357)	Coupling, half			2				
		4730-00-904-8627	3083-1 (23065)	Clamp, hose			3				
		4820-00-724-0768	1124211T (98991)	Valve, Ball			1				
		4720-00-003-0984	Bd16E5307-4 (97403)	Hose, Non-metallic			12				
		3740-00-179-6723	3069-11 (22065)	Boom Assembly Outboard			2				
		3740-00-179 6704	6645 (22065)	Windmill Assembly			1				
		4730-00-881-2220	M524522.34 (96906)	Adapter			1				

Section III. BASIC ISSUE ITEMS

(1) ILLUSTRATION (a) FIGURE NO.	(1) ILLUSTRATION (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	(8) QUANTITY DATE	(8) QUANTITY DATE	(8) QUANTITY DATE
		7520-00-559-9618	MIL-C-11743 (81349)	Case O&M Publications			1				
		9505-00-293-4208	MS20995C32 (96906)	Wire, Safety			1				
		5120-00-242-3249	GGGW006S1 (81348)	Wrench, Strap			2				

Appendix D is added after Appendix C as follows:

APPENDIX D

EXPENDABLE SUPPLIES AND MATERIALS LIST

Section I. INTRODUCTION

D-1. Scope

This appendix lists Expendable Supplies and Materials you will need to operate and maintain the Herbicide and Pesticide Sprayer. These items are authorized to you by CTA 50-970, Expendable Items (except Medical, Class V, Repair Parts and Heraldic Items).

D-2. Explanation of Columns

a. Column 1--Item Number. This number is assigned to the entry in the listing and is referenced in the narrative instructions to identify the material.

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

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 measured used in performing the actual maintenance function. This measure is expressed by a two-character alphabetical abbreviation (e.g., ea (ea), inch (in), pair (pr), etc.). 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	9130-00-160-1818	Gasoline, Automotive	GL
2	C	9150-00-265-9435	Oil, Engine, OE 30	GL
3	C	9150-00-402-2372	Oil, Eng, Sub Zero, OES App DD-1 OE A	GL

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 maintenance requirements for Herbicide and Insect and Pest Control.

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TECHNICAL MANUAL

NO. 5-3740-210-12

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, D.C., 12 SEPTEMBER 1969

OPERATOR AND ORGANIZATIONAL MAINTENANCE MANUAL

SPRAYER, HERBICIDE, HELICOPTER MOUNTED,

(AGRICULTURAL AVIATION ENG. CO. MODEL 3090-3)

FSN 3740 -131-4599

SPRAYER, PESTICIDE, HELICOPTER MOUNTED,

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FSN 3740-999-2405

LIST OF ILLUSTRATIONS

OPERATIONS AND MAINTENANCE INSTRUCTIONS

UH-1 B/D HELICOPTER SPRAY SYSTEM

1.0 INTRODUCTION

1.1 General

This publication has been prepared for the purpose of providing test and user personnel with information necessary to adequately operate and maintain the UH-1 B/D Helicopter Spray System during its usage in the field. It is not intended that the instructions contained herein be construed as either preliminary or final, but rather a compilation of readily available information, put into a format with minimum effort so that time of publication might coincide with the date of actual need,

1.2 Scope

Following a general introduction, this publication provides a functional system descriptions a tabulation of significant specifications, operating instructions, calibration procedures and maintenance instructions.

1.3 Reporting Equipment Publication Improvements

Report 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 the Commanding General, U. S. Army Mobility Equipment Command, ATTN: AMSME-MPP, 4300 Goodfellow Boulevard, St. Louis, Mo. 63120.

1.4 Facilities and Equipment

No special facilities, platforms, or tools are required for field assembly or installation.

For field maintenance and repair of the spray system, as described in Section 5.5, a mobile or stationary field repair shop is desirable.

1.5 Forms and Records

DA Forms and records used for equipment will be only those prescribed in TM 38-750 (Army Equipment Record Procedures).

2.0 SYSTEM DESCRIPTION

2.1 General

This aerial spray system is designed for installation in, and utilization with U. b. Army UH-1 B and D type helicopters. It is designed for dispensing herbicides and pesticides.

As noted in Figure 1, the system is composed of a windmill driven pump, spray booms and nozzles, a tank and support structure and valve control panel. The spray tank is a 200-gallon molded fiberglass reinforced epoxy resin structure haying two internal baffle-bulkheads.

The tank and support structure contain the basic attach points to which externally extended components are mounted to eliminate their need for attach points on the aircraft.

The entire spray system including the tank and tank structure, the spray atomizer boom, and the valve controls may be installed or removed, fully assembled for use, by adjusting quick-release locking clamps. This clamping technique serves to rigidly attach the entire system structure to existing cargo deck fittings in the helicopter.

As described in Figure 1, the spray boom and nozzle system configuration is established by the attachment of a windmill-driven centrifugal pump and the boom system, together with their struts and support cables, to the tank structure. The suction side of the windmill-powered centrifugal pump is connected to the left tank outlet and the pump outlet is extended to a tee fitting in the boom under the center of the tank in the cargo compartment.

A manually controlled flapper-type gate valve is placed in the output line of the pump at the boom tee. On the right side of the aircraft, the extended tank outlet is utilized for bottom loading of the tank from a pump powered supply source or for use as a quick draining of the tank. All fluid tubing and hoses have connections several inches outboard from the aircraft to eliminate leakage into aircraft from externally extended spray boom and spray pump fluid lines.

The windmill is manually adjustable on the ground and utilizes six (6) molded nylon fan blades designed for maximum power development at low aircraft speeds. "lade pitch settings are collectively positioned, from a single adjusting screw, to any selected angle from 10 to 90 degrees to derive a given rotational speed or may be feathered when desired. Overspeed rotation at high helicopter flight speeds is automatically limited by aerodynamic design.

The spray boom extends 31 feet 5.56 inches from tip-to-tip and contains threaded provisions for nozzles every four inches, starting two feet outboard from the body of the helicopter. The boom is constructed of standard aluminum extrusions. Its cross-section is circular with a built-in boss provided along its entire length into which any number of threaded holes may be tapped for additional nozzle installation. The spray boom is supported vertically by a diagonal tube strut and a supporting cable attached to the top of the tank. Fore and aft motions of the boom are restricted by horizontally adjustable cables attached to the lower section of the tank support structure.

The spray system is manually controlled in flight by a lever mounted on a control panel attached to the tank structure swinging down between the pilot and co-pilot seats. The system is operated by the co-pilot or other crew member by actuation of the lever which opens and closes the control valve.

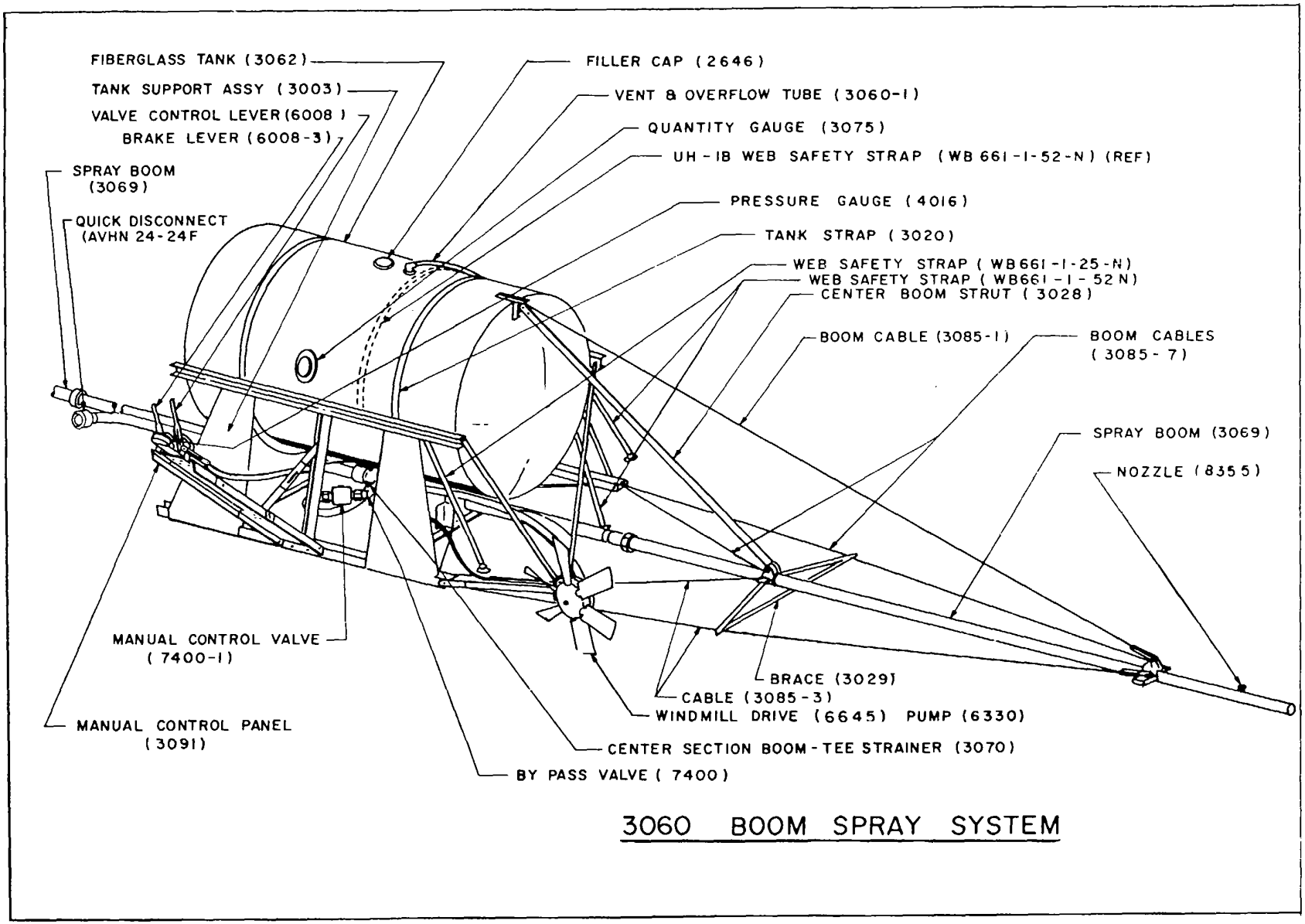


Figure 1. 3060 BOOM SPRAY SYSTEM

UH-1 B/D HELICOPTER SPRAY SYSTEM

FUNCTIONAL FLOW DIAGRAM

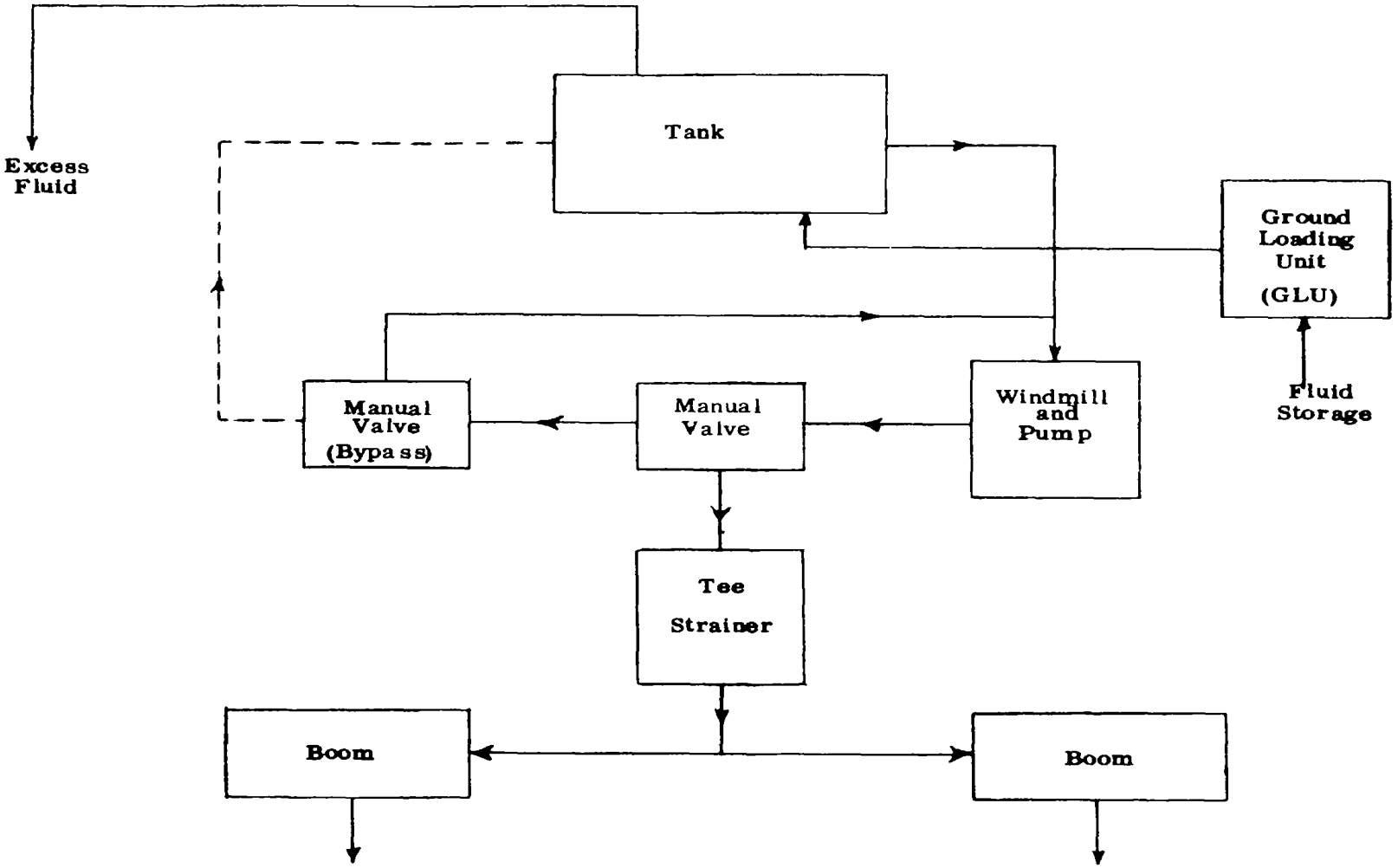


Figure 2.

An auxiliary part of the system is a specially adapted ground loading unit (GLU) composed of a two-cycle gasoline engine, pump, valve, and associated hoses and fittings, Refer to pages 43 thru 48 for GLU maintenance.

2.2 Major Components

2.2.1 Pump Drive

A pump drive is installed on the left side of the tank support structure assembly. Its purpose is to build up adequate pressure in the spray booms to atomize spray liquid through the nozzles. It is composed of a six (6) bladed ground adjustable windmill which drives a centrifugal pump. The pump drives fluid through an output pressure hose to the manual control valve which, when in open position, permits fluid to travel to the center boom tee strainer. It is then divided and driven into the booms and dispersed.

A manually operated pump brake is provided to hold or free the windmill for operation, as required.

2.2.2 Spray Booms and Nozzles

Two spray booms constructed of hollow extrusions are attached to the center boom section and are supported by struts and cables, They are each 11.7 feet in length and have provisions for 28 nozzles each for a maximum total of 56 nozzles per system unless new nozzle holes are tapped.

A boom tee strainer is located in the center boom section and serves to filter large particles that may clog or inhibit fluid flow through the nozzles (remove and clean),

2.2.3 Controls

The spray system is controlled by a manual valve which is actuated by manually moving the valve control lever fore and aft, at the copilots position, It controls the flow of the tank liquid to the spray booms,

A bypass valve (same design as control valve) is utilized to re-circulate the tank fluid back to the tank or pump inlet. It serves to preheat fluids when desirable and to prevent foaming,

2.2.4 Tank

A fiberglass constructed tank reinforced with two internal baffles serves as a reservoir for the spray liquid. The tank has a liquid quantity gauge at its forward side (applicable on serial no's 1 to 20 only), a filter strainer at the top, an air vent and an overflow tube which permits excess fluid to spill overboard, The tank also has capacity markings on each end and on its forward side. A twist type filler cap is located at top center of the tank to provide an alternate method of filling. Brackets for fastening boom struts and cables are attached and located above each end, The tank is normally filled from the bottom through a quick-disconnect fitting on the tank structure to which the tank is strapped.

2.2.5 Support Structure

A support structure, constructed primarily of aluminum extrusions and sheet metal, provides a base for the tank and has mounts for the remainder of the system component so It is fastened to the floor of the aircraft with tie-down lugs and straps as explained in Section 3.2.

An identification plate is located in the center of the forward upper channel of the support structure. It contains information such as serial and model numbers.

2.3 Tabulated Data (Type & Specifications)

2.3.1 Spray System

Weight	200 lbs.
Size (w/o booms)	10' x 4' x 3 1/2'

2.3.2 Pump Drive

Type operation	Direct coupled, variable pitch, air-driven windmill.

2.3.3 Pump

Type	Centrifugal
Bearing	Sealed

2.3.4 Pump Drive Brake

Type operation	Manually operated

2.3.5 Spray Tank

Capacity	195 gallons maximum when filled
Weight	
Empty	Approximately 100 pounds
Full	To be determined by density of agent being utilized.

2.3.6	**Valve Control**	
	Type	Levers push-pull rod
	Type operation	manually operated
2.3.7	**Control Valve**	
	Type	Flapper gate valve, operated manually
2.3.8	**Bypass Valve**	
	Type	Flapper gate valve, manually operated
2.3.9	**Spray Boom**	
	Type	Hollow aluminum extrusions
	Size	
	Length (Each boom)	11 Ft. 7.78 Inches
	Length (Both booms plus center section)	31 Ft. 5.56 Inches
	Inside Dia.	1 5/16 Inches
	outside Dia.	1 1/2 Inches
	Nozzles	
	Type	8355 NYL and 4664 AL Diaphragm tee-jet nozzle
	Number (Both booms)	As required

2.3.10 Tee Strainer

Type	Boom tee
Construction	Screen mesh (16 mesh)

2.3.11 Identification Plate

Location	Center forward channel in support structure.

3.0 OPERATING INSTRUCTIONS

3.1 General

The logical steps in the overall operation of this spray system will include un-crating, field assembly, installation into aircraft, preflight checkout, loading, calibration, in-flight checkout, in-flight operating, and post-flight operations (primarily flushing and cleaning), On an initial operation, four (4) to six (6) hours should be allowed for un-crating through loading. Subsequent assemblies and installation under similar conditions with the same personnel can be reduced to at least two (2) hours. (See figures 3a and 3b)

3.2 Field Assembly and Installation into Aircraft

Each system will be shipped and stored in a skid frames

(1) Un-crate panels in sequence as marked on panel exteriors,

(2) Remove tie-down lugs from frame, remove both nuts and washers and place on appropriate cargo deck fittings in aircraft. (See Figure 4)

(3) Place spray tank unit (including structure and pump) in aircraft with pump facing forwards

CAUTION: 4 MEN ARE RECOMMENDED FOR THIS OPERATION.

NOTE: LUGS WILL REMAIN ATTACHED TO TANK UNIT FOR SUBSEQUENT INSTALLATIONS.

(4) Following verification that lugs are properly positioned, place washers on each lug, hand tighten large nut down and tighten firmly with 1 5/8" socket wrench, locking lug to the unit frame.

NOTE: SHAKE LUGS TO KEEP STRAIGHT WHEN TIGHTENING NUTS,

(5) Place the 9/16" nut on each lug and tighten with 7/8" socket wrench which locks lug to the aircraft deck,

(6) Place AN380-3-4 cotter pin in each lug and spread.

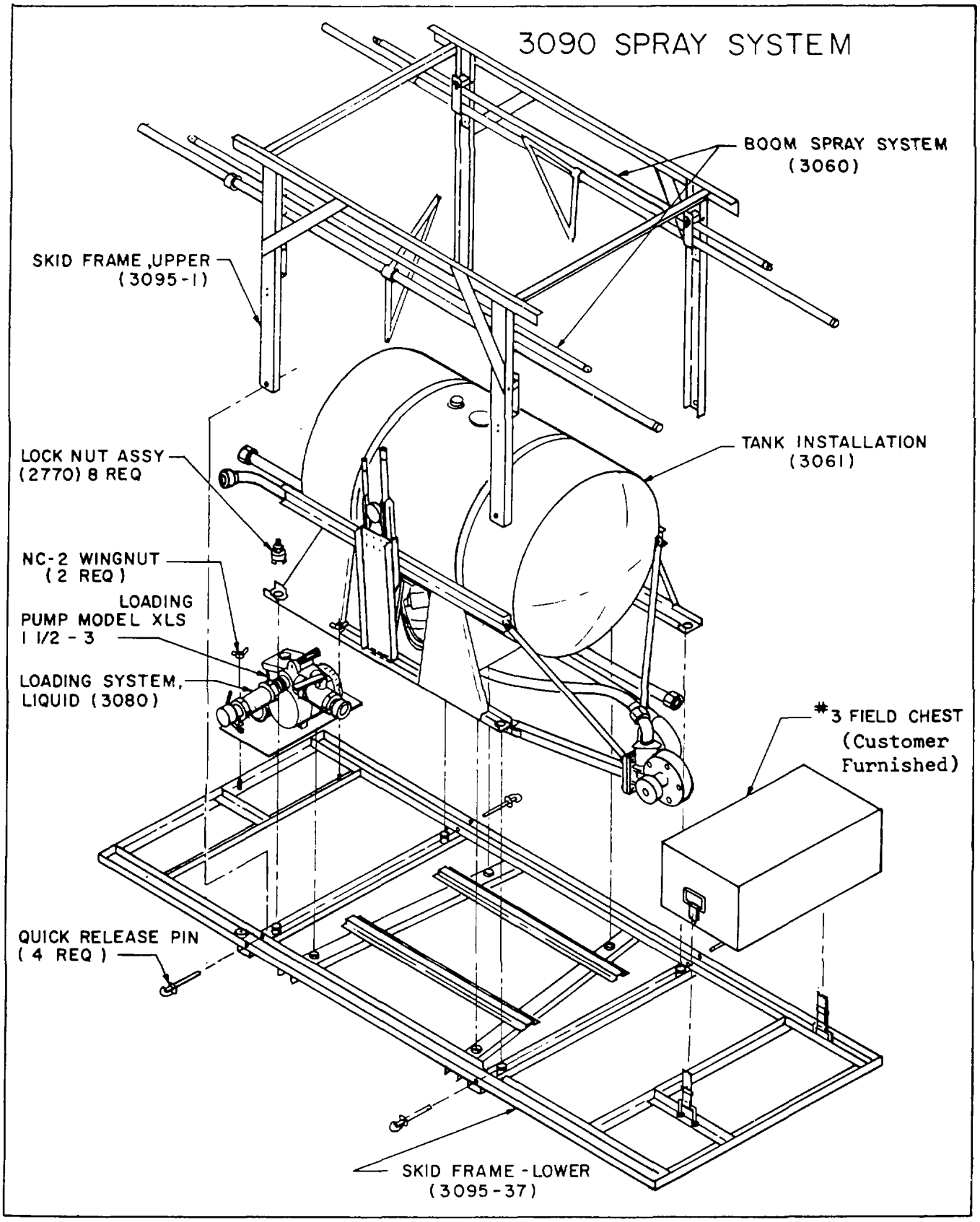


Figure 3a. 3090 SPRAY SYSTEM, HELICOPTER MOUNTED

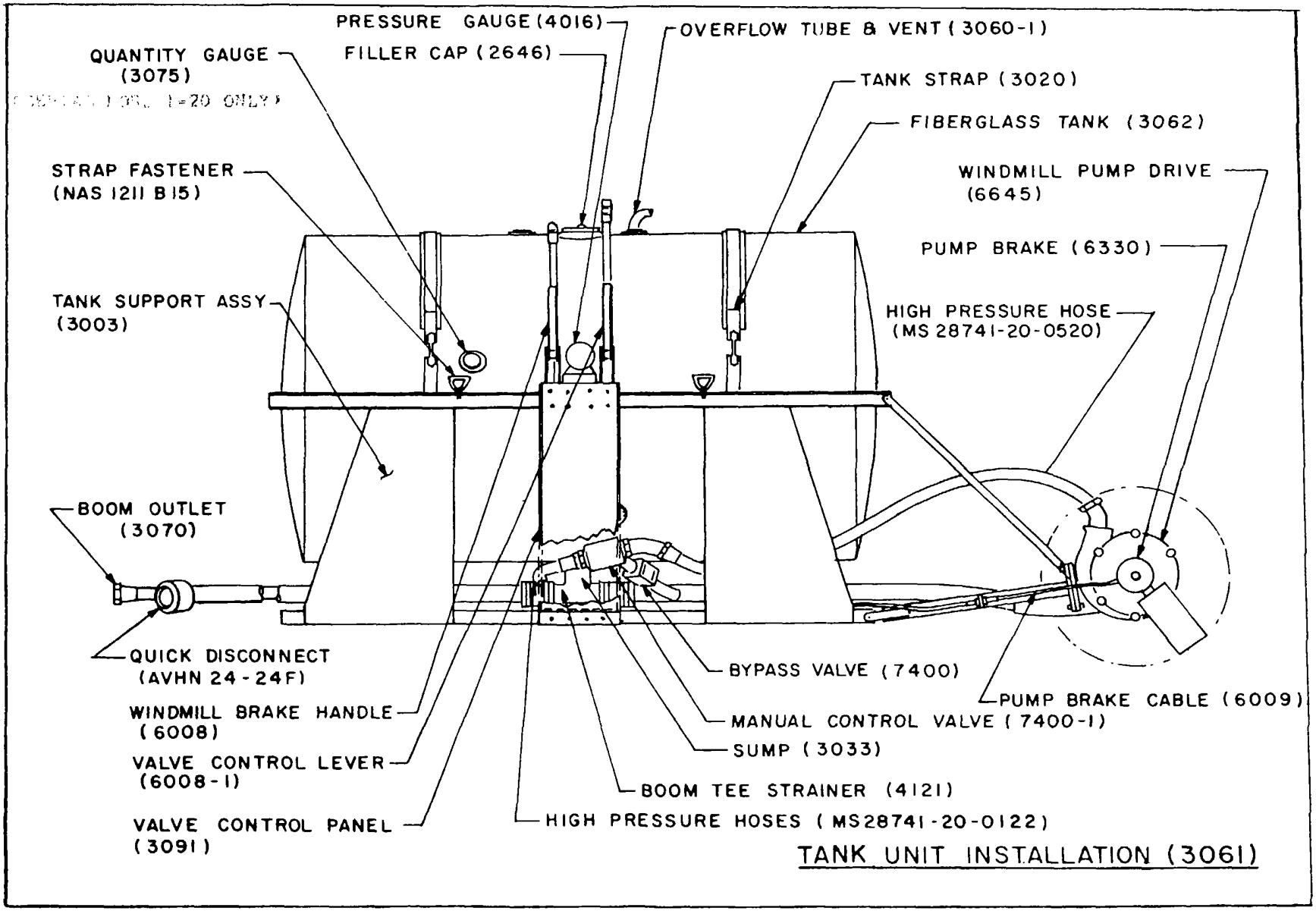


Figure 3b. 3061 TANK UNIT INSTALLATION

(7) Attach and cinch down tie-down straps as indicated in Figure 1.

(8) Attach strut on each boom, Install booms on appropriate side of aircraft (two men each) with nozzles aft in the following manner:

CAUTION: DO NOT ATTACH BOOM UNTIT TANK INSTALLATION IS SECURELY MOUNTED. REMOVE BOOMS PRIOR TO REMOVAL OF SYSTEM FROM AIRCRAFT.

a) Attach boom by hand tightening nut on inboard end of boom.

b) Secure brace to lower hole at the fitting on tank end.

c) Attach upper cable in top hole on same fitting.

d) Attach forward and aft support cables to side of frame.

e) Making sure the aft cables have slacks tighten turnbuckle on the inboard forward cables with drift punch until tip of boom is approximately 3” forward of boom centerlines Then tighten turnbuckle on inboard rear cables to draw (adjust) boom back to the centerline position.

f) Repeat above process for outboard cables, reducing deflection to 2”, for this step,

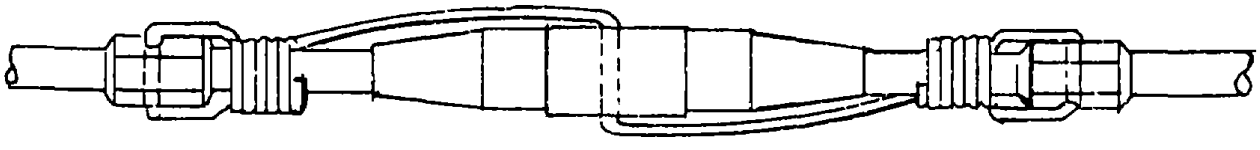
g) Firmly tighten boom to boom center section with 2 1/4" tube type wrench,

(9) Check booms to see if straight, If note adjust accordingly.

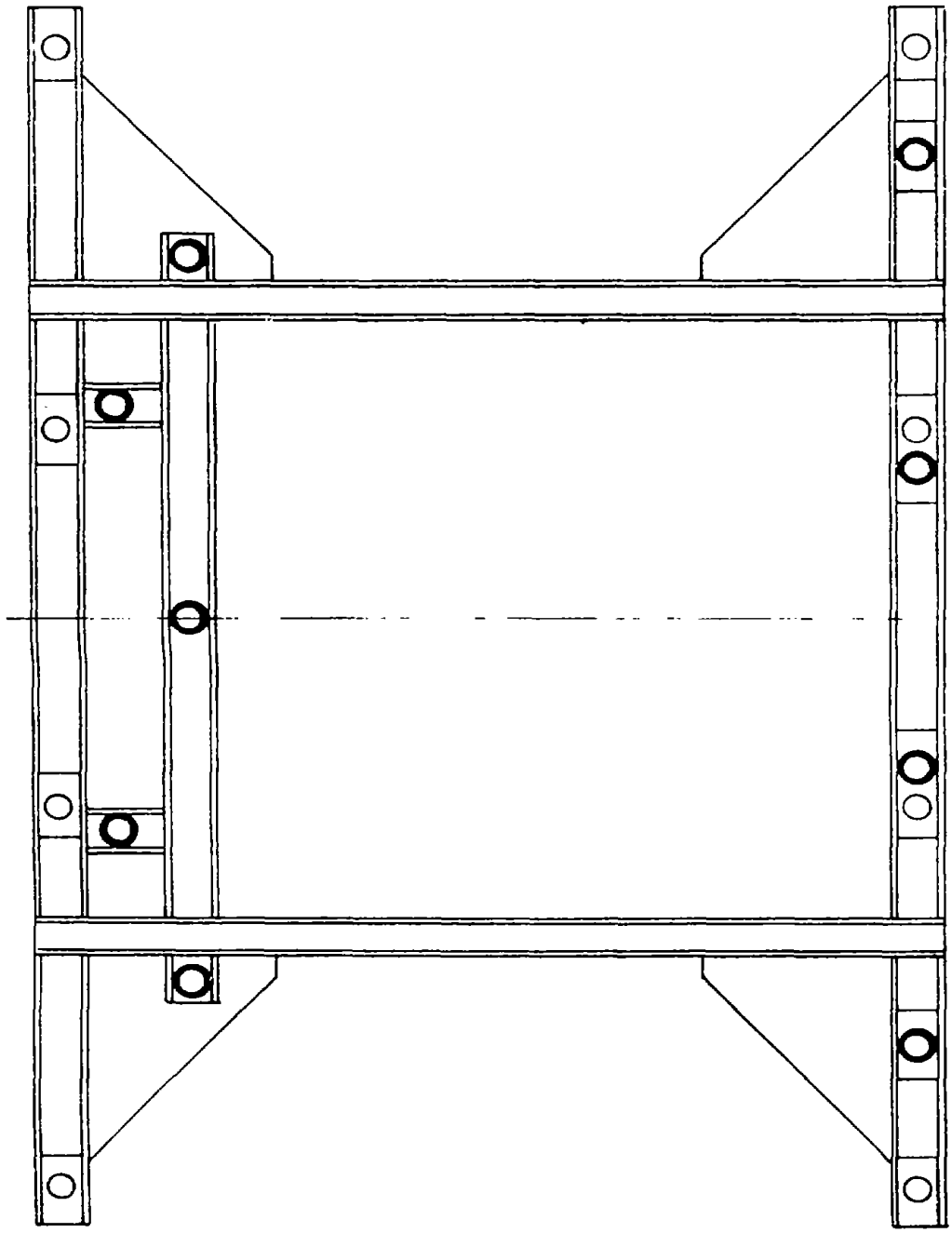
(10) Install nozzles by hand,

DANGER

CABLE TURNBUCKLES SHALL BE SAFETIED WITH .032 INCH SS AIRCRAFT TYPE SAFETY WIRE BEFORE FLIGHT.



TANK UNIT TIE-DOWN DIAGRAM



○ - UH-1B Helicopters (8 Lugs)

● - UH-1D Helicopters (9 Lugs - holes painted red)

Figure 4.

CAUTION: DO NOT OVERTIGHTEN NOZZLES,

(11) Attach pump fan using 3/8" socket wrench to tighten 3 attach bolts.

NOTE: CARE SHOULD BE TAKEN NOT TO OVERTIGHTEN (EQUIVALENT OF SCREWDRIVER PRESSURE)

3.3 Preflight Checkout

(1) Check five (5) low pressure hoses for security.

(2) Check three (3) high pressure hoses for security

(3) Check deck fittings for security.

(4) Check all pump attach fasteners.

(5) Check tank for damage and leaks and alignment.

(6) Check booms, boom struts and cables for wear, damage, proper tension and security.

(7) Check pump fasteners for security.

(8) Check pump fan blades for proper angle setting (as per flight and spray plan).

CAUTION: FAN BLADES SHOULD BE ADJUSTED GRADUALLY IN A CLOCKWISE DIRECTION AND STOPPED AT THE EXACT SETTING. IF THE DESIRED SETTING POINT IS OVERSHOT, RETURN BLADES TO MAXIMUM COUNTER-CLOCKWISE SETTING AND THEN REPEAT CLOCKWISE ADJUSTMENT.

(9) Check fan brake in locked and unlocked positions.

NOTE: FAN SHOULD SPIN FREELY BY HAND WHEN UNLOCKED.

(10) Listen to pump bearings when fan is hand-spun to ascertain freedom from friction.

(11) Check manually operated bypass valve for proper position according to plan.

NOTE: HANDLE IS CLOSED IN PULL POSITION

(12) Install and arrange nozzles, orifices, and cores on booms.

NOTE: CHECK TO VERIFY THAT ALL TIPS ARE CLEAN.

(13) Check for proper operation of manual control valve by actuating valve lever. If inoperative, check for binding in fittings at end of push-pull rod.

(14) Prepare general and pre-flight portion of System Log.

3.4 Loading Procedure

(1) Place ground loading unit (GLU) on right side of aircraft (pilot side).

(2) Check the GLU hoses and fittings for security and the strainer screen for cleanliness.

(3) Check fuel level of GLU.

(4) Check that GLU input valve is in closed position.

(5) Start GLU and run for 30 seconds to test for proper operation, stop GLU following test.

(6) Spray fluid drums should be placed within 25 feet of GLU.

(7) Remove large cap from top of fluid drum and place suction pipe into drum,

(8) Restart GLU engine, open valve and make sure pump is primed.

NOTE: INDICATION OF PRIMED PUMP WILL BE SLOW DOWN OR LABORING OF ENGINE.

(9) Remove dust cap from quick-disconnect fitting extending from the support structure of the spray unit,

(10) Place quick-disconnect fitting from GLU hose on mating part of spray unit.

CAUTION: AS TANK BEGINS TO FILL, CHECK FOR LEAKS. SHUT DOWN IMMEDIATELY IF LEAK IS OBSERVED,

(11) Fill to desired level according to markers on side and ends of tank. Do not fill above 195 gallons.

(12) To stop fluid flow, turn valve at GLU so handle is across tube,

CAUTION: CLOSE VALVE BEFORE DISCONNECTING HOSE,

(13) Remove hose and stop engine.

(14) Place quick-disconnect on top of barrel or other location protected from loose dirt.

(15) Replace dust cap on spray unit portion of quick-disconnect.

(16) Emergency method of filling is through the top filler cap.

Caution should be exercised to prevent damage to the screen and filler neck and contamination of aircraft.

3.5 In-flight Checkout

(1) Subject to flight plan, manual fan brake may be released immediately after takeoff to permit pre-agitation and/or heating of fluid.

WARNING: DO NOT RUN PUMP DRY IN ACTUAL OPERATION

(2) When planned altitude and speed have been attained and aircraft has reached designated test or operational area, in-flight check-out may proceed.

(3) If brake has not been previously released, release at this point. Open valve and visually check nozzles for spray.

(4) Observe pressure gauge for proper reading (as per flight plan), observe nozzles for proper operation and flow and check for system leaks.

(5) After approximately 30 seconds, close valve.

(6) Check for nozzle drip and note for future action.

(7) Repeat in-flight spray system checkout (steps 3 through 6).

(8) Apply pump brake handle or permit pump to run as per flight plan.

NOTE: SYSTEM IS NOW READY FOR OPERATION.

3.6 In-Flight Operation

(1) Prior to reaching spray area, release pump brake, if not in a release position.

(2) At desired point, move valve control lever to open position.

(3) Conduct spray operation as per plan and prepare in-flight portion of system log,

(4) At completion of swath, operation or mission9 move valve control lever to close position,

(5) Pump brake should be applied at completion of operation.

3.7 Post-Flight Operations

(1) Tank contains some spray fluid at end of flights tank must be drained. (Drain hose is provided) Remove quick-disconnect from ground loading unit and fasten to quick-disconnect on spray system in aircraft, as in loading operations Locate fluid container immediately underneath and remove quick-disconnect at end of drain operation.

(2) Using GLU so that it may be flushed also, fill spray tank with water, fuel oil or other desired flushing chemical,

(3) Fly to acceptable area and permit system to unload by spraying in conventional manner.

NOTE: SOME NOZZLES AND/OR PLUGS MAY BE REMOVED PRIOR TO FLUSHING OPERATION TO EXPEDITE CLEANING AND FLUSHING PROCESS,

(4) An alternate but less thorough method of cleaning and flushing is to dump cleaning fluid by gravity feed while aircraft is on the ground making sure control valve is in open position, Normal chemical precaution should be taken,

(5) Clean and decontaminate aircraft and spray system, as required.

CAUTION: BOTH THE CONTROL AND BYPASS VALVES SHOULD BE LEFT IN MIDDLE (UNLOCKED) POSITION WHEN SYSTEM IS NOT IN USE.

4.0 CALIBRATION PROCEDURES

The UH-1B/D Helicopter Spray System derives an effective swath width of 200 feet when flown at 75 foot flight elevation within a forward speed range of 50 to 90 knots. Its rate of application in terms of gallons per acre is based on the flow rate performance of the system predetermined by the selection and installation of core and orifice configuration in each of the nozzles on the spray boom and by the windmill pitch setting. The accompanying chart (Table I) defines the core and orifice configuration that will derive an application rate of water under specified windmill blade angle settings and helicopter ground speeds.

TABLE I

PERFORMANCE CHART

APPROXIMATE APPLICATION RATE (Gal/Acre) OF UH-1 B/D SPRAY SYSTEM WITH WATER AT A 200 FOOT SWATH SPACING

Flow	**HIGH**			**MEDIUM**			**LOW**		
Nozzles	50 Each D10-56			50 Each D8-45			50 Each D6-45		
Speed (Kn.)	50	70	90	50	70	90	50	70	90
Blade Pos.									
2.0	3	2 1/4	2	1 1/8	1	1	2/3	2/3	2/3
1.5	3 1/4	2 1/2	2 1/4	1 1/4	1 1/8	1	3/4	3/4	3/4
1.0	3 1/3	2 3/4	2 1/2	1 1/2	1 1/3	1 1/4	7/8	7/8	7/8

4.1 Selection Of Configuration

The spray system configuration to be selected for any given spray operation is based on the definition of the application rate and the forward speed desired. Based upon these definitions, the nozzle configurations can be selected from the Performance Chart, Table I. This is accomplished by scanning the table across from the 1.5 blade position setting until an application rate value nearest the desired value is found under the required forward speed column. At the top of this column the nozzle configuration will be defined.

EXAMPLE: With a one gallon per acre application rate given and a desired forward speed of 90 knots defined, a scan across the chart will reveal that the application rate of one gallon per acre may be obtained at 90 knots with a fifty D8-45 nozzle configuration at a blade angle position of 1.5.

4.2 Flight Test Calibration

The selection of nozzle configurations and windmill blade pitch angle settings are preliminary in nature and a flight test must be performed to refine the output performance of the system with the liquid chemicals to be used before initiating an operation. The procedure for adjusting the flow is to increase the windmill blade angle to decrease flow or to decrease the blade angle to increase flow to that required. Retain blade angles between the 1.0 to 2.0 values and remove or add nozzles to fulfill further adjustments that may be required. Procedures for flight testing are noted as follows:

(1) With a known liquid quantity in the tank, conduct a spray test for a specific time period and determine the amount of liquid dispersed.

The flow rate is the amount dispersed in gallons divided by the time in minutes.

(2) To derive the application rate, divide the flow rate by the swath width and speed factors as follows.

$$\text{Application Rate (gal/acre)} = \frac{\text{Flow Rate (gal/min)}}{.002 \times \text{swath (ft)} \times \text{speed (mph)}}$$

(3) As noted above, increase windmill blade angle position to decrease application rate or decrease blade angle to increase application rate and repeat tests. Increase or decrease number of nozzles to fulfill requirements if blade angle does not remain within the 1.0 to 2.0 range.

4.3 Calculation Procedures

Where variations in flight height become necessary, there will of course be a change in swath width. To determine new nozzle configurations to meet the new flow rate as a direct result of changes in swath width and also forward speed, a calculation procedure is useful. The following example is defined to establish the calculation procedure:

(1) Establish the rate of application required in gallons per acre. (1.0 gallon per acre is assumed in this example).

(2) Select a forward speed and swath width appropriate for the applicating conditions. (100 miles per hour for a speed and 300 feet for swath width is assumed for this procedure).

(3) Calculate work rate (acres/minute) as follows:

Acres/minute = .002 x forward speed (mph) x swath width (feet).

Acres/minute = .002 x 100 mph x 300 feet

Acres/minute = 60

(4) Determine the flow rate (gpm) required as follows:

$$\text{Gallons/minute} = \text{gallons/acre} \times \text{acres/minute}$$

(Step 1) x (Step 3)

Gallons/minute = 1.0 x 60 = 60

(5) Divide the flow rate by the number of nozzles to be placed on the system to derive gallons per minute, per nozzle. (Assume 30 nozzles for the purposes of this example).

$$\text{gallons/minute per nozzle} = \frac{60 \text{ gallons/minute}}{30 \text{ nozzles}} = 2.0$$

(6) Select a nozzle core and orifice configuration from Table II or Table III, nearest the desired pressure that derives the flow of 2.0 gallons/ minute per nozzle and install with uniform spacing along the spray boom.

(7) With a known liquid quantity in the tank, flight test the system with the windmill blade pitch angle setting at 1.5 and record the pressure obtained at the flight speed previously selected. Increase the blade

angle to lower the pressure (lower flow) or decrease the blade angle to increase pressure (increase flow).

(8) After the pressure has been adjusted to a value pre-selected (within 3 psi), conduct a flight test to determine the actual flow rate performance that exists. This is accomplished by spraying water from the system at those given conditions for a period of several minutes. The flow rate is established by dividing the amount of liquid spayed by the time recorded for spraying. For example if 120 gallons is sprayed in 2 minutes, the flow rate would be 60-gallons per minute, the desired amount previously established in Step (4).

(9) If the measured flow is too low, decrease the windmill blade angle. Similarly if the measured flow is high, increase the blade angle.

(10) Final adjustments can be made after the first chemical spray operations by the same procedures outlined in Steps (8) and (9).

An alternate adjustment is to remove or add a number of nozzles to correspond to the requirements to meet the flow. Add nozzles to increase flow and remove nozzles to decrease flow.

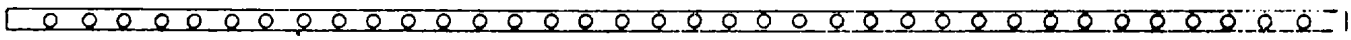
(11) Record all data on a spray Log Sheet (a sample of which is included on page 27a) to provide information for new chemical flow charts to be established from these data.

SYSTEM LOG (Sample)

PART NO. 3066

GENERAL	PRE-FLIGHT DATA
1. Flight Test No. _____	1. Nozzle Configuration
2. Date _____	(a) Nozzle Type _____
3. Location _____	(b) No. Of Nozzles _____
4. Purpose _____	(c) Core _____
5. Aircraft Cmdr. _____	(d) Orifice _____
6. Spray Controller _____	2. Windmill Blade Setting _____ deg
7. System Serial No. _____	3. Fluid Quantity _____ gal
8. Aircraft Serial No. _____	4. Name Of Fluid _____
IN-FLIGHT DATA	5. Concentration _____
1. Mission Duration _____ min	6. Bypass Position _____
2. Time Spray Is On _____ min	7. Desired Swath Spacing _____ ft
3. Amount Sprayed _____ gal	8. Desired Flight Height _____ ft
4. Spray Pressure _____ ft	9. Desired Air Speed _____ knots
5. Actual Flight Height _____ ft	10. Application Rate _____ gal/acre
6. Actual Air Speed _____ knots	**SPECIAL COMMENTS**
7. Actual Swath Spacing _____ ft	_____
8. Wind Velocity _____ mph	_____
9. Wind Direction _____ deg	_____

NOZZLE PLACEMENT

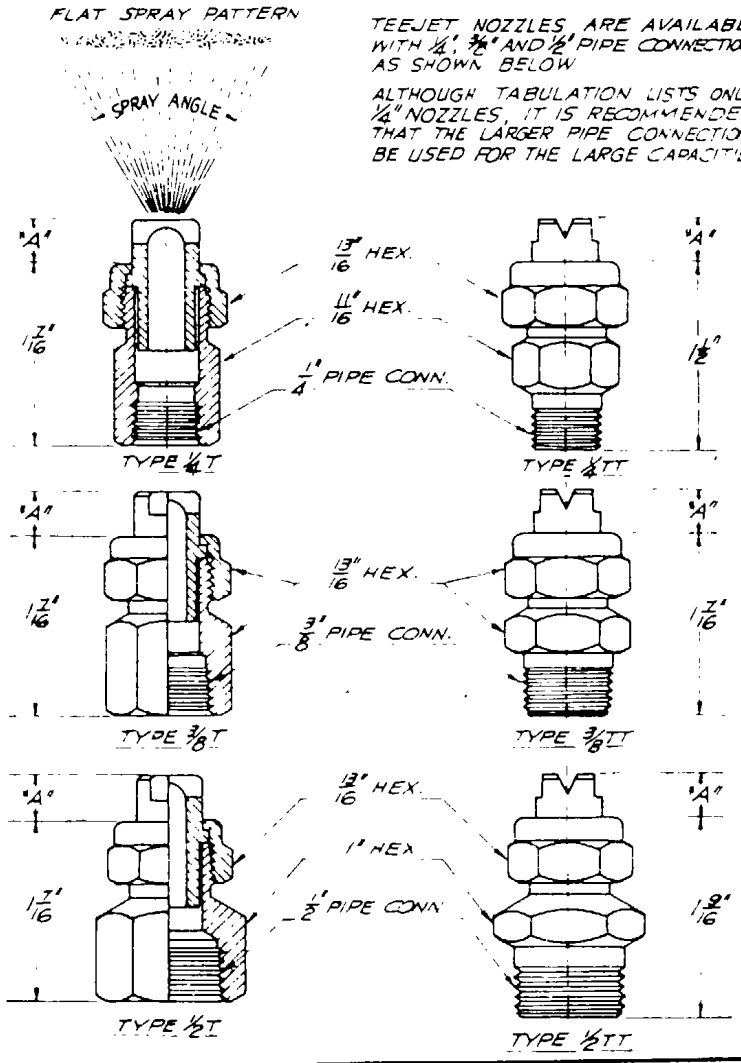


o **Boom Opening**

⊗ **Nozzle Position**

SPRAY ANGLE AT 40 p.s.i.	NOZZLE NO. TYPE T FEMALE CONN.	NOZZLE NO. TYPE TT MALE CONN	"A" Approx. Orifice Dia	CAPACITY G.P.M. (Gallons per Minute) AND SPRAY ANGLE AT 05 LBS PER SQUARE INCH. 5	7	10	15	20	30	40	60	80	100	150	200	300	400
110°	¼T 11010	¼TT 11010	7/64	5/64	35 86	42 99	53	67	77	96	110	2	6	9	2.3	2.7	3.2
	¼T 11015	¼TT 11015	9/64	3/32	53 78	63 92	77	92	100	04	25	1	6	8	2.4	2.9	3.4	4.1	4.8
95°	¼T 9530	¼TT 9530	7/64	9/64	6.9	8.5	11	13	16	20	23	30	38	4.2	4.9	5.8	6.8	8.2	9.5
	¼T 9540	¼TT 9540	9/64	5/32	4	7	8.0	9.5	11	13	15	19	23	26	30	36	42	51	59
	¼T 9550	¼TT 9550	11/64	11/64	8	10	12	15	18	22	26	33	40	47	54	65	76	92	107
	¼T 9560	¼TT 9560	13/64	3/16	12	15	18	22	27	33	39	49	59	69	80	96	112	135	158
	¼T 9570	¼TT 9570	15/64	7/64	25	29	35	43	49	61	70	86	99	1	14	16	19	23	26
80°	¼T 8030	¼TT 8030	9/64	9/64	3	5	6	8	10	12	15	20	25	30	35	42	48	58	68
	¼T 8040	¼TT 8040	11/64	5/32	4	7	8.0	10	12	15	18	25	31	38	44	53	61	74	86
	¼T 8050	¼TT 8050	13/64	11/64	8	10	12	15	18	22	26	33	40	47	54	65	76	92	107
	¼T 8060	¼TT 8060	15/64	3/16	12	15	18	22	27	33	39	49	59	69	80	96	112	135	158
	¼T 8070	¼TT 8070	15/64	7/64	25	29	35	43	49	61	70	86	99	1	14	16	19	23	26
65°	¼T 6530	¼TT 6530	11/64	9/64	3	5	6	8	10	12	15	20	25	30	35	42	48	58	68
	¼T 6540	¼TT 6540	11/64	5/32	4	7	8.0	10	12	15	18	25	31	38	44	53	61	74	86
	¼T 6550	¼TT 6550	13/64	11/64	8	10	12	15	18	22	26	33	40	47	54	65	76	92	107
	¼T 6560	¼TT 6560	15/64	3/16	12	15	18	22	27	33	39	49	59	69	80	96	112	135	158
	¼T 6570	¼TT 6570	15/64	7/64	25	29	35	43	49	61	70	86	99	1	14	16	19	23	26
50°	¼T 5030	¼TT 5030	9/64	9/64	3	5	6	8	10	12	15	20	25	30	35	42	48	58	68
	¼T 5040	¼TT 5040	11/64	5/32	4	7	8.0	10	12	15	18	25	31	38	44	53	61	74	86
	¼T 5050	¼TT 5050	13/64	11/64	8	10	12	15	18	22	26	33	40	47	54	65	76	92	107
	¼T 5060	¼TT 5060	15/64	3/16	12	15	18	22	27	33	39	49	59	69	80	96	112	135	158
	¼T 5070	¼TT 5070	15/64	7/64	25	29	35	43	49	61	70	86	99	1	14	16	19	23	26
40°	¼T 4030	¼TT 4030	11/64	9/64	3	5	6	8	10	12	15	20	25	30	35	42	48	58	68
	¼T 4040	¼TT 4040	11/64	5/32	4	7	8.0	10	12	15	18	25	31	38	44	53	61	74	86
	¼T 4050	¼TT 4050	13/64	11/64	8	10	12	15	18	22	26	33	40	47	54	65	76	92	107
	¼T 4060	¼TT 4060	15/64	3/16	12	15	18	22	27	33	39	49	59	69	80	96	112	135	158
	¼T 4070	¼TT 4070	15/64	7/64	25	29	35	43	49	61	70	86	99	1	14	16	19	23	26
25°	¼T 2530	¼TT 2530	9/64	9/64	3	5	6	8	10	12	15	20	25	30	35	42	48	58	68
	¼T 2540	¼TT 2540	11/64	5/32	4	7	8.0	10	12	15	18	25	31	38	44	53	61	74	86
	¼T 2550	¼TT 2550	13/64	11/64	8	10	12	15	18	22	26	33	40	47	54	65	76	92	107
	¼T 2560	¼TT 2560	15/64	3/16	12	15	18	22	27	33	39	49	59	69	80	96	112	135	158
	¼T 2570	¼TT 2570	15/64	7/64	25	29	35	43	49	61	70	86	99	1	14	16	19	23	26
15°	¼T 1530	¼TT 1530	9/64	9/64			1.5	1.8	2.2	2.6	3.0	4.0	5.0	6.0	7.0	8.5	9.5	12	14
	¼T 1540	¼TT 1540	11/64	5/32			2.0	2.5	2.8	3.5	4.0	5.0	6.3	7.7	9.0	11	13	16	19
	¼T 1550	¼TT 1550	13/64	11/64			2.5	3.1	3.5	4.3	5.0	6.3	7.9	9.7	11	14	16	20	24
	¼T 1560	¼TT 1560	15/64	3/16		2.5	3.0	3.7	4.2	5.2	6.0	7.3	8.5	9.5	12	13	16	19	23
	¼T 1570	¼TT 1570	15/64	7/64		2.9	3.5	4.3	4.9	6.1	7.0	8.6	9.9	11	14	16	19	23	26

ABOVE TABULATION IS BASED ON WATER AT TEMPERATURE OF 70°F. FOR SMALLER CAPACITY TEEJET NOZZLES SEE TABLE III.



DESCRIPTION

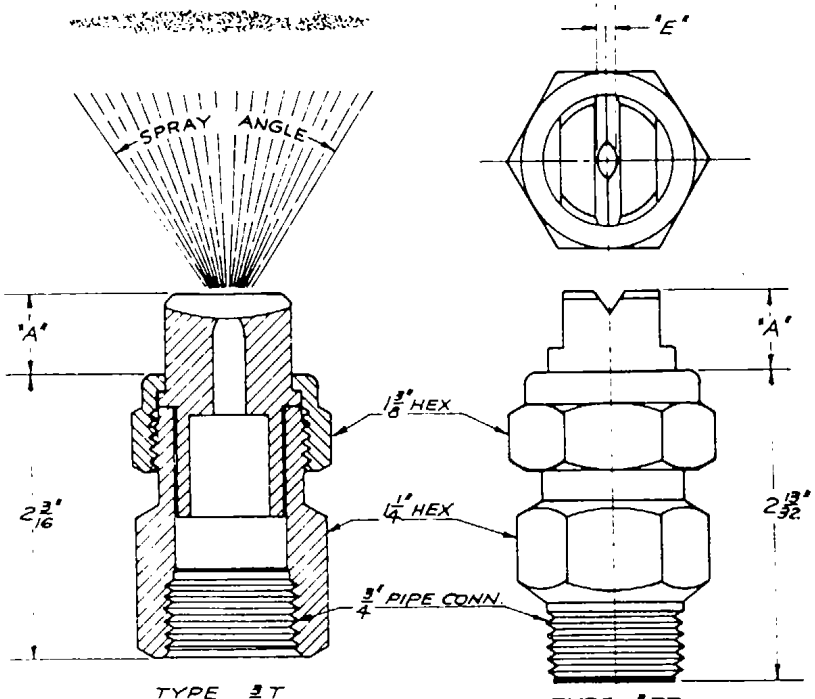
TABULATION OF CAPACITIES AND SPRAY ANGLES FOR LARGE CAPACITY TEEJET NOZZLES

over

TABLE II

SPRAY ANGLE AT 40 p.s.i.	NOZZLE NO. TYPE T FEMALE CONN	NOZZLE NO. TYPE TT MALE CONN.	"A"	Approx. Equiv. Orifice Dia.	"E" Approx.	CAPACITY G.P.M. (Gallons Per Minute) AND SPRAY ANGLE AT p.s.i. (Lbs. per square inch) 5	7	10	15	20	30	40	60	80	100	150	200	300	400
80°	¾T 8040	¾TT 8040	5/8"	5/32"	7/64"	1.4 54°	1.7 59°	2.0 64°	2.5 71°	2.8 74°	3.5 78°	4.0 80°	4.9 82°	5.7 84°	6.3 85°	7.7 86°	9.0 87°	11.0 88°	12.7 89°
	¾T 8050	¾TT 8050	5/8"	11/64"	1/8"	1.8 54°	2.1 59°	2.5 64°	3.1 71°	3.5 74°	4.3 78°	5.0 80°	6.1 82°	7.1 84°	7.9 85°	9.7 86°	11.2 86°	13.7 87°	15.8 88°
	¾T 8060	¾TT 8060	5/8"	3/16"	3/64"	2.1 55°	2.5 60°	3.0 64°	3.7 71°	4.2 74°	5.2 78°	6.0 80°	7.3 82°	8.5 84°	9.5 85°	11.6 85°	13.4 85°	16.4 86°	19.0 87°
	¾T 8070	¾TT 8070	5/8"	15/64"	5/32"	2.5 56°	2.9 61°	3.5 65°	4.3 72°	4.9 75°	6.1 78°	7.0 80°	8.5 82°	9.9 83°	11.0 84°	13.5 85°	15.6 85°	19.2 86°	22.1 87°
	¾T 80100	¾TT 80100	5/8"	1/4"	3/16"	3.5 56°	4.2 61°	5.0 65°	6.1 72°	7.1 75°	8.6 78°	10.0 80°	12.3 82°	14.1 83°	15.8 84°	19.4 85°	22.4 85°	27.4 86°	31.6 87°
	¾T 80150	¾TT 80150	5/8"	19/64"	5/32"	5.3 57°	6.3 62°	7.5 66°	9.2 72°	10.6 75°	13.0 78°	15.0 80°	18.4 82°	21.2 83°	23.7 84°	29.0 85°	33.6 85°	41.1 86°	47.4 87°
	¾T 80200	¾TT 80200	11/16"	11/32"	1/4"	7.1 58°	8.4 62°	10.0 66°	12.2 72°	14.1 75°	17.3 78°	20.0 80°	24.5 82°	28.2 83°	31.6 84°	38.8 85°	44.8 85°	54.8 86°	63.3 87°
	¾T 80250	¾TT 80250	3/4"	3/8"	3/32"	8.8 58°	10.5 63°	12.5 66°	15.3 72°	17.7 75°	21.6 78°	25.0 80°	30.6 82°	35.3 83°	39.5 83°	48.4 84°	55.8 84°	68.3 85°	79.0 86°
	¾T 80300	¾TT 80300	7/8"	27/64"	5/16"	10.6 59°	12.5 64°	15.0 67°	18.4 73°	21.2 76°	26.0 79°	30.0 80°	36.7 82°	42.5 83°	47.5 83°	58.2 83°	67.1 84°	82.3 85°	95.0 86°
65°	¾T 6540	¾TT 6540	5/8"	5/32"	7/64"	1.4 41°	1.7 47°	2.0 52°	2.5 56°	2.8 60°	3.5 63°	4.0 65°	4.9 67°	5.7 68°	6.3 69°	7.8 70°	9.0 71°	11.0 72°	12.7 73°
	¾T 6550	¾TT 6550	5/8"	11/64"	1/8"	1.8 41°	2.1 47°	2.5 52°	3.1 56°	3.5 60°	4.3 63°	5.0 65°	6.1 67°	7.1 68°	7.9 69°	9.7 70°	11.2 71°	13.7 72°	15.8 73°
	¾T 6560	¾TT 6560	5/8"	3/16"	3/64"	2.1 42°	2.5 47°	3.0 52°	3.7 56°	4.2 60°	5.2 63°	6.0 65°	7.3 67°	8.5 68°	9.5 69°	11.6 70°	13.4 71°	16.4 72°	19.0 73°
	¾T 6570	¾TT 6570	5/8"	15/64"	5/32"	2.5 42°	2.9 47°	3.5 52°	4.3 56°	4.9 60°	6.1 63°	7.0 65°	8.5 67°	9.9 68°	11.0 69°	13.5 70°	15.6 71°	19.2 72°	22.1 73°
	¾T 65100	¾TT 65100	5/8"	1/4"	3/16"	3.5 43°	4.2 48°	5.0 53°	6.1 57°	7.1 61°	8.6 63°	10.0 65°	12.3 67°	14.1 68°	15.8 69°	19.4 70°	22.4 71°	27.4 72°	31.6 73°
	¾T 65150	¾TT 65150	5/8"	19/64"	15/64"	5.3 45°	6.3 50°	7.5 54°	9.2 58°	10.6 62°	13.0 64°	15.0 65°	18.4 66°	21.2 67°	23.7 68°	29.0 69°	33.6 70°	41.1 71°	47.4 72°
	¾T 65200	¾TT 65200	11/16"	11/32"	1/4"	7.1 46°	8.4 51°	10.0 54°	12.2 58°	14.1 62°	17.3 64°	20.0 65°	24.5 66°	28.2 67°	31.6 68°	38.8 69°	44.8 70°	54.8 71°	63.3 72°
	¾T 65250	¾TT 65250	3/4"	3/8"	3/32"	8.8 46°	10.5 51°	12.5 54°	15.3 58°	17.7 62°	21.6 64°	25.0 65°	30.6 66°	35.3 67°	39.5 68°	48.4 69°	55.8 70°	68.3 71°	79.0 72°
	¾T 65300	¾TT 65300	7/8"	27/64"	5/16"	10.6 47°	12.5 52°	15.0 55°	18.4 59°	21.2 63°	26.0 64°	30.0 65°	36.7 66°	42.5 66°	47.5 67°	58.2 68°	67.1 69°	82.3 70°	95.0 71°
50°	¾T 5040	¾TT 5040	5/8"	5/32"	1/8"	1.4 27°	1.7 31°	2.0 36°	2.5 42°	2.8 45°	3.5 48°	4.0 50°	4.9 51°	5.7 52°	6.3 53°	7.7 55°	9.0 56°	11.0 57°	12.7 58°
	¾T 5050	¾TT 5050	5/8"	11/64"	9/64"	1.8 27°	2.1 31°	2.5 36°	3.1 42°	3.5 45°	4.3 48°	5.0 50°	6.1 51°	7.1 52°	7.9 53°	9.7 55°	11.2 56°	13.7 57°	15.8 58°
	¾T 5060	¾TT 5060	5/8"	3/16"	5/32"	2.1 28°	2.5 32°	3.0 37°	3.7 42°	4.2 45°	5.2 48°	6.0 50°	7.3 51°	8.5 52°	9.5 53°	11.6 55°	13.4 56°	16.4 57°	19.0 58°
	¾T 5070	¾TT 5070	5/8"	15/64"	11/64"	2.5 29°	2.9 33°	3.5 38°	4.3 43°	4.9 46°	6.1 48°	7.0 50°	8.5 51°	9.9 52°	11.0 53°	13.5 54°	15.6 55°	19.2 56°	22.1 57°
	¾T 50100	¾TT 50100	5/8"	1/4"	13/64"	3.5 29°	4.2 33°	5.0 38°	6.1 43°	7.1 46°	8.6 48°	10.0 50°	12.3 51°	14.1 52°	15.8 53°	19.4 54°	22.4 55°	27.4 56°	31.6 57°
	¾T 50150	¾TT 50150	5/8"	19/64"	15/64"	5.3 30°	6.3 34°	7.5 39°	9.2 43°	10.6 46°	13.0 48°	15.0 50°	18.4 51°	21.2 52°	23.7 53°	29.0 54°	33.6 55°	41.1 56°	47.4 57°
	¾T 50200	¾TT 50200	11/16"	11/32"	3/32"	7.1 30°	8.4 34°	10.0 39°	12.2 43°	14.1 46°	17.3 48°	20.0 50°	24.5 51°	28.2 52°	31.6 53°	38.8 54°	44.8 55°	54.8 56°	63.3 57°
	¾T 50250	¾TT 50250	3/4"	3/8"	5/16"	8.8 30°	10.5 34°	12.5 39°	15.3 43°	17.7 46°	21.6 48°	25.0 50°	30.6 51°	35.3 52°	39.5 53°	48.4 54°	55.8 55°	68.3 56°	79.0 56°
	¾T 50300	¾TT 50300	7/8"	27/64"	11/32"	10.6 31°	12.5 35°	15.0 40°	18.4 44°	21.2 46°	26.0 48°	30.0 50°	36.7 51°	42.5 52°	47.5 53°	58.2 54°	67.1 55°	82.3 56°	95.0 56°

FLAT SPRAY PATTERN



DESCRIPTION

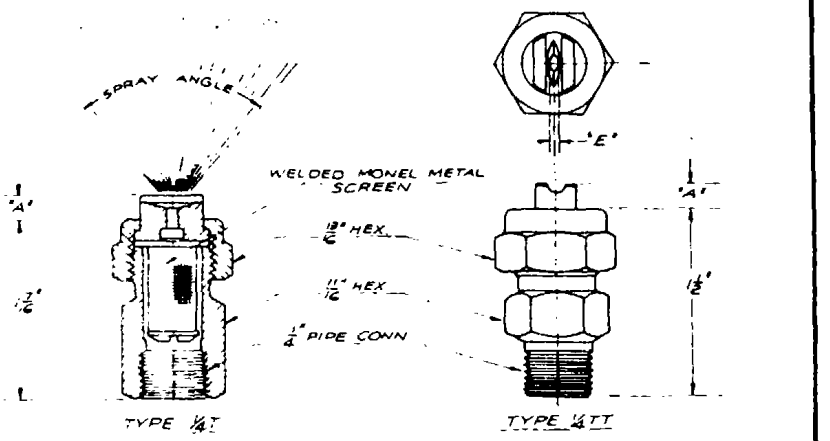
¾T ---- & ¾TT ----
TEEJET NOZZLES
TABULATION OF CAPACITIES
AND SPRAY ANGLES

SPRAY ANGLE AT 40psi.	NOZZLE NO. TYPE T FEMALE CONN.	NOZZLE NO. TYPE TT MALE CONN.	"A"	Approx. Orifice Dia.	"E"	MESH OF SCREEN	CAPACITY G.P.M. (Gallons Per Minute) AND SPRAY ANGLE AT p.s.i. (Lbs per square inch) 5	7	10	15	20	30	40	60	80	100	150	200	300	400
110°	1/4T 110 01	1/4TT 110 01	7/64	.026	.011	100	.03 42°	.04 55°	.05 69°	.06 87°	.07 94°	.09 105°	.10 110°	.12 117°	.14 121°	.16 122°	.19 123°	.22 124°	.27 125°	.32 126°
	1/4T 110 015	1/4TT 110 015	7/64	.031	.009	100	.03 43°	.06 60°	.07 76°	.09 89°	.11 97°	.13 104°	.15 110°	.18 117°	.21 121°	.24 125°	.29 124°	.34 125°	.41 126°	.48 126°
	1/4T 110 02	1/4TT 110 02	7/64	.036	.008	50	.07 61°	.08 72°	.10 80°	.12 92°	.14 98°	.17 105°	.20 110°	.25 116°	.28 120°	.32 121°	.39 122°	.45 123°	.55 124°	.64 123°
	1/4T 110 03	1/4TT 110 03	7/64	.043	.022	50	.11 70°	.12 87°	.15 88°	.18 95°	.21 99°	.26 106°	.30 110°	.37 116°	.42 120°	.47 121°	.58 122°	.67 122°	.82 124°	.94 125°
	1/4T 110 04	1/4TT 110 04	9/64	.052	.026	50	.14 80°	.17 85°	.20 90°	.25 96°	.28 100°	.35 106°	.40 110°	.49 115°	.57 119°	.68 120°	.78 121°	.90 122°	1.10 124°	1.26 124°
	1/4T 110 06	1/4TT 110 06	1/32	.062	.033	50	.21 82°	.25 87°	.30 91°	.37 97°	.42 101°	.52 107°	.60 110°	.73 114°	.85 117°	.98 119°	1.16 120°	1.34 122°	1.64 123°	1.90 124°
	1/4T 110 08	1/4TT 110 08	5/64	.072	.041	50	.28 84°	.33 89°	.40 93°	.49 98°	.56 102°	.69 107°	.80 110°	.98 113°	1.13 115°	1.30 117°	1.55 119°	1.79 120°	2.20 122°	2.52 123°
95°	1/4T 95 01	1/4TT 95 01	3/64	.026	.012	100	.03 40°	.04 46°	.05 54°	.06 74°	.07 81°	.09 89°	.10 93°	.12 102°	.14 109°	.16 108°	.19 113°	.22 114°	.27 114°	.32 115°
	1/4T 95 015	1/4TT 95 015	7/64	.031	.016	100	.05 42°	.06 49°	.07 66°	.09 75°	.11 82°	.13 90°	.15 95°	.18 102°	.21 105°	.24 103°	.29 104°	.34 114°	.41 114°	.48 115°
	1/4T 95 02	1/4TT 95 02	7/64	.036	.021	50	.07 47°	.08 56°	.10 67°	.12 76°	.14 82°	.17 90°	.20 95°	.25 101°	.28 105°	.32 102°	.39 104°	.45 113°	.55 114°	.64 115°
	1/4T 95 03	1/4TT 95 03	7/64	.043	.028	50	.10 49°	.12 56°	.15 68°	.18 77°	.21 83°	.26 91°	.30 95°	.37 100°	.42 104°	.49 105°	.58 107°	.67 112°	.82 113°	.94 113°
	1/4T 95 04	1/4TT 95 04	9/64	.052	.037	50	.14 52°	.17 64°	.20 73°	.25 79°	.28 84°	.35 91°	.40 95°	.49 100°	.57 103°	.68 104°	.78 106°	.90 108°	1.10 109°	1.26 110°	
	1/4T 95 06	1/4TT 95 06	1/32	.062	.036	50	.21 51°	.25 64°	.30 74°	.37 84°	.42 90°	.52 96°	.60 99°	.73 102°	.85 104°	.98 106°	1.16 107°	1.34 108°	1.64 109°	1.90 108°
	1/4T 95 08	1/4TT 95 08	5/64	.072	.040	50	.28 52°	.33 66°	.40 74°	.49 84°	.56 87°	.69 92°	.80 95°	.98 98°	1.13 100°	1.26 101°	1.55 103°	1.79 104°	2.20 106°	2.52 107°
	1/4T 95 10	1/4TT 95 10	3/32	5/64	.054	*	.35 53°	.43 70°	.50 84°	.61 89°	.70 92°	.86 96°	1.0 99°	1.2 97°	1.4 99°	1.58 101°	1.93 103°	2.24 104°	2.74 105°	3.16 106°
	1/4T 95 15	1/4TT 95 15	3/32	3/32	.066	*	.53 66°	.63 79°	.75 89°	.92 93°	1.16 95°	1.30 95°	1.5 96°	1.83 98°	2.12 100°	2.35 102°	2.90 103°	3.35 104°	4.10 105°	4.75
	1/4T 95 20	1/4TT 95 20	13/64	7/64	.079	*	.71 67°	.84 81°	1.0 90°	1.23 96°	1.41 98°	1.74 99°	2.0 99°	2.45 96°	2.83 97°	3.16 99°	3.88 101°	4.48 103°	5.48 104°	6.33 105°
80°	1/4T 80 0050	1/4TT 80 0050	1/64	.018	.010	200					.030 50°	.035 67°	.040 72°	.050 80°	.06 91°	.07 95°	.08 99°	.10 101°	.11 101°	.14 101°	.16 102°
	1/4T 80 0067	1/4TT 80 0067	1/64	.021	.02	100				.03 51°	.04 60°	.05 67°	.06 74°	.07 80°	.08 85°	.09 94°	.11 97°	.13 98°	.15 99°	.18 99°	.22 100°
	1/4T 80 01	1/4TT 80 01	7/64	.026	.015	100			.05 65°	.06 67°	.07 69°	.09 73°	.10 80°	.12 85°	.14 89°	.16 90°	.21 91°	.22 95°	.27 95°	.32 94°
	1/4T 80 015	1/4TT 80 015	9/64	.031	.018	100		.06 45°	.07 54°	.09 64°	.11 68°	.13 75°	.15 80°	.18 85°	.21 89°	.24 90°	.29 91°	.34 92°	.41 94°	.48 94°
	1/4T 80 02	1/4TT 80 02	9/64	.036	.023	50	.07 34°	.08 48°	.10 56°	.12 65°	.14 69°	.17 76°	.20 80°	.25 84°	.28 88°	.32 89°	.39 90°	.45 91°	.55 92°	.64 93°
	1/4T 80 03	1/4TT 80 03	9/64	.043	.028	50	.10 41°	.13 50°	.15 58°	.18 66°	.21 70°	.26 76°	.30 80°	.37 84°	.42 87°	.47 88°	.58 89°	.67 90°	.82 91°	.94 92°
	1/4T 80 04	1/4TT 80 04	9/64	.052	.031	50	.14 45°	.17 55°	.20 60°	.25 67°	.28 71°	.35 77°	.40 80°	.49 85°	.57 86°	.68 87°	.78 88°	.90 89°	1.10 90°	1.26 91°
	1/4T 80 06	1/4TT 80 06	1/32	.062	.040	50	.21 49°	.25 55°	.30 61°	.37 68°	.42 72°	.52 77°	.60 80°	.73 83°	.85 85°	.98 86°	1.16 87°	1.34 88°	1.64 89°	1.90 90°
	1/4T 80 08	1/4TT 80 08	5/64	.072	.044	50	.28 51°	.33 57°	.40 62°	.49 69°	.56 72°	.69 78°	.80 80°	.98 84°	1.13 85°	1.26 86°	1.55 87°	1.79 88°	2.20 89°	2.52 89°
	1/4T 80 10	1/4TT 80 10	5/32	5/64	.050	*	.35 53°	.43 58°	.50 63°	.61 70°	.70 75°	.86 78°	1.0 80°	1.22 82°	1.41 84°	1.58 85°	1.93 86°	2.24 87°	2.74 88°	3.16 89°
	1/4T 80 15	1/4TT 80 15	3/32	3/32	.062	*	.53 55°	.63 60°	.75 64°	.92 71°	1.16 74°	1.30 79°	1.5 80°	1.83 82°	2.12 83°	2.37 84°	2.90 85°	3.35 86°	4.10 87°	4.75 88°
	1/4T 80 20	1/4TT 80 20	7/64	7/64	.075	*	.71 55°	.84 60°	1.0 65°	1.23 71°	1.41 74°	1.74 78°	2.0 80°	2.45 82°	2.83 83°	3.16 84°	3.87 85°	4.47 86°	5.48 87°	6.32 88°
73°	1/4T 73 0023	1/4TT 73 0023	3/64	.012	.007	200					.014 42°	.016 50°	.020 64°	.023 73°	.028 83°	.032 89°	.036 92°	.045 95°	.051 97°	.063 98°	.073 99°
	1/4T 73 0039	1/4TT 73 0039	1/64	.016	.005	200				.020 91°	.024 44°	.028 58°	.034 65°	.039 73°	.046 82°	.053 87°	.062 90°	.073 92°	.087 93°	.11 94°	.12 96°
	1/4T 73 0077	1/4TT 73 0077	1/64	.022	.013	100		.032 69°	.039 55°	.047 45°	.065 58°	.067 65°	.077 73°	.09 81°	.11 86°	.12 89°	.15 91°	.17 92°	.21 93°	.24 94°
	1/4T 73 0116	1/4TT 73 0116	1/64	.028	.016	100	.04 26°	.05 31°	.06 37°	.07 46°	.08 54°	.10 66°	.116 73°	.14 81°	.16 86°	.18 87°	.22 89°	.26 90°	.32 91°	.37 92°
	1/4T 73 0154	1/4TT 73 0154	1/64	.032	.021	100	.05 29°	.06 32°	.08 38°	.09 47°	.11 55°	.13 67°	.154 73°	.19 80°	.22 84°	.24 86°	.30 87°	.34 88°	.42 89°	.48 90°
	1/4T 73 0231	1/4TT 73 0231	1/64	.040	.028	50	.06 30°	.08 35°	.10 43°	.12 49°	.14 56°	.16 67°	.20 73°	.231 79°	.28 83°	.33 85°	.37 86°	.45 87°	.52 88°	.63 89°	.73 89°
	1/4T 73 0308	1/4TT 73 0308	1/64	.045	.033	50	.11 31°	.13 35°	.15 43°	.19 52°	.22 58°	.27 68°	.308 75°	.38 79°	.44 82°	.49 84°	.60 85°	.69 86°	.84 87°	.97 88°
	1/4T 73 0385	1/4TT 73 0385	1/64	.051	.039	50	.14 32°	.16 38°	.19 45°	.24 53°	.27 59°	.33 68°	.385 75°	.47 78°	.54 81°	.61 83°	.74 84°	.86 85°	1.05 86°	1.22 87°
	1/4T 73 0462	1/4TT 73 0462	1/64	.059	.046	50	.16 35°	.19 42°	.23 47°	.28 55°	.32 60°	.40 69°	.462 77°	.57 80°	.65 82°	.73 83°	.90 84°	1.03 85°	1.25 86°	1.46 87°
	1/4T 73 0616	1/4TT 73 0616	1/64	.065	.046	50	.22 38°	.26 44°	.31 50°	.38 58°	.44 63°	.53 70°	.616 75°	.75 77°	.87 78°	.98 80°	1.20 82°	1.39 83°	1.69 84°	1.95 85°
	1/4T 73 0770	1/4TT 73 0770	3/64	.072	.061	50	.27 46°	.32 49°	.38 52°	.47 59°	.54 64°	.67 70°	.770 73°	.94 76°	1.09 77°	1.22 79°	1.49 81°	1.72 82°	2.11 83°	2.44 84°
	1/4T 73 0924	1/4TT 73 0924	3/32	.078	.064	50	.33 44°	.39 48°	.46 55°	.57 61°	.65 65°	.80 70°	.924 75°	1.13 76°	1.30 77°	1.46 78°	1.79 80°	2.06 81°	2.53 82°	2.92 82°

SPRAY ANGLE AT 40psi.	NOZZLE NO. TYPE T FEMALE CONN	NOZZLE NO. TYPE TT MALE CONN	"A"	Approx. Orifice Dia.	"E"	MESH OF SCREEN	CAPACITY G.P.M. (Gallons Per Minute) AND SPRAY ANGLE AT p.s.i. (Lbs. per square inch) 5	7	10	15	20	30	40	60	80	100	150	200	300	400
65°	1/4T 65 0017	1/4TT 65 0017	13/64	.011	.006	200					.012 42°	.015 58°	.017 65°	.021 73°	.024 77°	.027 81°	.033 84°	.038 86°	.047 90°	.054 94°
	1/4T 65 0025	1/4TT 65 0025	1/64	.013	.007	200					.018 48°	.022 58°	.025 65°	.031 73°	.035 77°	.040 80°	.048 84°	.056 86°	.069 90°	.079 91°
	1/4T 65 0033	1/4TT 65 0033	3/64	.015	.009	200				.021 35°	.023 47°	.029 58°	.033 65°	.040 72°	.047 76°	.058 79°	.064 82°	.074 83°	.092 86°	.11 88°
	1/4T 65 0050	1/4TT 65 0050	3/64	.018	.011	200				.030 40°	.035 48°	.040 56°	.050 65°	.060 72°	.077 75°	.08 78°	.10 81°	.11 82°	.14 84°	.16 86°
	1/4T 65 0067	1/4TT 65 0067	3/64	.021	.013	100		.02 25°	.03 30°	.04 44°	.05 50°	.06 59°	.067 72°	.08 75°	.09 77°	.11 77°	.13 80°	.15 81°	.18 82°	.20 83°
	1/4T 65 01	1/4TT 65 01	1/64	.026	.017	100		.04 27°	.05 33°	.06 45°	.07 54°	.09 65°	.10 71°	.12 74°	.14 76°	.16 78°	.19 79°	.22 80°	.27 81°	.32 82°
	1/4T 65 015	1/4TT 65 015	3/64	.031	.023	100		.06 29°	.07 36°	.09 46°	.11 51°	.13 59°	.15 65°	.18 71°	.21 74°	.24 76°	.29 78°	.34 79°	.41 80°	.48 82°
	1/4T 65 02	1/4TT 65 02	3/64	.036	.024	50	.07 25°	.08 32°	.10 39°	.12 47°	.14 52°	.17 60°	.20 65°	.25 70°	.29 73°	.32 75°	.39 77°	.45 78°	.55 79°	.64 81°
	1/4T 65 03	1/4TT 65 03	3/64	.043	.027	50	.10 2°	.12 39°	.15 41°	.18 48°	.21 53°	.26 60°	.30 65°	.37 72°	.42 74°	.47 76°	.58 77°	.67 78°	.82 79°	.94 80°
	1/4T 65 04	1/4TT 65 04	3/64	.052	.034	50	.14 29°	.17 36°	.20 42°	.25 49°	.28 53°	.35 60°	.40 65°	.49 69°	.57 71°	.63 73°	.78 75°	.90 77°	1.10 77°	1.26 78°
	1/4T 65 06	1/4TT 65 06	1/32	.062	.044	50	.21 32°	.25 39°	.30 45°	.37 50°	.42 54°	.52 61°	.60 65°	.73 69°	.85 72°	.95 73°	1.15 74°	1.34 75°	1.64 76°	1.90 77°
	1/4T 65 08	1/4TT 65 08	5/64	.072	.050	50	.28 35°	.33 39°	.40 44°	.49 51°	.56 56°	.69 61°	.80 65°	.98 68°	1.13 71°	1.26 72°	1.55 73°	1.79 74°	2.20 75°	2.52 76°
	1/4T 65 10	1/4TT 6510	3/32	5/64	.053	*	.35 38°	.43 42°	.50 48°	.61 52°	.70 56°	.86 61°	1.0 65°	1.22 68°	1.41 71°	1.58 72°	1.93 73°	2.24 74°	2.74 75°	3.16 76°
	1/4T 65 15	1/4TT 65 15	3/32	3/32	.070	*	.53 41°	.63 44°	.75 48°	.92 53°	1.16 56°	1.30 62°	1.5 65°	1.83 68°	2.12 70°	2.37 71°	2.90 72°	3.35 73°	4.10 74°	4.75 75°
	1/4T 65 20	1/4TT 65 20	13/64	7/64	.076	*	.71 44°	.84 47°	1.0 50°	1.23 54°	1.41 57°	1.74 62°	2.0 65°	2.45 68°	2.83 70°	3.16 71°	3.88 72°	4.48 73°	5.48 74°	6.33 75°

FLAT SPRAY PATTERN

PATENT NO 2,621,078



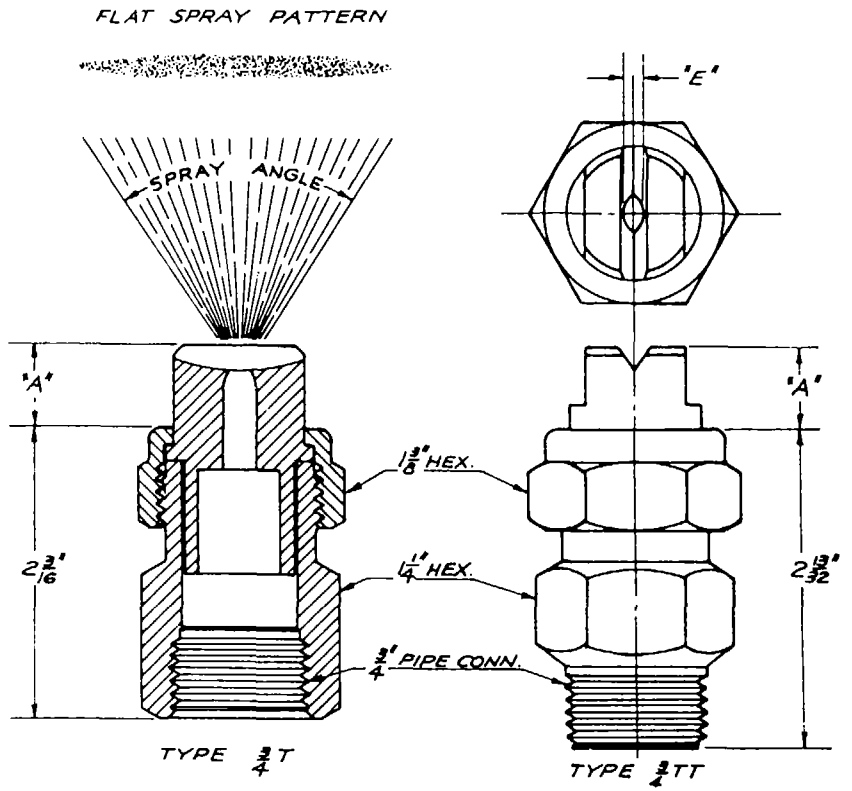
* STRAINERS ARE NOT FURNISHED WITH ORIFICE TIPS OF THIS CAPACITY

DESCRIPTION

TABULATION OF CAPACITIES AND SPRAY ANGLES FOR 1/4T---- AND 1/4TT---- TEEJET NOZZLES

TABLE III

SPRAY ANGLE AT 40 p.s.i.	NOZZLE NO. TYPE T FEMALE CONN.	NOZZLE NO. TYPE TT MALE CONN.	"A"	Approx. Equiv. Orifice Dia.	"E" Approx.	CAPACITY G.P.M. (Gallons Per Minute) AND SPRAY ANGLE AT p.s.i. (Lbs. per square inch) 5	7	10	15	20	30	40	60	80	100	150	200	300	400
80°	3/4T 8040	3/4TT 8040	5/16"	5/32"	7/64"	1.4 54°	1.7 59°	2.0 64°	2.5 71°	2.8 74°	3.5 78°	4.0 80°	4.9 82°	5.7 84°	6.3 85°	7.7 86°	9.0 87°	11.0 88°	12.7 89°
	3/4T 8050	3/4TT 8050	5/16"	11/64"	1/8"	1.8 54°	2.1 59°	2.5 64°	3.1 71°	3.5 74°	4.3 78°	5.0 80°	6.1 82°	7.1 84°	7.9 85°	9.7 86°	11.2 86°	13.7 87°	15.8 88°
	3/4T 8060	3/4TT 8060	6/16"	3/16"	8/64"	2.1 55°	2.5 60°	3.0 64°	3.7 71°	4.2 74°	5.2 78°	6.0 80°	7.3 82°	8.5 84°	9.5 85°	11.6 85°	13.4 85°	16.4 86°	19.0 87°
	3/4T 8070	3/4TT 8070	5/16"	9/64"	5/32"	2.5 56°	2.9 61°	3.5 65°	4.3 72°	4.9 75°	6.1 78°	7.0 80°	8.5 82°	9.9 83°	11.0 84°	13.5 85°	15.6 85°	19.2 86°	22.1 87°
	3/4T 80100	3/4TT 80100	5/16"	1/4"	3/16"	3.5 56°	4.2 61°	5.0 65°	6.1 72°	7.1 75°	8.6 78°	10.0 80°	12.3 82°	14.1 83°	15.8 84°	19.4 85°	22.4 85°	27.4 86°	31.6 87°
	3/4T 80150	3/4TT 80150	5/16"	13/64"	5/64"	5.3 57°	6.3 62°	7.5 66°	9.2 72°	10.6 75°	13.0 78°	15.0 80°	18.4 82°	21.2 83°	23.7 84°	29.0 85°	33.6 85°	41.1 86°	47.4 87°
	3/4T 80200	3/4TT 80200	11/16"	11/32"	1/4"	7.1 58°	8.4 62°	10.0 66°	12.2 72°	14.1 75°	17.3 78°	20.0 80°	24.5 82°	28.2 83°	31.6 84°	38.8 85°	44.8 85°	54.8 86°	63.3 87°
	3/4T 80250	3/4TT 80250	3/4"	3/8"	3/32"	8.8 58°	10.5 63°	12.5 66°	15.3 72°	17.7 75°	21.6 78°	25.0 80°	30.6 82°	35.3 83°	39.5 83°	48.4 84°	55.8 84°	68.3 85°	79.0 86°
	3/4T 80300	3/4TT 80300	7/16"	27/64"	5/16"	10.6 59°	12.5 64°	15.0 67°	18.4 73°	21.2 76°	26.0 79°	30.0 80°	36.7 82°	42.5 83°	47.5 83°	58.2 83°	67.1 84°	82.3 85°	95.0 86°
65°	3/4T 6540	3/4TT 6540	5/16"	5/32"	7/64"	1.4 41°	1.7 47°	2.0 52°	2.5 56°	2.8 60°	3.5 63°	4.0 65°	4.9 67°	5.7 68°	6.3 69°	7.8 70°	9.0 71°	11.0 72°	12.7 73°
	3/4T 6550	3/4TT 6550	5/16"	11/64"	1/8"	1.8 41°	2.1 47°	2.5 52°	3.1 56°	3.5 60°	4.3 63°	5.0 65°	6.1 67°	7.1 68°	7.9 69°	9.7 70°	11.2 71°	13.7 72°	15.8 73°
	3/4T 6560	3/4TT 6560	5/16"	3/16"	8/64"	2.1 42°	2.5 47°	3.0 52°	3.7 56°	4.2 60°	5.2 63°	6.0 65°	7.3 67°	8.5 68°	9.5 69°	11.6 70°	13.4 71°	16.4 72°	19.0 73°
	3/4T 6570	3/4TT 6570	5/16"	13/64"	5/32"	2.5 42°	2.9 47°	3.5 52°	4.3 56°	4.9 60°	6.1 63°	7.0 65°	8.5 67°	9.9 68°	11.0 69°	13.5 70°	15.6 71°	19.2 72°	22.1 73°
	3/4T 65100	3/4TT 65100	5/16"	1/4"	3/16"	3.5 43°	4.2 48°	5.0 53°	6.1 57°	7.1 61°	8.6 63°	10.0 65°	12.3 67°	14.1 68°	15.8 69°	19.4 70°	22.4 71°	27.4 72°	31.6 73°
	3/4T 65150	3/4TT 65150	5/16"	13/64"	15/64"	5.3 45°	6.3 50°	7.5 54°	9.2 58°	10.6 62°	13.0 64°	15.0 65°	18.4 66°	21.2 67°	23.7 68°	29.0 69°	33.6 70°	41.1 71°	47.4 72°
	3/4T 65200	3/4TT 65200	11/16"	11/32"	1/4"	7.1 46°	8.4 51°	10.0 54°	12.2 58°	14.1 62°	17.3 64°	20.0 65°	24.5 66°	28.2 67°	31.6 68°	38.8 69°	44.8 70°	54.8 71°	63.3 72°
	3/4T 65250	3/4TT 65250	3/4"	3/8"	9/32"	8.8 46°	10.5 51°	12.5 54°	15.3 58°	17.7 62°	21.6 64°	25.0 65°	30.6 66°	35.3 67°	39.5 68°	48.4 69°	55.8 70°	68.3 71°	79.0 72°
	3/4T 65300	3/4TT 65300	7/16"	27/64"	5/16"	10.6 47°	12.5 52°	15.0 55°	18.4 59°	21.2 63°	26.0 64°	30.0 65°	36.7 66°	42.5 66°	47.5 67°	58.2 68°	67.1 69°	82.3 70°	95.0 71°
50°	3/4T 5040	3/4TT 5040	5/16"	5/32"	1/8"	1.4 27°	1.7 31°	2.0 36°	2.5 42°	2.8 45°	3.5 48°	4.0 50°	4.9 51°	5.7 52°	6.3 53°	7.7 55°	9.0 56°	11.0 57°	12.7 58°
	3/4T 5050	3/4TT 5050	5/16"	11/64"	3/64"	1.8 27°	2.1 31°	2.5 36°	3.1 42°	3.5 45°	4.3 48°	5.0 50°	6.1 51°	7.1 52°	7.9 53°	9.7 55°	11.2 56°	13.7 57°	15.8 58°
	3/4T 5060	3/4TT 5060	5/16"	3/16"	5/32"	2.1 28°	2.5 32°	3.0 37°	3.7 42°	4.2 45°	5.2 48°	6.0 50°	7.3 51°	8.5 52°	9.5 53°	11.6 55°	13.4 56°	16.4 57°	19.0 58°
	3/4T 5070	3/4TT 5070	5/16"	9/64"	11/64"	2.5 29°	2.9 33°	3.5 38°	4.3 43°	4.9 46°	6.1 48°	7.0 50°	8.5 51°	9.9 52°	11.0 53°	13.5 54°	15.6 55°	19.2 56°	22.1 57°
	3/4T 50100	3/4TT 50100	5/16"	1/4"	13/64"	3.5 29°	4.2 33°	5.0 38°	6.1 43°	7.1 46°	8.6 48°	10.0 50°	12.3 51°	14.1 52°	15.8 53°	19.4 54°	22.4 55°	27.4 56°	31.6 57°
	3/4T 50150	3/4TT 50150	5/16"	13/64"	15/64"	5.3 30°	6.3 34°	7.5 39°	9.2 43°	10.6 46°	13.0 48°	15.0 50°	18.4 51°	21.2 52°	23.7 53°	29.0 54°	33.6 55°	41.1 56°	47.4 57°
	3/4T 50200	3/4TT 50200	11/16"	11/32"	3/32"	7.1 30°	8.4 34°	10.0 39°	12.2 43°	14.1 46°	17.3 48°	20.0 50°	24.5 51°	28.2 52°	31.6 53°	38.8 54°	44.8 55°	54.8 56°	63.3 57°
	3/4T 50250	3/4TT 50250	3/4"	3/8"	5/16"	8.8 30°	10.5 34°	12.5 39°	15.3 43°	17.7 46°	21.6 48°	25.0 50°	30.6 51°	35.3 52°	39.5 53°	48.4 54°	55.8 55°	68.3 56°	79.0 56°
	3/4T 50300	3/4TT 50300	7/16"	27/64"	11/32"	10.6 31°	12.5 35°	15.0 40°	18.4 44°	21.2 46°	26.0 48°	30.0 50°	36.7 51°	42.5 52°	47.5 53°	58.2 54°	67.1 55°	82.3 56°	95.0 56°



DESCRIPTION

3/4T ---- & 3/4TT ----
TEEJET NOZZLES
TABULATION OF CAPACITIES
AND SPRAY ANGLES

4.4 HERBICIDE OPERATIONAL INSTRUCTIONS

The data concerning application rates have been quickly obtained using methods acceptable to the urgency of the requirement fur information. Many variables are at play in calibrating spray systems some of which are not always amenable to being controlled. Swath widths, for instance, by the sampling procedure used may inherently have a plus or minus variation of 10 feet. Therefore, the data are presented for guidance until such time as further information is developed.

These calibration runs were all performed as near inwind as conditions permitted and are, therefore, generally as narrow as could be obtained. Operational conditions will seldom approach those used for calibration and in most cases it can be expected that operational swaths may be somewhat wider than those indicated. Also, the calibration data are based on spray droplet collection and qualitative assessment. On the other hand operational swath width will be judged frequently only by biological effect.

The information provided for agent WHITE is wholly estimated and has not been derived from tests. Procedures are described in this Section 4 for deriving actual flow performance for this agent during use in the field,

4.4.1 Herbicide Performance Data

The performance data for BLUE and ORANGE herbicide agents presented herein have been developed from preliminary flight tests to provide immediate guidance for the military user. Its initial use will provide satisfactory application results and provide a basis from which refinements can be developed as field experience and environment dictates.

APPLICATION RATE (gal/acre) PERFORMANCE OF THE UH 1 B/D HELICOPTER SPRAY SYSTEM E'ITH DEFINED HERBICIDE AGENTS
(Fluid Temperature 65° F and Windmill pitch setting at 1. 0)

NOTE: 2510 and 2560 tips are furnished with each sprayer. When the 2510 tip is used, application rate will be decreased approximately 33%. When the 2560 tip is used, application rate will be increased.

AGENT	BLUE			ORANGE			WHITE *		
Nozzle Orifice	56 ea. 8355-1/4 2530 Tip			56 ea. 8355-1/4 2530 Tip			56 ea. 8355-1/4 2530 Tip		
Speed (knots)	50	70	90	50	70	90	50	70	90
Swath (ft)	90	95	100	100	120	140	90	to	120
Flight Ht.	GPA	GPA	GPA	GPA	GPA	GPA	GPA	GPA	GPA
12 ft.	3 1/4	3 1/8	3	2 1/2	2 1/4	2	1 1/2	to	1 1/4
25 ft.	3 1/4	3 1/8	3	2 1/2	2 1/4	2	1 1/2	to	1 1/4
50 ft.	3 1/4	3 1/8	3	2 1/2	2 1/4	2	1 1/2	to	1 1/4
*WHITE herbicide agent application performance is estimated only									

4.4.2 Liquid Temperatures

Flow rate performance will vary with herbicide agent temperatures, particularly with ORANGE and WHITE agents. Thus the application rates derived above from tests may not be repeatable under colder or warmer environments. Application rates can be expected to decrease under cooler conditions and increase under warmer conditions. It is essential that the system performance be measured in accordance with Section 4.2 and 4.3 of this manual and adjustments made as required.

4.4.3 Compatibility of Agents

Flush completely with water when changing from BLUE to WHITE, or vice versa, otherwise a precipitate will form which will clog the spray system. ORANGE is known to have some deleterious effect on certain kinds of rubber so that frequent inspection of transfer hoses, seals and diaphragms will be required. ORANGE also will soften certain paints with continued exposure and aircraft contamination should be held to a minimum.

4.4.4 Contamination Precautions

Maneuvers such as skidding are likely to contaminate the aircraft while spraying and should be avoided. Spillage of ORANGE in loading areas should also be held to a minimum especially where asphalt or macadam may be splashed because these paving materials deteriorate under continued exposure. ORANGE can best be flushed from the spray system or wiped from contaminated aircraft using an organic solvent such as #2 diesel fuel oil. Final cleansing shall be conducted by using normal aircraft cleaning procedures.

4.5 SUPPLEMENTARY OPERATIONAL AND MAINTENANCE INFORMATION

General operating and maintenance instruction are contained in Sections 3.0, 4.0 and 5.0 of this manual. Supplementary information is provided here for herbicide application operations.

4.5.1 Nozzle Configuration

The herbicide nozzle kit when installed will consist of 56 each of brass nipples (P/N W33254)nozzles (P/N 8355-1/4) w/orifice (P/N 2530) and Teflon diaphragms (P/N 6227-TEF).

CAUTION: Both Teflon and viton diaphragms must be used.

The kit shall be installed on the spray booms in the following order:

1. Starting outboard after coating with thread compound, install brass nipples (P/N W3325-4) in each boom opening excepting positions where pipe plugs are installed in the first holes inboard of the two boom clamps (P/N 3031) and in the last five positions nearest the helicopter fuselage.

CAUTION: Tighten each nipple securely with a short wrench of appropriate size.

DO NOT TORQUE HEAVILY

2. Install, by hand, nylon nozzles (P/N 8355-1/4) complete with tip, making sure that rotation is clockwise and only until orifice is pointed downward. Use 2510 or 2560 tip as required for desired application according to table H or table III. Adjust the groove in all the nozzle tips so that they are parallel to the spray boom.

CAUTION: TORQUE ONLY CLOCKWISE FIRMLY BUT NOT TIGHTLY.

3. Install Teflon diaphragms by removing check valve end (P/N 4623ASB) and placing Teflon diaphragm (P/N 6227) between nozzle and installed black viton diaphragm (P/N 4620-VI).

4.5.2 Maintenance of Nylon Nozzles

1. The nylon nozzle provided with the herbicide nozzle kit requires delicate handling, assembly and installation care to prevent cross threading and thread stripping. NEVER TORQUE NYLON PARTS OTHER THAN BY HAND. FIRM TIGHTNESS WILL RETAIN.ASSEMBLED PARTS.

2. When a fluid leak develops from any nozzle tip during static conditions, the check valve (end cap sub-assembly, P/N 9758NYL) shall be removed and inspected for debris that may be lodged between the fluid passage and diaphragm which would prevent its closing. More often however, the leak may be stopped by partially unscrewing the retainer (P/N 4624AL) and then re-tightening it gradually until the leak discontinues. A light pressure only is required to maintain proper check valve operation. OVERTIGHTENING WILL CREATE NOZZLE DRIPPING.

4.5.3 Windmill Adjustment

Before starting operations the windmill pitch must be adjusted to its maximum setting (1.O) by lightly rotating its external adjusting screw in a clock wise direction until the blade root edge matches the indicated setting value of 1.0.

CAUTION: DO NOT TORQUE BEYOND BLADE POSITION 1.0 WHEN RESISTANCE TO ROTATIONAL MOTION IS EXPERIENCED. INTERNAL DAMAGE TO MECHANISM WILL RESULT FROM OVER TORQUING.

4.5.4 Re-circulation Valve

The manual control valve (P/N 7400-1.) in its OFF position directs flow to a by-pass valve (P/N 7400) which may be positioned to re-circulate fluid back to the tank or return the fluid to the pump inlet line. For herbicide applications or other high volume uses, the by-pass valve handle shall be rotated clockwise to direct flow back to the tank. If excessive agent foaming occurs, it is recommended that the valve handle be rotated counter clockwise to direct the fluid into the pump intake line.

4.5.5 Decontamination

BLUE and WHITE are soluble in water and flushing the system with 30 gallons of water should leave the system relatively clean. Traces of WHITE are most difficult to remove and probably will be found in the system for some time after repeated spraying has been done with other materials. WHITE has a relatively long residual activity in soil and the area to rinse the system should be chosen with attention to minimizing damage to desirable vegetation in the area. BLUE is relatively rapidly rendered inactive in the soil. BLUE contains a detergent which may assist in flushing out residues of the chemical.

ORANGE is soluble in many organic solvents and #2 diesel fuel has been commonly used to remove this material from spray systems and from accessory gear.

None of these three chemicals should be allowed to stand in the system It is advisable to clean the system out directly after spraying using the appropriate solvent and finish with #2 diesel fuel as the last rinse. The check valves (P/N 4623 ASB) should be removed, cleaned and dried. The check valve diaphragms should be inspected fur replacement as necessary where evidence of deterioration is found.

Using the Gr6und Loading Unit (GLU) to pump the flushing fluid will be sufficient to clean out that unit, its hoses and connectors. Again, #2 diesel fuel shall be used for the final rinse.

Aircraft surfaces shall be rinsed with water or wiped with # diesel depending on the chemical involved. ORANGE, particularly shall NOT be allowed to remain on painted surfaces.

4.5.6 Definitions:

For the purposes of this manual the following definitions are established:

1. WORK RATE (acres/min.) is the amount of area traversed per unit of time based on the forward speed of the vehicle and the effective swath width.

2. FLOW RATE (gal/min) is the total volume of agent dispensed by the spray system per unit of time.

3. APPLICATION RATE (gal/acre) is the volume of agent dispensed per area traversed. It is obtained by dividing the FLOW RATE by the WORK RATE.

4. DEPOSIT RATE (gal/acre) is the volume of agent deposited on a target per unit area of the target.

5.0 MAINTENANCE INSTRUCTIONS

5.1 Receiving and Inspection

5.1.1 Unpacking

The entire spray system is packed and shipped in one crate, containing the tank and support structure and the booms, boom struts and cables, mounted and attached to a skid frame.

5.1.2 Mechanical Inspection

Following an inventory of parts as per drawings, a visual observation shall be made of possible damage in shipment or storage. Items not passing inspection shall be replaced with spares.

5.2 Lubrication

If the pump brake sticks after extensive use of the system, the cable may be removed and lubricated with standard grease. All other mechanical components are adequately lubricated for the service life of the system.

5.3 Preventive Maintenance

The assembly and installation items in Section 3.2 also serve as preventive maintenance instructions. Lack of historical reliability data under the specific application intended for this system precludes an accurate estimate of component service life for preventive maintenance, removal and replacement at this time.

Generally, short or intermittent use and long periods of storage between usage, particularly if system is not entirely clean, will tend to deteriorate sealed components and cause corrosion of moving parts.

System should be thoroughly cleaned and then prepared by flushing with a non-corrosive mineral oil or kerosene prior to long periods of storage (five days or longer).

5.4 Troubleshooting

5.4.1 General

This section provides sufficient information to locate and correct malfunctions in the UH-1B/D Helicopter Spray System. Remedies requiring higher echelons of maintenance are covered in Section 5.5, Field Maintenance and Repair.

5.4.2 No Response To Start Spray Command

PROBABLE CAUSE	POSSIBLE REMEDY
Loose connector or connection on the control valve	Tighten
Inlet or outlet pump couplings split.	Replace

5.4.3 No Response To Stop Spray Command*

PROBABLE CAUSE	POSSIBLE REMEDY
Loose connector or connection on control valve.	Tighten

5.4.4 Spray Intermittent

PROBABLE CAUSE	POSSIBLE REMEDY
Brake cable or cable connector loose	Tighten
Faulty windmill drive on pump	Replace entire unit

*** Stop pump immediately by using brake.**

5.4.5 Spray Uneven

PROBABLE CAUSE	POSSIBLE REMEDY
Contamination in spray nozzle	Clean and flush
Faulty pump	Replace
Boom tee strainer clogged	Clean and replace

5.5 Field Maintenance and Repair

5.5.1 Windmill Drive Assembly

The windmill drive assembly may be disassembled, serviced and adjusted and parts may be replaced as per the following instructions, and information contained in Figure 5.

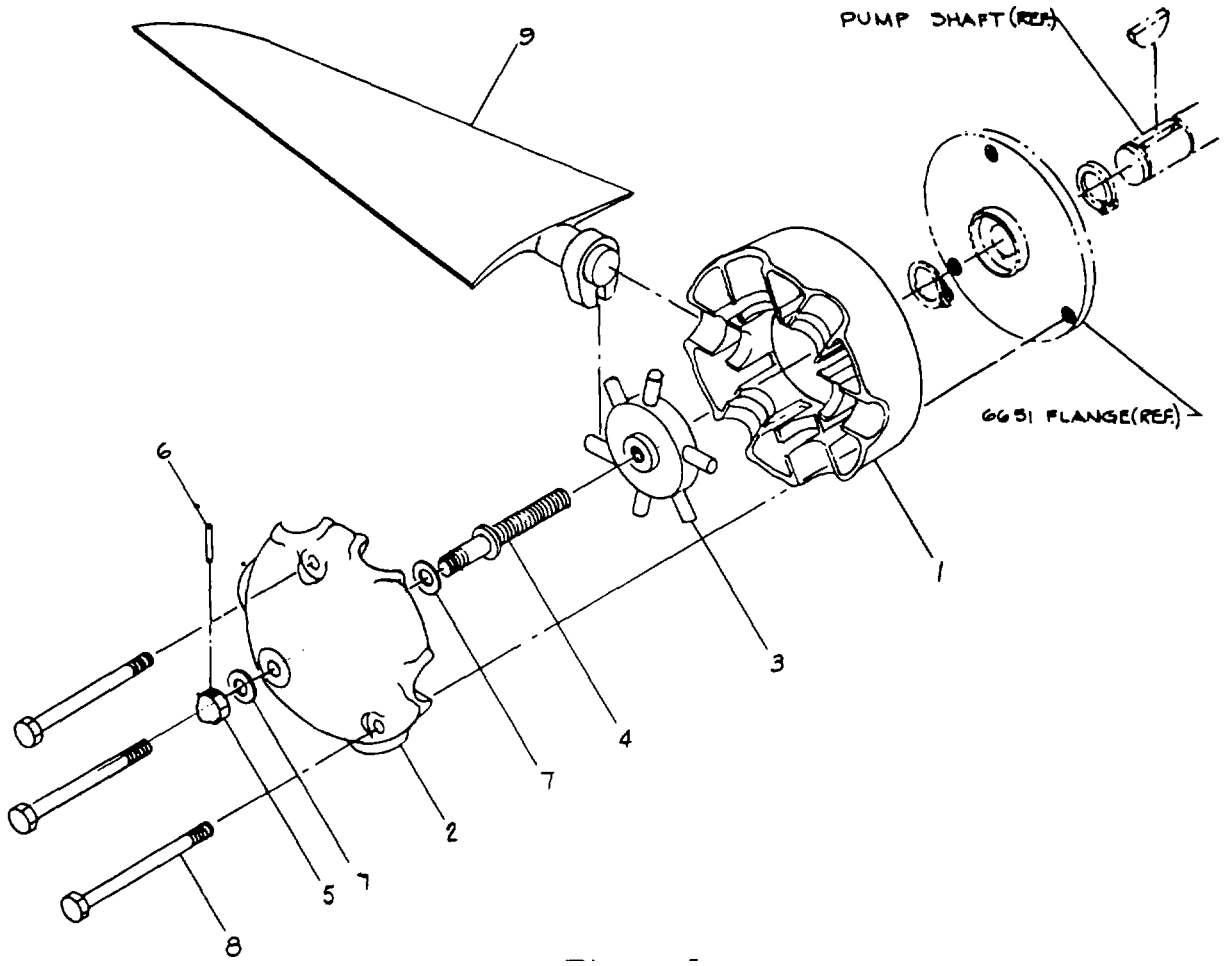


Figure 5.

6645
SYNCHROMATIC WINDMILL ASSEMBLY

ITEM NO.	PART NO.	DESCRIPTION	QTY. REQ.
-	6645	Windmill Assembly (FSN 3740-179-6704)	-
1	6647	• Base Hub (FSN 3740-179-6705)	1
2	6648	• Cap, Hub (FSN 3740-179-6706)	1
3	6652	• Actuator (FSN 3740-179-6707)	1
4	6653	• Screw, Adjusting (FSN 3740-179-6708)	1
5	6672	• Acorn Nut (FSN 5310-797-3615)	1
6	MS9048-008	• Roll Pin	1
7	AN960-616L	• Washer	2
8	LP3-22A	• Bolt, (Nylock) (FSN 5306-795-3280)	3
9	6649	• Blade	6

6645 SYNCHROMATIC WINDMILL INSTRUCTIONS

1. The 6645 Synchromatic Windmill has been designed to fit directly to the AGAVENCO 6300 pump.

2. For installation remove the three bolts installed, to hold hub together for shipping, and replace with the three AN3-22 A bolts (Nylock)

CAUTION: DO NOT TIGHTEN "HE AN3-22 A BOLTS SO TIGHT THAT THEY RESTRICT BLADES FROM TURNINC, ALSO CAUSING UNDUE HUB STRESSES.

3. Blade pitch angle, on all blades, is controlled by external nut shown as number five (5) on Figure 5.

NOTE: ALWAYS SET BLADE TO PITCH SETTING BY STARTING FPOM A COMPLETE COUNTER CLOCKWISE POSITION.

4. Set base of propeller blade to desired pitch setting number, which is located on hub boss.

ACTUAL TIP ANGLE	PITCH SETTING NUMBER
35°	2 1/2 pitch or greater
30°	2 pitch or greater
25°	1 1/2 pitch or greater
20°	1 pitch or greater

5.5.2 Pump and Brake Assembly

The pump and brake assembly may be serviced and repaired as per the drawings and instructions in Figures 6 and 7 and the Field Service Instructions.

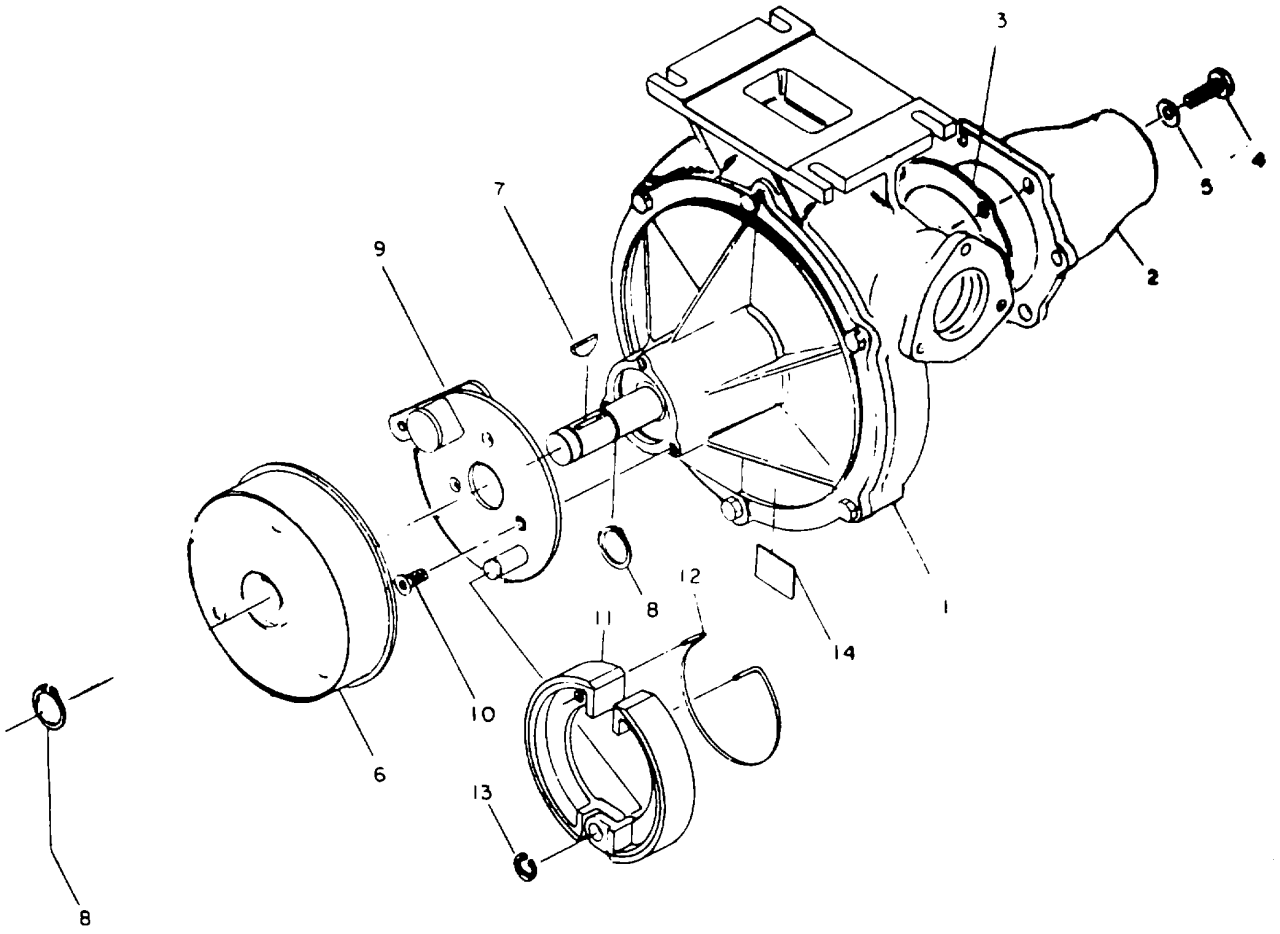


Figure 6.

6330
PUMP & BRAKE ASSEMBLY

ITEM NO.	PART NO.	DESCRIPTION	QTY. REQ.
-	6330	Pump & Brake Assembly (FSN 3740-179-6710)	1
1	6300T-5	• Assembly (FSN 3740-179-6713)	1
2	6313	• Inlet	1
3	6642	• Gasket (FSN 3740-179-6711)	1
4	1/4-20 x 5/8	• Screw, Cap Longlock, Hexhead	6
5	AN960-416	• Washer	6
6	6655	• Drum (FSN 3740-179-6712	1
7	#10	• Key, Woodruff	1
8	5160-66	• Snap Ring (FSN 5340-143-0335)	2
9	6654-2	• Back Plate, Brake (FSN 3740-179-6675)	1
10	1/4-20 x 1/2	• Screw, Socket, Flathead, Nyloc	3
11	6654-3	• Brake Shoe (FSN 3740-179-6676)	2
12	6654-4	• Spring, Brake (FSN 5340-178.1369)	1
13	6654-5	• Retainer, Brake (FSN 5340-622-1799)	1
14	1200	• Decal	1

FIELD SERVICE INSTRUCTIONS
6300
PUMP ASSEMBLY

1. Brake Removal

   a) After removing pump propeller, remove snap ring on front of shaft. A gear puller may be attached to any two of the four propeller mounting holes in the flanges and by wrench-tightening a bolt against the end of the shaft. the flange and drum will slip off the shaft.

   b) Removal of the brake retainer clip will allow you to slip off the brake shoes.

   c) The brake back plate can be removed with an Allen wrench by simply removing the three counter-sunk screws.

2. Impeller Removal

   a) Remove the six bolts holding the pump body and case together.

   b) Remove the LP4C6A bolt which secures the impeller to the shaft.

   c) Insert a 3/8-16 coarse threadbolt in the impeller. Tightening this bolt against the shaft will remove the impeller from the shaft.

3. Seal Removal

   a) With the impeller removed, the seal can be pried with two screw drivers from the pump body, taking advantage of the two recesses cut in body for this purpose, Remove stationary seat from the impeller by prying with a small blade screw driver.

4. Installing New Seal

   a) Before installing new seal in body, apply sealant to back of seal that will make contact with pump body.

   b) Press seal into body, using large socket or tubing, being careful not to press on seal surface, Wipe off excess sealant.

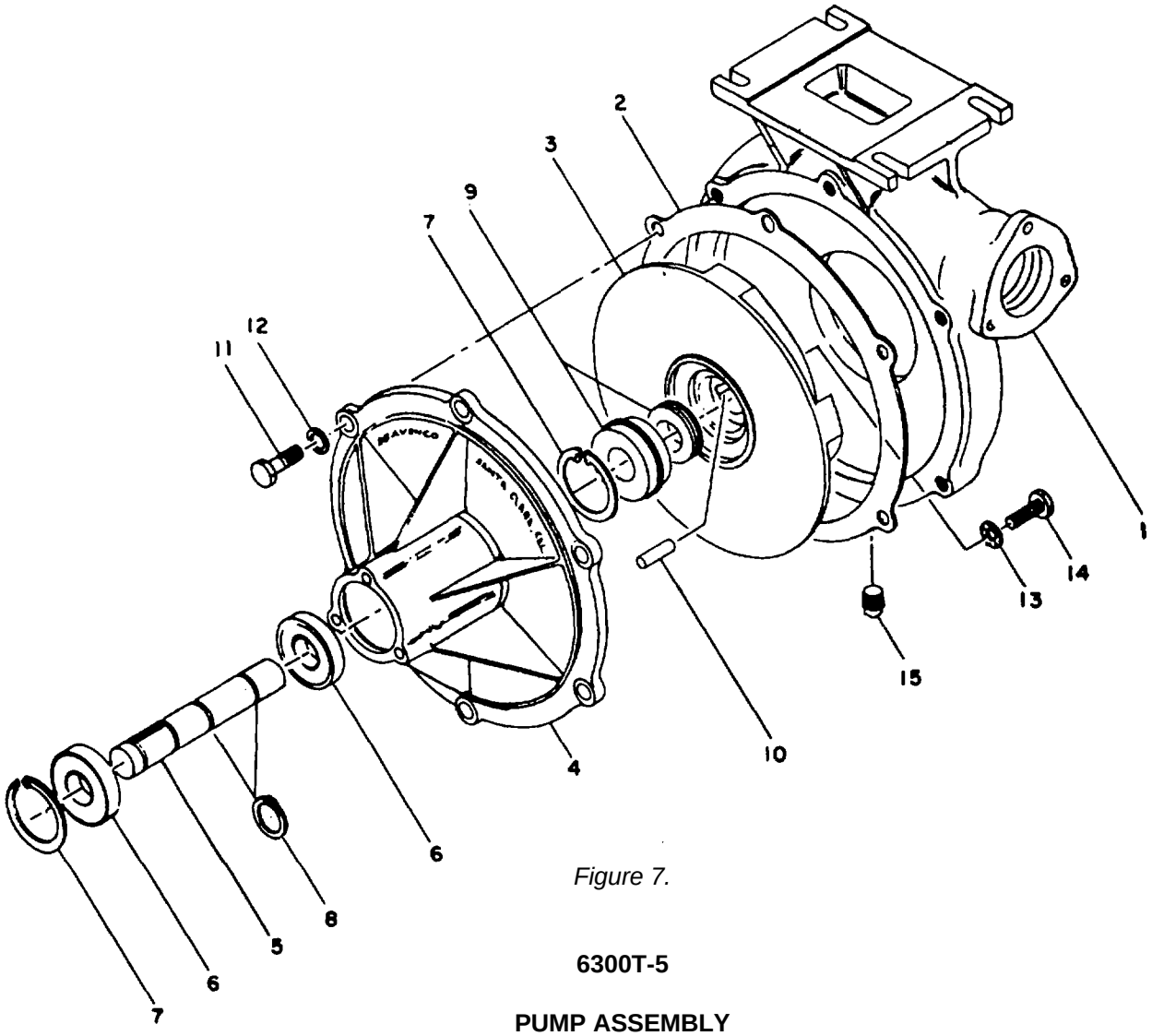


Figure 7.

6300T-5

PUMP ASSEMBLY

ITEM NO.	PART NO.	DESCRIPTION	QTY. REQ.
-	6300T-5	Pump Assembly (FSN 3740-179-6713)	-
1	6303-5	• Case, Threaded Outlet (FSN 3740-179-6714)	1
2	6306	• Gasket (FSN 3740-179-6715)	1
3	6302	• Impeller (FSN 3740-179-6716)	1
4	6301	• Body (FSN 3740-179,6717)	1
5	6305	• Shaft (FSN 3740-179-6719)	1
6	6203	• Bearing (FSN 3130-179-7259)	2
7	N5000-156	• Snap Ring (FSN 5340-804-9746)	2
8	5160-66	• Snap Ring (FSN 5340-143-0335)	2
9	6308-T	• Seal Assy, Teflon (FSN 5330-179-6248)	1
10	6609	• Pin	1
11	5/16-18 x 3/4	• Hex Head Cap Screw	6
12	AN960-516	• Washer	1
13	AN960C416	• Washer (FSN 5310-531-9515)	1
14	LP4C6A	• Bolt (FSN 5306-156-2338)	1
15	1/8-27	• Plug	1

NOTE: BE SURE SEAL IS CLEAN,

c) Install stationary seal in impeller, being sure that polished surface will make contact with carbon surface on main seal, Prior to installations grease stationary seal with any light grease.

d) Prior to re-installing impeller, be sure pin is in place in slot provided in impeller,.

e) Apply sealant to end of pump shaft before replacing impeller.

Be sure no sealant comes in contact with stationary or main seal.

Install LP4C6A bolt and tighten to secure impeller on shaft,

5. Shaft and Bearing Removal

a) Shaft and bearings are secured by snap rings; therefore, snap ring pliers will be necessary,

b) After completing operations "A" - "B" and "C"' the following procedures can be used.

c) Remove two snap rings installed in pump body against front and back bearings.

d) Press; do not hammer bearings and shaft from pump body.

e) Remove #10 Woodruff Key from shaft, and press bearings off shaft.

5.5.3 Valves

The manual control valve and bypass valve may be disassembled and repaired as per Figure 8 and the accompanying field service instructions.

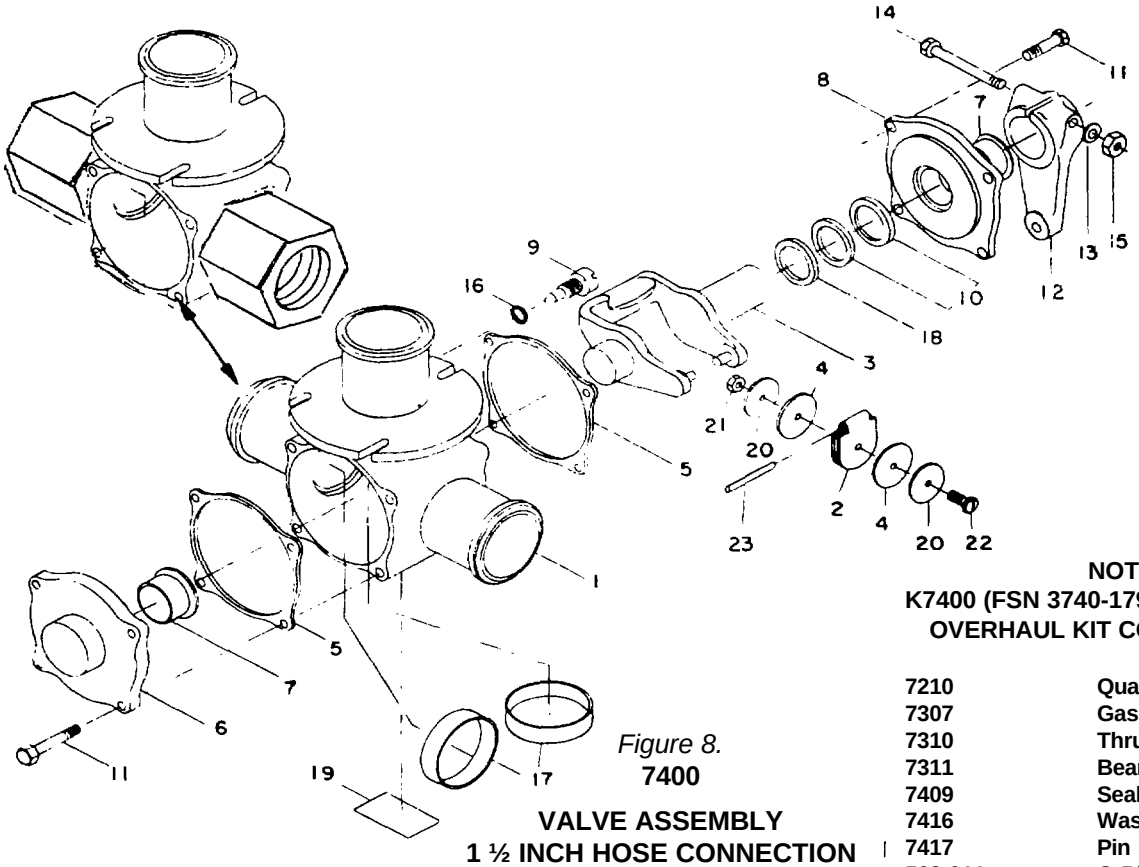


Figure 8.
7400

VALVE ASSEMBLY
1 ½ INCH HOSE CONNECTION

NOTE
K7400 (FSN 3740-179-6721)
OVERHAUL KIT CONSISTING OF:

7210	**Quad Ring**	**2**
7307	**Gasket**	**2**
7310	**Thrust Washer**	**1**
7311	**Bearing**	**2**
7409	**Seal**	**2**
7416	**Washer**	**2**
7417	**Pin**	**1**
568-011	**O-Ring**	**1**
AN363C1032	**Nut**	**1**
AN526C10R12	**Screw**	**1**

ITEM NO.	PART NO.	DESCRIPTION	QTY. REQ.
-	7400-1	Valve Assembly, Threaded 1 1/2" NPT (FSN 3740-179-6741)	-
-	7400	Valve Assembly, Hose Fittings (FSN 3740-179-6720)	-
1	7401-1	• Body, Pipe	1
	7401	• Body, Hose	1
2	7406	• Flapper	1
3	7404	• Rotor	1
4	7409	• Seal	2
5	7307	• Gasket	2
6	7402	• Cap	1
7	7311	• Bearing	2
8	7403	• Cap, Shaft End	1
9	7313	• Screw, Flow Control	1
10	7210	• Quad Ring	2
11	1/4-20 x 5/8	• Bolt - Longlock	8
12	7208	• Lever, Control	1
13	AN960-10	• Washer	1
14	AN3-13A	• Bolt	1
15	AN365-1032	• Nut	1
16	568-011	• O-Ring	1
17	7419	• Seat SS	2
18	7310	• Thrust Washer	1
19	1200	• Decal	1
20	7416	• Washer	2
21	AN363C1032	• Nut	1
22	AN525C10R12	• Screw	1
23	7417	• Pin	1

7400 AGAVENCO "CROP LINE" VALVE
FIELD SERVICE INSTRUCTIONS

A. Equipment for Valve Overhaul

1. The AGAVENCO Kit K-7400 contains all necessary parts to overhaul valve.

2. No special tools are required for overhaul. The only tools required are a screwdriver 7/16" wrench and a 3/8" wrench.

B. Valve Disassembly

1. Remove control lever from rotor shaft.

2. Remove 8 screws holding end caps to valve body, and remove end caps.

3. Remove rotor end flapper from valve body.

4. Remove "back suction" flow control screw from body.

C. Valve Overhaul Procedures

1. Thoroughly clean all parts prior to beginning overhaul.

2. Replace seals (7409) and washers (-7416) on flapper and install new screw and nut supplied in kit. Tighten firmly so seals do not rotate.

3. Install flapper assembly in body by inserting pin (7417), be sure nut on flapper assembly is opposite to valve outlet port, to give smoother flow during operations.

4. Install rotor (7404) to flapper being sure pins are engaged in slotted sides of flapper.

5. Install bearing (7311), and gasket (7307) to end cap (7402) attach to valve body. At this point do not securely tighten the four screws.

6. Install thrust washer (7310) on rotor shaft.

7. Install bearing (7311) two quad rings (7210) and gasket (7307) to end cap (7403). It is suggested you now grease quad rings prior to sliding over rotor shaft. Attach end cop to body leaving the screws loose.

8. Install lever on rotor shaft and tighten bolt to clamp lever to shaft.

9. Tighten two opposite screws on each end cap and rotate lever to test valve operation and "over center locking". Adjustment of end caps will give desired valve action and "over center locking", at this point tighten securely the 4 screws on each end cap.

10. Install new "O" ring on flow control screw grease well and install in valve body. The amount of "back suction" is controlled by flow control screw position. Back suction can be shut-off with the screw completely closed back off 2 to 2-1/2 turns for maximum back suction.

NOTE: In emergency cases substitute material con be used in place of the seal (7409) to facilitate keeping your airplane flying. Also, as you have now noted the flapper assembly can be shimmed behind the seal to give any desired "over center" lock condition.

5.5.4 Spray Tank

The recommended way to repair minor cracks, holes or other leaks in the spray tank is to push epoxy resin through opening and permit it to cure for the required amount of time. Larger damage requires use of a reinforcing patch of glass or linen cloth on top of previously applied epoxy. The patch should be completely covered with epoxy and permitted to cure. The size and nature of damage may indicate the need for additional layers of patching material.

NOTE: TANK AREAS TO BE REPAIRED MUST BE PREPARED BY THOROUGH CLEANING AND ROUGHING OF THE SURFACE.

5.5.5 Spray Nozzles

(1) If spring check valve in nozzle fatigues and breaks, replace entire nozzle cap assembly.

(2) Upon deterioration of nozzle diaphragm, remove and replace.

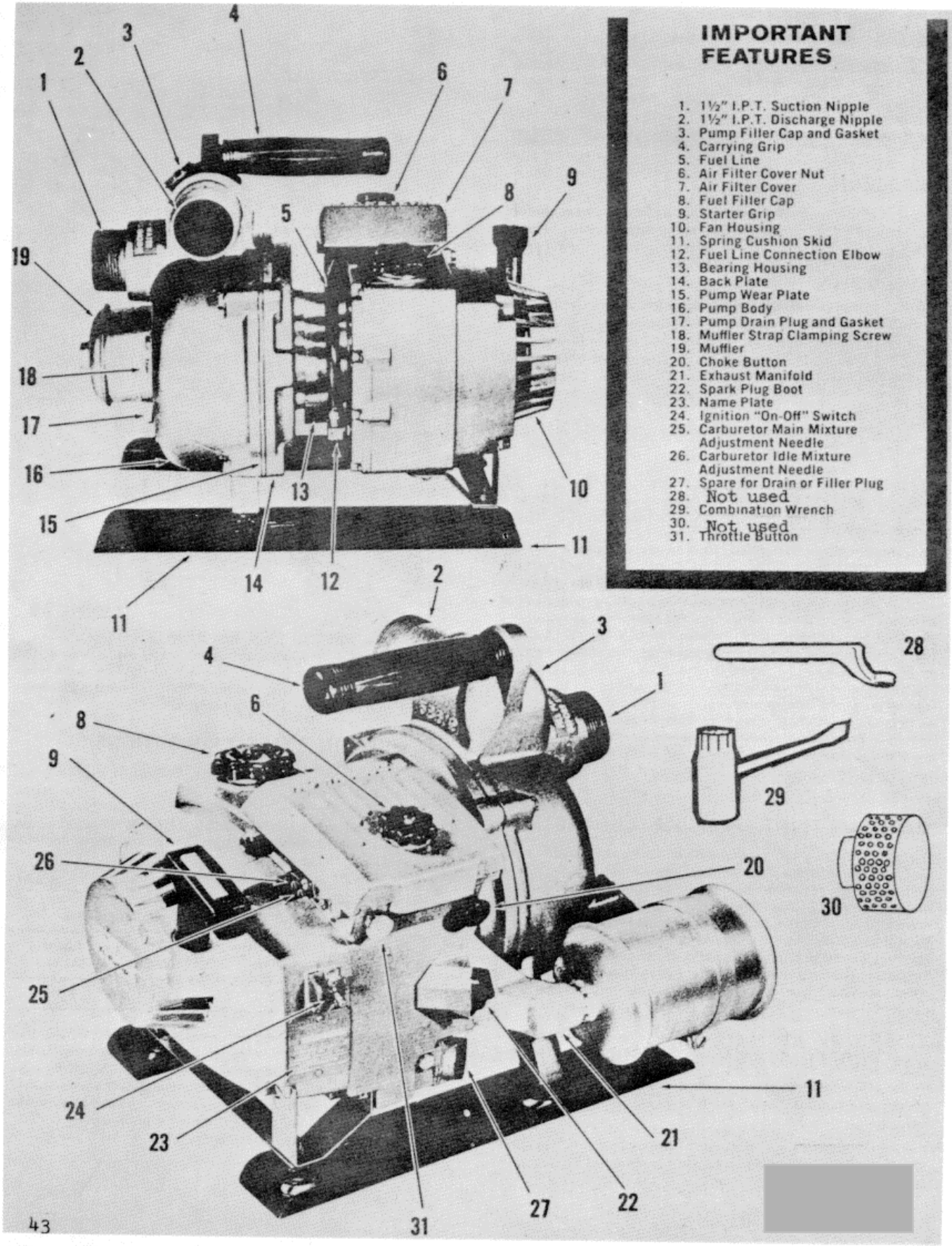


Figure 15. Pump Assembly

PREPARING THE PUMP

UNPACKING

Please read this manual through carefully, at least once, before you attempt to start and operate the pump. If you discover that anything was damaged in shipment, or is missing from the carton, NOTIFY THE SHIPPER IMMEDIATELY.

Lift the pump out of the carton and strip all of the packing pieces from the pump. In addition to the pump, and the manual, you should also find included; a combination wrench that is very useful.

FILL PUMP BODY WITH LIQUID USED

Pour through the intake or discharge nipple, or remove filler cap, 3, fig 15, and fill through that opening. If removed, filler cap and gasket must be put back tightly before pump can be used. Although the pump cannot prime in dry condition, once filled with water, it will retain water for automatic priming, and need not be refilled except if overturned or drained. Draining can be accomplished either by removing the drain cap and gasket (17). or by disconnecting hoses and turning the pump over. The pump should be drained for shipping and storing purposes, and in cold weather locations, whenever it is to be shut down long enough to freeze. Before cranking the engine in cold weather, always pull the starter just enough to see whether crankshaft will turn freely. If the impeller Is frozen fast, heat the pump gradually until the ice melts.

MAKE AIR-TIGHT, FLEXIBLE CONNECTIONS

All connections on the suction side of the pump must be made air-tight, or the unit will not prime. Connections on both suction and discharge sides must be flexible, permitting floating action of the pump on its mounting. When rigid pipe is used, always connect a short section of flexible hose between pipe and pump to maintain flexibility. Lay hose out carefully; there should be no sharp bends or kinks in the hose. If hose must be laid across a roadway, protect it with planking. Instantaneous shut-off pressures, applied when a vehicle runs across unprotected hose, cause pounding - can split pump body or damage the hose.

USE PROPER STRAINER ON SUCTION HOSE

The strainer prevents particles which could clog the pump from being sucked into it. Attach the strainer to the suction hose and never pump without it.

Locate the strainer over rock, or as firm a bottom as possible.

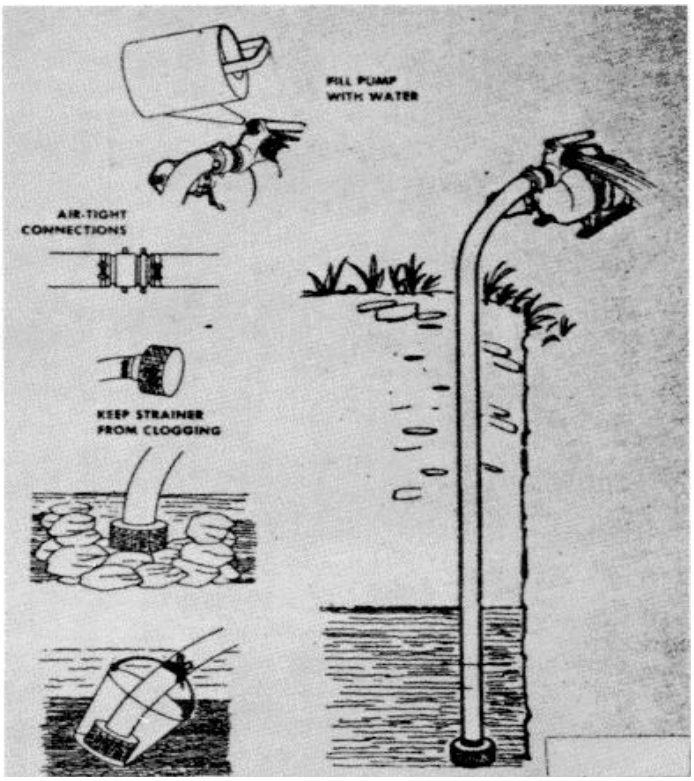


FIGURE 16. PROPER USE OF SRAINER

When soft, muddy bottom presents a problem of clogging, the strainer can often be kept from burying itself by tying it inside a pail. See fig 16. For seepage control, dig a hole in the floor of the excavation and line the side of the hole with large rocks-set strainer inside the lined hole. If strainer becomes clogged, pull hose from water and clean the strainer.

MIX FUEL IN EXACT PROPORTIONS

Mix thoroughly in a clean container, ½ pint of a good grade of SAE-30 motor oil per gallon of fresh, regular gasoline. DO NOT FILL THE TANK WHEN THE ENGINE IS RUNNING AS THIS MAY CAUSE A FIRE. After filling the tank be sure to wipe up any spilled fuel before you start the engine.

FUEL MIXING TABLE
1:16 ratio of S.A.E. 30 Motor Oil to regular gasoline

OIL	1/2 pint (8 oz.)	1 pint (16 oz.)	1 quart (32 oz.)
GASOLINE	1 gal.	2 gal.	4 gal.

Because this two-cycle engine depends on the oil in the fuel mixture for internal lubrication, it is important that the fuel be uniform in oil content. Moreover, the gasoline should be both clean and fresh. All mixing equipment and containers should be clean. Because oil and gasoline do not combine readily, the mixing should be done before the fuel is poured into the fuel tank.

STARTING AND OPERATING

CAUTION

THIS PUMP IS DESIGNED FOR PUMPING WATER. IT MAY BE USED FOR PUMPING OTHER LIQUIDS OF NON-HAZARDOUS TYPE, BUT UNDER NO CIRCUMSTANCES SHOULD IT BE USED FOR PUMPING HAZARDOUS MATERIAL.

BEFORE YOU PULL THE STARTER CORD, BE SURE THE PUMP CONTAINS WATER. WATER IN THE PUMP NOT ONLY LUBRICATES AND PRIMES THE PUMP, BUT ALSO KEEPS IT COOL. WHEN CONTAMINANTS SUCH AS MUD OR DETERGENTS IN THE WATER PREVENT PRIMING TO HIGH LIFTS, DRAIN PUMP AND FILL WITH CLEAR, CLEAN WATER.

1. LOOSEN THE FUEL CAP JUST PRIOR TO CRANKING A COLD ENGINE--Then retighten as soon as engine starts. When an engine cools off, a vacuum may form in the tank. Loosening the cap relieves this vacuum for easiest starting/

2. THE SWITCH MUST BE IN "ON" POSITION FOR IGNITION -- In the "OFF" position, the switch grounds the magneto primary circuit and prevents ignition.

3. CHOKE A COLD ENGINE BY PULLING THE CHOKE BUXTON OUTWARD.

4. OPEN THROTTLE WIDE BY PUSHING THROTTLE BUTTON AL.L THE WAY IN -Although an XL starts easily at any throttle setting, including *idle*, offer the engine all the fuel it wants for "cold starting." After the pump gets running and has primed, you can set throttle to desired pumping speed by pulling the button outward.

5. CRANK THE ENGINE SMARTLY-ENGINE MAY KICK IF CRANKED TOO SLOWLY--Always crank with quick, short pulls. Never pull the starter cord out to the end, or let it snap back by itself. Hold the cord so it will rewind properly on the pulley. When engine fires, push choke half-way in and continue cranking until engine starts. As engine warms up, push choke button in for normal operation.

6. TO STOP THE ENGINE, FLIP THE SWITCH TO "OFF".

7. TO START A WARM ENGINE, LITTLE OR NO CHOKING MAY BE NECESSARY-First crank with choke in. Should the engine fail to start right up after a few pulls, revert to the procedure for starting a cold engine.

8. DRAIN PUMP WHENEVER NECESSARY-Pump should be drained in preparation for storage, or whenever the unit is to be idle long enough for the pump to freeze in cold weather. Salt water should not be left standing in the pump.

WARNING

SALT WATER and SALT SEA AIR are very corrosive. If the unit is used to pump salt water, drain and flush pump with fresh water after each use. Then hose exterior off with fresh water, wipe dry and protect the finish by wiping with an oily rag, or by applying auto wax.

STORAGE

Whenever the unit is to be idle for more than a month, it should be protected as follows:

1. Start the engine, then choke it until it stops. This will coat all internal parts of the engine with oil-containing fuel, and protect them from rust.

2. Drain the fuel tank completely by removing the fuel cap and inverting the unit. Put fuel cap back on tank.

3. Protect the finish by wiping the entire unit clean. Store the unit in a dry, well ventilated place.

MAINTENANCE AND ADJUSTMENT

THROTTLE ROD FRICTION

There should be enough friction exerted by the throttle rod clamp, that the throttle rod and button will "stay put" in the desired position. If the throttle rod slips or "walks" through the clamp during pump operation, stop engine and tighten the two spring-loaded throttle-clamping screws (fig 17) to increase the friction as required.

AIR FILTER

Clean the air filter as often as necessary to preserve engine power. Under very dusty operating conditions the filter may require weekly or even daily cleanings. Never operate the engine without the air filter. Clean the filter as follows: (See figure 17.)_

Turn captive nut and remove the air filter cover from the carburetor chamber. First, remove all loose dust and dirt particles so they can't fall inside the engine; then remove the air filter. SLOSH the filter in clean solvent (not in fuel mix) and dry it before use. The filter can also be cleaned by tapping it against a flat surface, or blowing it with an air hose. After many cleanings the pores of the filter may clog permanently, and the filter should be replaced.

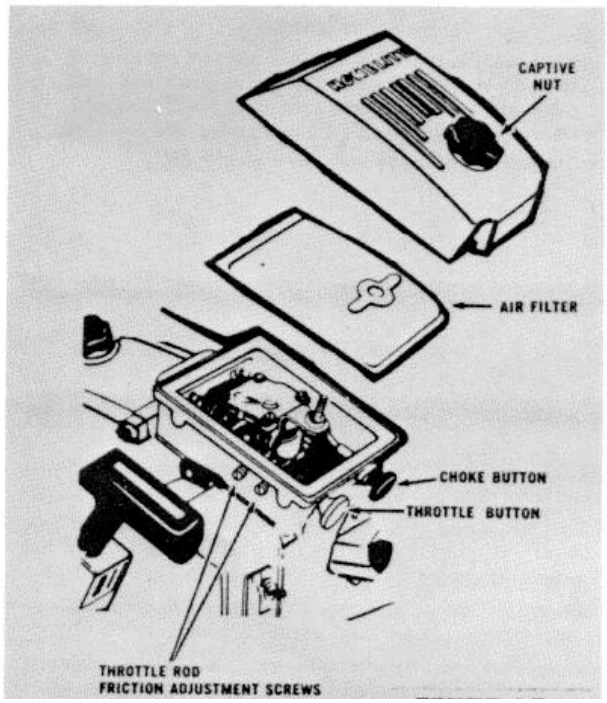


FIGURE 17.
THROTTLE ROD ADJUSTMENT AND AIR CLEANER

FUEL FILTER

The felt wick in the fuel tank absorbs fuel which it supplies on demand. The wick also acts as a filter to keep moisture and dirt out of the carburetor. This filter is so large in capacity that it should never become clogged as long as only fresh, clean fuel is used. To check the fuel filter. loosen the fuel cap and disconnect the fuel line at the fuel tank outlet connection. If, with the tank full, fuel flows by gravity from the outlet hole, the filter is not clogged. A plugged filter will prevent the engine from running properly.

VENTED FUEL CAP

To determine whether the fuel cap vent (fig 18) is operating correctly, start engine and remove the cap - if engine operation improves, fuel cap vent may be faulty.

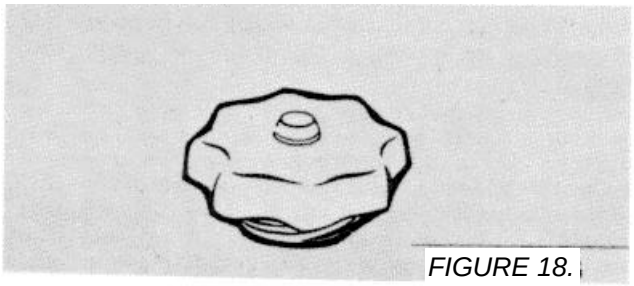


FIGURE 18.

VENTED FUEL CAP

CARBURETOR ADJUSTMENT

Before changing the mixture adjustments, be sure the tank is full of clean, fresh, properly mixed fuel. Then clean the air filter. and leave the filter and cover off until the carburetor has been adjusted.

1. The Idle Mixture Adjustment Needle is marked "LO" on the side of the carburetor chamber (fig 19) and the Main Mixture Adjustment Needle is marked "HI." VERY GENTLY (so as not to jam needles into their orifices) turn each needle clockwise until it Just closes against its seat. Now, open both needles one lull turn from the gently closed position. and adjust carefully as follows.
2. Push the throttle button all the way in. Start engine and pump water at open discharge. When engine is fully warmed up. adjust the Main Mixture Adjustment Needle (fig 19) for the highest pumping speed obtainable. NOW, OPEN THE NEEDLE 1/8 TURN MORE. This slightly rich setting will keep the engine from faltering during the pump's priming surges.
3. Maximum no-load speed is limited to approximately 6500 RPM by the built-in automatic governor. The screws holding the Governed Speed Adjust Clamp(fig 19)should never be loosened, unless a reliable reed tachometer is available for readjusting governed speed to approximately 6500 RPM.
4. Pull the throttle button all the way out, and adjust the Idle Mixture (LO) Needle for the highest and smoothest speed obtainable. If the speed so obtained is either too high or too low to suit operator, adjust speed by means of the Idle Speed Screw. (fig 19)Usually 2500 or higher RPM is desirable.
5. Because the Main and Idle Needle settings are interdependent, some readjustment of needles may be necessary-recheck adjustments under full load conditions, as above--be sure settings are correct before you reinstall the air filter and cover. **NOTE:** If performance changes when you reinstall the air filter, the filter may not be clean enough....Clean or replace as necessary. Do not operate pump without the filter.

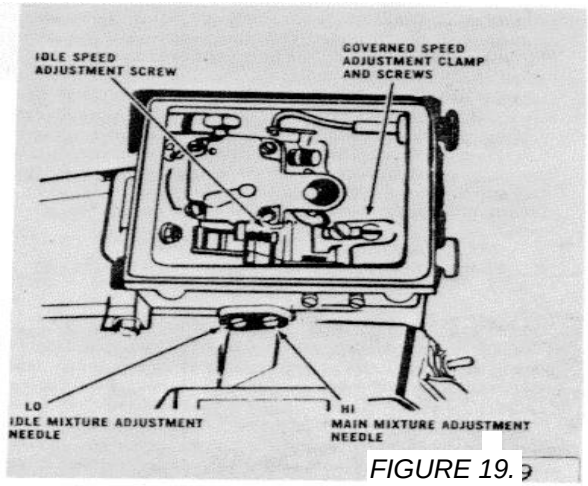
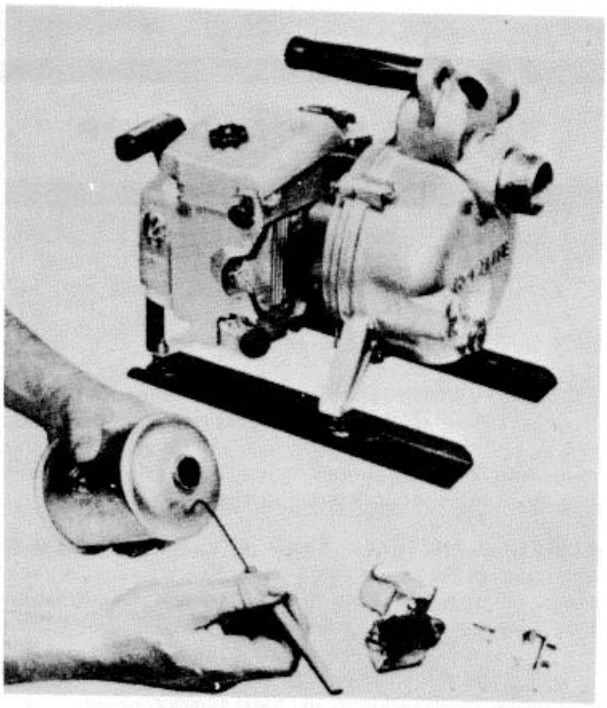
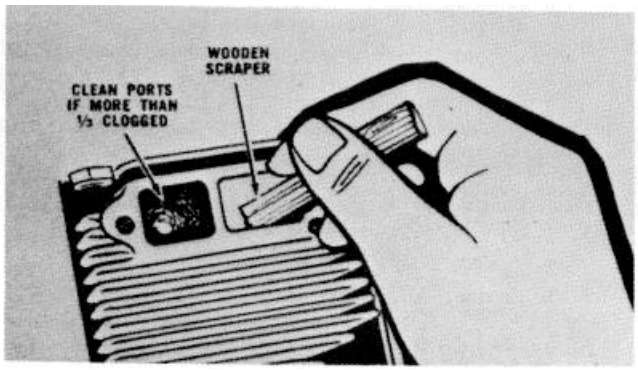


FIGURE 19.

CARBURETOR ADJUSTMENT



CLEANING MUFFLER FIGURE 20.



CLEANING EXHAUST PORTS FIGURE 21.

CYLINDER COOLING FINS

The fins and the surrounding area should be kept clean and open for maximum cooling.

MUFFLER, EXHAUST MANIFOLD AND EXHAUST, PORTS

Occasionally, the muffler and manifold should be disassembled from the engine and separated from each other to permit checking for carbon. Any carbon clogging the perforations in the inner tube of muffler can be picked out with a bent rod or scriber. (See fig 20)How often to inspect the muffler, manifold. and the cylinder exhaust ports depends on how much the unit is used- the exhaust ports(fig 21)should be cleaned when they become more than a third clogged with carbon. FIRST, put piston to top dead center (covering the ports so the scrapings can't fall inside), THEN, remove the carbon carefully with a wooden scraper. Be careful not to scratch the piston or damage the chamfered edges of the exhaust ports. Blow all loose particles clear of engine before installing manifold and muffler.

SPARK PLUG (See figure 22)

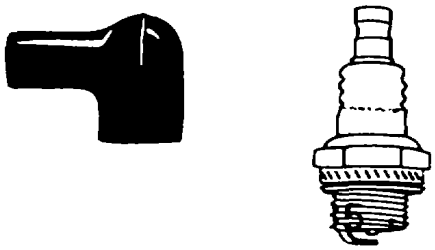
Many times a fouled or dirty spark plug which has caused trouble will prove serviceable after it has been thoroughly cleaned, washed, and properly gapped.

NOTE: WHEN SETTING GAP BE SURE NOT TO DAMAGE ELECTRODES OR INSULATOR. THE PROPER GAP IS .035 ".

Replacement spark plugs are made in wide heat ranges to suit different engines.

Always install spark plug tightly so air cannot leak into the firing chamber.

When trouble-shooting, it is advisable to use a new spark plug, or one of known performance --at least until the trouble has been located. Plugs cleaned by sand blasting must he thoroughly washed to remove all abrasives.



SPARK GAP FIGURE 22.

TROUBLE SHOOTING ENGINE

In order to start and run, an engine needs

FUEL (1-4 below)

SPARK (5 and 6 below)

Here are some simple checks you can perform:

1. With tank full and fuel cap off or loose, fuel should run from tank when the fuel line is disconnected at the tank.
2. If engine stops with cap tight, but runs with the cap off, the cap is not venting and has to be replaced or cleaned.
3. Run engine with filter on and with filter off. If there is a difference in performance, the filter is dirty.
4. Always keep exhaust ports and muffler clean.
5. Magneto can fire only with switch "on."
6. The firing end of the spark plug tells a story:

IF THE PLUG IS DRY even after you have cranked the engine several times with the choke pulled out, it means fuel is not getting into the combustion chamber. Check 1, 2, 3

and 4. (Assuming that carburetor adjusting needle is set correctly -- about 1 1/4 turn open.)

IF THE PLUG IS WET with fuel. check spark as follows: Push a long 1/4 " screw into the rubber boot to take the place of the spark plug terminal. Make sure the screw contacts the spring connector inside the boot. Hold the boot so that there is an air gap of about 1-4 " between the screw and any bare metal surface of the unit. (See fig 23) (Caution: Keep fingers back from the screw to avoid getting shocked: also. don't choose a spot too close to the open spark plug hole where fuel is expelled.) Crank the engine with switch "on". A spark should jump from the screw to bare metal. If it does, the ignition system is all right--use new plug. If no spark jumps, the ignition has to be checked,

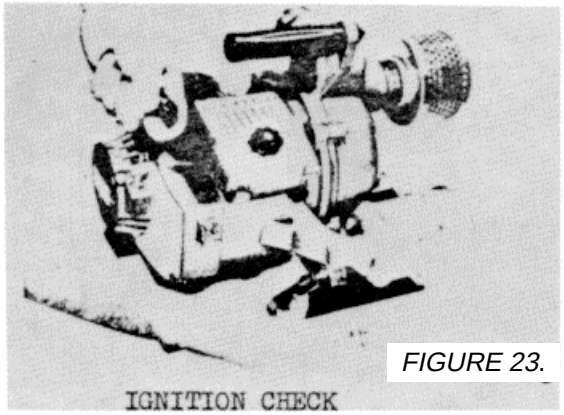


FIGURE 23.

IGNITION CHECK

FAN HOUSING ASSEMBLY

CAUTION: Should the fan housing be removed for any reason, he sure to RESEAT THE FAN HOUSING flush against the engine during reassembly as follows: FIRST. position housing on engine. NEXT, pull the starter handle out, THEN let the starter rewind until the FAN HOUSING CLICKS INTO PERFECT all-the-way-around register against the engine. (See fig 24.)The fastening screws can now be installed without fear of cracking the fan housing or breaking the pawls.

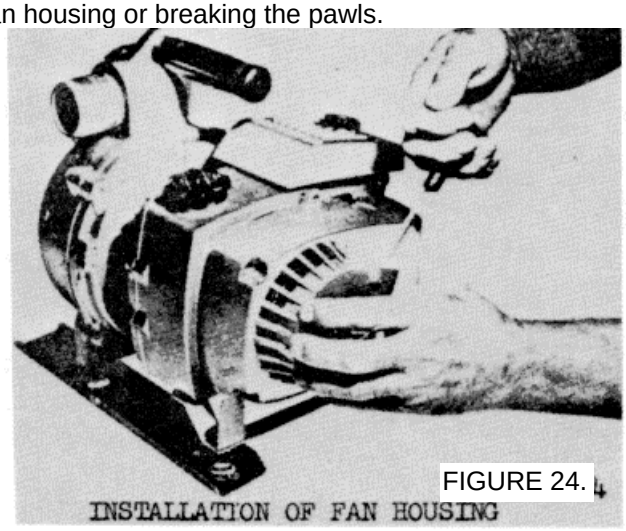


FIGURE 24.

INSTALLATION OF FAN HOUSING

TROUBLE SHOOTING PUMP

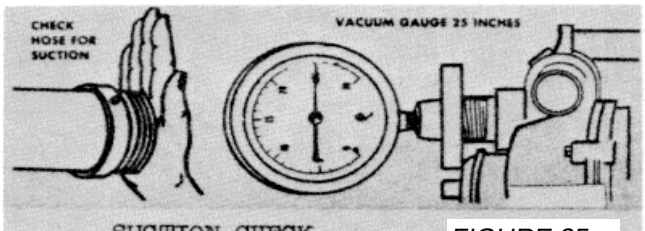
FIRST SHUT OFF ENGINE.

CHECK PUMP BODY FOR WATER --fill it low or empty.
CLEAN SUCTION STRAINER IF CLOGGED.
CHECK HOSE CONNECTIONS - Most pumping trouble is due to air leaks at the suction hose connections. All hose gaskets should be perfect. as even a slight leak will prevent pump from priming. If making connections tighter has no effect, disconnect hoses from pump and check pump suction, below.
CHECK PUMP SUCTION -- Cover the pump suction opening with the palm of your hand (fig 25) or with a vacuum gauge. If pump and engine are both In good operating condition, the suction against your hand will be very strong, almost painful. At sea level a vacuum gauge should read 25 inches. The pump will prime at least 25 feet. At high altitudes, where atmospheric pressure is not as high and air is thinner, lower readings and correspondingly lower lifts will be obtained.

As the impeller and the pump seals become worn, the pump vacuum will be reduced, but water can be satisfactorily pumped as long as there is enough vacuum for the required suction lift. In all cases, the vacuum gauge reading times a factor of 1.13 will give the approximate suction lift in feet. For best results (fast priming and maximum flow) always keep the suction lift distance as short as possible.

Excellent Suction	-	Pump and engine eliminated as trouble sources; check condition of suction hose, below.
Adequate Suction	-	Enough to do the job; check condition of suction hose, below.
Poor Suction	-	Engine not up to speed or power: or internal pump trouble. Test unit.
No Suction at all	-	If engine runs, trouble definitely in pump. Have pump checked.

CHECK SUCTION AT STRAINER END OF HOSE— Connect suction hose to pump, haul hose from water and remove suction strainer. Test suction at end of hose with palm of hand - wait for suction to build up inside the hose. If there is no suction or only weak suction at end of hose,. there is an air-leak at the connection or in the hose. If there is good suction but no flow, try another hose. Your hose may be partially blocked or the liner may be separating on the inside.



SUCTION CHECK

FIGURE 25.

APPENDIX A

REFERENCES

NOT USED

APPENDIX B
BASIC ISSUE ITEMS LIST

Section I. INTRODUCTION

B-1. Scope.

This appendix lists items which accompany the helicopter mounted sprayer or are required for installation, operation, or operator's maintenance.

B-2. General.

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

a. Basic Issue Items - Section II. A list of items which accompany the helicopter mounted sprayer and are required by the operator/crew for installation, operation, or maintenance.

b. Maintenance and Operating Supplies - Section III. A listing of maintenance and operating supplies required for initial operation.

B-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):

(1) Source code, indicates the selection status and source for the listed item. Source Codes are:

Code	Explanation
P	Repair parts which are stocked in or supplied from the GSA/DSA, or army supply system and authorized for use at indicated maintenance categories.
P2	Repair parts which are procured and stocked for insurance purposes because the combat or military essentiality of the end item dictates that a minimum quantity be available in the supply system.
M	Repair parts which are not procured or stocked, but are to be manufactured in indicated maintenance levels.
A	Assemblies which are not procured or stocked as such, but are made up of two or more units. Such component

units carry individual stock, numbers and descriptions, arc procured and stocked separately and can be assembled to form the required assembly at indicated maintenance categories.

X — Parts and assemblies which are not procured or stocked and the mortality of which normally is below that of the application end item or component. The failure of such: part or assembly should result in retirement of the end item From the supply system.

X1 — Repair parts which are not procured or stocked. The requirement of such items will be filled by use of the next higher assembly or component.

X2 — Repair parts which are not stocked. The indicated maintenance category requiring such repair parts will attempt to obtain them through cannibalization. Where such repair parts are not obtainable through cannibalization, requirements will he requisitioned, with accompanying justification, through normal supply channels.

C — Repair parts authorized for local procurement. Where such repair parts are not obtainable from local procurement, requirements will be requisitioned through normal supply channels accompanied by a supporting statement of non-availability, From local procurement.

G — Major assemblies that are procured with PEMA funds for initial issue only as exchange assemblies at DSU and GSU level. These assemblies will not be stocked above GS and DS level or returned to depot supply levels.

(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	Repair parts and assemblies which are economically reparable at DSU and GSU activities and are normally furnished by supply on an exchange basis.
S	Repair parts and assemblies which arc economically reparable at DSU and GSU activities and which; normally are furnished by supply on an exchange basis. When items are determined by a SSU to be uneconomically reparable they will be evacuated to a depot For evaluation and analysis before final disposition.
T	High dollar value recoverable repair parts which arc subject to special handing and are issued on an exchange basis. Such repair parts are normally repaired or overhauled at depot maintenance activities.
U	Repair parts specifically selected for salvage by reclamation units because of precious metal content, critical materials, or high dollar value reusable casings or castings.

b. Federal Stock number. This column indicates the Federal stock number assigned to toe 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 2 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 Incorporated in Unit. This column indicates the quantity of the item used in the assembly group. A "V" appearing in this column in lieu of a quantity indicates that a definite quantity cannot be indicated (e.g., shims, spacers, etc.).

f. Quantity Furnished With Equipment. This column indicates the quantity of an item furnished with the equipment.

g. Illustration. This column is divided as follows:

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

(2) Item Number. Indicates the callout number used to reference the item in the illustration.

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

a. Component Application. This column identifies the component application of each maintenance or operating supply item.

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

c. Description. This column indicates the item name and brief description.

d. Quantity Required for Initial Operation. This column indicates the quantity of each maintenance or operating supply item required for initial operation of the equipment.

e. Quantity Required for 8 Hours Operation. This column indicates the estimated quantities required for an average 8 hours of operation.

f. Notes. This column indicates informative notes keyed to data appearing in a preceding column.

B-5. Special Information.

Not applicable.

B-6. Abbreviations.

Not applicable.

B-7. Federal Supply Code for Manufacturers.

Not applicable.

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) FIG NO	(7) ILLUSTRATION (B) ITEM NO.
PC	7520-559-9618	CASE, OPERATIONAL AND MAINTE-NANCE PUBLICATIONS	ea.		1		
PC		DA TECHNICAL MANUAL TM	ea.		1		
PC	9505-293-4208	WIRE, SAFETY MS20995C32 (96906)	SL		1		
PC	5120-242-3249	WRENCH, STRAP	ea.		2		

SECTION III. MAINTENANCE AND OPERATING SUPPLIES

(1) COMPONENT APPLICATION	(2) FEDERAL STOCK NUMBER	(3) DESCRIPTION	(4) QUANTITY REQUIRED F/ INITIAL OPERATION	(5) QUANTITY REQUIRED F/ 8 HRS OPERATION	(6) NOTES
Fuel Tank	9130-160-1818	91A, Gasoline, Automotive, Bulk	1 qt	1 gal	1:16 ratio of SAE 30 motor oil to regular gasoline
	9150-265-9433	OE 30, Oil Engine 1 qt can	1/3 pint	1/2 pint	

APPENDIX C
MAINTENANCE ALLOCATION CHART

Section I. Introduction

C-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 functions on the identified end item or component. The implementation of the maintenance Functions upon the end item or component will be consistent with the assigned maintenance functions.

c. Section III. Not applicable.

d. Section IV. Not applicable.

C-2. Explanation of Columns in Section II.

a. Group Number. Column 1. The functional group is a numerical group set up 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

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 change, 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, preserving, adjusting, replacing, welding, riveting, and strengthening.

J - OVERHAIL. 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 originator 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, (Section Ii1) required to perform the maintenance functions (Section II).

e. Remarks, Column 5. This column is provided for referencing by code the remark's (Section IV) pertinent to the maintenance functions.

SECTION II - MAINTENANCE ALLOCATION CHART

(1) GROUP NO.	(2) FUNCTIONAL GROUP	(3) MAINTENACE 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	Frame Assembly													
	Tank Support	C								O				
	Tank Straps, Cables, Struts & tie down lugs	C			C				O					
02	Tank, Lines, Hoses & Strainer													
	Tank	C		C					O	O				
	Lines	C							O					
	Strainers			O					O					
	Valves				O				O	O				
03	Spray Ducts & Manifolds													
	Spray Booms	C			C			O		O				
	Nozzle	C							O					
	Tee Boom								O					
04	Pump													
	Pump Assembly								O	O				
	Impeller				O				O					
	Seals & Gaskets								O					
	Bearings								O					
	Shafts								O					

SECTION II - MAINTENANCE ALLOCATION CHART

(1) GROUP NO.	(2) FUNCTIONAL GROUP	(3) MAINTENACE 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
04	Pumps (cont.)													
	Pump Drive	C							O	O				
	Windmill Assy	C							O	O				
	Blade Propeller	C			C				O					
	Brake Assy	O							O	O				
	Drum, Brake								O					
	Shoe, Brake								O					
	Cable, Brake				O				O					
05	Control System													
	Levers								O					
	Connecting Rods				O				O					
	Gage Pressure								O					
	Instruction Plates								O					
06	Ground Loading Unit													
	Engine Assy	C		C	O					O				
	Point Set	O			O				O					
	Carb.				O				O					
	Recoil Starter								O	O				
	Pump Assy	C							O	O				
	Impeller								O					
	Seal, Gaskets & Bearings													

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.

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THE METRIC SYSTEM AND EQUIVALENTS

'NEAR MEASURE

. Centimeter = 10 Millimeters = 0.01 Meters = 0.3937 Inches
1 Meter = 100 Centimeters = 1000 Millimeters = 39.37 Inches
1 Kilometer = 1000 Meters = 0.621 Miles

'VEIGHTS

Gram = 0.001 Kilograms = 1000 Milligrams = 0.035 Ounces
1 Kilogram = 1000 Grams = 2.2 lb.
1 Metric Ton = 1000 Kilograms = 1 Megagram = 1.1 Short Tons

LIQUID MEASURE

1 Milliliter = 0.001 Liters = 0.0338 Fluid Ounces
1 Liter = 1000 Milliliters = 33.82 Fluid Ounces

SQUARE MEASURE

1 Sq. Centimeter = 100 Sq. Millimeters = 0.155 Sq. Inches
1 Sq. Meter = 10,000 Sq. Centimeters = 10.76 Sq. Feet
1 Sq. Kilometer = 1,000,000 Sq. Meters = 0.386 Sq. Miles

CUBIC MEASURE

1 Cu. Centimeter = 1000 Cu. Millimeters = 0.06 Cu. Inches
1 Cu. Meter = 1,000,000 Cu. Centimeters = 35.31 Cu. Feet

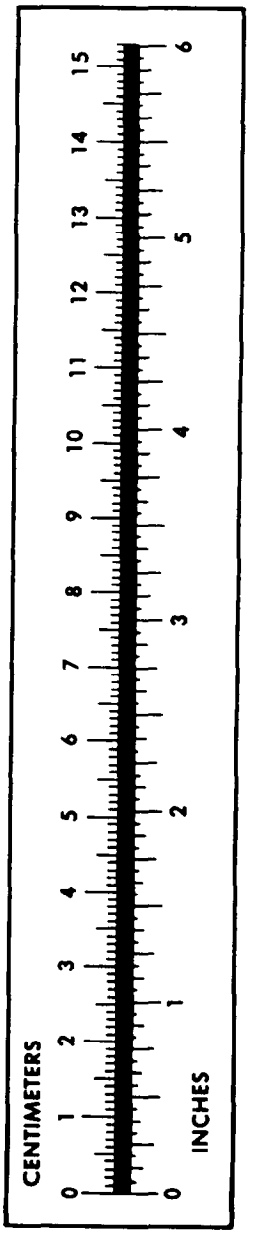
TEMPERATURE

5/9(°F - 32) = °C
212° Fahrenheit is evuivalent to 100° Celsius
90° Fahrenheit is equivalent to 32.2° Celsius
32° Fahrenheit is equivalent to 0° Celsius
9/5C° + 32 =°F

APPROXIMATE CONVERSION FACTORS

TO CHANGE	TO	MULTIPLY BY
Inches	Centimeters	2.540
Feet	Meters	0.305
Yards	Meters	0.914
Miles	Kilometers	1.609
Square Inches	Square Centimeters	6.451
Square Feet	Square Meters	0.093
Square Yards	Square Meters	0.836
Square Miles	Square Kilometers	2.590
Acres	Square Hectometers	0.405
Cubic Feet	Cubic Meters	0.028
Cubic Yards	Cubic Meters	0.765
Fluid Ounces	Milliliters	29.573
ıts	Liters	0.473
arts	Liters	0.946
allons	Liters	3.785
Ounces	Grams	28.349
Pounds	Kilograms	0.454
Short Tons	Metric Tons	0.907
Pound-Feet	Newton-Meters	1.356
Pounds per Square Inch	Kilopascals	6.895
Miles per Gallon	Kilometers per Liter	0.425
Miles per Hour	Kilometers per Hour	1.609

TO CHANGE	TO	MULTIPLY BY
Centimeters	Inches	0.394
Meters	Feet	3.280
Meters	Yards	1.094
Kilometers	Miles	0.621
Square Centimeters	Square Inches	0.155
Square Meters	Square Feet	10.764
Square Meters	Square Yards	1.196
Square Kilometers	Square Miles	0.386
Square Hectometers	Acres	2.471
Cubic Meters	Cubic Feet	35.315
Cubic Meters	Cubic Yards	1.308
Milliliters	Fluid Ounces	0.034
Liters	Pints	2.113
Liters	Quarts	1.057
ers	Gallons	0.264
ms	Ounces	0.035
ograms	Pounds	2.205
Metric Tons	Short Tons	1.102
Newton-Meters	Pounds-Feet	0.738
Kilopascals	Pounds per Square Inch	0.145
lometers per Liter	Miles per Gallon	2.354
meters per Hour	Miles per Hour	0.621



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