

TECHNICAL MANUAL

**OPERATOR'S, ORGANIZATIONAL, DIRECT SUPPORT AND
GENERAL SUPPORT MAINTENANCE MANUAL FOR
COMPRESSOR, RECIPROCATING, AIR:
ELECTRIC MOTOR DRIVEN
5 CFM, 175 PSI
MODEL 20-904
NSN 4310-01-064-2386**

HEADQUARTERS, DEPARTMENT OF THE ARMY

1 JULY 1980

CHANGE }
No. 1 }

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, D.C., 11 May 1983

Operator's Organizational, Direct Support and
General Support Maintenance Manual for

COMPRESSOR, RECIPROCATING, AIR:
ELECTRIC MOTOR DRIVEN
5CFM, 175 PSI
MODEL 20904
NSN 4310-01-064-2386
MODEL 20411
NSN 4310-01-125-0934

TM 5-4310-362-14, 1 July 1980, is changed as follows:

1. Title is changed as shown above.
2. Remove and insert pages as indicated below:

	Remove pages	Insert pages
Table of Contents	i and ii	i and ii
Chapter 1	1-1 thru 1-4	1-1 thru 1-4
Chapter 2	2-1 thru 2-6	2-1 thru 2-6
Chapter 3	3-1 thru 3-8	3-1 thru 3-8
Chapter 4	4-1 thru 4-4	4-1 thru 4-4.1/4-4.2
Chapter 5	5-1 thru 5-6	5-1 thru 5-6
Chapter 6	6-13 thru 6-16	6-13 thru 6-16
Chapter 8	8-1 thru 8-10 8-11 thru 8-16 8-17 thru 8-23/824	8-1 thru 8-10.3/8-10.4 8-11 thru 8-16.5/8-16.6 8-17 thru 8-32
Chapter 10	10-3 thru 10-6 10-7/10-8	10-3 thru 10-6 10-7/10-8
Appendix	C-3 thru C-6	C-3 thru C-7/C-8
Index	Index 1 and Index 2	Index 1 thru Index 3/Index 4

3. New or changed text material is indicated by a vertical bar in the margin. An illustration change is indicated by a miniature pointing hand.

4. Retain this sheet in front of manual for reference purposes.

By Order of the Secretary of the Army:

Official:

ROBERT M. JOYCE
Major General, United States Army
The Adjutant General

E. C. MEYER
General, United States Army
Chief of Staff

DISTRIBUTION:

To be distributed in accordance with DA Form 12-25A, Operator requirements for Air Compressor 5 CFM.

WARNING

Always disconnect electric power from the air compressor before starting any work on it. The air compressor could start up accidentally and could cause serious injury to maintenance personnel.

WARNING

Never attempt to service any of the air compressor components until the unit is relieved of all air pressure.

WARNING

Lethal voltages are present in the circuitry of the air compressor. Disconnect power from the compressor before starting any repair work.

WARNING

Do not weld the air receiver tank to repair leaks.

WARNING

Do not operate the air compressor with the belt guard removed.

WARNING

Do not operate in a tilted position.

WARNING

The compressed air supplied by this compressor is not breathable and must not be used to charge cylinders that will be used to supply breathable air.

WARNING

Operation of this equipment presents a noise hazard to personnel in the area. The noise level exceeds the allowable limits for unprotected personnel. Wear ear muffs or earplugs which were fitted by a trained professional.

WARNING

Make certain any lifting device used has a capacity equal to the weight being lifted. Failure to observe this precaution could result in injury or death to personnel and damage to equipment.

WARNING

Before starting motor or operating any of the components, ensure that no loom bars, tools or parts are lying in or on any of the equipment as they could cause serious damage to equipment or bodily injury to personnel.

WARNING

Never wear loose clothing, or hanging appendages from person or clothing, while inspecting running motor moving shafts, or like machinery.

WARNING

Wear gloves or other skin protective equipment when working with cleaning solvents.

WARNING

Eye protective equipment must be worn when scraping rust and loose paint.

**Operator's, Organizational, Direct Support and
General Support Maintenance Manual for
COMPRESSOR, RECIPROCATING, AIR:
ELECTRIC MOTOR DRIVEN
5CFM, 175 PSI
MODEL 20-904
NSN 4310-01-064-2386
MODEL 20911
NSN 4310-01-125-0934**

REPORTING ERRORS AND RECOMMENDING IMPROVEMENTS

You can help improve this manual. If you find any mistake or if you know of any 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 & Aviation Materiel Readiness Command, ATTN: DRSTS-MPSD, 4300 Goodfellow Boulevard, St. Louis, MO 63120. A reply will be furnished directly to you.

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CHAPTER 1

INTRODUCTION

Section I. GENERAL INFORMATION

1-1. SCOPE

Type of Manual: Operator's, Organizational, Direct Support and General Support Maintenance Model Number and Equipment Name:

20-04	5 cfm, 175 psi
20-911	Electric Motor Driven Air Compressor Unit

Purpose of Equipment: Supplies compressed air for general shop use.

1-2. MAINTENANCE FORMS, RECORDS AND REPORTS

Department of the Army forms and procedures used for equipment maintenance will be those prescribed by TM 38-750, The Army Maintenance Management System.

1-2.1. HAND RECEIPT

Hand receipts for Components of End Item (COEI), Basic Issue Items (BII), and Additional Authorization List (AAL) items are published in a Hand Receipt Manual, TM 54310-362-14-HR. This manual is published to aid in property accountability and is available through: Commander, US Army Adjutant General Publication Center, ATTN: AGDL-OD, 1655 Woodson Road, St. Louis, MO 63114.

1-3. REPORTING EQUIPMENT IMPROVEMENT RECOMMENDATIONS (EIR'S)

If your compressor needs improvement, let us know. Send us an EIR. You, the user, are the only one who can tell us what you don't like about your equipment. Let us know why you don't like the design. Tell us why a procedure is hard to perform. Put it on an SF 368 (Quality Deficiency Report). Mail it to us at Commander, US Army Troop Support and Aviation Materiel Readiness Command, ATTN: DRSTS-MPSD, 4300 Goodfellow Blvd., St. Louis, MO 63120. We'll send you a reply.

1-4. WARRANTY INFORMATION

All components of the Air Compressor Unit are warranted by C & H Distributors Inc. for a period of 17 months. The warranty starts on the date found in block 23, DA Form 24089, in the logbook. Report all defects in material or workmanship to your supervisor, who will take appropriate action through your organizational maintenance shop.

Section II. EQUIPMENT DESCRIPTION AND DATA

1-5. PURPOSE, CAPABILITIES AND FEATURES

Purpose of the Air Compressor Set

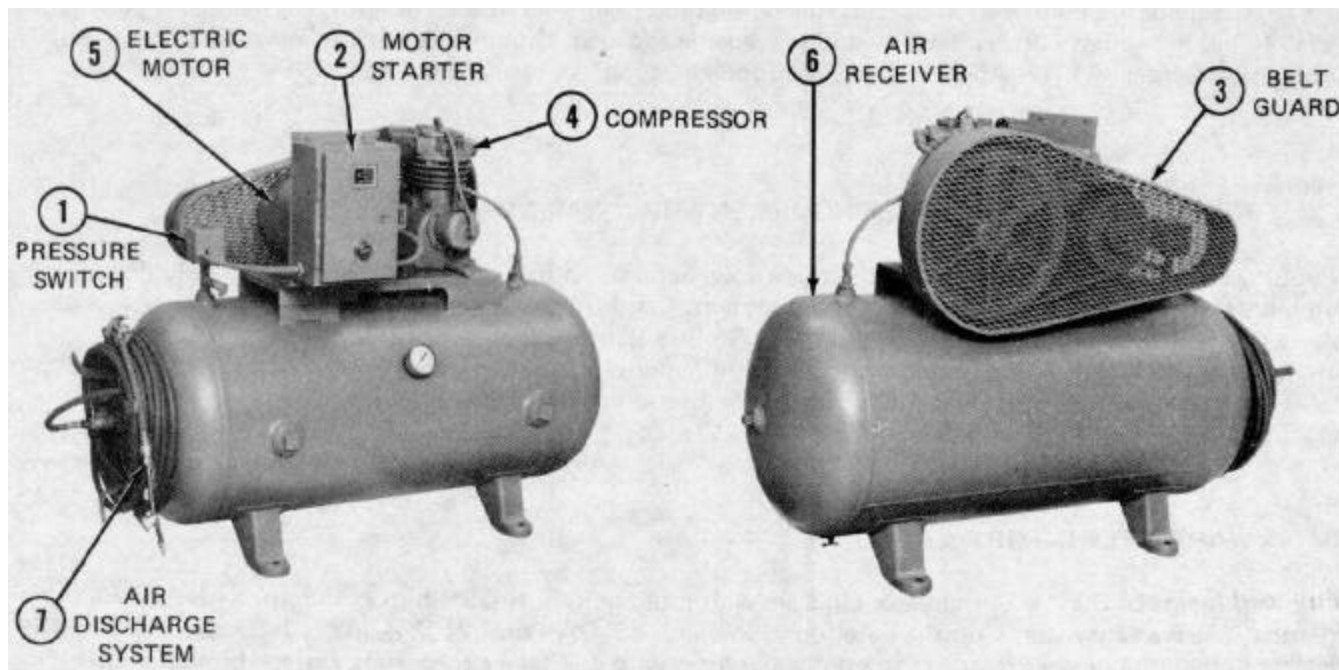
An electric motor driven air compressor for general shop use.

Capabilities and Features

- 2-stage compressor provides compressed air at 5 cfm and 175 psi.
- Electric motor driven.
- Motor starter with melting alloy relay protects motor against overload.
- Pressure switch provides for automatic compressor cut in at 160 psi and cut out at 180 psi, and automatic unloading for model 20-911.
- Air discharge system with inflator gage can be used to directly inflate tires to proper pressure.
- Tank mounted pressure gage gives constant reading of air pressure in tank.

1-6. LOCATION AND DESCRIPTION OF MAJOR COMPONENTS

1. PRESSURE SWITCH. Diaphragm senses pressure and opens and closes switch contacts. Cutout pressure and pressure difference between cut in and cutout are adjustable with 2 screws.
2. MOTOR STARTER. Contacts are magnetically clod when power is applied. Also contains a melting alloy relay which opens the circuit when a current overload is sensed.
3. BELT GUARD. Steel mesh and sheet metal construction protects belts and personnel.



4. COMPRESSOR. Dual stage, two or three piston, air cooled with 175 cfm capacity. Includes intercooler, aftercooler and air inlet filter. Model 20-904 has centrifugal unloader and Model 20-911 has pressure switch unloader for no load starting.

5. ELECTRIC MOTOR. Single phase 2 HP induction motor.

6. AIR RECEIVER. Consists of 40 gal. air tank, check valve to prevent escape of air back to compressor, pressure gage, drain cock, safety relief valve and globe shutoff valve at the outlet.

7. AIR DISCHARGE SYSTEM. Consists of air hose and inflator gage which permits simultaneous filling of tires and reading of pressure.

1-7. EQUIPMENT DATA

1.7.1 DIFFERENCES BETWEEN MODELS. This manual covers models 20904 and 20911 air compressors manufactured by C and H Distributors. See below for equipment data and differences.

Air Compressor Unit	Model 20-904	Model 20-911
Manufacturer	C&H Distributors Inc.....	C& H Distributors Inc.
Output	5 cfm at 175 psi	5 cfm at 175 psi
Type	Electric motor driven, tank mounted	Electric motor driven, tank mounted
Length.....	56 in. (142 cm)	56 in. (142 cm)
Width	25 in. (64 cm)	25 in. (64 cm)
Height	40 in. (102 cm).....	37 in. (95 cm)
Weight, net	460 lbs. (209 kg).....	460 lbs. (209 kg)
With, shipping	565 lbs. (257 kg).....	565 lbs. (257 kg)

Air Compressor.....	Model 20-904	Model 20-911
Manufacturer	Champion.....	Champion
Type	2 stage vertical	2 stage W

Bore and Stroke	Model 20904	Model 20-911
Low pressure stage	3.0 in. x 2.0 in. (7.6 cm x 6.1 cm)	2.6 in. x 2.0 in. (6.6 cm x 6.1 cm)
High pressure stage	1.5 in. x 2.0 in. (3.8 cm x 5.1 cm)	1.75 in. x 2.0 in. (4.5 cm x 5.1 cm)
Pumping rate	5 cfm at 175 psi	5 cfm at 175 psi
Air cleaner	dry element type	washable type

Electric Motor

Manufacturer	Leeson Electric Corporation
Model	N182C17DB1A
RPM	1740
Horsepower	2
Input requirements	115V, 6 Hz
Full load current.....	27.0 Amp
Phase	Single
Service factor	1.15
Duty.....	Continuous

1-7. EQUIPMENT DATA (cont)

Air Receiver

ManufacturerC &H Distributors Inc.
 Pressure limit200 psi (14 kg/cm²)
 Capacity* 60 gal. (227 l)

Air Hose

ManufacturerC &H Distributors Inc.
 Length..... 50 feet (15 m)
 Inside diameter5/16 in. (8 mm)
 Maximum pressure.....200 psi (14 kg/cm²)

Magnetic Starter

Manufacturer Furnas Electric Co.
 Model No. 14CF120
 EnclosureNEMA 12
 PhaseSingle
 Type Magnetic
 Overload relay Melting alloy

Pressure Switch (Model 20-904)

Manufacturer Furnas Electric Co.
 Model.....69HA1
 Type Diaphragm operated
 Cut in and cutout pressure and differential..... Adjustable

Pressure Switch (Model 20-911)

Manufacturer Furnas Electric Co.
 Model..... 69HAU1
 TypeDiaphragm operated, unloader control
 Cut in and cut out pressure and differential Adjustable

Safety Relief Valve

ManufacturerF. C. Kingston Co.
 Model 112C-1/4-200
 Relief pressure 200 psi, factory set non-adjustable

Pressure Gage

ManufacturerMarsh Instrument Co.
 Model..... J5458
 Type Liquid filled
 Range 0 - 300 psi

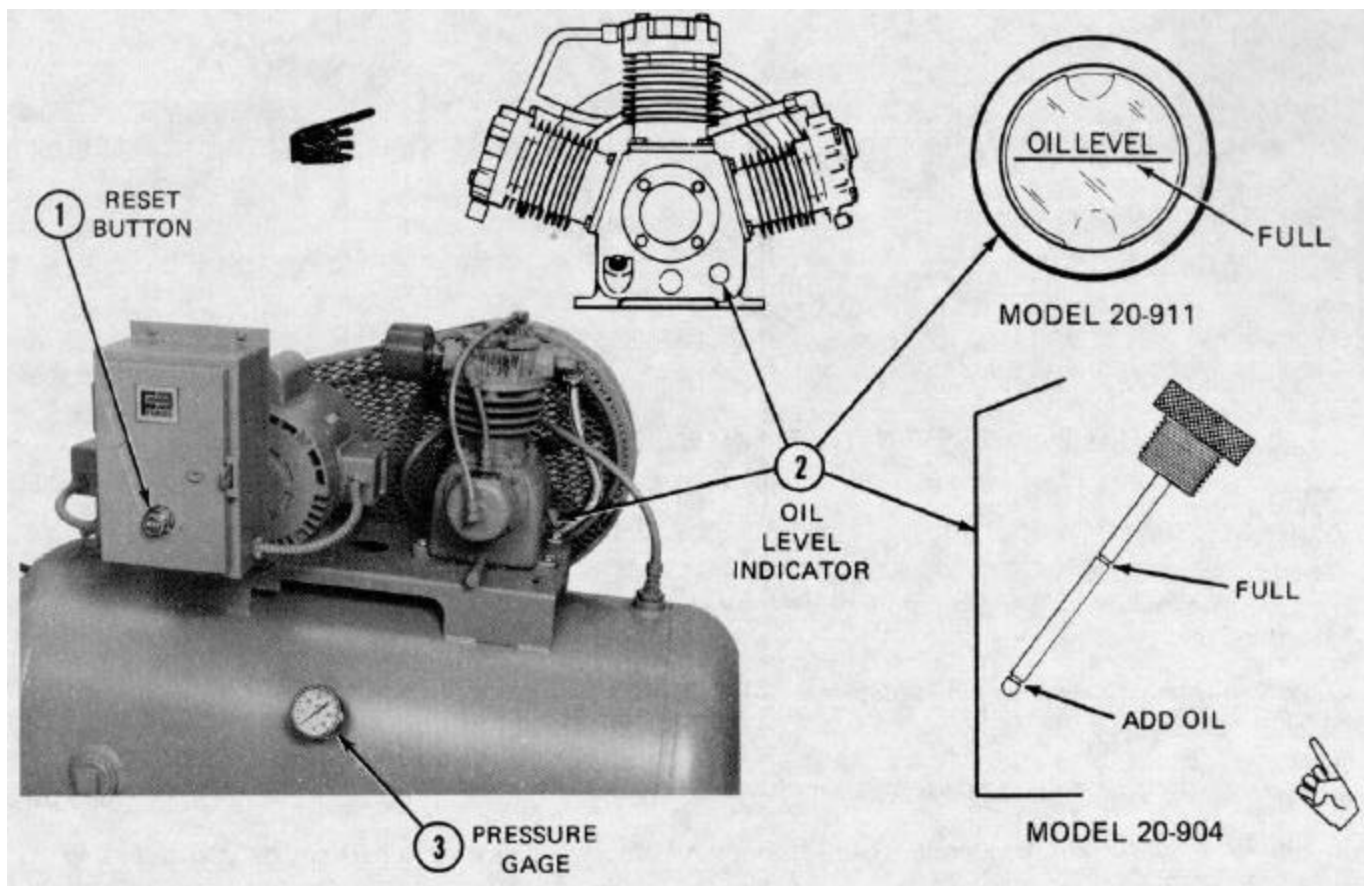
CHAPTER 2

OPERATING INSTRUCTIONS

Section I. DESCRIPTION AND USE OF OPERATORS CONTROLS AND INDICATORS

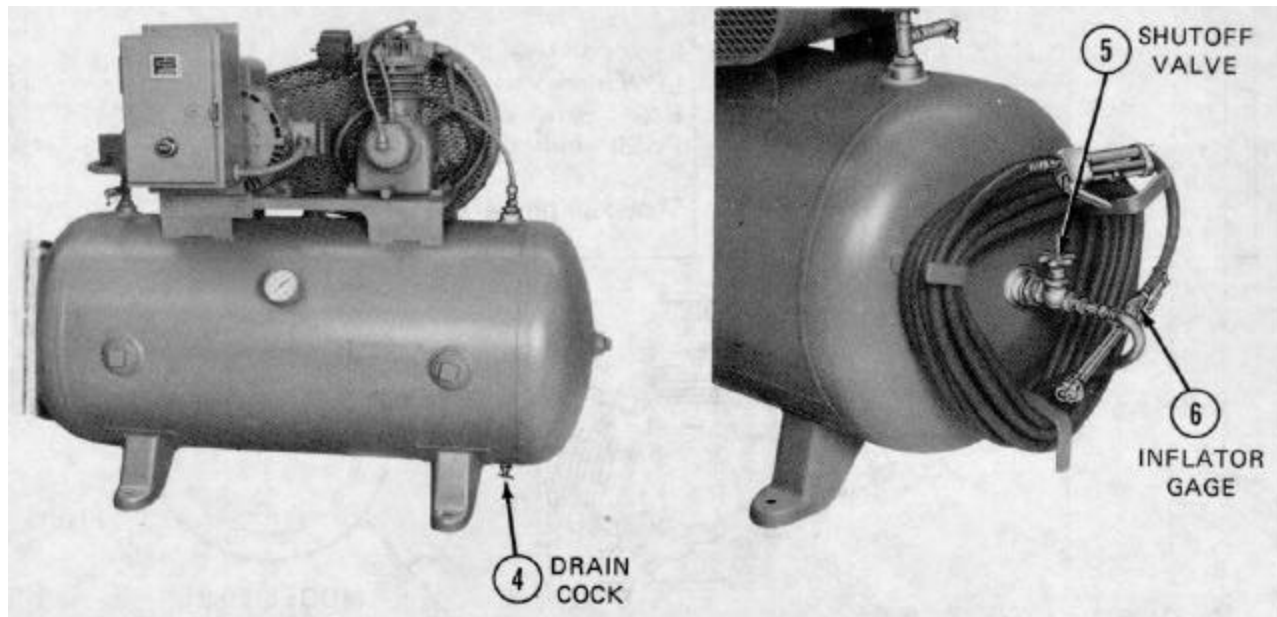
2-1. OPERATOR'S CONTROLS AND INDICATORS

KEY	NAME	LOCATION	FUNCTION
	Main power switch	Main switch box	Turn electric power to the compressor set on and off
1	RESET button	Starter enclosure	Push to reset after overload condition has tripped the protective relay
2	Oil level indicator	Compressor crankcase	Shows oil level in crankcase. LOW mark - add oil Model 20-904 HIGH mark - oil level ok 24 FULL- indicating line Model 20-911
3	Pressure gage	Air tank	Shows air pressure in tank



2-1. OPERATOR'S CONTROLS AND INDICATORS (cont)

KEY	NAME	LOCATION	FUNCTION
4	Drain cock	Bottom of air tank	To drain air and water from tank
5	Shut off valve	End of tank	To close off air tank when air hose has to be removed
6	Inflator gage	End of tank	To pressurize pneumatic equipment and read air pressure



Section II. PREVENTIVE MAINTENANCE CHECKS AND SERVICES

2-2. GENERAL

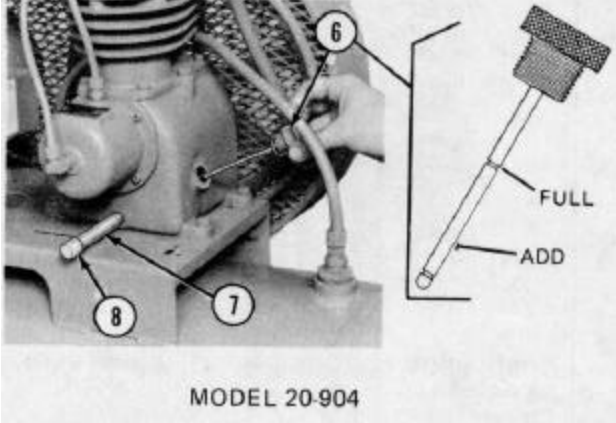
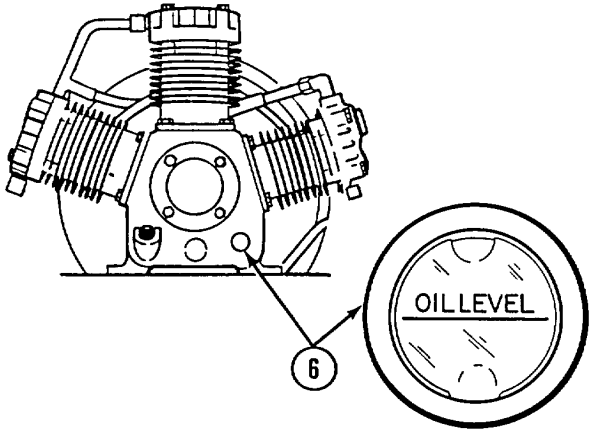
Before You Operate. Always keep in mind the CAUTIONS and WARNINGS. Perform your before (B) PMCS.

While You Operate. Always keep in mind the CAUTIONS and WARNINGS. Perform your during (D) PMCS.

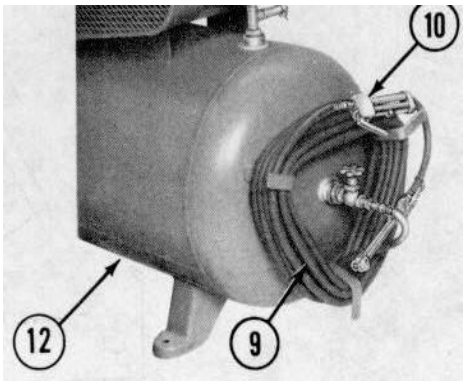
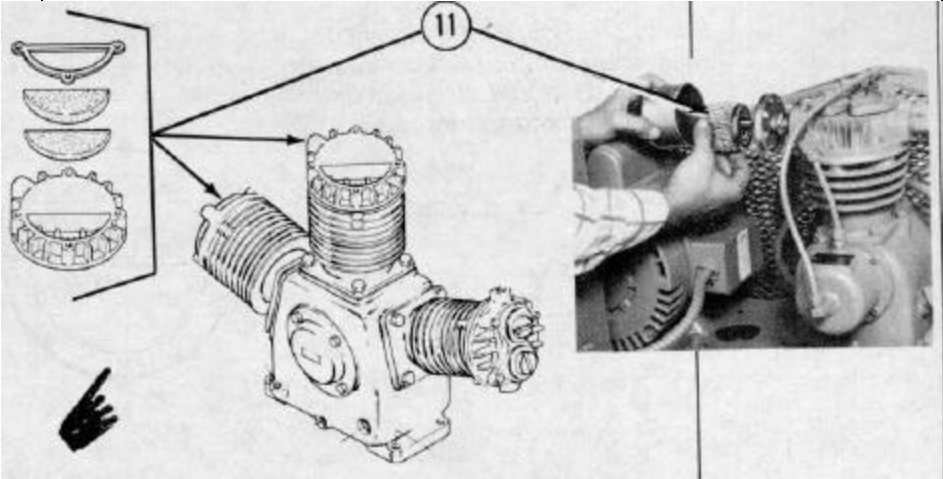
After You Operate. Be sure to perform your after (A) PMCS.

If Your Equipment Fails to Operate. Troubleshoot with proper equipment. Report any deficiencies using the proper forms, see TM 38-750.

2-3. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (cont)

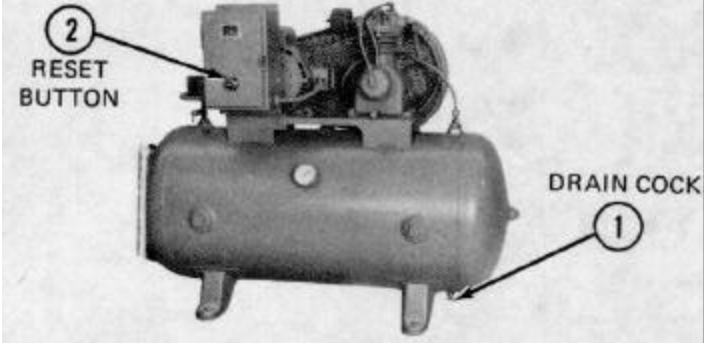
ITEM NO.	INTERVAL				ITEM TO BE INSPECTED PROCEDURE:	Equipment Will Be Reported Not Ready (RED) If:
	B	D	A	W		
5	•				 <p>MODEL 20-904</p>	
6	•	•	•		 <p>MODEL 20-911</p>	
					<p>OIL FILL GAGE. Check oil level with fill gage (6). Add oil to bring level up to full mark.</p> <p>OIL DRAIN PIPE AND CAP. Check for leaks around pipe (7) and cap (8). Tighten to stop leak. If leak can't be stopped by tightening, replace.</p>	

2-3. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (cont)

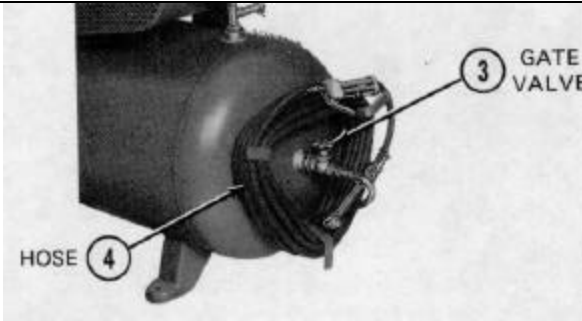
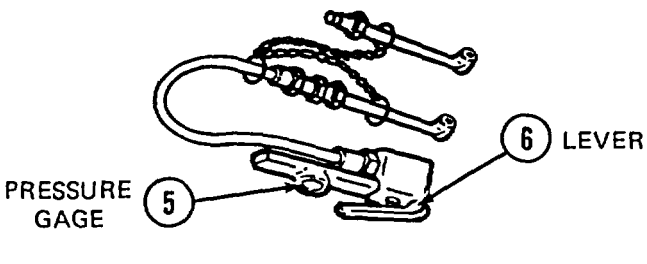
ITEM NO.	INTERVAL				ITEM TO BE INSPECTED PROCEDURE:	Equipment Will Be Reported Not Ready (RED) If:
	B	D	A	W		
7	•	•			 <p>AIR HOSE. Check hose (9) for cuts or cracks. Check for air leaks during operation, especially around fittings. Tighten 2 connectors on either end of hose if loom.</p>	
8	•	•				
9					 <p>AIR CLEANER ELEMENT. Check element (11) for dirt. Clean if dirty. Replace element (11) if cleaning is ineffective.</p>	
10						

Section III. OPERATION UNDER USUAL CONDITIONS

2-4. OPERATING PROCEDURES

STEP	PROCEDURE	REMARKS
<p>1.</p> <p>2.</p> <p>3.</p>	 <p>Open drain cock (1) to drain condensation from tank. Then close drain cock (1).</p> <p>Turn main power switch ON.</p> <p style="text-align: center;">CAUTION</p> <p style="text-align: center;">Notify organizational maintenance if the compressor has shut down due to overload. Overload condition must be removed before compressor is restarted.</p> <p>Push RESET button (2) to restart compressor shut down due to an overload.</p>	<p>Accumulated moisture will rut out inside of tank.</p> <p>Air compressor will automatically cut in when pressure drops below 160 psi, and cut out when pressure reaches 180 psi.</p> <p>Overloading of the electrical motor causes the relay in the motor Starter to open.</p>

2-4. OPERATING PROCEDURES (cont)

STEP	PROCEDURE	REMARKS
		
4.	Open gate valve (3).	
5.	Unwind hose (4).	
		
6.	Read pressure with pressure gage (5).	Do not press on lever (6) while reading pressure
7.	Depress lever (6) to fill tire.	
8.	Turn main power switch OFF at end of work shift.	

Section IV. OPERATION UNDER UNUSUAL CONDITIONS

2-5. OPERATION IN DUSTY ENVIRONMENT

Check and clean air cleaner daily to prevent it from clogging.

Clean dirt off compressor fins so cooling ability won't be lost.

2-6. OPERATION IN EXTREME HEAT

Keep motor and compressor clean. Dirt keeps heat from escaping.

Make sure compressor gets adequate ventilation and airflow isn't blocked.

Check air filter often. A dirty air cleaner will make the compressor run hot.

CHAPTER 3


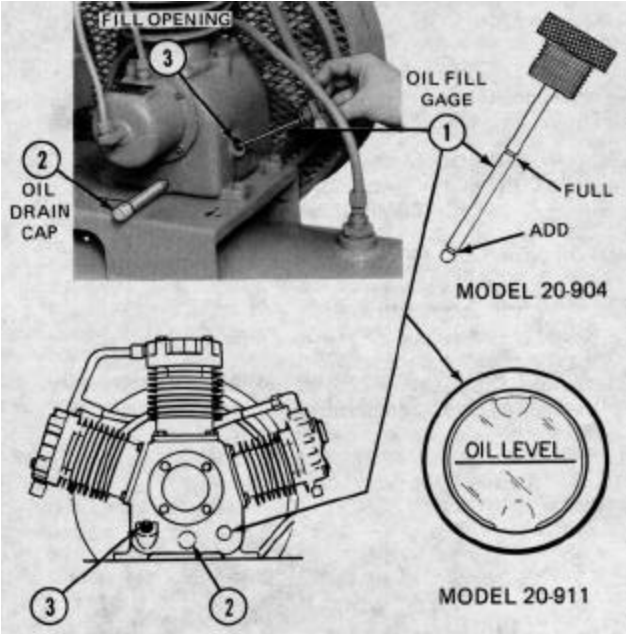
OPERATOR'S MAINTENANCE INSTRUCTIONS

Section I. LUBRICATION INSTRUCTIONS

3-1. GENERAL

The air compressor is the only component of the compressor set which requires lubrication. The bearings of the electric motor are sealed and cannot be lubricated.

3-2. LUBRICATION INSTRUCTIONS

ITEM	PROCEDURE	INTERVAL
 <p>1. Oil gage (1) 2. Oil drain cap (2)</p>	 <p>Check oil level. Add oil, OE-30 to bring up to full mark.</p> <ol style="list-style-type: none"> a. Remove and drain oil into container with at least 1 quart (1 liter) capacity b. Install cap (2) and pour OE-30 into fill opening (3). 1-2/3 pints (.8 l) in Model 20-904 1 pint (.5 l) in Model 20-911 	<p>Daily Quarterly</p>

Section II. TROUBLESHOOTING PROCEDURES

3-3. GENERAL

This section contains troubleshooting procedures for the operator. When the operator can't perform the procedure, he is referred to the proper level of maintenance.

3-4. TROUBLESHOOTING PROCEDURES

The table lists the common malfunctions which you may find during the operation or maintenance of the air compressor or its components. You should perform the tests/inspections and corrective actions in the order listed.

This manual cannot list all malfunctions that may occur, nor all tests or inspections and corrective actions. If a malfunction is not listed or is not corrected by listed corrective actions, notify your supervisor.

Troubleshooting

MALFUNCTION

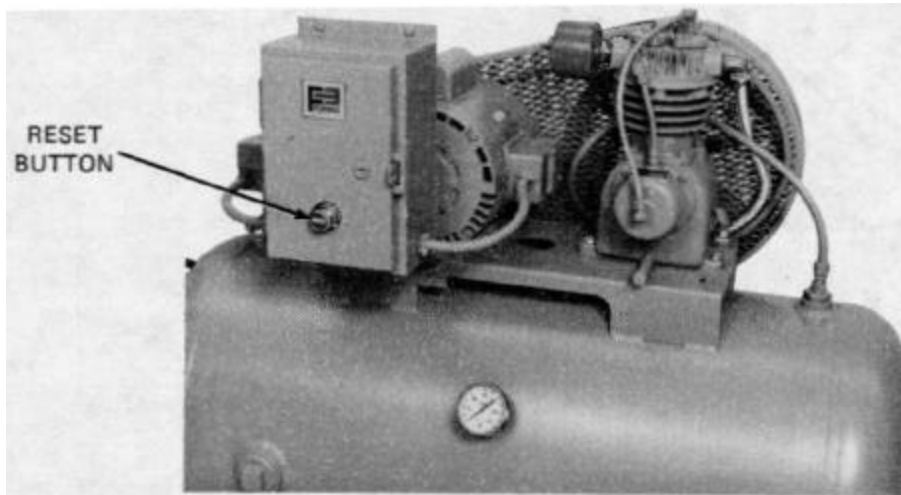
TEST OR INSPECTION

CORRECTIVE ACTION

COMPRESSOR UNIT

1. ELECTRIC MOTOR WON'T START

- Step 1. See if main power switch is on.
Turn on main power.
- Step 2. Check if overload condition has opened the overload relay.
Push RESET button on starter box.



3-4. TROUBLESHOOTING PROCEDURES (cont)

Troubleshooting

MALFUNCTION

TEST OR INSPECTION

CORRECTIVE ACTION

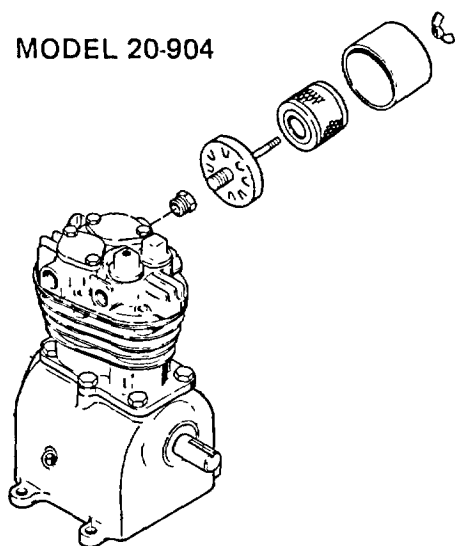
COMPRESSOR UNIT

2. TANK PRESSURE IS LOW, PUMPING RATE IS SLOW

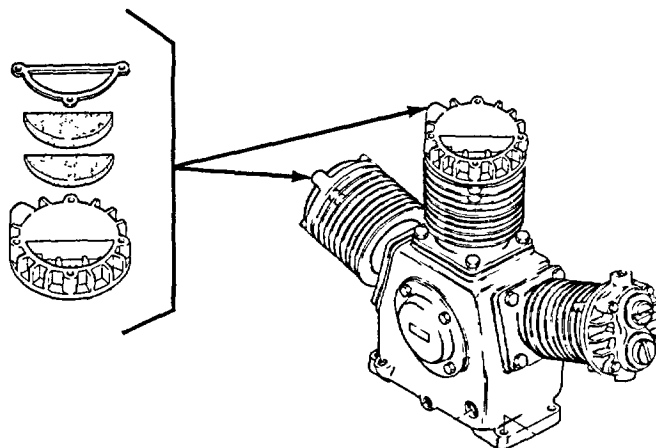
Step 1. Inspect air filter for clogging.



MODEL 20-904

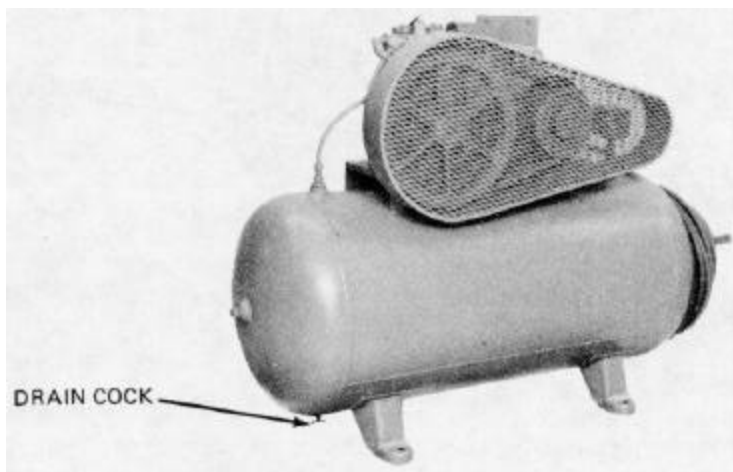


MODEL 20-911



Clean air filter element if dirty.

Step 2. Check to see that drain cock is closed.



Close drain cock tightly,

3-4. TROUBLESHOOTING PROCEDURES (cont)

Troubleshooting

MALFUNCTION

TEST OR INSPECTION

CORRECTIVE ACTION

COMPRESSOR UNIT

Step 3. Check for air leaks, using soapy water if necessary. Check around all air connections.

- a. Tighten loose connections.
- b. Notify organizational maintenance if tightening does not eliminate leak.

3. COMPRESSOR OIL CONSUMPTION IS EXCESSIVE

Step 1. Check oil.

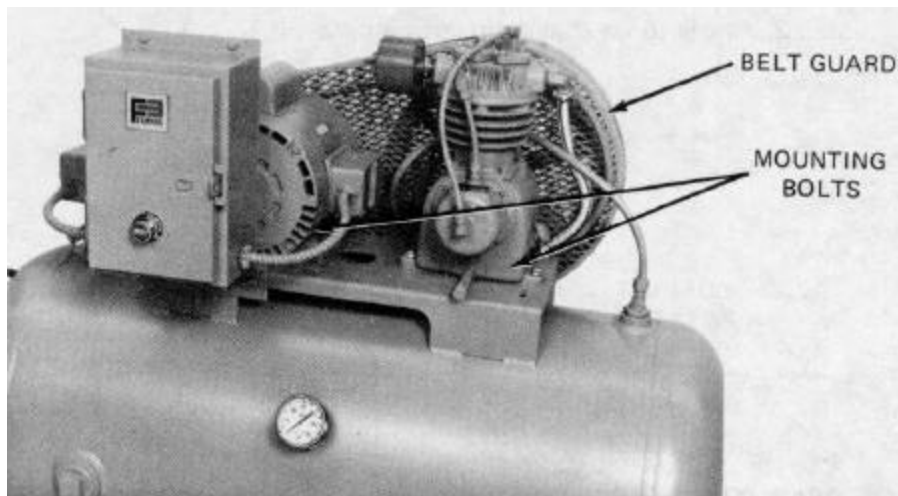
- a. OE-30 should be used. Change oil if too light.
- b. Notify organizational maintenance if oil change does not help.

Step 2. Oil rings of new or rebuilt pump may take some time to seat in cylinder walls.

- a. Oil consumption should drop once rings are seated.
- b. Notify organizational maintenance if oil consumption does not drop.

4. COMPRESSOR RUNS NOISY

Step 1. Check for loose mounting bolts.
Tighten bolts.



Step 2. Check for loose belt guard.

Tighten mounting screws.

3-4. TROUBLESHOOTING PROCEDURES (cont)

Troubleshooting

MALFUNCTION

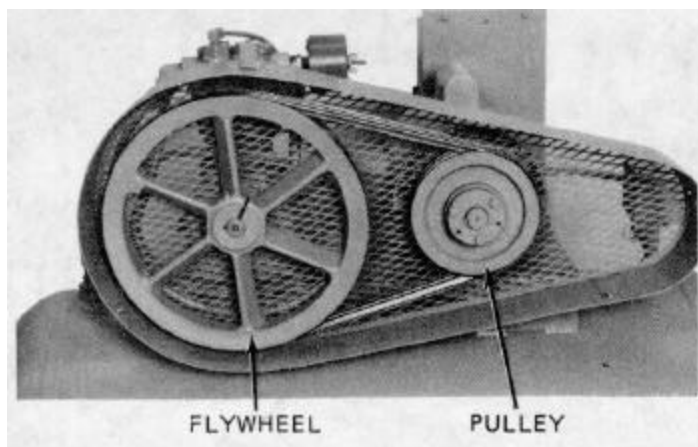
TEST OR INSPECTION

CORRECTIVE ACTION

COMPRESSOR UNIT

Step 3. Check for loose flywheel or pulley.

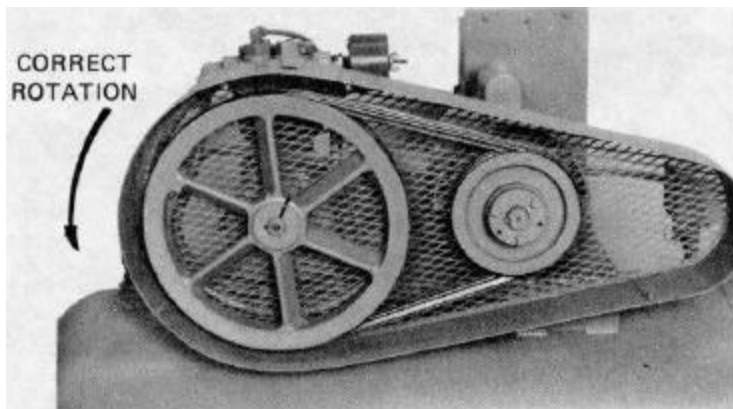
Tighten flywheel or pulley.



5. COMPRESSOR OVERHEATS

Step 1. Check to see if pump is running backwards. Correct rotation is counterclockwise facing flywheel.

Notify organizational maintenance.



Troubleshooting (cont)

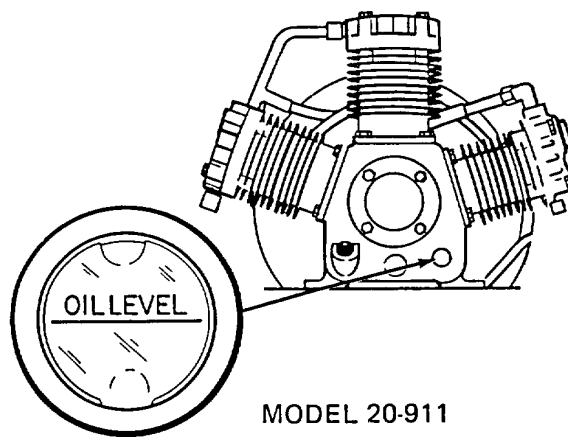
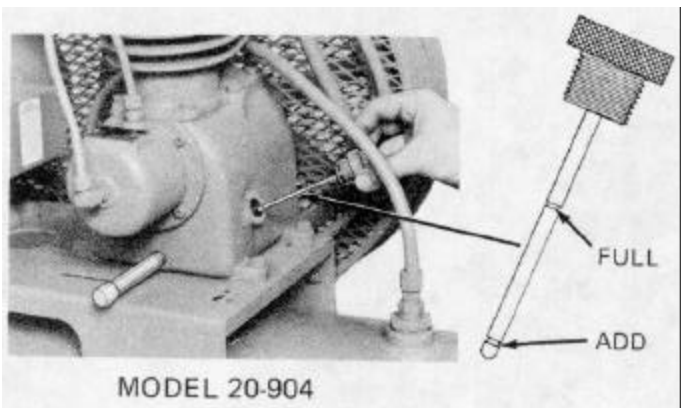
MALFUNCTION

TEST OR INSPECTION

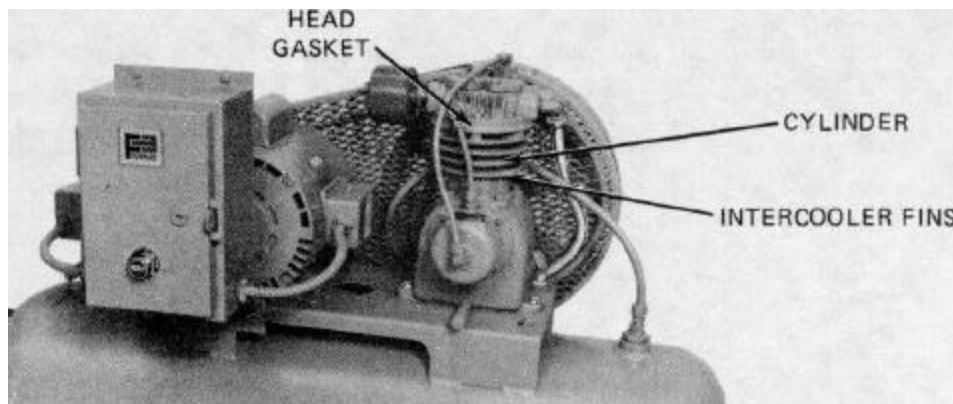
CORRECTIVE ACTION

COMPRESSOR UNIT

Step 2. Check for low oil level.
Add oil to FULL mark.



Step 3. Check for din in cylinder or intercooler fins.
Remove din.



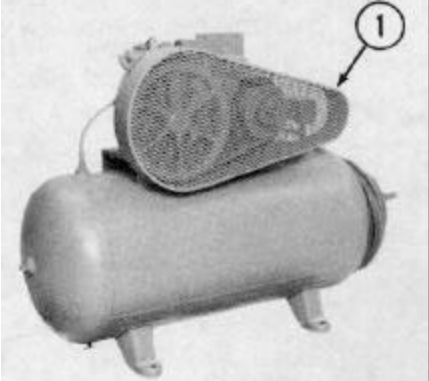
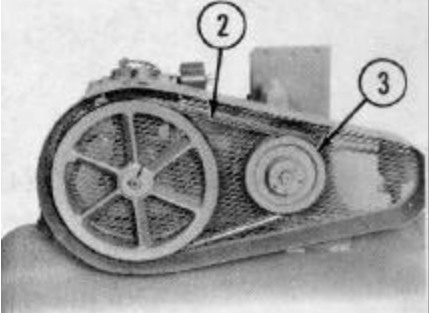
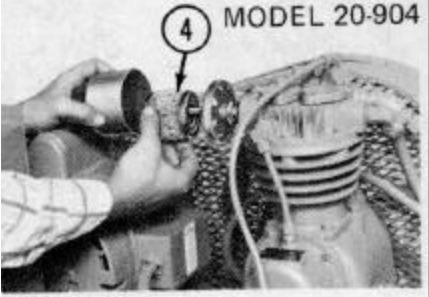
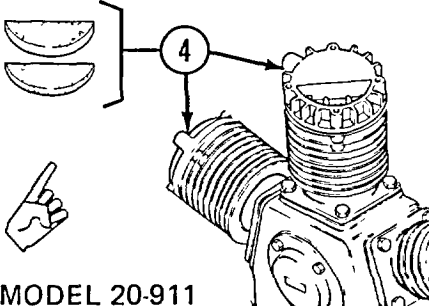
Step 4. Check for proper ventilation.
Move objects which prevent air circulation around compressor.

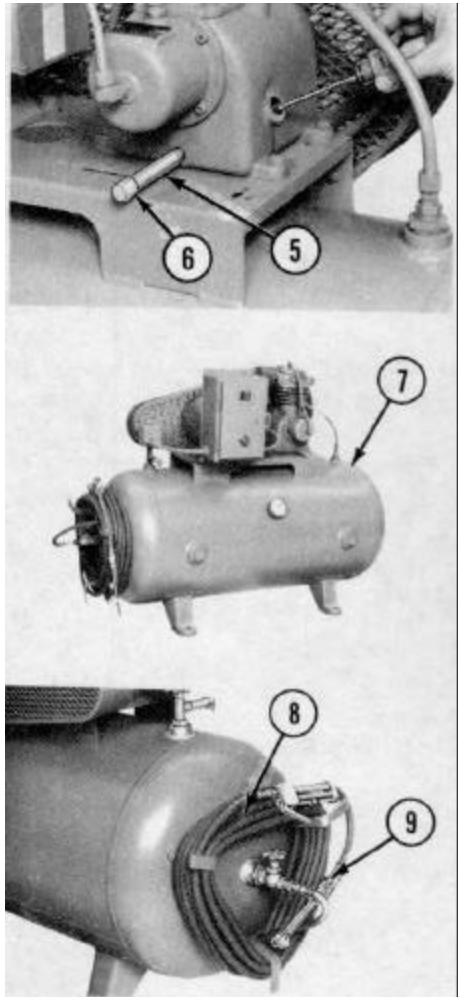
Step 5. Check for blown head gasket (air escaping between head and cylinder).
Notify organizational maintenance.

Section III. MAINTENANCE PROCEDURES

3-5. INTRODUCTION

This section covers maintenance procedures that the operator has to perform.

LOCATION 1 ITEM	ACTION	REMARKS
<p>3-6. OPERATORS MAINTENANCE</p> <p>1. Belt guard assembly (1)</p> <p>2. V-Belts (2)</p> <p>3. Drive pulley (3)</p> <p>4. Air cleaner element (4)</p>	<p>Inspect for loose mounting hardware. Tighten if necessary.</p> <p>WARNING Disconnect main power before inspecting belts and pulleys to avoid unexpected starting of the compressor.</p> <p>a. Inspect for cracks, proper tension and alinement.</p> <p>b. Notify organizational maintenance if belts are defective.</p> <p>a. Inspect for looseness.</p> <p>b. Tighten set screw if loose.</p> <p>a. Remove.</p> <p>b. Inspect for dirt.</p> <p>WARNING Air pressure must not exceed 30 psi when cleaning. Gloves or other skin protection must be used when working with cleaning solvents.</p> <p>c. Clean Model 20-904 with air Clean Model 20-911 with solvent</p> <p>d. Inspect for tears or holes.</p> <p>e. Replace element if defective.</p>	   

LOCATION 1 ITEM	ACTION	REMARKS
<p>3-6. OPERATOR'S MAINTENANCE (cont)</p> <p>5. Oil drain pipe (5) and cap (6)</p> <p>6. Air tank (7)</p> <p>7. Air hose (8)</p> <p>8. Inflator gage (9)</p>	<p>a. Inspect for leaks.</p> <p>b. Tighten if leaking.</p> <p>c. Replace if tightening does not stop leak.</p> <p>a. Inspect for rust or peeling paint.</p> <p>b. Remove rust and loose paint with wire brush.</p> <p>c. Repaint affected area.</p> <p>a. Inspect for cuts or cracking.</p> <p>b. Notify organizational maintenance if defective.</p> <p>a. Inspect for cuts, cracks, or defective gage.</p> <p>b. Notify organizational maintenance if defective.</p>	 <p>The 'REMARKS' column contains three photographs. The top photo shows a close-up of an oil drain pipe (5) and its cap (6) on a piece of equipment. The middle photo shows an air tank (7) with a rusted area on its side. The bottom photo shows an air hose (8) and an inflator gage (9) attached to a tank.</p>

CHAPTER 4

TECHNICAL PRINCIPLES OF OPERATION

4-1. CHAPTER OVERVIEW

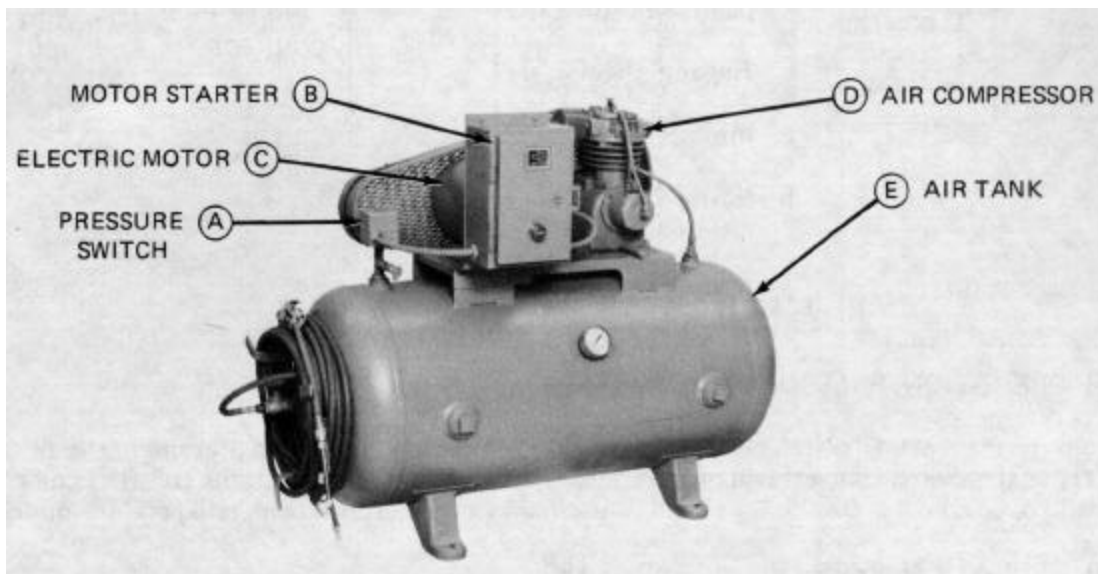
This chapter contains a description of how the air compressor works.

Section I describes the operation of the whole system. Section II describes the operation of the individual components.

Section I. AIR COMPRESSOR SET

4-2. AIR COMPRESSOR SET FUNCTION

- A **PRESSURE SWITCH.** The switch is wired in series with the motor. When pressure in the tank drops below 160 psi, the switch closes and starts the motor. When pressure in the air tank rises above 180 psi, the switch opens and stops the motor. The switch on the Model 20-911 compressor also controls the unloading of the compressor.
- B **MOTOR STARTER.** The starter protects the motor from a current overload. Current overload causes the starter to break the circuit and stop the motor to prevent it from burning out.

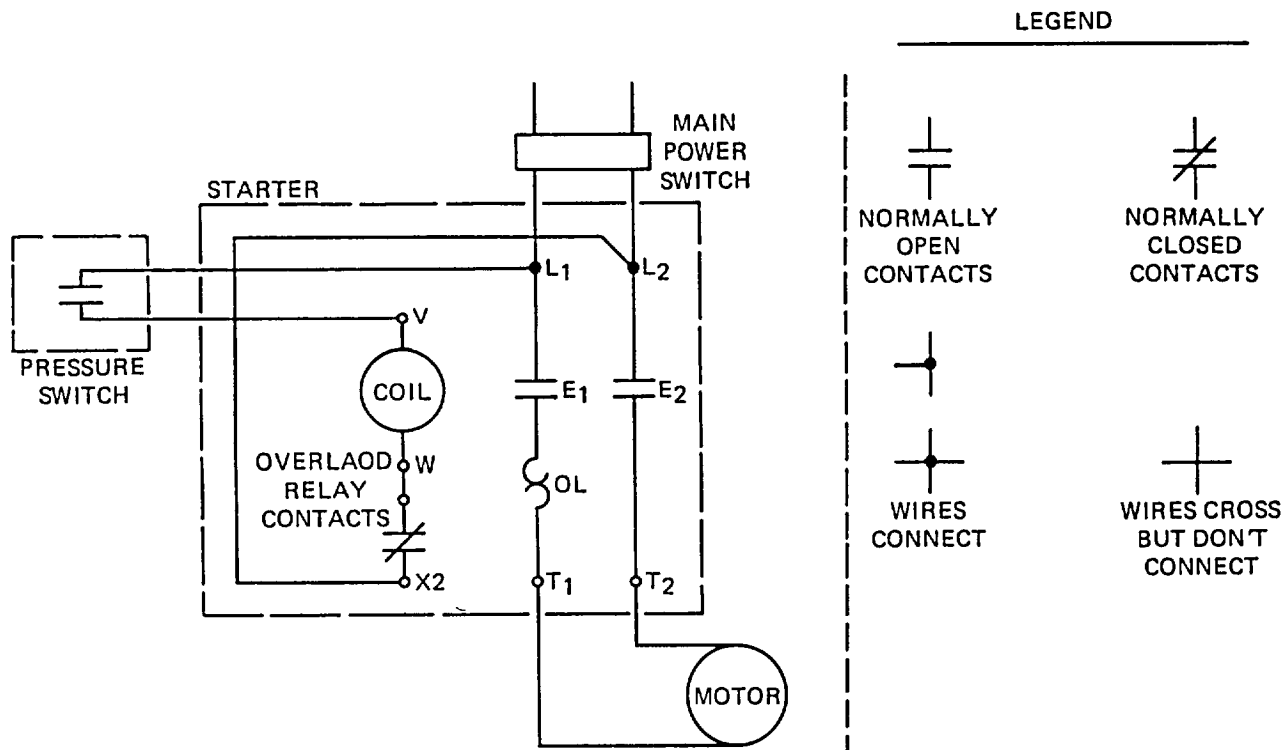


- C **ELECTRIC MOTOR.** The electric motor drives the air compressor D. An electric motor has the advantage of being easily turned on and off so that the compressor does not have to be run when no air is being drawn from the air tank E.
- D **AIR COMPRESSOR.** The air compressor compresses the air by means of pistons. Its operation is similar to a gasoline engine except that the power to drive the pistons is supplied by the electric motor.
- E **AIR TANK.** The air tank acts as a reservoir for the compressed air. It also dampens pressure fluctuations which you would get if you took the compressed air directly from the air compressor.

Section II. COMPONENT FUNCTION

4-3. ELECTRIC MOTOR CONTROLS

The electric motor controls consist of the pressure switch and the motor starter. These controls make the operation of the air compressor fully automatic.



ELECTRIC MOTOR CONTROLS SCHEMATIC

NORMAL OPERATION, PRESSURE BELOW 160 PSI

Power from the main power switch comes into the starter at L₁ and L₂. If the pressure in the air tank is below 160 psi, the switch contacts will be closed. Current will then go through the coil. The coil then pulls the normally open contacts E₁ and E₂ closed. The circuit to the motor is completed and the motor starts.

NORMAL OPERATION, PRESSURE ABOVE 180 PSI

When pressure goes above 180 psi the contacts of the pressure switch open and stop the current through the coil. Contacts E₁ and E₂ open and the motor stops.

OVERLOAD CONDITION

If the motor draws too much current, overload relay OL melts and the normally closed contacts in series with the coil open up. This tops the current through the coil and contacts E₁ and E₂ open. This stops the motor and prevents it from burning out. The relay has to be manually reset before the motor can be started again.

4-4. AIR COMPRESSOR

The air compressor is a 2 stage air cooled type with a centrifugal unloader on Model 20-904, and a pressure switch unloader on Model 20-911.

AIR COMPRESSOR

The compression cycle starts with the low pressure piston A at the top of its stroke.

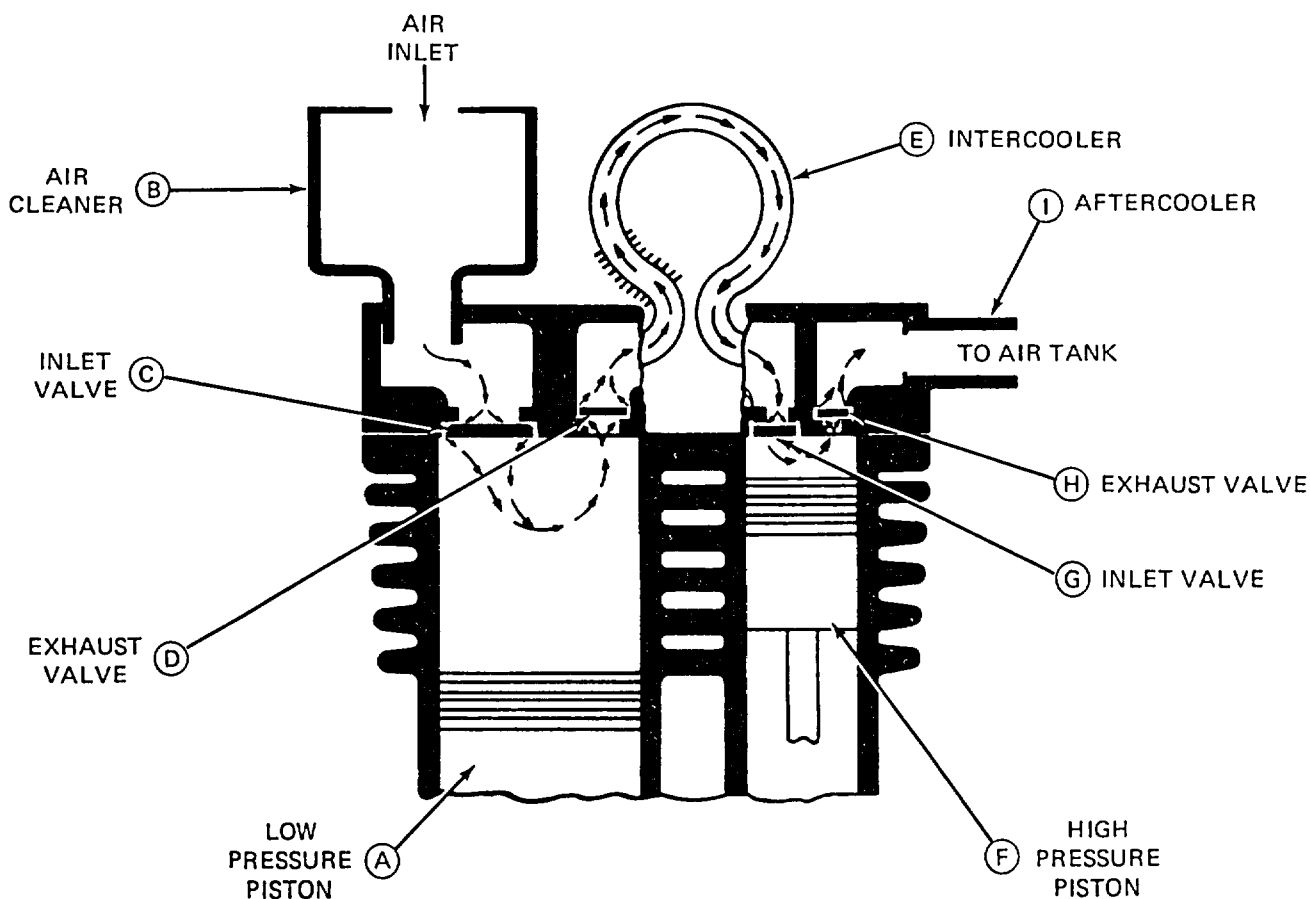
When the piston moves down, it draws air through the air cleaner B and inlet valve C into the cylinder. The air cleaner keeps dirt out of the compressor.

On the upstroke, inlet valve C closes and the low pressure piston A pushes air out into the intercooler E through the exhaust valve D.

Compressing the air heats it up. The intercooler E gets rid of some of that heat before passing the air on to the high pressure stage.

The high pressure stage works the same as the low pressure stage except that the high pressure piston F goes up when the low pressure piston A goes down. This way, the low pressure piston is drawing air in while the high pressure piston is pushing air out.

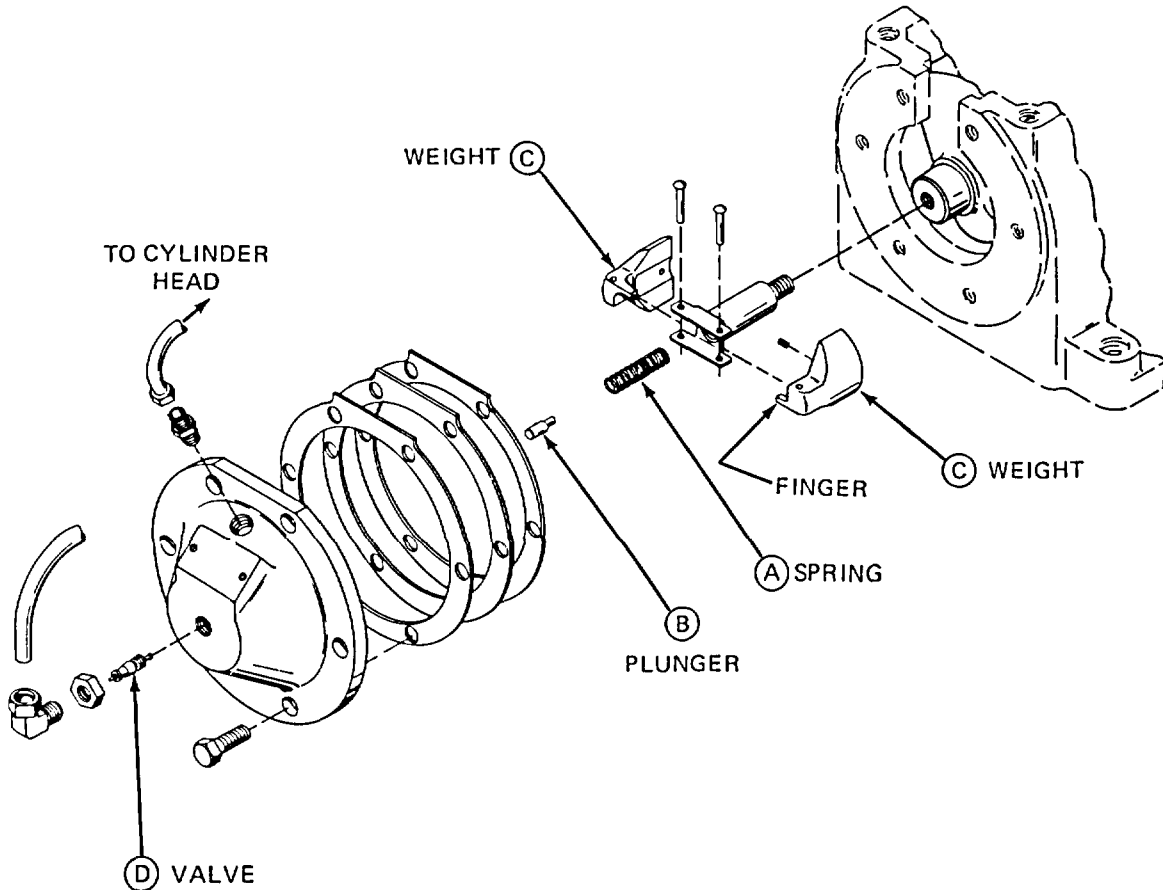
Compressed air from the high pressure stage goes to the air tank through the aftercooler. The aftercooler gets rid of some more of the heat generated by compression of the air.



4-4. AIR COMPRESSOR (cont)

CENTRIFUGAL UNLOADER (MODEL 20-904)

The centrifugal unloader releases pressure from the high pressure cylinder of the compressor until the electric motor is running close to full speed.



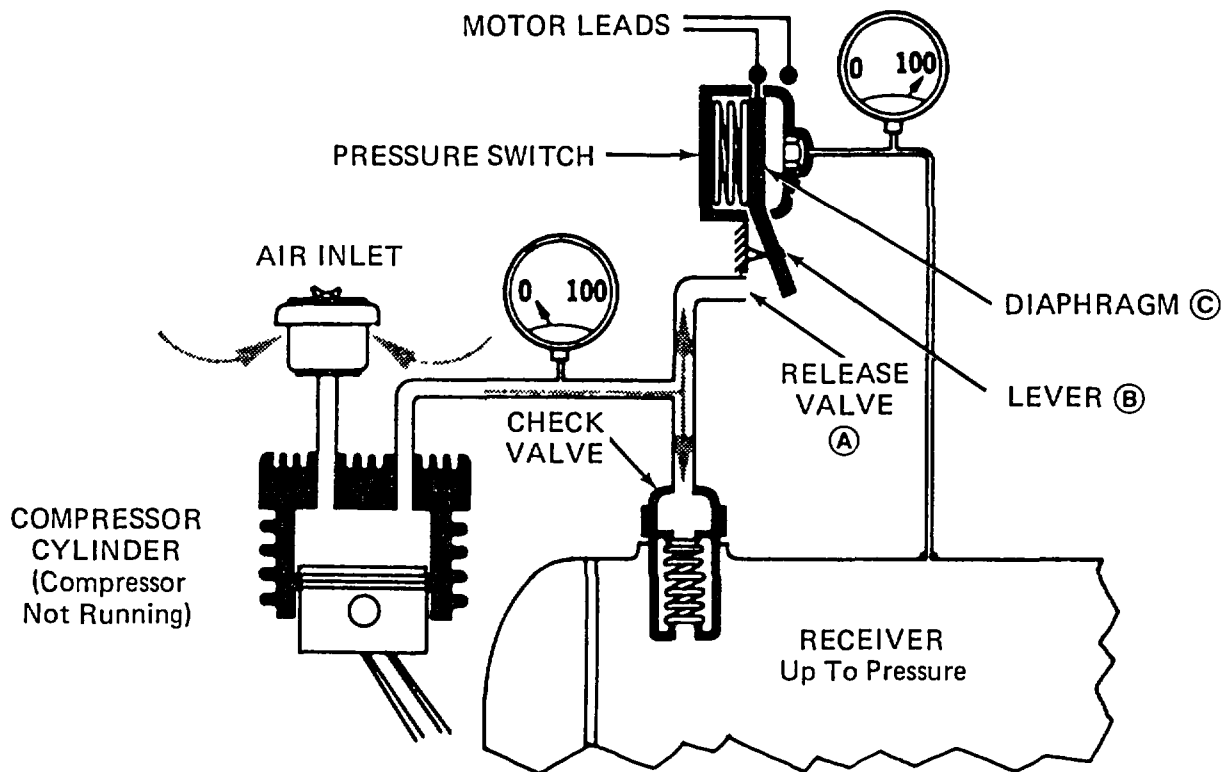
The electric motor draws more current when it is first starting up than when it is running full speed. It also draws more current when it works against a load such as compressing air as when it is running without a load. The unloader prevents big current surges in the motor by unloading it during start up.

Here is how the unloader works: When the compressor is standing still or rotating at a low speed the fingers on the weights C push in on plunger B.

The plunger pushes on valve D and causes it to release the pressure from the cylinder head. When the compressor reaches normal speed, the centrifugal force causes the weights C to pull outward. This takes the pressure off the plunger B, the valve D closes and the compressor builds up pressure.

PRESSURE SWITCH UNLOADER (MODEL 20-911)

The pressure switch unloader releases pressure from the high pressure cylinder of the compressor when the electric motor stops.



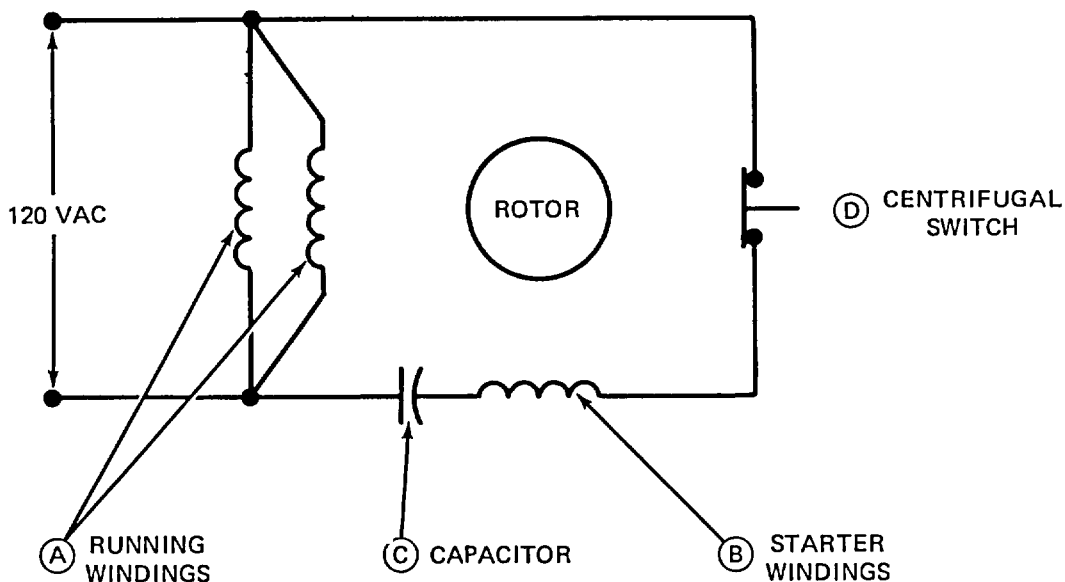
The electric motor draws more current when it is first starting up than when it is running at full speed. It also draws more current when it works against a load such as compressing air as when it is running without a load. The unloader prevents big current surges in the motor by unloading the compressor when the motor is stopped and during the first few cycles of start up.

Here is how the unloader works: Lever B is attached to pressure switch diaphragm C. At the same time the diaphragm moves to open switch contacts and stop the motor, it also causes lever B to push open valve A and release pressure from the cylinder head.

When the pressure in the tank falls, the diaphragm C moves in the opposite direction closing switch contacts starting the electric motor and at the same time causes lever B to close valve A and the compressor builds up pressure.

4-5. ELECTRIC MOTOR

The electric motor is a single phase capacitor start induction motor.



ELECTRIC MOTOR SCHEMATIC

The running and starter windings A and B make up the stator or stationary windings of the motor. The rotor also contains a set of windings which have no external connections.

120 VAC comes into the running windings which make up the stator or stationary part of the motor. The alternating current in the running windings sets up a magnetic field. This field induces a current in the rotor which sets up a magnetic field opposite to the field in the running windings.

The two opposite fields attract each other and the rotor does not turn except if it is given an initial push. This initial push comes from the starter windings B and the capacitor C.

The capacitor C causes the current in the starter winding to lead the applied voltage. The shift in phase starts the rotor spinning.

Once the rotor is getting close to full speed, the centrifugal switch D opens up. This stops the current through the starter windings which are made of finer wire and can't stand up to continuous operation.

CHAPTER 5

COMPRESSOR UNIT MAINTENANCE INSTRUCTIONS

5-1. CHAPTER OVERVIEW

This chapter contains maintenance information applicable to the compressor unit as a whole.

Section I. REPAIR PARTS, SPECIAL TOOLS, TMDE AND SUPPORT EQUIPMENT

5-2. COMMON TOOLS AND EQUIPMENT

For repair of the compressor unit you will need the following common tools

Nomenclature	National/NATO Stock Number
<ul style="list-style-type: none"> • Tool Kit, General Mechanic, Automotive 	5180-00-177-7033
<ul style="list-style-type: none"> • Shop Set, Automotive Repair, Field Maintenance, Basic 	4910-00-754-4705
<ul style="list-style-type: none"> • Shop Set, Machine: Field Maintenance, Heavy 	3470-00-754-0738
<ul style="list-style-type: none"> • Shop Equipment, Automotive Maintenance and Repair: Organization, Common NO1 	4910-00-754-4654

5-3. SPECIAL TOOLS

Seat tool 16869 (53239) and retainer tool 16870 (53239) are required for assembly and disassembly of the compressor cylinder head.

5-4. SPARES AND REPAIR PARTS

Spares and repair parts are listed and illustrated in the repair parts and special tools list covering organizational DS and GS maintenance for this equipment (TM 5-4310-362-24P).

Section II. SERVICE AND RECEIPT

5-5. SITE AND SHELTER REQUIREMENTS

The 20-904 and 20-911 air compressor units were designed for permanent installation in a sheltered environment.

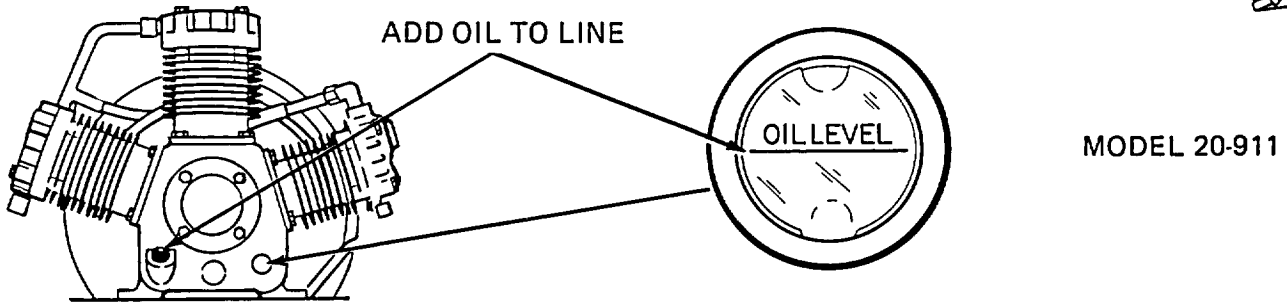
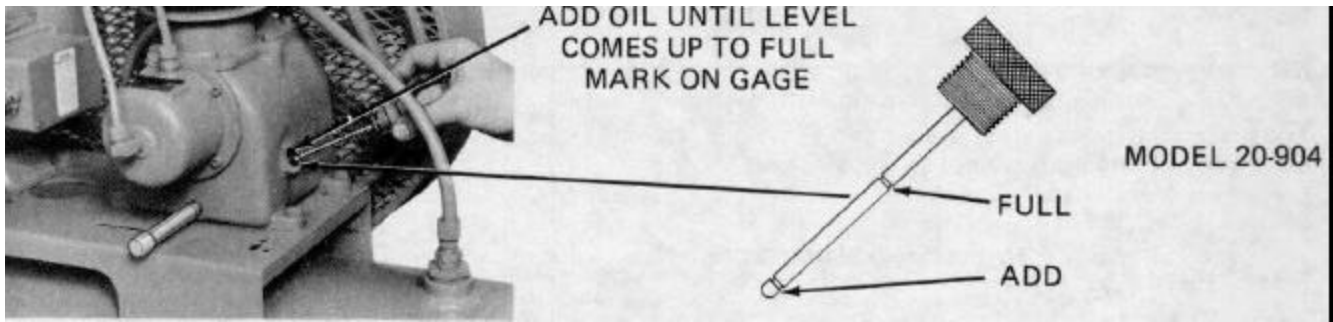
Protect the compressor from water, excessive dirt and corrosive atmospheres.

Install the compressor in an area that receives adequate ventilation to prevent it from overheating.

Locate the compressor away from work areas and areas frequently traveled, preferably outside of the maintenance building. A special noise reduction enclosure may be necessary.

5-6. SERVICE UPON RECEIPT

The compressor is shipped without oil in the crankcase. Before start-up, fill the crankcase with oil to the full mark on the level gage. 1-2/3 pints (.8 l) for Model 20-904; 1 pint (.5 l) for Model 20-911.



Air Temperature	Oil Type
Above 32°F (0°C)	OE/HDO 30
0°F to 40°F (-18°C to 4°C)	OE/HDO 10

Before start-up, turn the flywheel over a few revolutions by hand to make sure that there aren't any obstructions anywhere in the unit.

5-7. INSTALLATION INSTRUCTIONS

Bolt the compressor unit securely and evenly to a level barn. Where the base isn't completely level use shims under the feet. Do not eliminate space between the base and a foot by drawing the foot down. This would put strain on the unit.

Secure mounting of the base is necessary to minimize vibration.

Leave sufficient space around the compressor so that it is accessible from all sides for maintenance. Mount the compressor with the pulley side toward the wall and at least 6 inches (18 cm) away from it.

Connect the motor starter to a 120 VAC single phase power source. The source must have a separate on off switch for the compressor.

Section III. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS)

5-8. INTRODUCTION

The preventive maintenance checks and services listed in the PMCS table cover procedures to be performed by organizational maintenance personnel.

5-9. PMCS TABLE

Explanation of the columns

- Item Number. Checks and services are numbered in sequence. This column shall be used as source of item numbers for the TM Number Column on DA Form 2404, Equipment Inspection and Maintenance Worksheet, in recording results of PMCS.
- Item To Be Inspected. This column gives the name of the item to be inspected or serviced.
- Procedures. This column lists inspection procedures.
- Equipment Will Be Reported Not Ready/Available If: This column contains the criteria which will cause the equipment to be classified as not ready or not available because of inability to perform its primary mission.

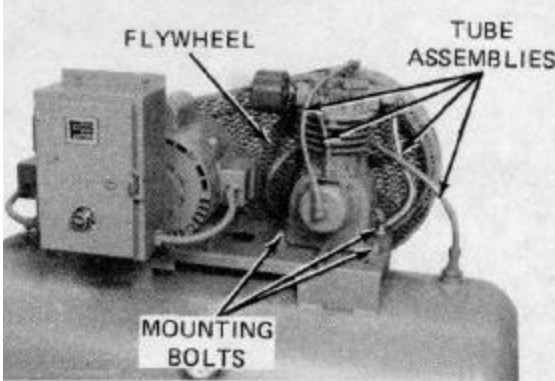
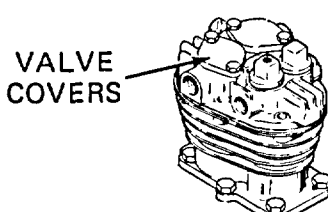
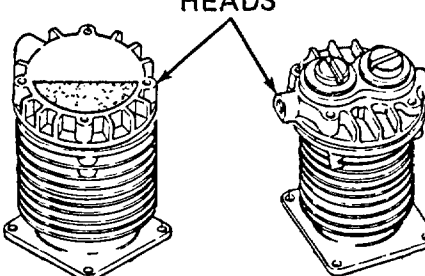
Preventive Maintenance Checks and Services

Legend

W-Weekly

M-Monthly

Q-Quarterly

Item No.	Interval			Item To Be Inspected	Procedures	Equipment Will Be Reported Not Ready/ Available If:
	W	M	Q			
1	•			Compressor Assembly	<p>Check mounting bolts for tightness.</p> 	
2	•			Flywheel	Check for tightness of mounting.	
3	•			Tube Assemblies	Check tube fittings for tightness.	
4			•	Intake and exhaust valves	<p>MODEL 20-904</p>  <p>MODEL 20-911</p>  <p>a. Remove valve covers or heads. b. Remove valves.</p>	

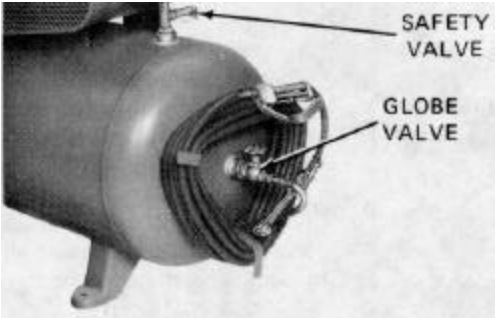
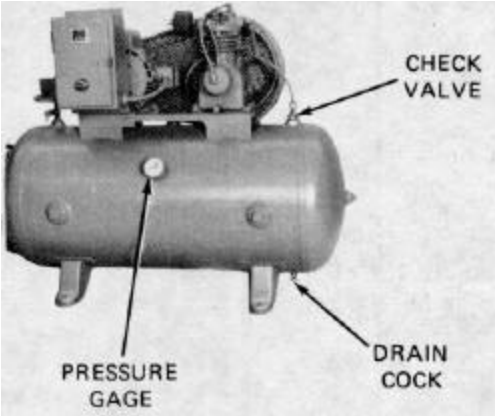
Preventive Maintenance Checks and Services (cont)

Legend

W-Weekly

M-Monthly

Q-Quarterly

Item No.	Interval			Item To Be Inspected	Procedures	Equipment Will Be Reported Not Ready/ Available If:
	W	M	Q			
6	•			Safety Valve	<p>Pull ring to see that valve reseats.</p> 	Valve does not reseat.
7	•			Globe Valve	Inspect for leaks.	
8	•			Check Valve	Check for leaks.	
9	•			Pressure Gage	<p>a. Check for leaks. b. Check for cracked glass.</p>	
10	•			Drain Cock	<p>Check for leaks.</p> 	

CHAPTER 6

ELECTRIC MOTOR CONTROLS

6-1. CHAPTER OVERVIEW

This chapter covers maintenance of the electric motor controls. The controls consist of:

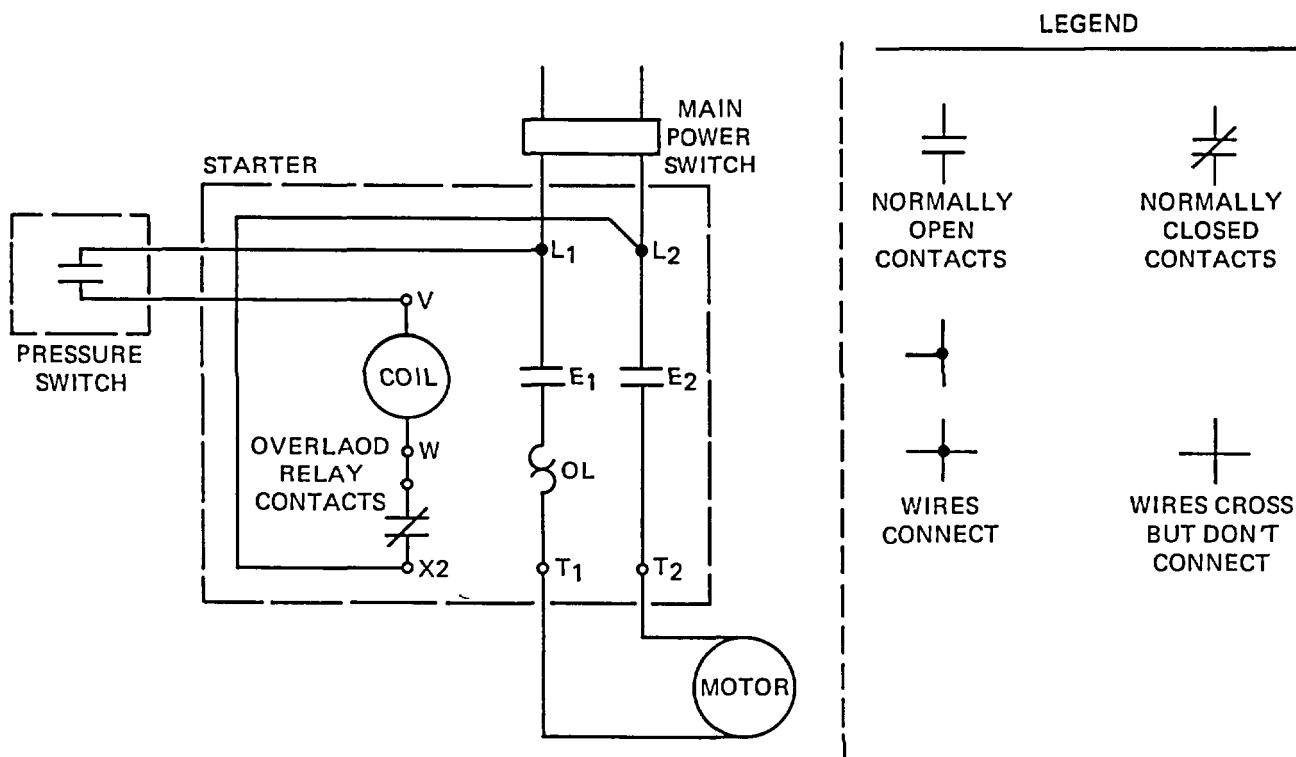
- Pressure Switch
- Motor Starter and Wiring

Section I covers troubleshooting of the whole system. Section II covers maintenance of the motor starter. Section III covers maintenance of the pressure switch.

Section I. TROUBLESHOOTING PROCEDURES

6-2. GENERAL

The schematic of the electric motor controls shows internal wiring of the pressure switch and the starter as well as external wiring.



ELECTRIC MOTOR CONTROLS SCHEMATIC

Problems in the motor control circuitry will usually cause the motor to stop running.

Note that there has to be current through the coil for contacts E₁ and E₂ to close. This means that the motor won't run if the coil circuit is bad even though the rest of the circuit is good.

Overload conditions will cause the overload relay contact to open. Overloading may be caused by shorts in the motor or by a blockage in the compressor. Overload conditions must be removed before the compressor can be put back in operation. Otherwise, the relay will just open up again.

Once overload conditions have been eliminated, the RESET button on the motor control box can be pushed to start the compressor back up.

6-3. TROUBLESHOOTING CHART

- **MALFUNCTION.** Malfunctions listed are the ones most likely to happen. Not all possible malfunctions can be foreseen and listed.
- **TEST OR INSPECTION.** Tests or inspections are listed to help you find the cause of the malfunction. The tests that are easiest to do are listed first. The tests that are hardest to do are listed last.
- **CORRECTIVE ACTION.** Corrective actions are listed to help you eliminate the malfunction. Where the corrective action is too complicated to be listed in full detail, the paragraph number of the detailed procedure is given in parentheses.

Troubleshooting

MALFUNCTION

TEST OR INSPECTION

CORRECTIVE ACTION

1. ELECTRIC MOTOR WON'T START

Step 1. Check to see that main power switch is on.
Turn on power

Step 2. Press RESET button on electric starter.
Reset button will start motor only if relay was tripped by momentary overload.

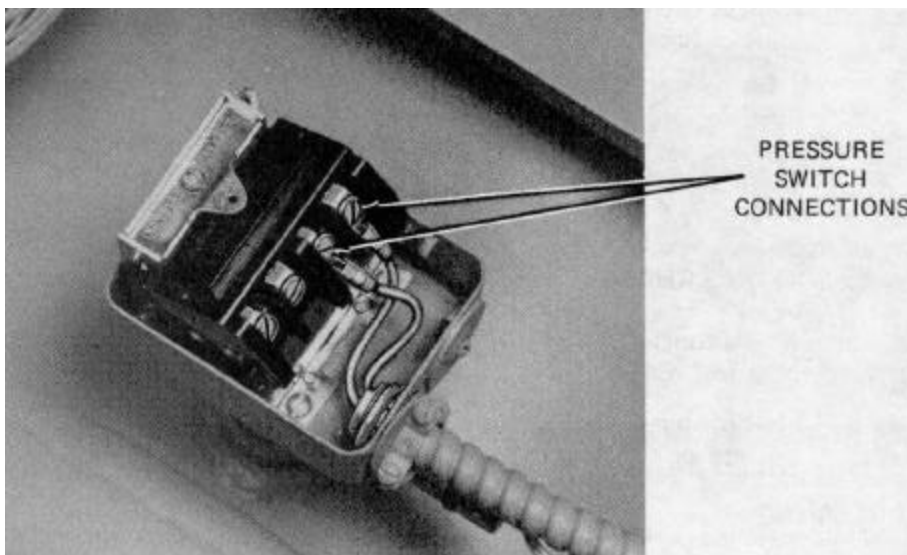
Troubleshooting

MALFUNCTION

TEST OR INSPECTION

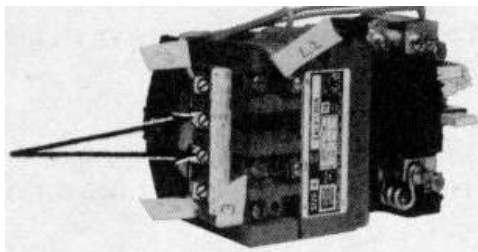
CORRECTIVE ACTION

- Step 3. Check pressure switch connections for tightness.
Tighten connections.



- Step 4. Check if pressure switch contacts are open at pressures below 160 psi.
Replace switch if contacts don't close (6-13).
- Step 5. Check motor starter connections for looseness
Tighten.
- Step 6. Check motor controls for faulty wiring.
Wire controls correctly. (6-9 and 6-13).
- Step 7. Check for bad motor control coil.
Replace coil.

CHECK FOR CONTINUITY
BETWEEN THESE
TERMINALS OF THE COIL



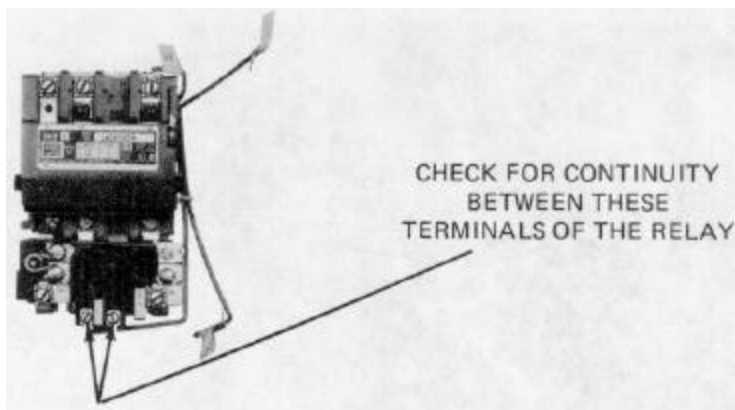
Troubleshooting (cont)

MALFUNCTION

TEST OR INSPECTION

CORRECTIVE ACTION

- Step 8. Check for bad motor control relay.
Replace relay.



- Step 9. Check for burned motor control contacts.
Replace contacts.

2. LOW AIR PRESSURE

- Step 1. Check to see if compressor cuts out at low pressure.
Adjust pressure switch. (6-14)

Section II. MOTOR STARTER & BRACKET MAINTENANCE INSTRUCTIONS

6-4. MAINTENANCE SUMMARY

This task covers:

- a. Removal.
- b. Disassembly.
- c. Cleaning.
- d. Inspection.
- e. Repair.
- f. Assembly.
- g. Installation

INITIAL SETUP

Personnel Required

1

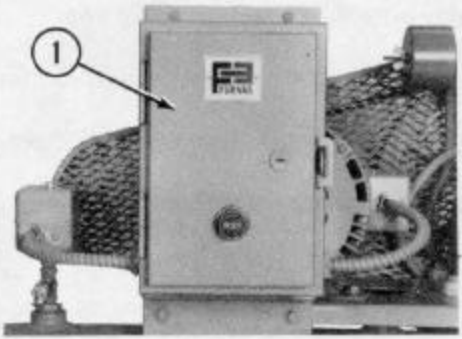
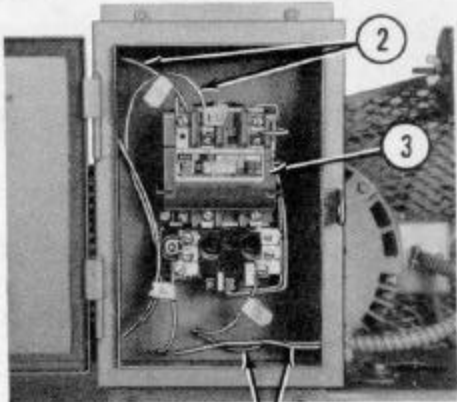



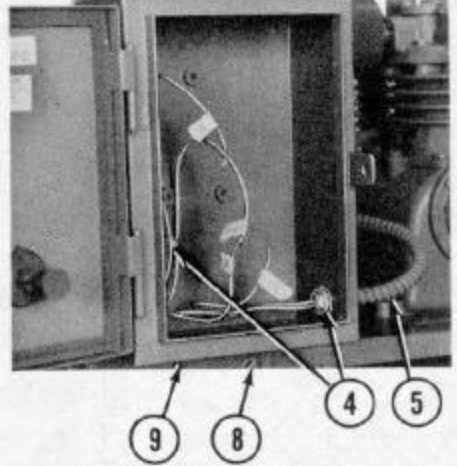
General Safety Instructions

Disconnect electrical power before beginning maintenance procedure.

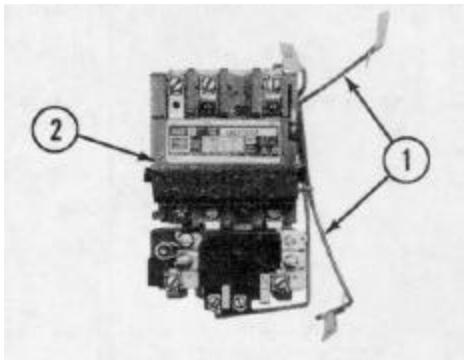
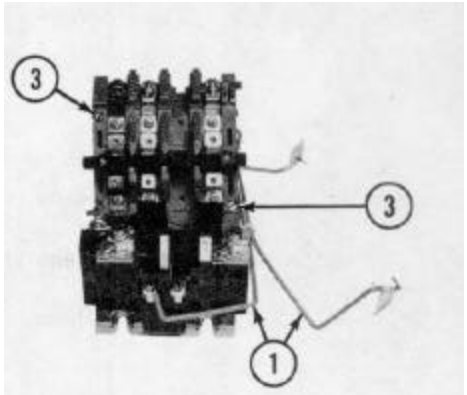
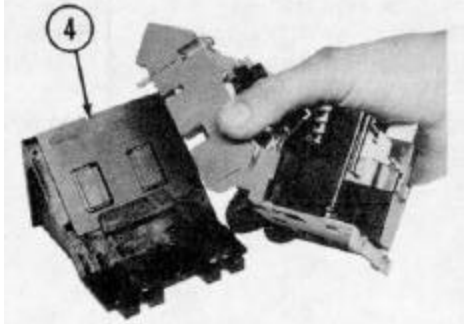
TASK SUMMARY

No.	Task	Ref.	Remarks
1	Disconnect main power	6-5	
2	Disconnect wiring from motor starter	6-5	
3	Remove motor starter from enclosure	6-5	
4	Disassemble motor starter	6-6	Disassemble motor starter only as far as necessary to repair a problem.
5	Clean, inspect and replace starter components as necessary	6-7	
6	Assemble starter	6-8	
7	Install starter	6-9	
8	Install starter in enclosure	6-9	
9	Connect external wiring to starter	6-9	

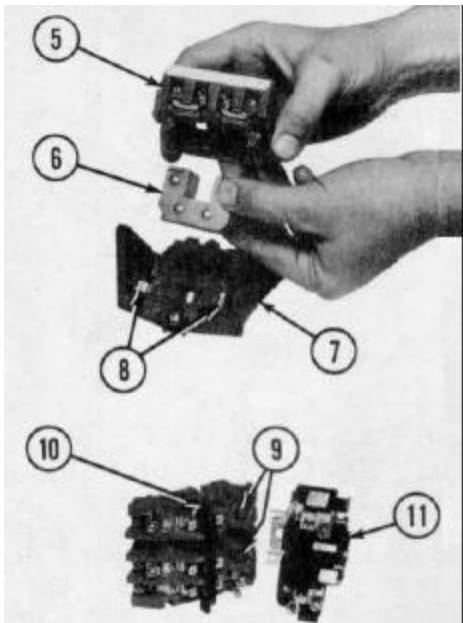
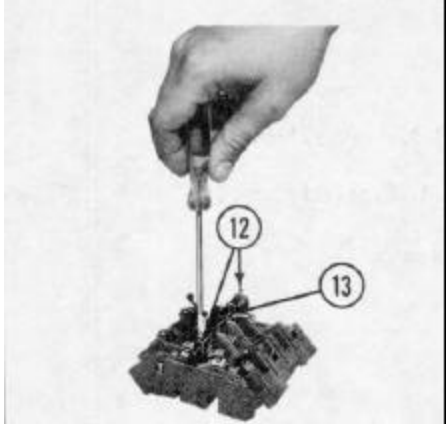
MOTOR STARTER & BRACKET

LOCATION/ITEM	ACTION	REMARKS
6-5. REMOVAL		
1. Main power	Disconnect	
2. Enclosure cover (1)	Open	
3. Wires (2) (2 from starter switch and 2 from motor)	Tag	<p>Wires must be tagged so they can be re-connected to the proper terminals.</p>
4. Wires (2)	Disconnect	
5. Motor starter (3)	Remove	
6. Conduit locknuts (4)	Remove	
7. Conduit (5) & wires (2)	Remove	
8. 4 Screws, nuts & washers (6)	Remove	
9. Enclosure (7)	Remove	
10. 2 Screws (8), nuts and lockwashers	Remove	
11. Starter mounting bracket (9)	Remove	
		

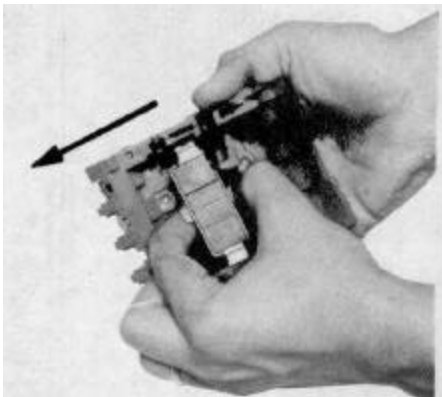
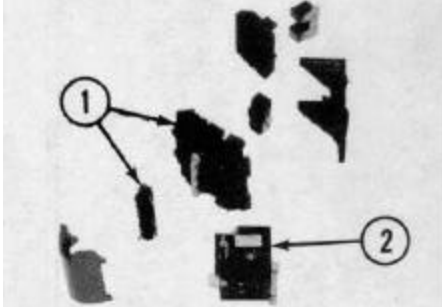
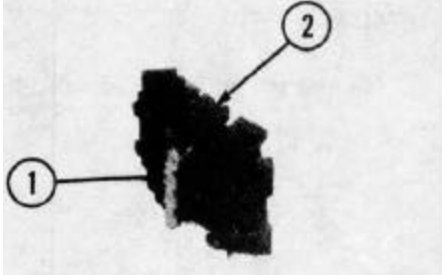
MOTOR STARTER

LOCATION/ITEM	ACTION	REMARKS
<p>6-6. DISASSEMBLY</p> <p>1. Wires (1)</p> <p>2. Wires (1)</p> <p>3. Cover (2)</p>	<p>Tag</p> <p>Disconnect</p> <p>Remove</p>	 <p>To make sure wires get reconnected to the proper terminals.</p>
<p>4. 2 screws (3)</p>	<p>Remove</p>	
<p>5. Base, coil and magnet (4)</p>	<p>Separate from starter as a unit.</p>	

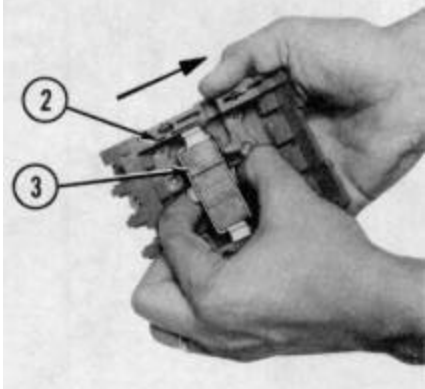
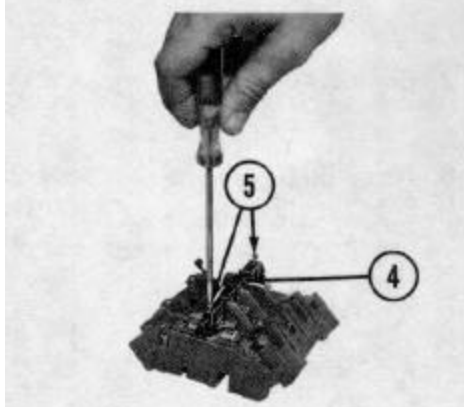

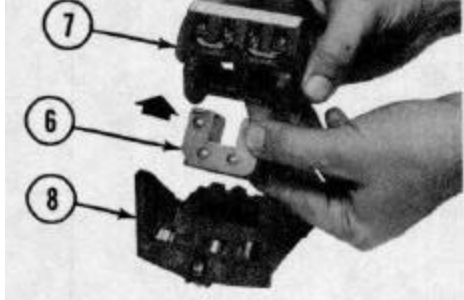
MOTOR STARTER (cont)

LOCATION/ITEM	ACTION	REMARKS
6. Coil (5), magnet (6)	Separate from base (7) by pulling back on spring clip (8).	
7. 2 screws (9)	Loosen	
8. Contact board (10) and relay (11)	Separate	<p>Relay is not repairable and must not be disassembled</p>
9. 2 screws (12)	Remove	
10. Cross arm and contacts (13)	Remove from contact board.	

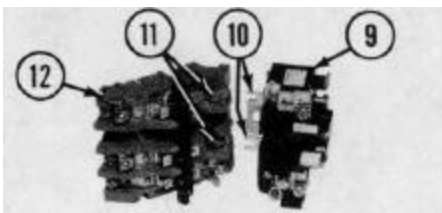
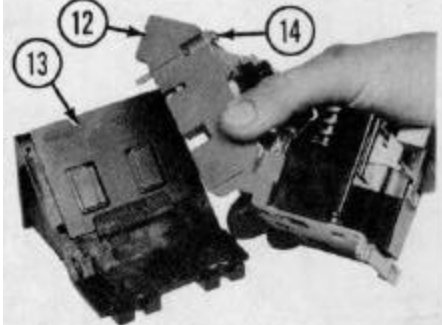
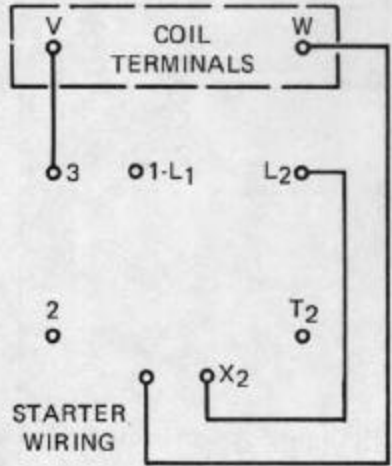
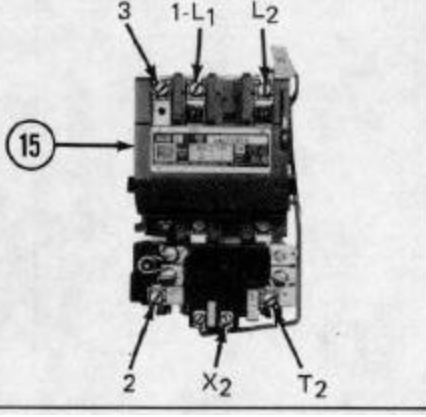
MOTOR STARTER (cont)

LOCATION/ITEM	ACTION	REMARKS
11. Spring clip	Press in and pull up on spring clip and at the same time pull in the direction of the arrow.	
<p>6-7. CLEANING, INSPECTION AND REPAIR</p>		
1. All non-metal components	a. Inspect for cracks. b. Replace if cracked.	
2. Contacts (1)	a. Inspect for pitting or burning. b. Replace if pitted or burned.	
3. Relay (2)	a. Inspect for cracks or evidence of burning. b. Replace if cracked or burned.	
<p>6-8. ASSEMBLY</p>		
1. Cross arm base (1)	Slide into contact board (2).	

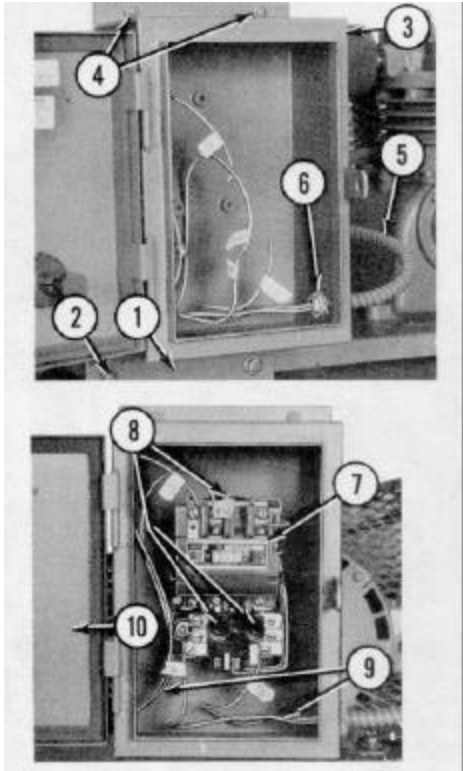
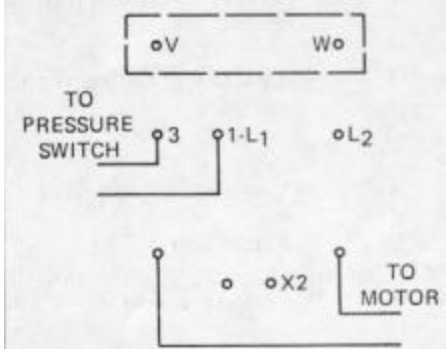
MOTOR STARTER (cont)

LOCATION/ITEM	ACTION	REMARKS
2. Armature (3)	a. Assemble with spring clip. b. Slide into contact board (2) in direction of arrow while pushing in on cross arm barn.	 <p>Cross arm base must be pushed in so armature can slide into slots in cross arm base</p>
3. Cross arm (4)	Attach to cross arm base with 2 screws (5).	
4. Magnet (6)	Slide into coil (7).	
5. Magnet (6) and coil (7)	Slide into base (8).	

MOTOR STARTER (cont)

LOCATION/ITEM	ACTION	REMARKS
6. Relay (9)	Assemble with contact board (12) so terminals (10) slide under 2 screws (11).	
7. 2 screws (11)	Tighten	
8. Contact board (12)	Assemble with base (13).	
9. 2 screws (14)	Tighten	
10. Wires	Install per tags (check diagram at right if not sure about wiring).	
11. Cover (15)	Install	
12. Terminal screws	Double check to make sure all of them are tight.	

MOTOR STARTER (cont)

LOCATION/ITEM	ACTION	REMARKS
<p>6-9. INSTALLATION</p> <p>1. Starter mounting bracket</p> <p>2. Starter enclosure (3)</p> <p>3. Conduits (5) and wires</p> <p>4. Starter (7)</p> <p>5. Wires (9)</p> <p>6. Door (10)</p> <p>7. Drain cock on bottom of air tank</p> <p>8. Main power</p>	<div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 0 auto;"> <p>WARNING</p> </div> <p>Voltages present in this equipment can cause injury or death.</p> <p>Make sure main power is disconnected before doing any work on electrical systems.</p> <p>Attach with 2 screws (2), washers, lockwashers and nuts.</p> <p>Attach to bracket (1) with 4 screws (4), washers, lockwashers and nuts.</p> <p>Attach to enclosure with conduit nut (6).</p> <p>Mount in enclosure with 2 screws (8).</p> <p>Attach to starter terminals per tags.</p> <p>Close</p> <p>a. Open b. Close when pressure is below 100 psi.</p> <p>Connect</p>	 <p>If unsure of how to wire the starter, see the diagram below</p>  <p>STARTER EXTERNAL WIRING</p> <p>NOTE V and W are coil terminals on Top of starter. All other terminals are on Front of starter.</p> <p>Motor should start up. If not, disconnect power and recheck wiring.</p>

Section III. PRESSURE SWITCH MAINTENANCE INSTRUCTIONS

6-10. MAINTENANCE SUMMARY

This task covers:

- a. Removal.
- b. Cleaning.
- c. Inspection
- d. Installation.
- e. Adjustment.

INITIAL SETUP

Personnel Required

1

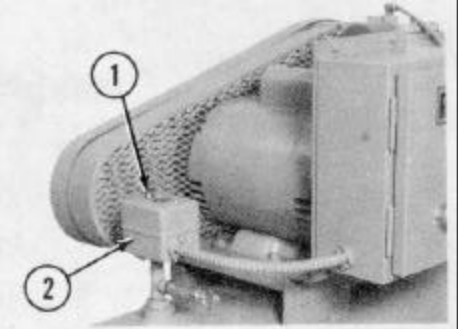
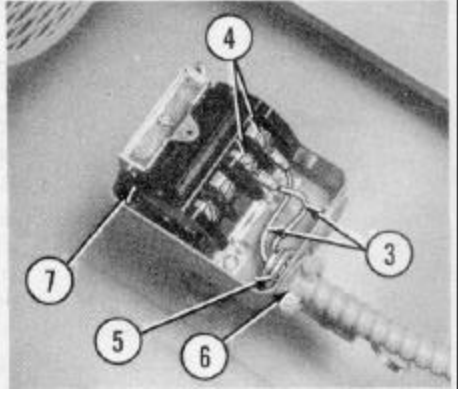
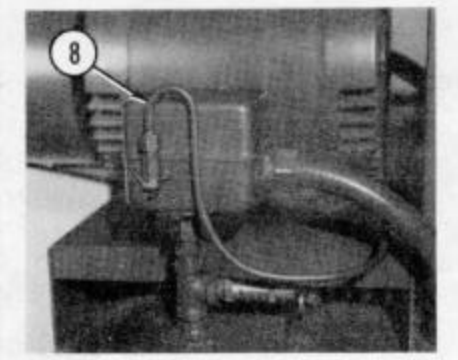
General Safety Instructions

Disconnect power before removing switch.


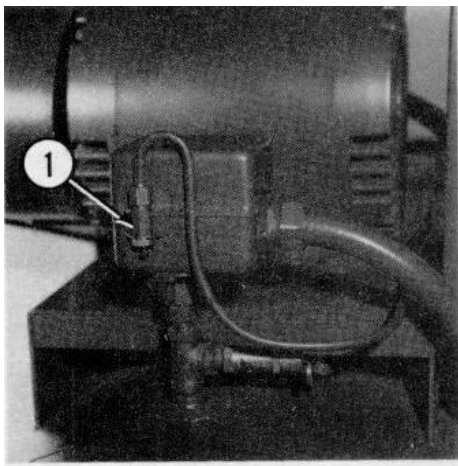
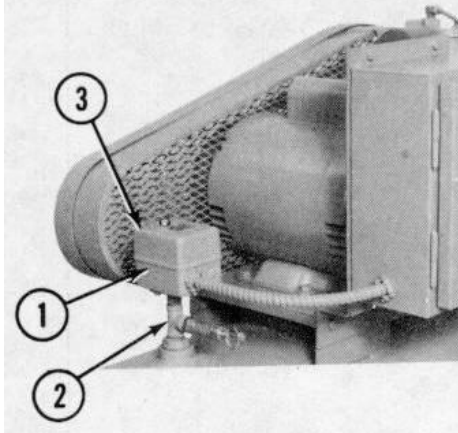
TASK SUMMARY

No.	Task	Ref.	Remarks
1	Disconnect main power	6-11	
2	Disconnect wiring from pressure switch	6-11	
3	Disconnect unloader tube	6-11	Model 20-911 only
4	Unscrew pressure switch	6-11	Pressure switch may be inspected while installed. Remove switch only if it is bad.
5	Clean and inspect switch	6-12	
6	Install switch	6-13	
7	Connect unloader tube	6-13	Model 20-911 only
8	Connect wiring	6-13	
9	Adjust cut-in pressure for 160 psi. Adjust cut-out pressure for 180 psi.	6-14	

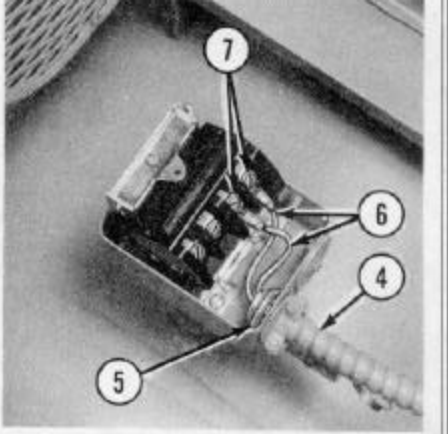
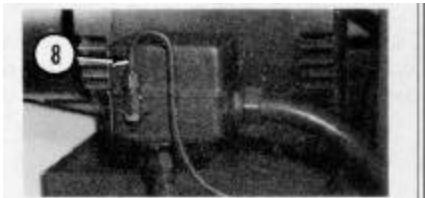
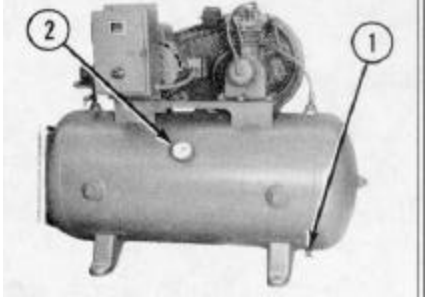

PRESSURE SWITCH

LOCATION/ITEM	ACTION	REMARKS
6-11. REMOVAL		
1. Main Power Switch	Turn OFF	
2. Screw (1)	Loosen	
3. Cover (2)	Lift off	
		
4. Wires (3)	Tag with masking tape. Label tags MOTOR and LINE.	Tag wires to make sure you connect Them to the right terminals on installations
5. 2 screws (4) connecting wires to switch terminals	Loosen	
6. Wires (3)	Disconnect from switch terminals.	
7. Connector locknut (5) (inside of switch)	Remove	
8. Conduit connector (6)	Remove	
9. Unloader tube (8)	Disconnect	
10. Pressure switch (7)	Unscrew by hand.	Model 20-911 only

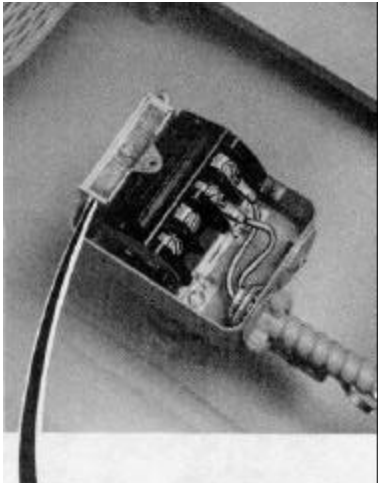
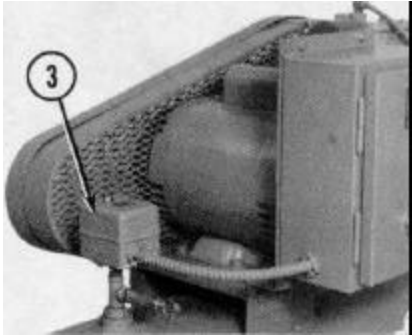
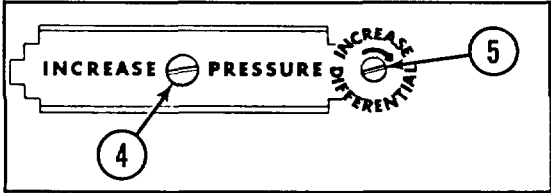
PRESSURE SWITCH (cont)

LOCATION/ITEM	ACTION	REMARKS
<p>6-12. CLEANING, INSPECTION AND REPAIR</p> <p>1. Pressure switch</p> <p>2. Switch contacts</p> <p>3. Unloader valve (1) (Model 20-911 only)</p>	<div style="border: 1px solid black; padding: 5px; text-align: center; margin-bottom: 10px;">WARNING</div> <p>Clean pressure switch with compressed air no greater than 30 psi.</p> <p>a. Remove loose dirt from inside of switch with brush or compressed air.</p> <p>b. Inspect for damaged threads on pipe connection.</p> <p>c. Replace if thread damage is bad enough to cause an air leak.</p> <p>a. Inspect for burning or excessive wear.</p> <p>b. Replace switch if contacts are badly worn.</p> <p>a. Inspect for leaks or sticky movement.</p> <p>b. Replace valve if leaky or movement sticky.</p>	 
<p>6-13. INSTALLATION</p> <p>1. Pressure switch (1)</p> <p>2. Cover (3)</p>	<div style="border: 1px solid black; padding: 5px; text-align: center; margin-bottom: 10px;">WARNING</div> <p>Voltages present in this equipment can cause injury or death.</p> <p>Disconnect main power switch before doing any work on this unit.</p> <p>Screw onto tee (2).</p> <p>Remove</p>	

PRESSURE SWITCH (cont)

LOCATION/ITEM	ACTION	REMARKS
3. Conduit (4)	Attach with conduit nut (5).	 <p>Compressor should start up if switch is Properly connected</p>  
4. Wires (6)	Attach to two right hand terminals. (7)	
5. Cover (3)	Replace	
6. Unloader tube (8) (Model 20-911 only)	Connect	
7. Drain cock on bottom of air tank	Open until pressure drops below 100 psi, then close.	
8. Main power	Connect	
6-14. PRESSURE ADJUSTMENT		
1. Drain cock (1)	<p>a. Open while watching pressure gage (2).</p> <p>b. Close while watching pressure gage (2)</p> <p style="text-align: center;">NOTE If cut-in pressure isn't 160 psi, or if cut-out pressure isn't 180 psi, proceed to the adjustment procedure below.</p>	

PRESSURE SWITCH (cont)

LOCATION/ITEM	ACTION	REMARKS																												
2. Main power 3. Pressure switch cover (3)	Disconnect Remove   																													
4. Pressure adjusting screw (4) and differential adjusting screw (5)	<table border="1" data-bbox="537 1150 1466 1434"> <thead> <tr> <th data-bbox="537 1150 867 1224">Turn Pressure Adjusting Screw</th> <th data-bbox="867 1150 1117 1224">Turn Differential Adjusting Screw</th> <th data-bbox="1117 1150 1289 1224">Cut-In Pressure</th> <th data-bbox="1289 1150 1466 1224">Cut-Out Pressure</th> </tr> </thead> <tbody> <tr> <td data-bbox="537 1224 867 1262">Clockwise</td> <td data-bbox="867 1224 1117 1262">—</td> <td data-bbox="1117 1224 1289 1262">Increase</td> <td data-bbox="1289 1224 1466 1262">Increase</td> </tr> <tr> <td data-bbox="537 1262 867 1299">Counterclockwise</td> <td data-bbox="867 1262 1117 1299">—</td> <td data-bbox="1117 1262 1289 1299">Decrease</td> <td data-bbox="1289 1262 1466 1299">Decrease</td> </tr> <tr> <td data-bbox="537 1299 867 1337">—</td> <td data-bbox="867 1299 1117 1337">Clockwise</td> <td data-bbox="1117 1299 1289 1337">No change</td> <td data-bbox="1289 1299 1466 1337">Increase</td> </tr> <tr> <td data-bbox="537 1337 867 1375">—</td> <td data-bbox="867 1337 1117 1375">Counterclockwise</td> <td data-bbox="1117 1337 1289 1375">No change</td> <td data-bbox="1289 1337 1466 1375">Decrease</td> </tr> <tr> <td data-bbox="537 1375 867 1413">Clockwise</td> <td data-bbox="867 1375 1117 1413">Counterclockwise</td> <td data-bbox="1117 1375 1289 1413">Increase</td> <td data-bbox="1289 1375 1466 1413">No change</td> </tr> <tr> <td data-bbox="537 1413 867 1434">Counterclockwise</td> <td data-bbox="867 1413 1117 1434">Clockwise</td> <td data-bbox="1117 1413 1289 1434">Decrease</td> <td data-bbox="1289 1413 1466 1434">No change</td> </tr> </tbody> </table>	Turn Pressure Adjusting Screw	Turn Differential Adjusting Screw	Cut-In Pressure	Cut-Out Pressure	Clockwise	—	Increase	Increase	Counterclockwise	—	Decrease	Decrease	—	Clockwise	No change	Increase	—	Counterclockwise	No change	Decrease	Clockwise	Counterclockwise	Increase	No change	Counterclockwise	Clockwise	Decrease	No change	
Turn Pressure Adjusting Screw	Turn Differential Adjusting Screw	Cut-In Pressure	Cut-Out Pressure																											
Clockwise	—	Increase	Increase																											
Counterclockwise	—	Decrease	Decrease																											
—	Clockwise	No change	Increase																											
—	Counterclockwise	No change	Decrease																											
Clockwise	Counterclockwise	Increase	No change																											
Counterclockwise	Clockwise	Decrease	No change																											
5. Cut-in and cutout pressure	Check	To make sure adjustment is correct.																												
6. Switch cover (3)	Replace																													
7. Main power	Connect																													

CHAPTER 7

COMPRESSOR DRIVE

7-1. CHAPTER OVERVIEW

This chapter covers maintenance of the compressor drive system. The compressor drive system consists of:

- Belt Guard Assembly
- V-Belts
- Drive Pulley

Section I covers troubleshooting of the compressor drive system. Section II covers maintenance of the compressor drive system.

Section I. TROUBLESHOOTING PROCEDURES

7-2. GENERAL

The compressor drive is a fairly simple system. The main problems are improper belt tension, bad alignment and loose pans.

7-3. TROUBLESHOOTING CHART

- **MALFUNCTION.** Malfunctions listed are the ones most likely to happen. Not all possible malfunctions can be foreseen and listed.
- **TEST OR INSPECTION.** Tests or inspections are listed to help you find the cause of the malfunction. The tests that are easiest to do are listed first. The tests that are the hardest to do are listed last.
- **CORRECTIVE ACTION.** Corrective actions are listed to help you eliminate the malfunction. Where the corrective action is too complicated to be listed in full detail, the paragraph number of the detailed procedure is given in parentheses.

Troubleshooting

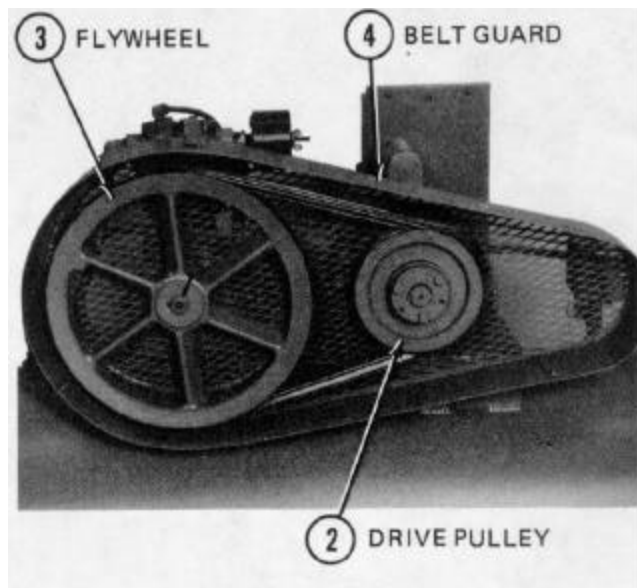
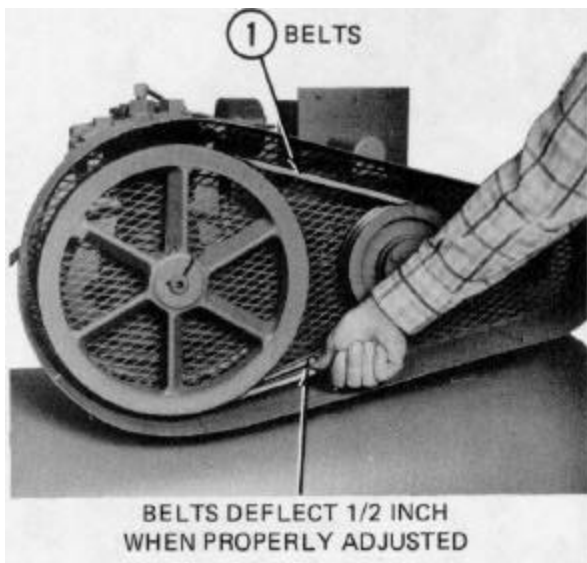
MALFUNCTION

TEST OR INSPECTION

CORRECTIVE ACTION

1. COMPRESSOR DOES NOT PUT OUT ENOUGH AIR

Step 1. Check if the 2 belts (1) are loose.
Tighten belts (7-7).



2. BELTS WEAR TOO FAST

Step 1. Check if the 2 belts (1) are loose.
Tighten belts (7-7).

Step 2. Check if drive pulley (2) and flywheel (3) are out of alignment.
Align.

3. COMPRESSOR RUNS NOISY

Step 1. Check if belt guard (4) is loose.
Tighten 4 mounting screws.

Step 2. Check if drive pulley (2) is loose.
Tighten 4 mounting screws.

Section II. COMPRESSOR DRIVE MAINTENANCE INSTRUCTION

7-4. MAINTENANCE SUMMARY

This task covers:

- a. Removal.
- b. Cleaning.
- c. Inspection.
- d. Repair.
- e. Installation.
- f. Adjustment.

INITIAL SETUP

Special Tools

None

Personnel Required

1

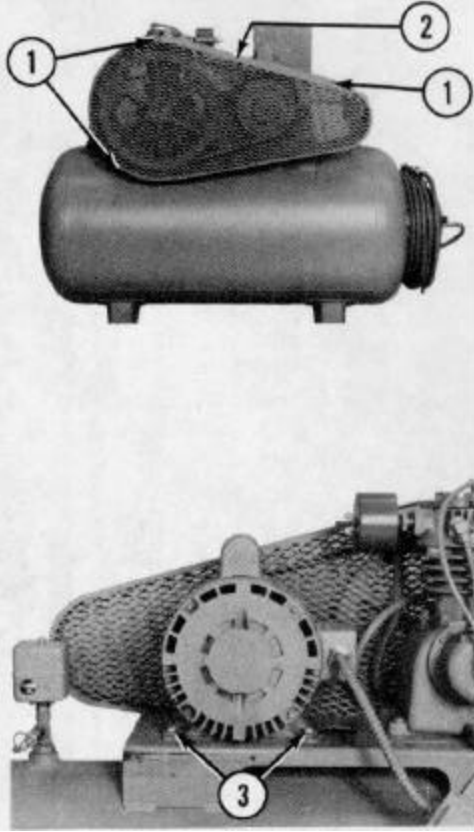
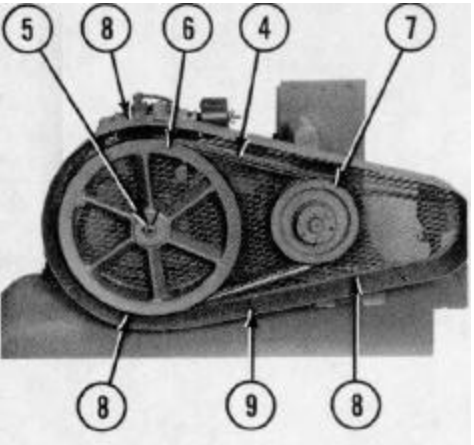
General Safety Instructions

Disconnect electrical power before starting procedure.

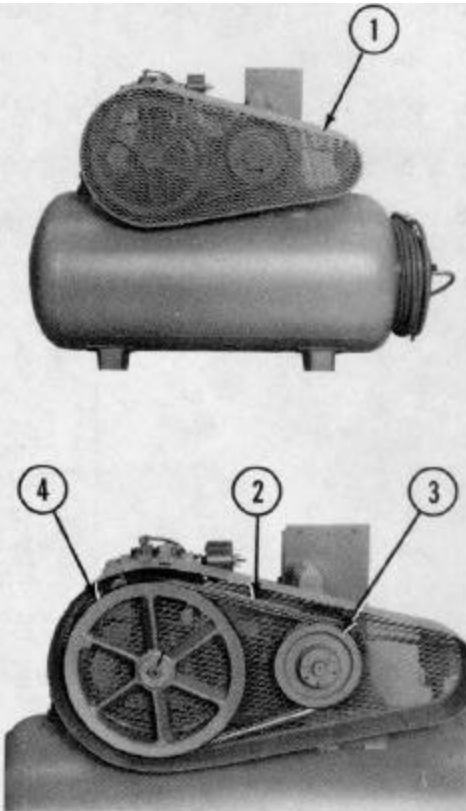
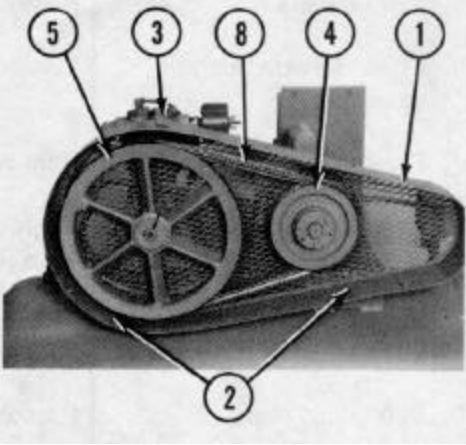
TASK SUMMARY

No.	Task	Ref.	Remarks
1	Disconnect main power	7-5	To prevent start up of compressor
2	Remove belt guard cover	7-5	
3	Remove drive belts	7-5	
4	Remove flywheel	7-5	
5	Remove pulley	7-5	
6	Remove belt guard body	7-5	
7	Clean, inspect and repair	7-6	
8	Install belt guard body	7-7	
9	Install flywheel	7-7	
10	Install pulley	7-7	
11	Install belts	7-7	
12	Adjust belt tension	7-7	
13	Install belt guard cover	7-7	

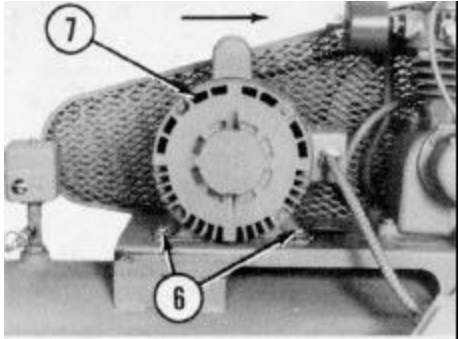
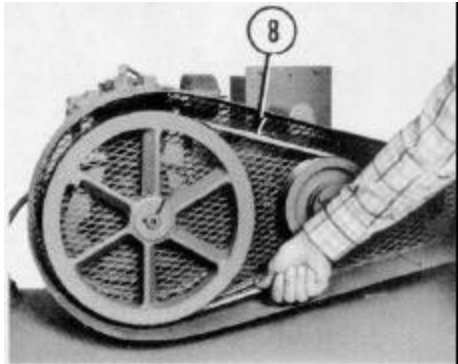
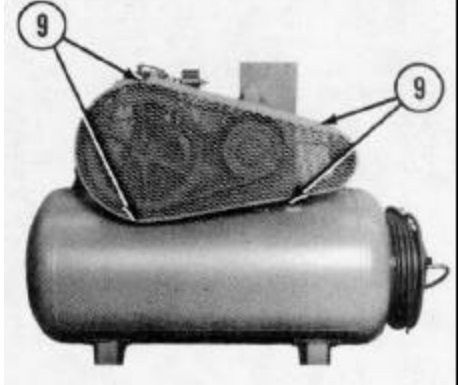
COMPRESSOR DRIVE

LOCATION/ITEM	ACTION	REMARKS
<p>7-5. REMOVAL</p> <p>1. Main power</p> <p>2. 3 machine screws (1) on belt guard cover</p> <p>3. Belt guard cover (2)</p>	<p>Disconnect</p> <p>Remove</p> <p>Remove</p>	
<p>4. 4 electric motor mounting screws (3)</p> <p>5. 2 drive belts (4)</p> <p>6. Flywheel attaching screw (5)</p> <p>7. Flywheel (6)</p> <p>8. Drive pulley (7)</p> <p>9. Belt guard body mounting screws (8) (2 on the bottom, 1 on top)</p> <p>10. Belt guard body (9)</p>	<p>Loosen to take tension off drive belts.</p> <p>Remove</p> <p>Loosen</p> <p>Remove</p> <p>Remove</p> <p>Remove</p> <p>Remove</p>	<p>Belts may be cut or damaged if removed under full tension.</p> 

COMPRESSOR DRIVE (cont)

LOCATION/ITEM	ACTION	REMARKS
<p>7-6. CLEANING, INSPECTION AND REPAIR</p> <p>1. Belt guard (1)</p> <p>2. Belts (2)</p> <p>3. Pulley</p> <p>4. Flywheel</p>	<p>Clean with stiff brush</p> <p>a. Inspect for wear and cracks. b. Replace if worn or cracked.</p> <p>a. Inspect for cracks. b. Replace if cracked.</p> <p>a. Inspect for cracks. b. Replace if cracked.</p>	
<p>7-7. INSTALLATION AND ADJUSTMENT</p> <p>1. Main power</p> <p>2. Belt guard (1)</p> <p>3. Pulley (4)</p> <p>4. Flywheel (5)</p>	<p>Disconnect</p> <p>a. Attach to base with 2 screws (2), nuts and lockwashers. b. Attach to compressor cylinder head (3) with existing cylinder head screw.</p> <p>Install</p> <p>Install</p>	

COMPRESSOR DRIVE (cont)

LOCATION/ITEM	ACTION	REMARKS
5. Motor mounting screws (6) 6. Motor (7) 7. 2 belts (8) 8. Motor (7)	Loosen Slide in direction of arrow. Install Adjust position for proper belt tension. <p style="text-align: center;">CAUTION</p> <p>Too little belt tension causes belts to overheat and wear out prematurely. Too much tension causes bearing wear in motor and compressor.</p>	To allow belts to be mounted on pulley.  Belt tension is right when belts move 1/2 inch when pushed on half way between pulley and flywheel. 
9. Mounting screws (6) 10. Cover (8)	Tighten when proper belt tension is achieved. Install with four screws (9).	

CHAPTER 8

COMPRESSOR ASSEMBLY

8-1. CHAPTER OVERVIEW

This chapter covers maintenance of the compressor assembly. The compressor assembly consists of:

- Air Compressor
- Oil Filler, Cap and Plugs
- Flywheel
- Tube Assemblies
- Cylinder Head, Intake and Exhaust Valves
- Centrifugal Unloader (Model 20-904 only)
- Pistons, Connecting Rods and Cylinder
- Crankshaft, Bearings, Oil Seals and Cylinder Block

Section I covers troubleshooting of the whole system. Section II covers maintenance of the air compressor assembly. Section III covers maintenance of the cylinder head and valves. Section IV covers maintenance of the pistons, crankshaft and centrifugal unloader.

Section I. TROUBLESHOOTING PROCEDURES

8-2. GENERAL

The intake and exhaust valves are the most critical parts of the compressor. Loss of pumping efficiency can most often be traced back to the valves.

However, problems with getting enough air aren't always caused by the compressor. Leaky fittings or an improperly adjusted pressure switch may also be at fault.

8-3. TROUBLESHOOTING CHART

The troubleshooting chart has three headings:

- **MALFUNCTION.** Malfunctions listed are the ones most likely to happen. Not all possible malfunctions can be foreseen and listed.
- **TEST OR INSPECTION.** Tests or inspections are listed to help you find the cause of the malfunction. The tests that are easiest to do are listed first. The tests that are hardest to do are listed last.
- **CORRECTIVE ACTION.** Corrective actions are listed to help you eliminate the malfunction. Where the corrective action is too complicated to be listed in full detail, the paragraph number of the detailed procedure is given in parentheses.

Troubleshooting

MALFUNCTION

TEST OR INSPECTION

CORRECTIVE ACTION

1. SLOW PUMPING OR INSUFFICIENT PRESSURE

Step 1. Check for leaks in air lines and fittings.
Tighten fittings or replace leaking parts.

Step 2. Check for overloading of the compressor.
Reduce air use to less than 5 cfm.

Step 3. Check for wrong adjustment of pressure switch.
Adjust pressure switch to cut in at 160 psi and to cut out at 180 psi. (para 6-14)

Step 4. Check for bad head valves (para 8-12).
Repair or replace valves (para 8-13).

2. EXCESSIVE COMPRESSOR OIL CONSUMPTION

Step 1. If unit is new, oil consumption may be high until rings seat.
Wait for rings to seat, then recheck oil consumption.

Step 2. Check for worn or stuck piston rings.
Replace bad rings. (para 8-17)

NOTE

Rings can be replaced by removing head and cylinder. The pump can stay mounted on the air tank.

3. COMPRESSOR RUNS NOISY

Step 1. Check for loose mounting bolts or flywheel.
Tighten.

Step 2. Check for foreign matter such as carbon, metal chips, etc. in cylinder.
Remove head and clean cylinder. (para 8-11)

Step 3. Check if piston extends above cylinder at top of stroke and hits cylinder head.
Add gaskets between crankcase and cylinder. Do not add gaskets between cylinder and head since air leaks may occur if more than one gasket is used.

Step 4. Check for end play in crankshaft.
Remove one end cover gasket and reinstall end cover. Do not remove too many gaskets or the crankshaft may bind. (para 8-17)

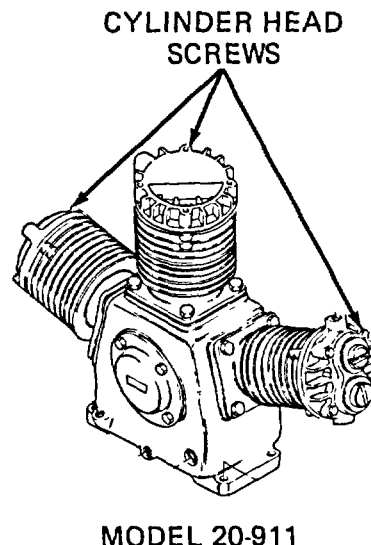
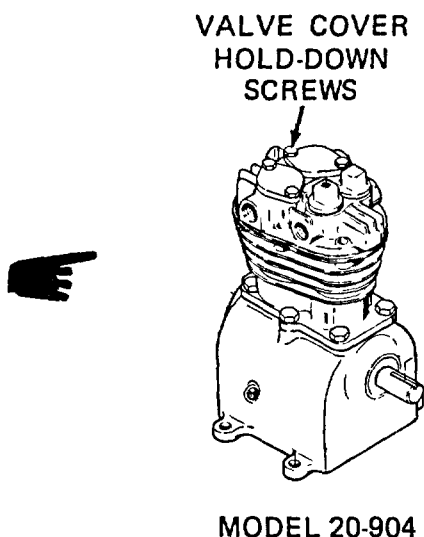
Troubleshooting (cont)

MALFUNCTION

TEST OR INSPECTION

CORRECTIVE ACTION

Step 5. Check for loose valve cover hold-down screws (Model 20-904) or loose cylinder head screws (Model 20-911).



Step 6. Check for wear on internal moving parts. (para 8-16) Replace worn parts. (para 8-17)

4. COMPRESSOR OVERHEATS

Step 1. Check if pump is low on oil.
Add oil to bring level up to full mark on dipstick or gage.

Step 2. Check for dirt in intercooler or cylinder fins.
Remove dirt.

Step 3. Compressor is getting poor ventilation.
Clear obstructions from around the compressor.

Step 4. Check for blown cylinder head gasket.
Replace gasket. (para 8-17)

Step 5. Check for worn valves.
Repair or replace valves. (para 8-13)

Step 6. Check if pump is running backwards (clockwise as you face the flywheel).
Rewire motor so it runs counterclockwise. (para 9-9)

Section II. AIR COMPRESSOR ASSEMBLY MAINTENANCE INSTRUCTIONS

8-4. MAINTENANCE SUMMARY

This task covers:

- a. Removal.
- b. Disassembly.
- c. Cleaning.
- d. Inspection
- e. Repair.
- f. Assembly.
- g. Installation.

INITIAL SETUP

Personnel Required		Equipment Condition
1		
	Par	Condition
Materials	7-5	Belts removed
Engine Oil, OE 10, OE 30	7-5	Belt guard removed
	7-5	Drive pulley removed

TASK SUMMARY

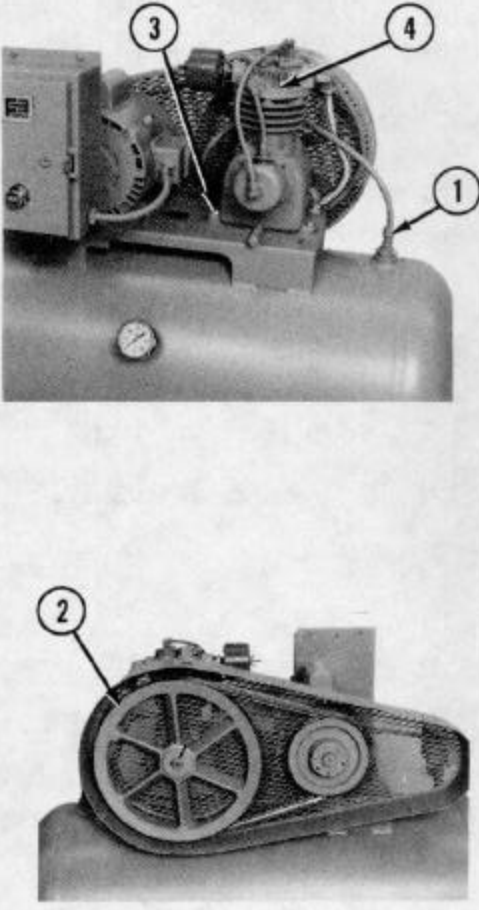
Model 20-904

No.	Task	Ref.	Remarks
1	Turn off main power	8-5	
2	Drain air from system	8-5	
3	Remove compressor from air tank	8-5	
4	Remove air cleaner	8-6	
5	Remove oil drain	8-6	
6	Remove tubing	8-6	
7	Clean, inspect and repair	8-7	
8	Install tubing	8-8	
9	Install oil drain	8-8	
10	Install air cleaner	8-8	
11	Add oil to crankcase	8-8	
12	Install compressor on air tank	8-9	

Model 20-911

1	Turn off main power	8-5	
2	Drain air from system	8-5	
3	Remove compressor from air tank	8-5	
4	Remove air cleaner	8-8A	
5	Remove oil drain	8-8A	
6	Remove tubing	8-8A	
7	Clean, inspect repair	8-8B	
8	Install tubing	8-8C	
9	Install oil drain	8-8C	
10	Install air cleaner	8-8C	
11	Add oil to crankcase	8-8C	
12	Install compressor on air tank	8-9	

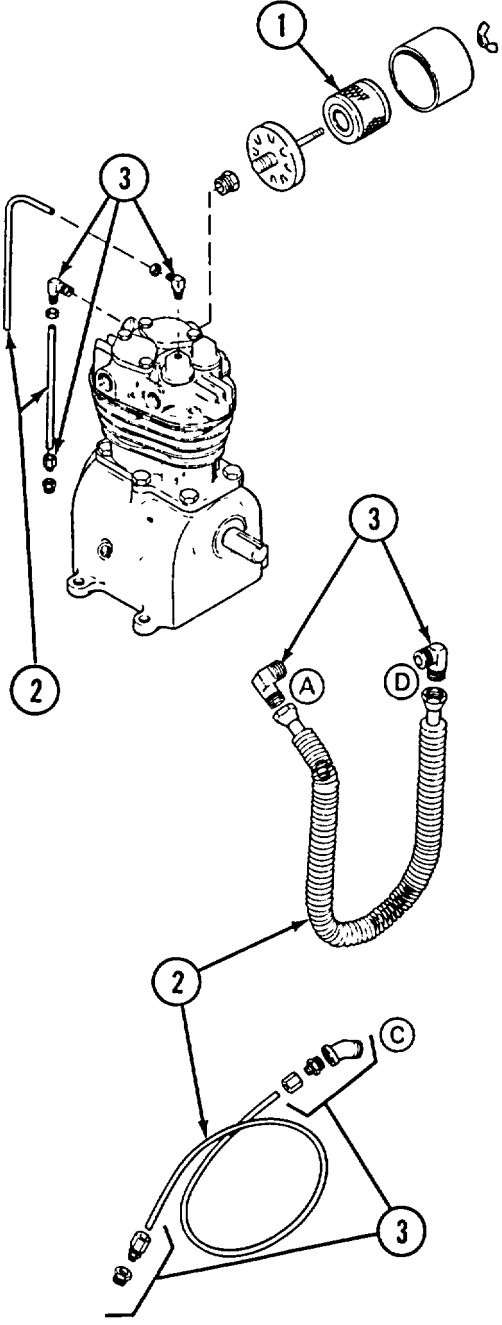
COMPRESSOR

LOCATION/ITEM	ACTION	REMARKS
<p>8-5. REMOVAL</p> <ol style="list-style-type: none"> 1. Main power 2. Drain cock at bottom of air tank 3. Aftercooler (1) 4. Flywheel (2) 5. 4 compressor mounting screws (3), washers, lock-washers and nuts 6. Compressor (4) 	<p>Disconnect</p> <ol style="list-style-type: none"> a. Open to release air. b. Close <p>Disconnect</p> <p>Remove</p> <p>Remove</p> <p>Lift off base</p>	<p>To prevent accidental startup of compressor during removal.</p>  <p>The top photograph shows a close-up of the compressor assembly mounted on a base. Callout 1 points to a hose or pipe on the right side. Callout 3 points to a cylindrical component (aftercooler) in the center. Callout 4 points to the main compressor unit. The bottom photograph shows a flywheel (callout 2) which is a large, spoked wheel connected to the compressor via a belt drive system.</p>

COMPRESSOR (MODEL 20-904)

LOCATION/ITEM	ACTION	REMARKS
8-6. DISASSEMBLY		
1. Air cleaner (1)	Unscrew from cylinder head (2).	
2. Wing nut (3)	Remove	
3. Cover (4) and filter element (5)	Separate from air cleaner body (6),	
4. Oil pan	Place under oil drain cap (7).	
5. Oil drain cap (7)	Remove and let oil drain.	
6. Oil drain pipe (8)	Remove	
7. Oil level gage (9)	Unscrew	
8. Aftercooler (10)	Unscrew from 45° street el.	
9. Street el (11)	Unscrew	
10. Intercooler (12)	Unscrew tubing nuts from 90° elbows.	
11. 90° elbows (13)	Unscrew	
12. Unloader tube (14)	Unscrew 2 tubing nuts and remove tube.	
13. Breather tube (15)	Unscrew 2 tubing nuts and remove tube.	
14. 90° elbows (13)	Remove from cylinder head.	

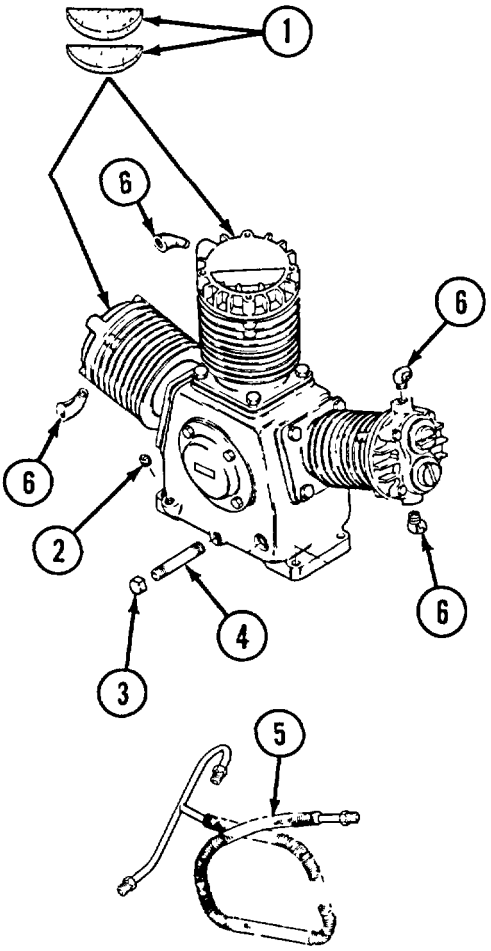
COMPRESSOR (MODEL 20-904) (Cont)

LOCATION/ITEM	ACTION	REMARKS
<p>8-7. CLEANING, INSPECTION AND REPAIR</p> <p>1. Air cleaner element (1)</p> <p>2. Air compressor tubing (2) damage.</p> <p>3. Pipe and tube fittings (3)</p>	<p>a. Inspect for dirt. b. Clean air filter element with compressed air no greater than 30 psi.</p> <p>a. Inspect tubing nuts for thread damage. b. Inspect tubing for kinks or cracks. c. Replace if damaged.</p> <p>a. Inspect for thread damage. b. Replace if damaged.</p>	 <p>The diagram shows a compressor unit with various components labeled. Callout 1 points to the air filter element. Callout 2 points to the air compressor tubing. Callout 3 points to various pipe and tube fittings. Specific fittings are labeled A, B, C, and D.</p>

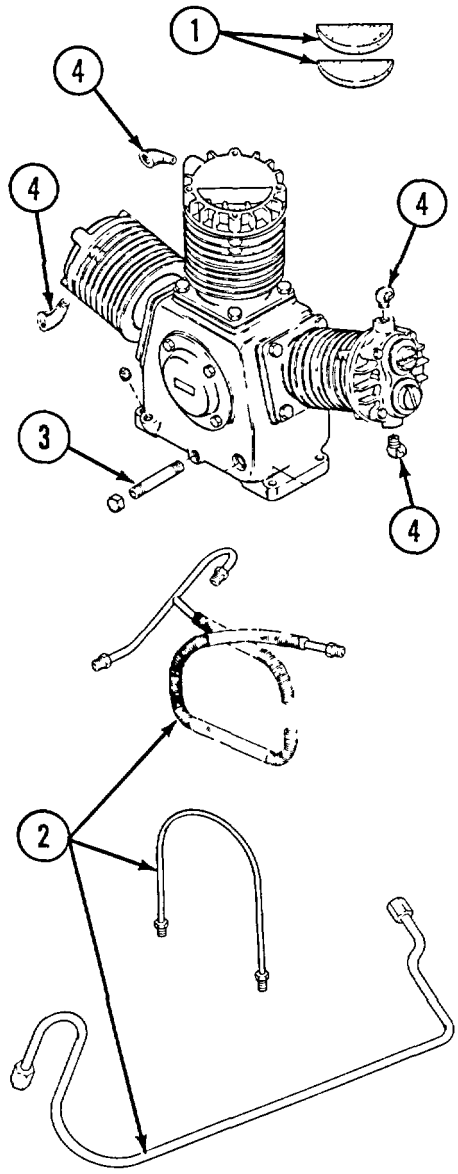
COMPRESSOR (MODEL 20-904) (Cont)

LOCATION/ITEM	ACTION	REMARKS
<p>8-8. ASSEMBLY</p> <p>1. Unloader tube (1)</p> <p>2. Breather tube (2)</p> <p>3. 90° elbows (3)</p> <p>4. Intercooler (4)</p> <p>5. 45° street el (5)</p> <p>6. Aftercooler (6)</p> <p>7. Air cleaner (7)</p> <p>8. Oil drain pipe (8)</p> <p>9. Oil drain cap (9)</p> <p>10. Oil fill hole (10)</p> <p>11. Oil level gage (11)</p>	<p>Install</p> <p>Install</p> <p>Install</p> <p>Connect to elbows (3).</p> <p>Install in head.</p> <p>Connect to street el (5).</p> <p>Install</p> <p>Install</p> <p>Install</p> <p>Add oil. OE 10 below 32°F (0°C), OE 30 above 32°F (0°C).</p> <p>a. Check that oil level is up to full mark.</p> <p>b. Screw into crankcase.</p>	

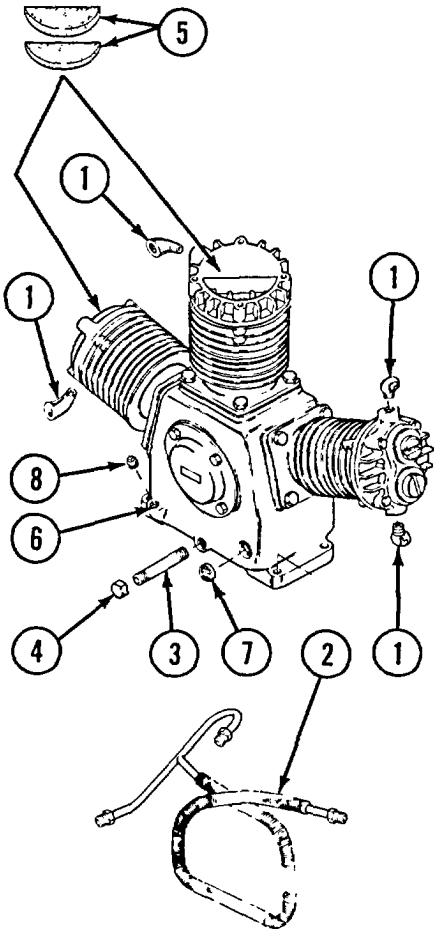
COMPRESSOR MODEL 20-911

LOCATION/ITEM	ACTION	REMARKS
<p>8-8A DISASSEMBLY</p> <p>1. Air cleaner (1)</p> <p>2. Oil pan</p> <p>3. Oil fill plug (2)</p> <p>4. Oil drain cap (3)</p> <p>5. Oil drain pipe (4)</p> <p>6. Intercooler (5)</p> <p>7. 90° elbows (6)</p>	<p>Remove by pinching together with fingers and pull out.</p> <p>Place under oil drain cap (3).</p> <p>Remove.</p> <p>Remove and let oil drain into 1 quart container.</p> <p>Remove.</p> <p>Remove by unscrewing tubing nuts from 90° elbows.</p> <p>Remove from cylinder heads.</p>	

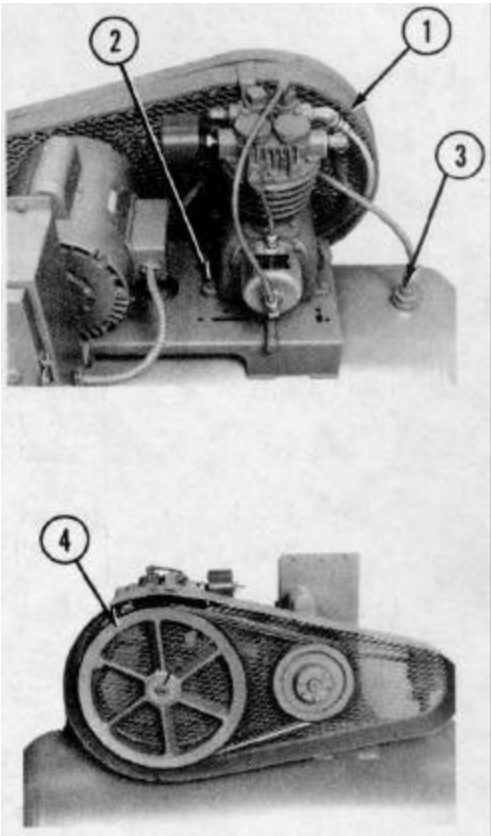
COMPRESSOR MODEL 20-911 (Cont)

LOCATION/ITEM	ACTION	REMARKS
<p>8-8B CLEANING, INSPECTION AND REPAIR</p> <p>1. Air cleaner elements (1)</p> <p>2. Air compressor tubing (2)</p> <p>3. Pipe fittings (3)</p> <p>4. 90° elbows (4)</p>	<p>a. Inspect for dirt.</p> <p>b. Clean air filter elements with detergent solution and let air dry.</p> <p>c. Replace if cleaning is ineffective.</p> <p>a. Inspect tubing nuts for thread damage.</p> <p>b. Inspect tubing for kinks or cracks.</p> <p>c. Replace if damaged.</p> <p>a. Inspect for thread damage.</p> <p>b. Replace if damaged.</p> <p>a. Inspect for thread damage.</p> <p>b. Replace if damaged.</p>	

COMPRESSOR MODEL 20-911 (Cont)

LOCATION/ITEM	ACTION	REMARKS
<p>8-8C ASSEMBLY</p> <ol style="list-style-type: none"> 1. 90° elbows (1) 2. Intercooler (2) 3. Oil drain pipe (3) 4. Oil drain cap (4) 5. Air cleaner (5) 6. Oil fill hole (6) 7. Oil level gage (7) 8. Oil fill plug (8) 	<p>Install in cylinder head.</p> <p>Connect to elbows (1)</p> <p>Install</p> <p>Install</p> <p>Install by pinching together with fingers and inserting in cylinder heads.</p> <p>Add oil. OE-10 below 32°F (0°C) OE-30 above 32°F (0°C)</p> <p>Check that oil level is up to full mark</p> <p>Install</p>	 <p>The diagram shows an exploded view of the compressor assembly. At the top, two semi-circular air cleaner elements (5) are shown. Below them, two 90-degree elbows (1) are positioned to be inserted into the cylinder head. An intercooler (2) is shown to the left, with an oil drain pipe (3) and oil drain cap (4) attached to its bottom. An oil fill plug (8) and oil fill hole (6) are shown on the front of the compressor. An oil level gage (7) is shown on the right side. A separate view at the bottom shows the intercooler (2) and oil drain pipe (3) assembly.</p>

COMPRESSOR

LOCATION/ITEM	ACTION	REMARKS
<p>8-9. INSTALLATION</p> <p>1. Main power</p> <p>2. Compressor (1)</p> <p>3. Aftercooler (3)</p> <p>4. Flywheel (4)</p>	<p>Disconnect</p> <p>Attach to base with 4 mounting screws (2), washers, lock-washers and nuts.</p> <p>Attach to tank.</p> <p>Install</p>	 <p>The top photograph shows a compressor assembly mounted on a base. Callout 1 points to the main power connection area. Callout 2 points to the four mounting screws used to secure the compressor to the base. Callout 3 points to the aftercooler component. The bottom photograph shows a flywheel (callout 4) which is part of the compressor's drive mechanism, featuring a large spoked wheel and a smaller pulley.</p>

Section III. COMPRESSOR CYLINDER HEAD AND VALVES MAINTENANCE INSTRUCTIONS

8-10. MAINTENANCE SUMMARY

This task covers:

- a. Disassembly.
- b. Cleaning.
- c. Inspection.
- d. Repair.
- e. Assembly.

INITIAL SETUP

Special Tools

Valve seat tool 16869 (53239)

Valve retainer tool 16870 (53239)

Personnel Required

1

Para

Equipment Condition

Condition

Materials/Parts

8-6

Tubing removed

Cylinder head gasket

TASK SUMMARY

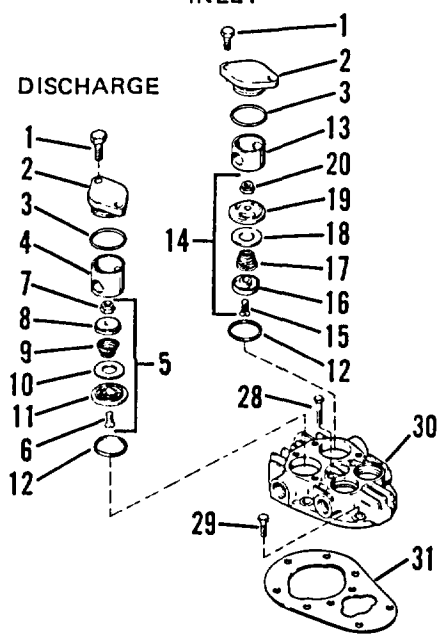
MODEL 20904

No.	Task	Ref.	Remarks
1	Remove cylinder head	8-11	
2	Remove valves	8-11	
3	Disassemble valves	8-11	
4	Clean, inspect and repair	8-12	
5	Assemble valves	8-13	
6	Install valves in cylinder head	8-13	
7	Install cylinder head	8-13	

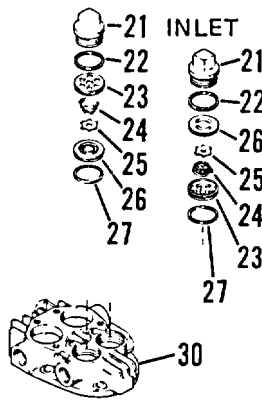
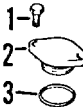














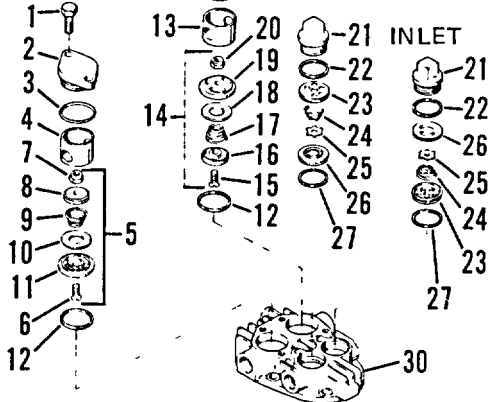
MODEL 20-911

1	Remove cylinder heads	8-13A, 8-13B	
2	Remove valves	8-13A, 8-13B	
3	Clean, inspect and repair	8-13C	
4	Install valves in cylinder heads	8-13D, 8-13E	
5	Install cylinder heads	8-13D, 8-13E	

CYLINDER HEAD AND VALVES MODEL 20-904

LOCATION/ITEM	ACTION	REMARKS
8-11. DISASSEMBLY		
1. Cylinder head screws (28 & 29)	Remove	
2. Cylinder head (30)	Remove	
3. Gasket (31)	Discard	Used gaskets will not seal and must be discarded.
4. Hold-down cover screws (1)	Remove	<p style="text-align: center;">LOW PRESSURE INLET</p> 
5. Holddown covers (2)	Remove	
6. O-ring (3)	Remove	
7. Valve cages (4 and 13)	Lift out of cylinder head.	
8. Low pressure valve assemblies (5 and 14)	<p>a. Lift out of cylinder head. b. Clamp in soft jaw vise. c. Remove screws (6 and 15).</p>	
NOTE		
<p>Do not mix up low pressure inlet and discharge valve parts. They are not interchangeable.</p>		

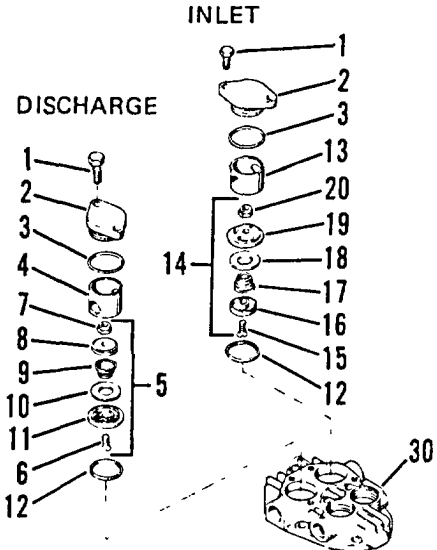
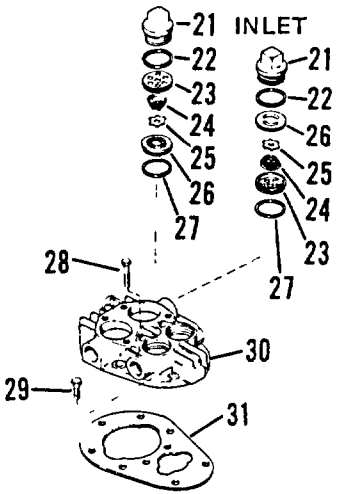
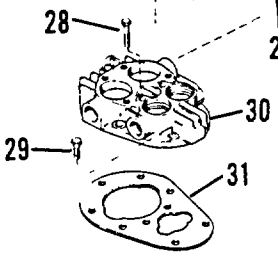
CYLINDER HEAD AND VALVES MODEL 20-904 (Cont)

LOCATION/ITEM	ACTION	REMARKS
9. High pressure holddown covers (21)	Remove	HIGH PRESSURE
10. Gaskets (22)	Remove	DISCHARGE
11. Seats (26) and retainers (23)	Turn counterclockwise using seat tool (16869) and retainer tool (16870).	
12. Spring (24) and plate (25)	Lift out of cylinder head.	
13. Gasket (27)	Remove	
8-12. CLEANING, INSPECTION AND REPAIR		LOW PRESSURE
1. Cylinder head (30)	a. Clean, especially area between cooling fins. b. Remove gasket material stuck to bottom of head.	INLET 1- 
2. Valve parts	<p style="text-align: center;">WARNING</p> <p style="text-align: center;">Wear gloves or other skin protective equipment when working with cleaning solvents.</p> Clean with cleaning solution.	DISCHARGE 2-  3-  13-  14-  15-  16-  17-  18- 19- 20- 21-  INLET 22-  23-  24-  25-  26-  27- 
3. Valve plates and seats (10, 11, 18, 19, 25 and 26)	a. Inspect for wear and flatness. b. Resurface with No. 400 emery cloth if wear is slight. c. Replace if they can't be resurfaced.	 <p>Valve seats must be flat and smooth.</p>
4. Valve springs (9, 17 and 24)	a. Inspect for cracks or loss of elasticity. b. Replace if cracked.	
5. Gaskets and O-rings (3, 12, 22 and 27)	a. Inspect for cracking, cutting or other conditions which might cause leaks. b. Replace if damaged.	

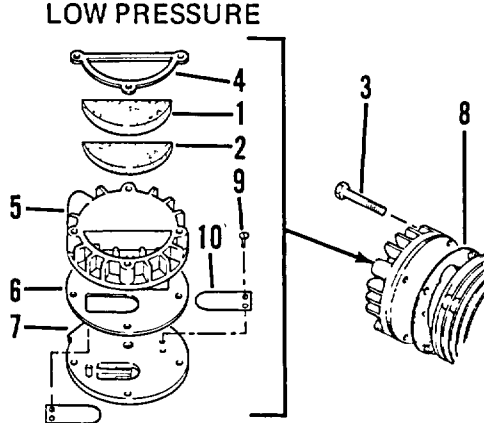
CYLINDER HEAD AND VALVES MODEL 20-904 (Cont)

LOCATION/ITEM	ACTION	REMARKS
<p>8-13. ASSEMBLY</p> <p>1. Valve retainer (8), spring (9), valve plate (10) and valve seat (11)</p>	<p>Assemble with screw (6) and nut (7).</p>	<p>Push on valve plate (10) after assembly to make sure valve works freely.</p> <p style="text-align: center;">LOW PRESSURE</p> <p>The diagram illustrates the assembly of the cylinder head and valves. It shows two valves: a Discharge Valve on the left and an Inlet Valve on the right. The Discharge Valve assembly includes parts 1 through 12. The Inlet Valve assembly includes parts 1 through 20. A separate view shows the valve gaskets (12) and the cylinder head (30).</p>
<p>2. Inlet valve assembly (14)</p>	<p>Assemble with screw (15) and nut (20).</p>	<p>Push on valve plate (18) after assembly to make sure valve works freely.</p>
<p>3. Valve gaskets (12)</p>	<p>Install in head.</p>	

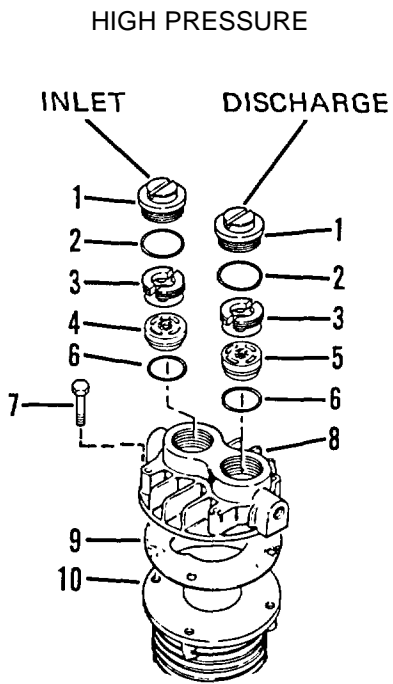
CYLINDER HEAD AND VALVES MODEL 20-904 (Cont)

LOCATION/ITEM	ACTION	REMARKS	
4. Discharge valve assembly (5)	Install in head with valve seat down.	<p style="text-align: center;">LOW PRESSURE</p> 	
5. Inlet valve assembly (14)	Install with valve seat (19) up.		
6. Valve cages (4 and 13)	Install		
7. O-rings (3)	Install on valve covers (2).		
8. Holddown covers (2)	<p style="text-align: center;">CAUTION</p> <p style="text-align: center;">Tighten screws evenly to avoid breaking corners off hold-down covers.</p>		
			a. Install with screws (1).
			b. Torque screws to 10 ft-lbs.
9. Gaskets (27)	Install in head.		
10. Valve retainer (23), spring (24), valve plate (25) and valve seat (26)	<p>a. Install in head as shown, using special tools (16869) and (16870).</p> <p>b. Be careful not to catch valve plate (25) between edges of valve retainer and seat.</p>		
11. Gaskets (22)	Install	<p style="text-align: center;">HIGH PRESSURE</p> <p style="text-align: center;">DISCHARGE</p> 	
12. Valve covers (21)	a. Install.		
13. Cylinder bores	b. Torque to 40 ft-lbs.		
14. Head (30) and gasket (31)	Check to see nothing has fallen into them before installing cylinder head.		
14. Head (30) and gasket (31)	Install on cylinder with screws (29 and 30).		

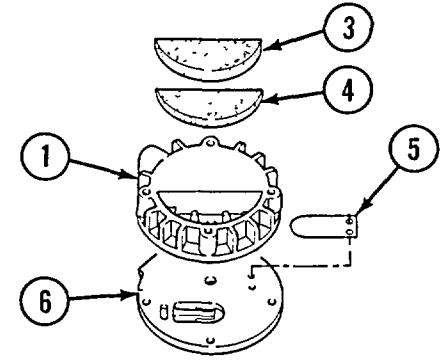
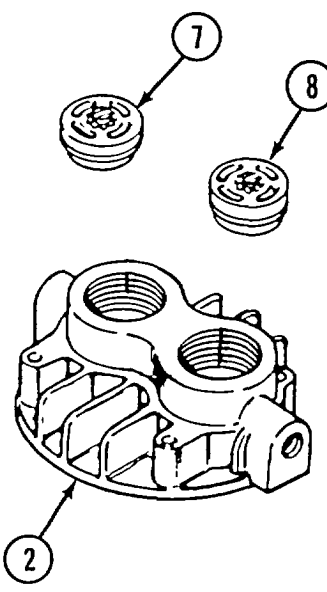
CYLINDER HEAD AND VALVES MODEL 20-911

LOCATION/ITEM	ACTION	REMARKS
<p>8-13A DISASSEMBLY</p> <p>LOW PRESSURE CYLINDERS</p> <ol style="list-style-type: none"> 1. Filter (1) 2. Silencer (2) 3. Capscrews (3) 4. Retainer (4) 5. Cylinder head (5) 6. Valve plate gasket (6) 7. Valve plate (7) 8. Cylinder head gasket (8) 9. Screw (9) 10. Reed valve (10) 	<ol style="list-style-type: none"> Pinch together with fingers and remove. Pinch together with fingers and remove. Unscrew. Remove. Remove Discard. Remove. Discard. Remove. Remove. 	<p>LOW PRESSURE</p>  <p>Used gaskets do not seal.</p>

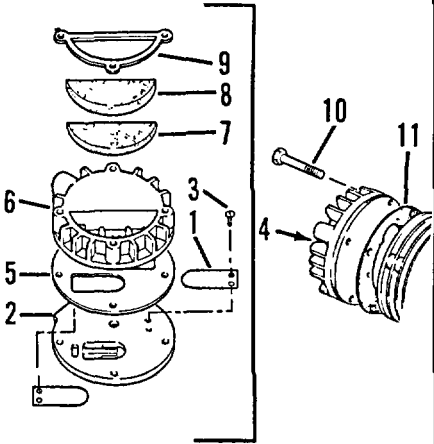
CYLINDER HEAD AND VALVES MODEL 20-911 (Cont)

LOCATION/ITEM	ACTION	REMARKS
8-13B DISASSEMBLY		
HIGH PRESSURE CYLINDER		
1. Valve chamber caps (1)	Unscrew.	
2. Gaskets (2)	Discard.	
3. Valve retainers (3)	Unscrew.	Used gaskets do not seal and must be discarded.
CAUTION		
Do not mix up inlet and discharge valves. They are not interchangeable.		
4. Valve assemblies (4) and (5)	Lift out of cylinder head.	If necessary tap valve assembly with a piece of wood to work it loose from cylinder head.
5. Gaskets (6)	Discard.	
6. Capscrews (7)	Remove.	
7. Cylinder head (8)	Remove.	
8. Gasket (9)	Remove from cylinder (10) and discard.	
<p style="text-align: center;">HIGH PRESSURE</p> 		

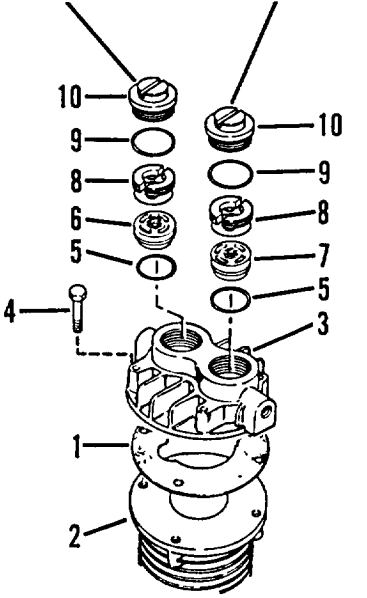
CYLINDER HEAD AND VALVES MODEL 20-911 (Cont)

LOCATION/ITEM	ACTION	REMARKS
<p>8-13C CLEANING, INSPECTION AND REPAIR</p> <p>1. Cylinder heads (1)</p> <p>2. Air filter (3) and silencer (4)</p> <p>3. All valve parts</p> <p>4. Reed valves (5)</p> <p>5. High pressure valve assemblies (7) and (8)</p>	<p>a. Clean, especially area between cooling fins.</p> <p>b. Remove gasket material stuck to bottom of heads.</p> <p style="text-align: center;">WARNING</p> <p>Wear gloves or other skin protective equipment when working with cleaning solvents.</p> <p>a. Clean with detergent solution and let air dry.</p> <p>b. Replace if cleaning is not effective.</p> <p>Clean with cleaning solution.</p> <p>a. Inspect for flatness by placing on valve plate (6).</p> <p>b. Replace if not flat or bent.</p> <p style="text-align: center;">NOTE</p> <p>High pressure valve assemblies are not repairable. They must be replaced if defective.</p> <p>a. Inspect by inserting small tool in valve holes and push parts up and down. Movement should be free.</p> <p>b. Replace if movement is sticky.</p>	<p style="text-align: center;">LOW PRESSURE</p>  <p>Do not use solvent on air filters.</p> <p>Reed valves must lie perfectly flat.</p> <p style="text-align: center;">HIGH PRESSURE</p> 

CYLINDER HEAD AND VALVES MODEL 20-911 (Cont)

LOCATION/ITEM	ACTION	REMARKS
<p>8-13D ASSEMBLY</p> <p>LOW PRESSURE CYLINDERS</p> <p>1. Reed valve (1)</p> <p>2. Low pressure head</p> <p>3. Gasket (11)</p> <p>4. Low pressure head assembly (4)</p> <p>5. Capscrews (10)</p>	<p>Place into position over valve plate (2) and attach with screw (3).</p> <p>Assemble components.</p> <p>a. Place gasket (5) into position over valve plate (2).</p> <p>b. Place valve head (6) into position over gasket (5).</p> <p>c. Install silencer (7) in valve head (6).</p> <p>d. Install filter (8) in valve head (6).</p> <p>e. Place retainer (9) in position and install screws (10) through entire assembly.</p> <p>Place into position on cylinder.</p> <p>Install on cylinder and thread screws (10).</p> <p>Tighten evenly.</p>	<p>LOW PRESSURE CYLINDER</p> 

CYLINDER HEAD AND VALVES MODEL 20-911 (Cont)

LOCATION/ITEM	ACTION	REMARKS
<p>8-13E ASSEMBLY</p>		
<p>HIGH PRESSURE CYLINDER</p>		<p>HIGH PRESSURE CYLINDER</p>
<p>1. Gasket (1)</p>	<p>Place into position over cylinder (2).</p>	<p>INLET DISCHARGE</p>
<p>2. Cylinder head (3)</p>	<p>Place into position over gasket (1).</p>	
<p>3. Capscrews (4)</p>	<p>Thread into cylinder and tighten evenly.</p>	
<p>4. Gaskets (5)</p>	<p>Install.</p>	
		<p>CAUTION</p>
		<p>Do not mix up inlet and discharge valve assemblies. They are not interchangeable.</p>
<p>5. Valve assemblies (6) and (7)</p>	<p>Install.</p>	
<p>6. Valve retainers (8)</p>	<p>Screw into cylinder head and tighten.</p>	
<p>7. Gaskets (9)</p>	<p>Install.</p>	
<p>8. Valve chamber caps (10)</p>	<p>Screw into cylinder head and tighten.</p>	

**Section IV. PISTONS, CRANKSHAFT AND CENTRIFUGAL UNLOADER
MAINTENANCE INSTRUCTIONS MODEL 20-904**

**PISTONS, CRANKSHAFT AND CRANKCASE
MAINTENANCE INSTRUCTIONS MODEL 20-911**

8-14. MAINTENANCE SUMMARY

This task covers:

- a. Disassembly.
- b. Cleaning.
- c. Inspection.
- d. Repair.
- e. Assembly.

INITIAL SETUP

Personnel Required		Equipment Condition
1		
Materials/Parts	Para	Condition
Unloader and end cover gaskets	8-6 or 8-8A	Flywheel removed
Cylinder to crankcase gaskets	8-6 or 8-8A	Tubing removed
	8-11 or 8-13A & 8-13B	Cylinder head removed

TASK SUMMARY

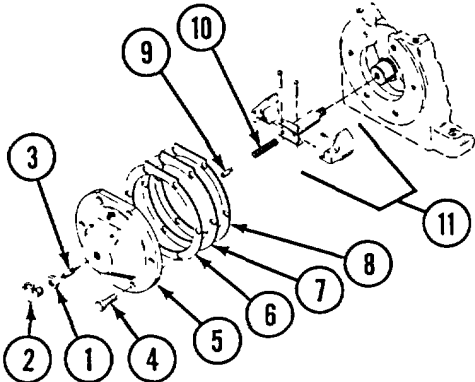
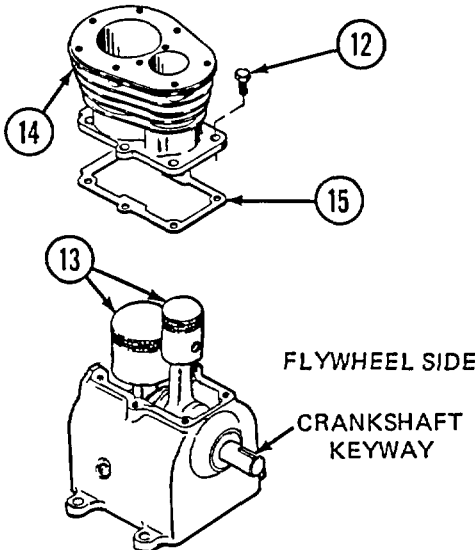
MODEL 20-904

No.	Task	Ref.	Remarks
1	Remove end cover	8-15	
2	Remove centrifugal unloader	8-15	
3	Remove cylinder	8-15	
4	Remove crankshaft with pistons and connecting rod	8-15	
5	Disassemble crankshaft and pistons	8-15	
6	Clean, inspect and repair	8-16	
7	Fit crankshaft for end play	8-17	
8	Assemble crankshaft pistons and connecting rod	8-17	
9	Install crankshaft assembly	8-17	
10	Install end cover	8-17	
11	Install cylinder	8-17	

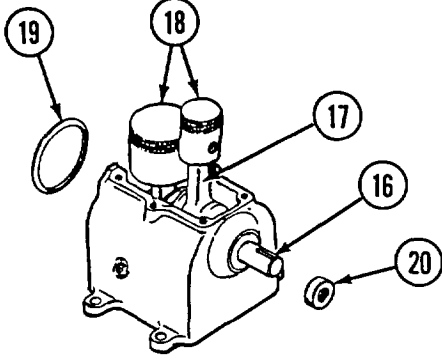
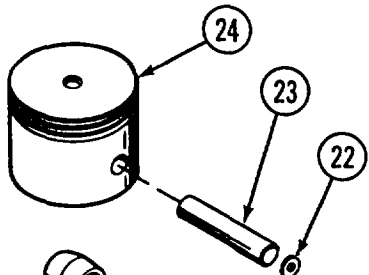
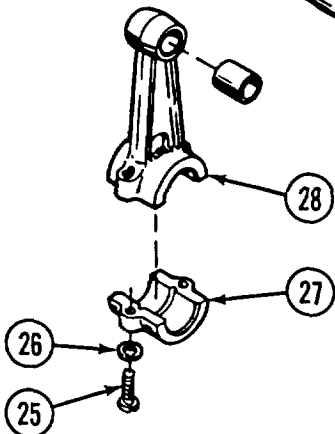
MODEL 20-911

1	Remove cylinders	8-18	
2	Remove pistons and connecting rods	8-18	
3	Disassemble pistons and connecting rods	8-18	
4	Remove breather chamber cover	8-18	
5	Remove crankshaft	8-18	
6	Clean, inspect and repair	8-19	
7	Install crankshaft	8-20	
8	Fit crankshaft for end play	8-20	
9	Install breather chamber cover	8-20	
10	Assemble pistons and connecting rods	8-20	
11	Install pistons and connecting rods	8-20	
12	Install cylinders	8-20	

PISTONS, CRANKSHAFT AND CENTRIFUGAL UNLOADER MODEL 20-904

LOCATION/ITEM	ACTION	REMARKS
8-15. DISASSEMBLY		
1. Locknut (1)	Loosen	 <p>Used gaskets do not seal properly.</p> <p>Weight retainer shaft has left hand threads so it won't unscrew itself from the crankshaft during normal operation.</p>
2. Valve elbow (2)	Unscrew	
3. Valve (3)	Unscrew	
4. 6 capscrews (4)	Remove	
5. Cover and cup assembly (5)	Remove	
6. Gaskets (6, 7 and 8)	Discard	
7. Plunger (9) and spring (10)	Remove from weight retainer and shaft assembly.	
8. Weight retainer and shaft assembly (11)	Unscrew from crankshaft by turning clockwise.	
9. 6 capscrews (12)	Remove	
10. Pistons (13)	Mark top of both pistons on side closest to flywheel to make sure you reinstall them in the same position.	
	<p style="text-align: center;">CAUTION</p> <p>Pistons and connecting rods may be damaged by hitting crankcase when the cylinder is removed. Support pistons when removing the cylinder.</p>	 <p>Support pistons from below while removing cylinder.</p> <p>Used gaskets don't seal.</p> <p>To prevent cutting oil seal.</p>
11. Cylinder (14)	Remove by twisting it slightly back and forth while pulling upward.	
12. Gasket (15)	Discard	
13. Crankshaft keyway	File sharp edges.	

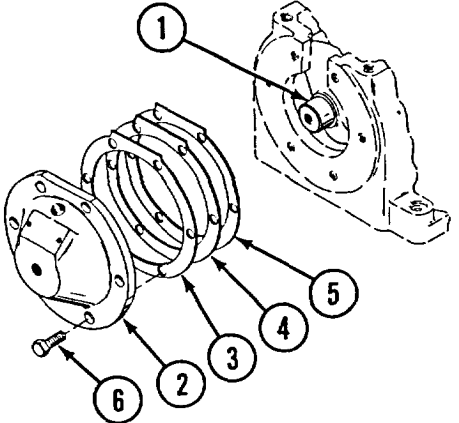
PISTONS, CRANKSHAFT AND CENTRIFUGAL UNLOADER MODEL 20-904 (Cont)

LOCATION/ITEM	ACTION	REMARKS
14. Crankshaft assembly (16) connecting rods (17) and pistons (18) and oil feeder ring (19)	Slide out of crankcase (21) as a unit.	
15. Oil seal (20)	Drive out of crankcase (21) with evenly spaced blows from the inside.	Remove only if damaged or worn and replacement is necessary.
16. Crankshaft flywheel end	Clamp in soft jaw vise.	
17. Washer (22)	Remove	Steps 17-22 apply to both the high and low pressure pistons and connecting rods. Connecting rods must be installed on crankshaft in the same position they originally occupied.
18. Wrist pin (23)	Push out	
19. Piston (24)	Remove	
20. Connecting rod identification marks	Note position in relation to crankshaft.	
21. 2 capscrews (25) and 2 lockwashers (26)	Remove	
22. Connecting rod (28) and cap (27)	Remove from crankshaft.	<p style="text-align: center;">NOTE</p> <p style="text-align: center;">Keep connecting rods and caps in matched sets.</p>

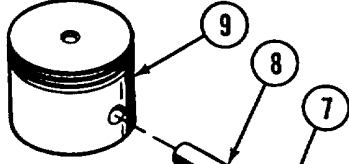

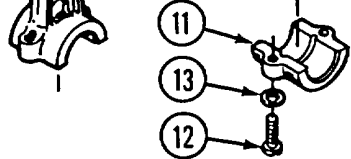
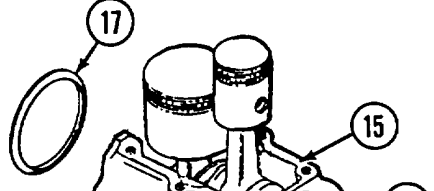
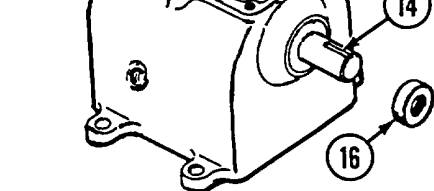
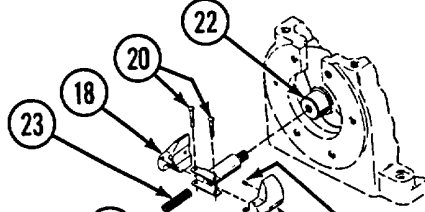
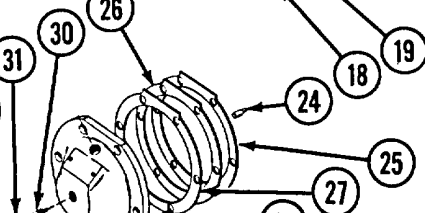
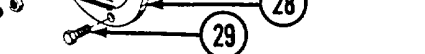
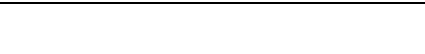

PISTONS, CRANKSHAFT AND CENTRIFUGAL UNLOADER MODEL 20-904 (Cont)

LOCATION/ITEM	ACTION	REMARKS
<p>8-16. CLEANING, INSPECTION AND REPAIR</p>	<p style="text-align: center;"><u>WARNING</u></p> <p>Wear gloves or other skin protective equipment when working with cleaning solvents.</p>	
<p>1. All parts of unloader</p>	<p>Clean with cleaning solution.</p>	
<p>2. End cover</p>	<p style="text-align: center;"><u>WARNING</u></p> <p>Eye protective equipment must be worn when scraping rust and loose paint.</p> <p>a. Remove rust or loose paint with wire brush. b. Repaint affected area.</p>	
<p>3. Valve</p>	<p>a. Push in valve stem to make sure it moves freely. b. Replace valve if stem is stuck. c. Inspect threads for damage which might cause leaks. d. Replace if damaged.</p>	
<p>4. Crankcase</p>	<p>Remove metal chips and dirt.</p>	
<p>5. Cylinder</p>	<p>a. Clean, especially between cooling fins. b. Inspect for scored cylinder walls. c. Replace if scored.</p>	<p>Dirt between fins interferes with cooling.</p>
<p>6. Pistons</p>	<p>a. Inspect piston for scoring. b. Replace if scored</p>	

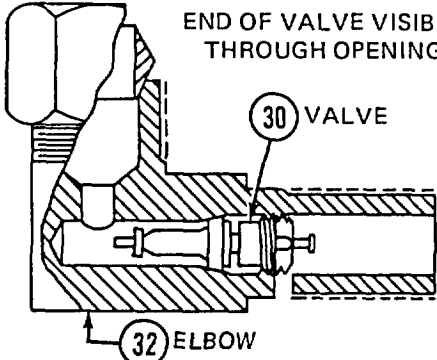
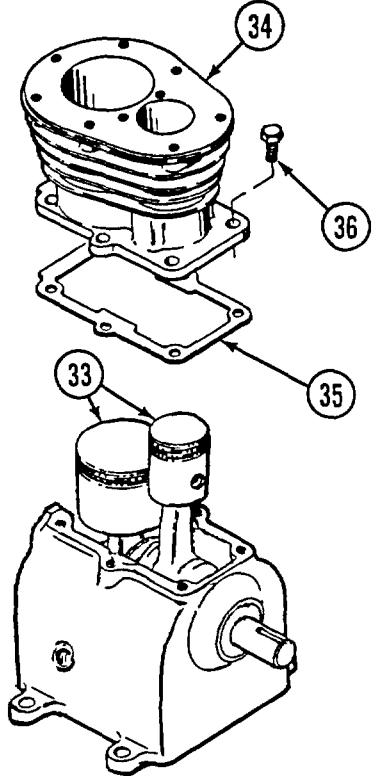
PISTONS, CRANKSHAFT AND CENTRIFUGAL UNLOADER MODEL 20-904 (Cont)

LOCATION/ITEM	ACTION	REMARKS
7. Connecting rod to crankshaft	a. Check fit. (1) Tap cap to make sure that rod is making contact. (2) Tighten both connecting rod screws and both lockwashers to 8 ft-lbs. (3) Combined piston and connecting rod should turn slowly on the crankshaft of their own weight. b. If connecting rod to crankshaft fit is loose, replace connecting rod.	
8. Oil seal	a. Inspect for cuts or damage. b. Replace if damaged.	
8-17. ASSEMBLY		
1. Crankshaft assembly (1)	Install in base.	
2. End cover (2) and gaskets (3, 4 and 5)	a. Install with six screws (6). b. Crankshaft should spin in bearings without end play. c. Check that oil feeder ring turns freely within guide lugs in base. d. Add gaskets if crankshaft can't be spun. e. Remove gaskets to eliminate end play.	Too many gaskets will give the crankshaft end play and cause noisy operation. Too few gaskets will cause the crankshaft to bind and bearings to wear out.
3. Crankshaft	a. Remove from base. b. Clamp in soft jaw vise.	

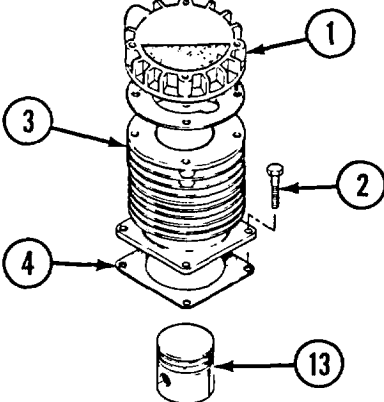
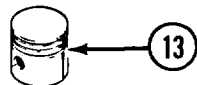
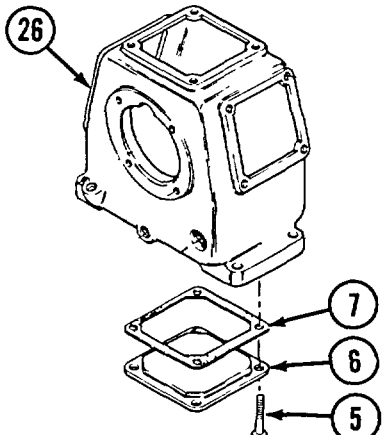
PISTONS, CRANKSHAFT AND CENTRIFUGAL UNLOADER MODEL 20-904 (Cont)

LOCATION/ITEM	ACTION	REMARKS
4. Wrist pin bearing	If bearing needs replacement, line up oil hole in bearing with oil hole in connecting rod.	If bearing is replaced, also replace wrist pin.
5. Pistons (9) and connecting rods (10)	a. Assemble with wrist pin (8). b. Wrist pin should be "tap" fit by hammer.	
6. Connecting rod to crankshaft	Tap to make sure rod is making contact.	
7. Connecting rod cap (11)	a. Install with two screws (12) and two lockwashers (13). b. Torque to 8 ft-lbs. c. Combined piston and connecting rod should turn slowly on the crankshaft of their own weight if bearing adjustment is correct.	
8. Crankshaft assembly (14) with pistons, connecting rods and oil ring (17)	Install in crankcase.	
9. Oil seal (16)	Install with lip side toward crankcase (15).	
10. Weights (18), springs (19) and rivets (20)	Assemble with shaft (21).	
11. Weight retainer and shaft assembly (21)	a. Install in crankshaft (22) (left hand threads). b. Tighten with a 5/8" open end wrench. Do not bend wings of weight retainer.	
12. Rivets (20)	Lubricate with OE 10.	
13. Spring (23)	Install in shaft (21).	
14. Plunger (24)	a. Lubricate with OE 10. b. Install.	

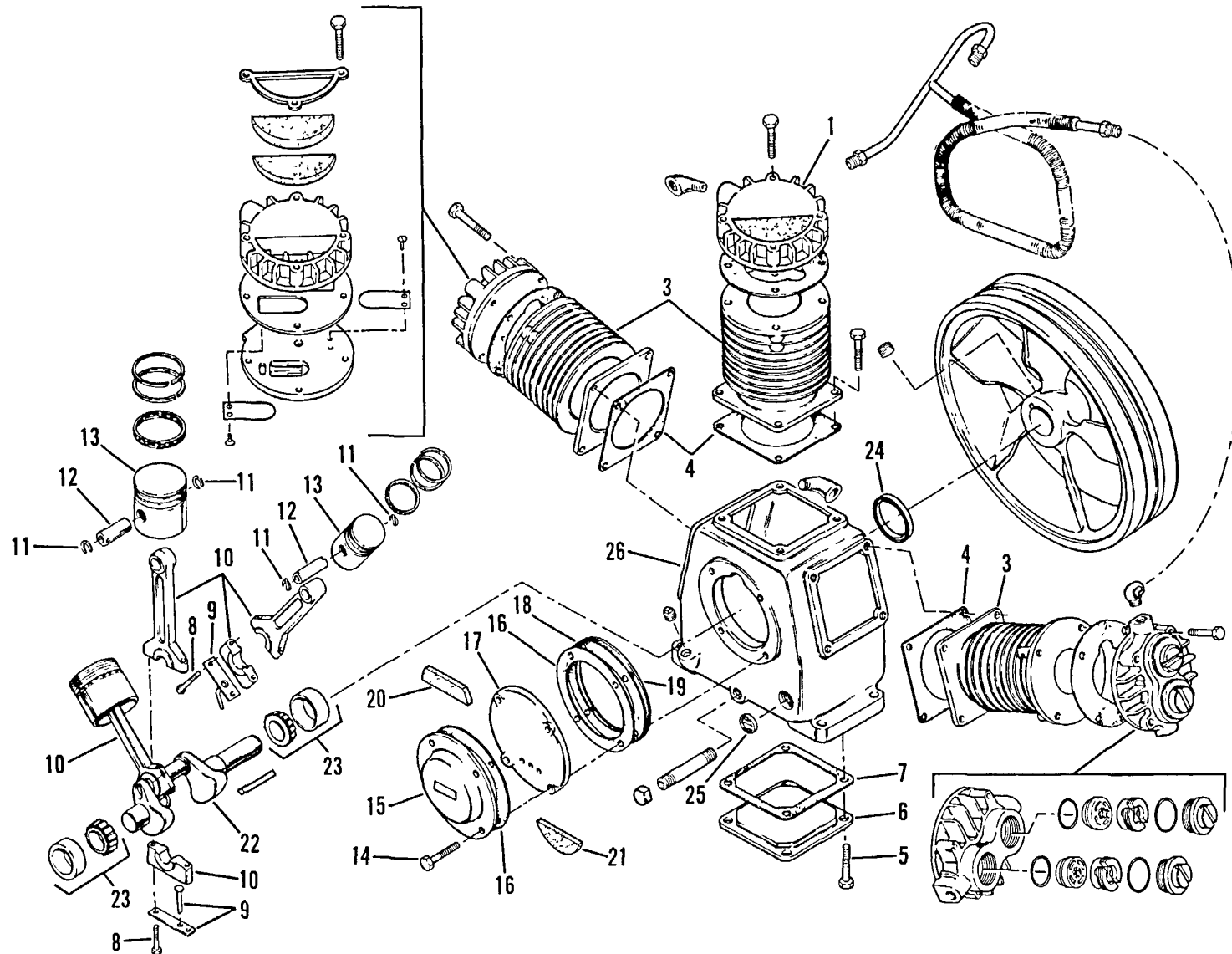
PISTONS, CRANKSHAFT AND CENTRIFUGAL UNLOADER MODEL 20-904 (Cont)

LOCATION/ITEM	ACTION	REMARKS	
15. Cover cup assembly (28) and gaskets (25, 26 and 27)	Install with screws (29).	Use the correct number of gaskets determined in Step 2.	
16. Valve (30)	Screw into elbow (32) until end is visible through opening.		
17. Locknut (31)	Screw on elbow (32).		
18. Elbow (32)	Screw into end cover (28).		Do not screw in too far or unloader plunger will permanently keep valve open.
19. Locknut (31)	Tighten		
20. Pistons (33)	Lubricate with OE 10.		
21. Cylinder (34) and gasket (35)	Install with screws (36).		
22. Crankcase	Fill with oil, OE 10 below 32°F (0°C) OE 30 above 32°F (0°C).		
23. Flywheel	Install		
24. Compressor	<p>a. Turn over a few times by hand to make sure there is no binding.</p> <p>b. If new pistons, rings, cylinders or bearings have been installed, run compressor in without the head installed for several hours.</p>	This insures that new parts seat. Head is kept off so compressor is run in without load and parts seat gradually.	

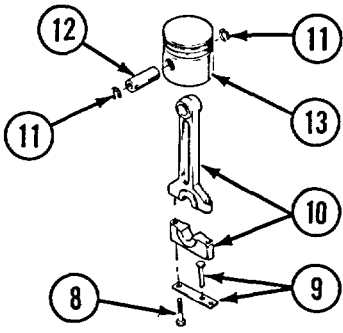
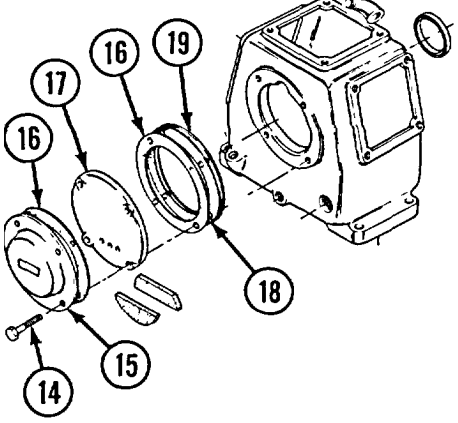
PISTONS, CRANKSHAFT AND CRANKCASE MODEL 20-911

LOCATION/ITEM	ACTION	REMARKS
<p>8-18. DISASSEMBLY</p>		
<p>1. Cylinder head (1)</p>	<p>Remove</p>	<p>(See para 8-13A, 8-13B)</p>
<p>2. Piston (13)</p>	<p>Mark top of all pistons on side closet to flywheel to be sure you install them in the same position.</p>	
<p>3. Capscrews (2)</p>	<p>Remove</p> <p style="text-align: center;">CAUTION</p> <p>Pistons and connecting rods may be damaged by hitting crankcase when the cylinders are removed. Support pistons when removing cylinders.</p>	
<p>4. Cylinder (3)</p>	<p>Remove by twisting slightly back and forth while pulling upward.</p>	<p>Support pistons from below when removing cylinders.</p>
<p>5. Gasket (4)</p>	<p>Discard</p>	<p>Used gaskets do not seal.</p>
<p>6. Crankcase (26)</p>	<p>Tip on it's side to gain access to hand hole plate on bottom of crankcase.</p>	
<p>7. Capscrews (5)</p>	<p>Remove.</p>	
<p>8. Hand hole plate (6)</p>	<p>Remove.</p>	
<p>9. Gasket (7)</p>	<p>Discard.</p>	<p>Used gaskets do not seal.</p> 

PISTONS, CRANKSHAFT AND CRANKCASE MODEL 20-911 (Cont)

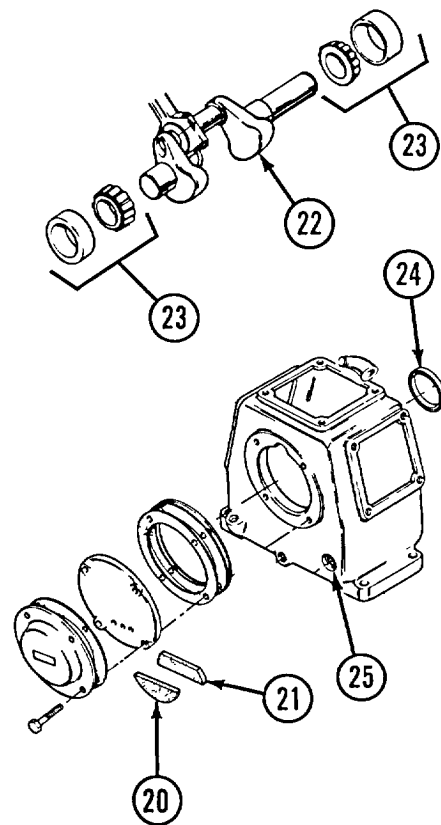


PISTONS, CRANKSHAFT AND CRANKCASE MODEL 20-911 (Cont)

LOCATION/ITEM	ACTION	REMARKS
	<p style="text-align: center;">NOTE</p> <p>Connecting rods and caps are a matched set and must be installed on crankshaft in the same position they originally occupied.</p> <p>Oil dippers are not interchangeable and must be installed in the same position they originally occupied.</p>	
10. Connecting rods (10) and dippers (9)	Mark and note position in relation to crankshaft.	To insure they will be installed correctly.
11. Capscrews (8), dippers (9), caps (10)	Remove.	Repeat steps 9 through 14 for each piston, connecting rod assembly.
12. Pistons and connecting rods (10)	Remove through top of crankcase.	
13. Retaining rings (11)	Remove.	
14. Piston pins (12)	Remove.	
15. Pistons (13)	Remove from connecting rods (10).	
16. Capscrews (14)	Remove.	
17. Breather chamber cover (15)	Remove.	
18. Gasket (16)	Discard.	Used gaskets do not seal.
19. Crankcase cover (17)	Remove.	
20. Gasket (16)	Discard.	Used gaskets do not seal.
21. Shims (18) and (19)	Remove.	

PISTONS, CRANKSHAFT AND CRANKCASE MODEL 20-911 (Cont)

LOCATION/ITEM	ACTION	REMARKS
22. Oil separator (20) and breather element (21)	Remove.	
23. Crankshaft (22)	Remove from crankcase.	Leave bearings (23) on crankshaft until after inspection.
24. Oil seal (24)	Remove by driving out from inside of crankcase and discard.	Used oil seals may not seal properly.
25. Oil level gage (25)	Do not remove unless unreadable or broken.	Oil level gage is press fit into crankcase and removal by driving out will destroy it.



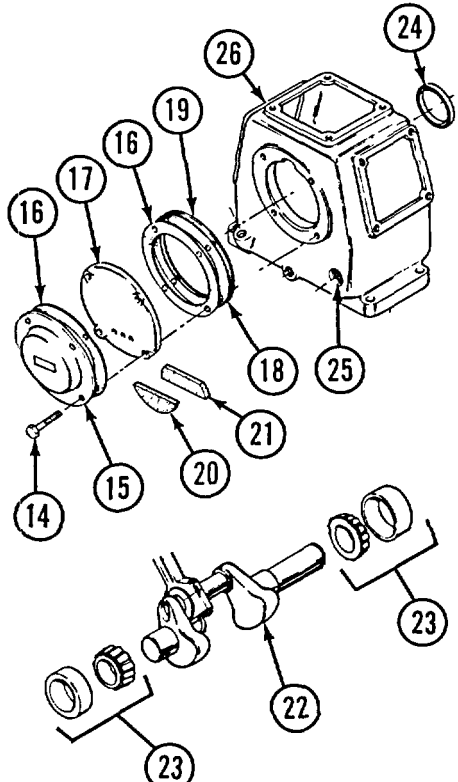
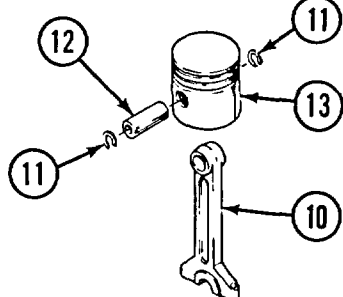
PISTONS, CRANKSHAFT AND CRANKCASE MODEL 20-911 (Cont)

LOCATION/ITEM	ACTION	REMARKS
<p>8-19. CLEANING, INSPECTION AND REPAIR</p> <p>1. All parts</p> <p>2. All painted surfaces</p> <p>3. Crankcase</p> <p>4. Crankshaft bearings</p>	<p style="text-align: center;"><u>WARNING</u></p> <p>Wear gloves or other skin protective equipment when working with cleaning solvents.</p> <p>Clean with cleaning solution.</p> <p style="text-align: center;"><u>WARNING</u></p> <p>Eye protective equipment must be worn when scraping rust and loose paint.</p> <p>a. Remove rust or loose paint with wire brush. b. Repaint affected area.</p> <p>a. Inspect for cracks. b. Replace if cracked.</p> <p>a. Inspect for pitting or signs of wear. b. Replace both bearings and bearing cups if bearings are bad.</p>	

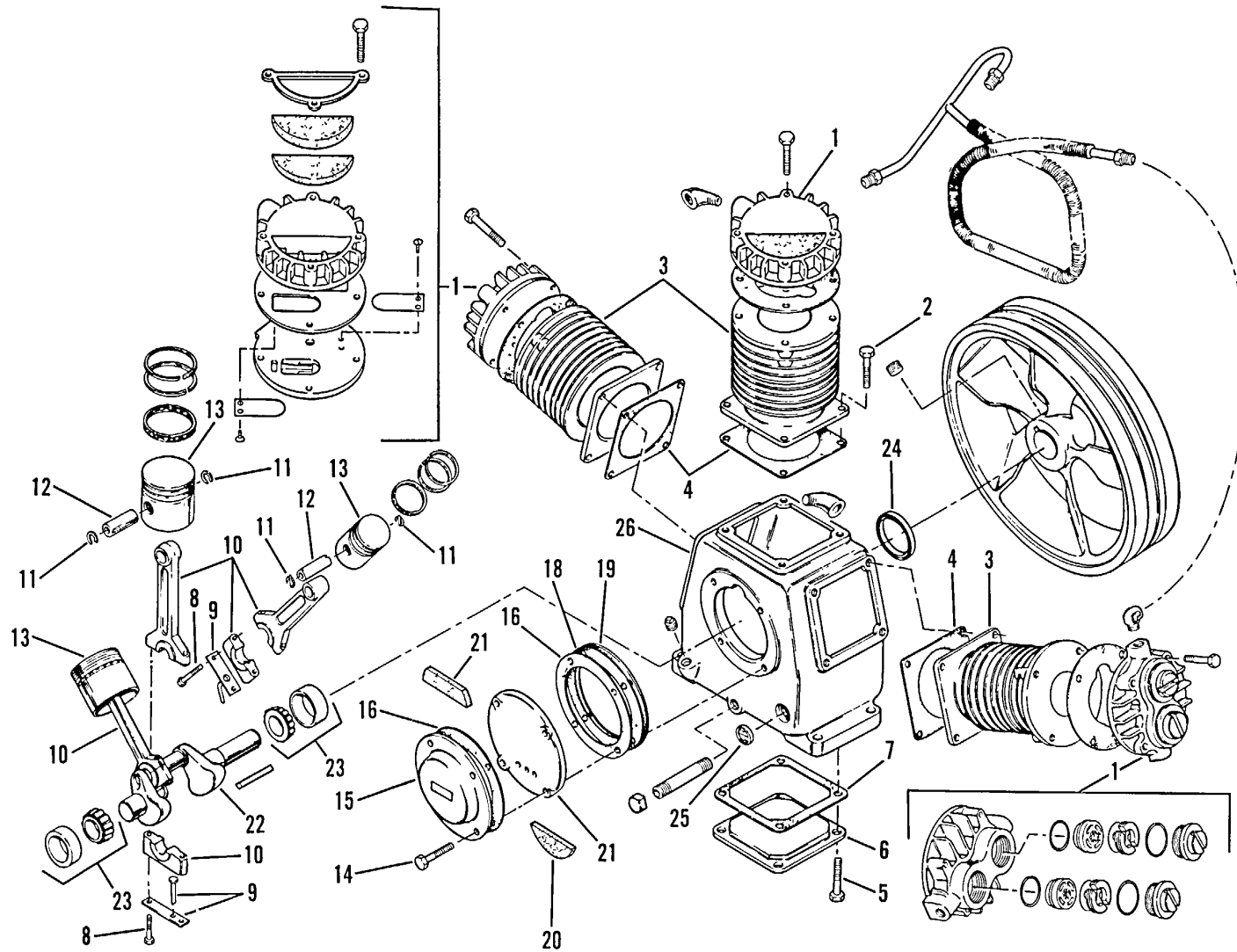
PISTONS, CRANKSHAFT AND CRANKCASE MODEL 20-911 (Cont)

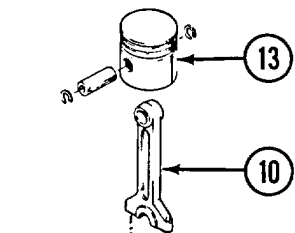
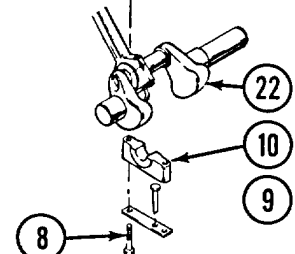
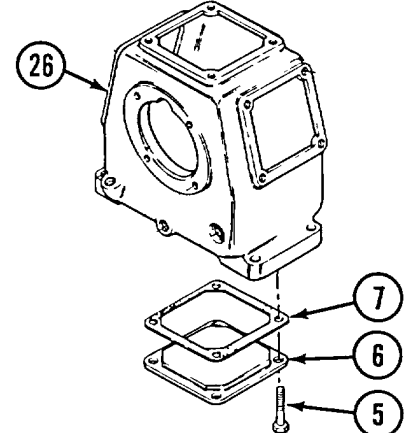
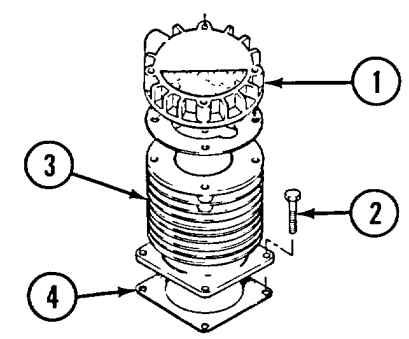
LOCATION/ITEM	ACTION	REMARKS
5. Crankshaft	a. Inspect for cracks, scoring or excessive wear. b. Replace if cracked, scored, or excessively worn.	
6. Connecting rods	a. Check for fit. rods. 1. Install connecting rod with piston to crankshaft. 2. Tighten connecting rod capscrews to 10 ft-lbs. 3. Combined piston and connecting rod should turn slowly on the crankshaft of their own weight. b. If connecting rod fit is too loose, replace connecting rod.	Repeat step 6 for all connecting rods.
7. Breather filter and silencer	Replace if cleaning is not effective.	
8. Oil level gage	a. Inspect for cracked glass or unreadable scale. b. Replace if glass is cracked or scale is unreadable.	Oil level gage should be removed only if defective.

PISTONS, CRANKSHAFT AND CRANKCASE MODEL 20-911 (Cont)

LOCATION/ITEM	ACTION	REMARKS
<p>8-20. ASSEMBLY</p> <p>1. Oil level gage (25)</p> <p>2. Oil seal (24)</p> <p>3. Crankshaft bearings (23)</p> <p>4. Crankshaft (22)</p> <p>5. Breather element (21) and oil separator (20)</p> <p>6. Shims (19), (18), gas-kets (16), covers (17) and (15)</p>	<p>Install in crankcase (26).</p> <p>Install in crankcase (26).</p> <p>Install on crankshaft (22).</p> <p>Install in crankcase (26).</p> <p>Install in breather chamber cover (15).</p> <p>a. Assemble together and place into position on crankcase (26).</p> <p>b. Attach with capscrews (14).</p>	<p>If removed after inspection.</p> <p>If removed after inspection.</p> 
<p>7. Crankshaft (22)</p>	<p>Turn over by hand.</p>	<p>Crankshaft should spin freely. Correct crankshaft adjustment is made by adding or removing shims (18) and (19).</p>
<p>8. Pistons (13) and connecting rods (10)</p>	<p>Assemble with piston pin (12) and retainers (11).</p> <p>CAUTION</p> <p>Connecting rods and caps are a matched set and must be installed as marked during disassembly procedure.</p>	

PISTONS, CRANKSHAFT AND CRANKCASE MODEL 20911 (Cont)



LOCATION/ITEM	ACTION	REMARKS
	<p>CAUTION</p> <p>Oil dippers are not interchangeable and must be installed as noted in disassembly procedure.</p>	
9. Connecting rods (10)	<p>a. Lubricate with OE/HDO 30 oil.</p>	
10. Oil dippers (9)	<p>b. Assemble with caps (10) to crankshaft (22).</p>	
11. Hand hole plate (6)	<p>a. Install on connecting rod caps (10) with capscrews (8).</p>	<p>b. Torque capscrews to 10 ft-lbs.</p>
12. Pistons (13) and cylinders (3)	<p>a. Assemble with gasket (7).</p>	<p>b. Install with capscrews (5).</p>
13. Cylinders (3)	<p>Lubricate with OE/H DO 30 oil.</p>	
14. Capscrews (2)	<p>a. Assemble with gaskets (4).</p>	<p>b. Install over pistons (13) and position on crankcase (26).</p>
15. Cylinder head (1)	<p>Install and tighten.</p>	
		
		<p>(See para 8-13A, 8-13B)</p>
15. Cylinder head (1)	<p>Install.</p>	<p>(See para 8-13A, 8-13B)</p>

CHAPTER 9 ELECTRIC MOTOR

9-1. CHAPTER OVERVIEW

This chapter covers maintenance of the electric motor. The electric motor consists of:

- Stator and Frame Assembly
- Rotor
- Capacitor
- Bearings
- Centrifugal switch

Section I covers troubleshooting of the motor. Section II covers maintenance of the motor.

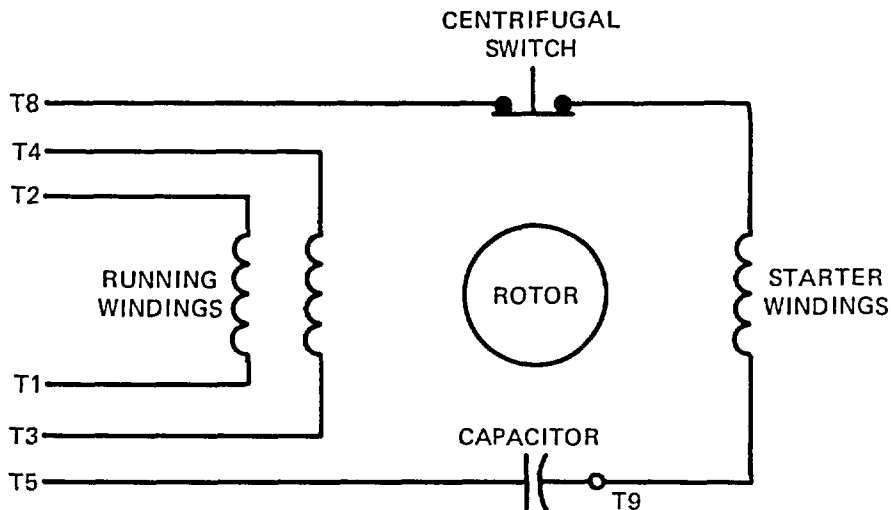
Section I. TROUBLESHOOTING PROCEDURES

9-2. GENERAL

The electric motor is made up of electrical and mechanical components. The main mechanical components to go bad are the bearings.

Other malfunctions are usually due to problems with the electrical components. The diagram below shows how the electrical components are wired.

Problems with the windings, centrifugal switch or capacitor will all cause motor malfunction. If the starter windings, switch or capacitor are bad, the motor will just sit and hum, but not start. If the running windings are bad, the motor will run at reduced output or not at all.



9-3. TROUBLESHOOTING CHART

The troubleshooting chart has three headings:

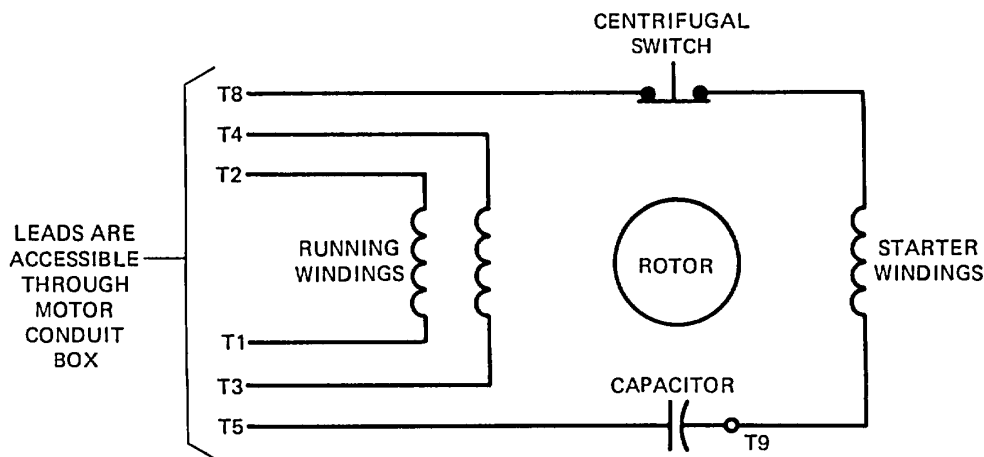
- **MALFUNCTION.** Malfunctions listed are the ones most likely to happen. Not all possible malfunctions can be foreseen and listed.
- **TEST OR INSPECTION.** Tests or inspections are listed to help you find the cause of the malfunction. The tests that are easiest to do are listed first. The tests that are hardest to do are listed last.
- **CORRECTIVE ACTION.** Corrective actions are listed to help you eliminate the malfunction. Where the corrective action is too complicated to be listed in full detail, the paragraph number of the detailed procedure is given in parentheses.

Troubleshooting

MALFUNCTION
 TEST OR INSPECTION
 CORRECTIVE ACTION

1. MOTOR HUMS BUT WON'T RUN

- Step 1. Check for bad capacitor. Substitute good 890 mfd capacitor or use capacitor tester to see if capacitor is 890 mfd. (para 9-8)
 Replace bad capacitor
- Step 2. Check for open centrifugal switch. (para 9-7)
 Replace switch.
- Step 3. Check for open starter windings. (para 9-8)
 Replace frame and stator assembly.



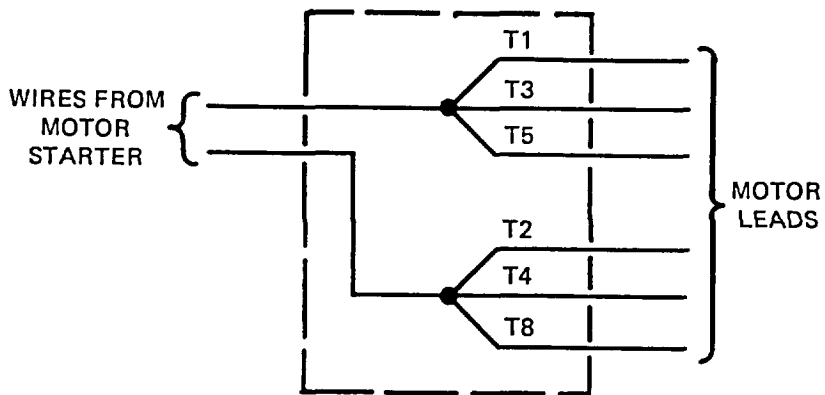
INTERNAL WIRING OF MOTOR

Troubleshooting (cont)

MALFUNCTION
 TEST OR INSPECTION
 CORRECTIVE ACTION

2. MOTOR WON'T RUN

- Step 1. Check if main power switch is open.
 Turn main power on.
- Step 2. Check motor controls. (para 6-3)
 Repair motor controls.
- Step 3. Check wiring of motor.
 Rewire motor correctly.



EXTERNAL WIRING OF MOTOR

- Step 4. Check for open running windings. Check for open circuit between T₁ and T₂ or T₃ and T₄. (para 9-8)
 Replace frame and stator assembly.
- Step 5. Check for shorts between windings and motor frame. (para 9-8)
 Replace frame and stator assembly.

3. MOTOR DOES NOT RUN AT FULL POWER

- Step 1. Check motor for internal short. (para 9-8): Remove drive belts from motor. Connect ammeter in series with motor. Run motor and check ammeter reading. If reading shows more than 27 amps, motor is internally shorted.
 Replace frame and stator assembly.

Section II. ELECTRIC MOTOR MAINTENANCE INSTRUCTIONS

9-4. MAINTENANCE SUMMARY

This task covers:

- a. Removal.
- b. Cleaning.
- c. Inspection.
- d. Repair.
- e. Testing.
- f. Assembly.
- g. Installation.

INITIAL SETUP

Test Equipment

Multimeter, Capacitor Tester,
Ammeter (50 ampere minimum)

Special Tools

None

Para

Equipment Condition

Condition Description

Personnel Required

7-5

Drive belts removed

1

7-5

Drive pulley removed

References

None

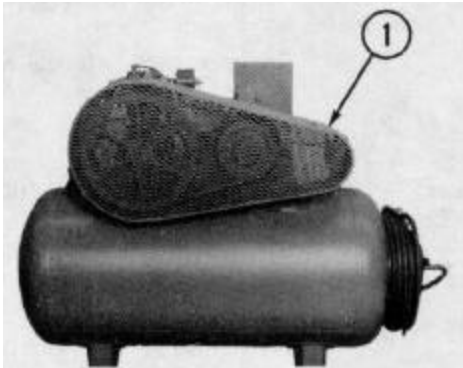
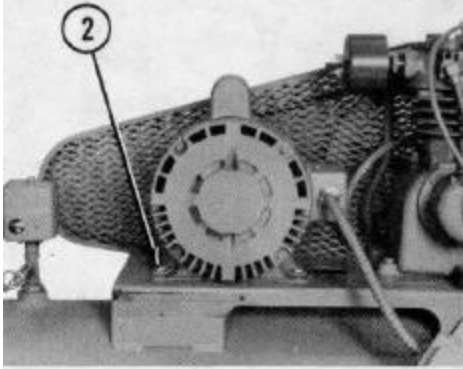
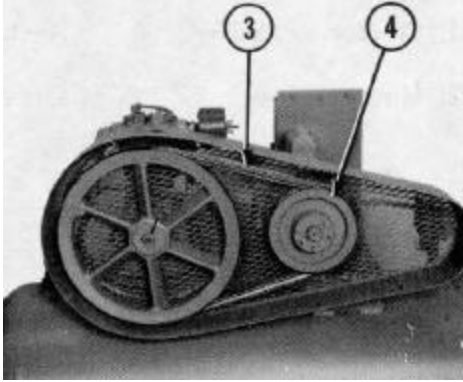
General Safety Conditions

Disconnect electrical power before performing maintenance procedures.

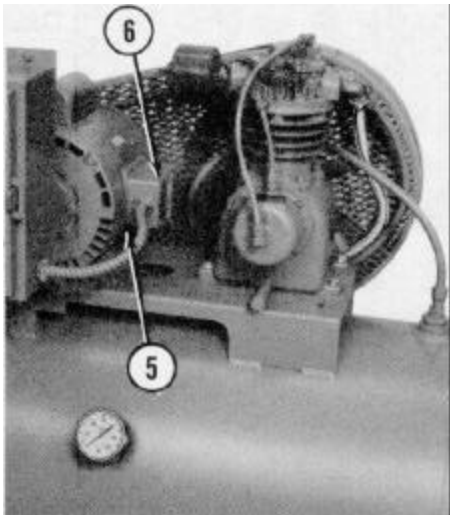
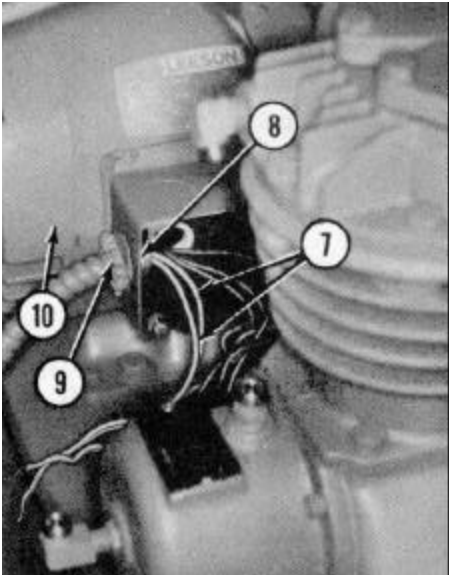
TASK SUMMARY

No.	Task	Ref.	Remarks
1	Disconnect main power	9-5	
2	Disconnect external wiring	9-5	
3	Remove motor	9-5	
4	Remove capacitor and case	9-6	Disassemble motor only far enough to isolate a problem.
5	Remove end bells	9-6	
6	Remove rotor and shaft assembly	9-6	
7	Remove bearings	9-4	
8	Remove centrifugal switch	9-4	
9	Clean, inspect and repair	9-7	
10	Test	9-8	
11	Install bearings	9-9	
12	Install centrifugal switch	9-9	
13	Install shaft and rotor assembly	9-9	
14	Install end bells	9-9	
15	Install capacitor	9-9	
16	Install motor on air tank	9-10	
17	Connect wiring to motor	9-10	

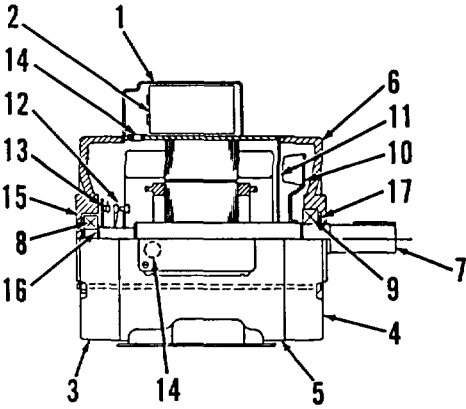
ELECTRIC MOTOR

LOCATION/ITEM	ACTION	REMARKS
<p>9-5. REMOVAL</p>		
<p>1. Main power switch</p>	<p>Disconnect</p>	
<p>2. Belt guard cover (1)</p>	<p>Remove</p>	
<p>3. 4 motor mounting screws (2), washers, lock-washers, and nuts</p>	<p>Remove</p>	
<p>4. Drive belts (3)</p>	<p>Remove</p>	
<p>5. Pulley and key (4)</p>	<p>Remove</p>	

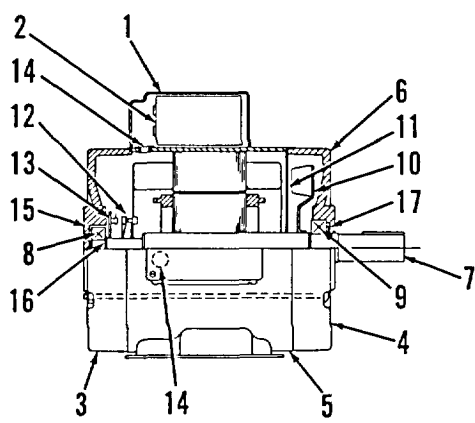
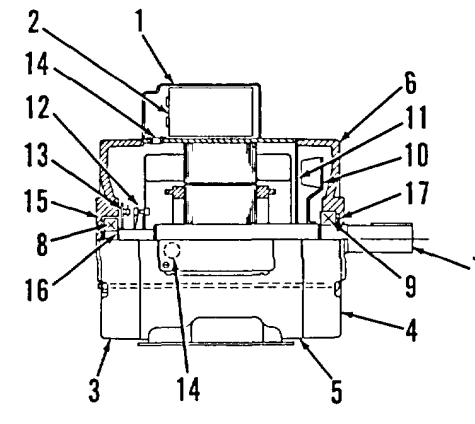
ELECTRIC MOTOR (cont)

LOCATION/ITEM	ACTION	REMARKS
6. 2 conduit box cover screws (5) and cover (6)	Remove	
7. 2 wires (7) from motor starter	Tag	
8. Wires (7) from motor starter	Disconnect from motor leads.	<p>Each wire is connected to 3 motor leads. Each motor lead is labeled. One wire is connected to motor leads T₁, T₃ and T₅. The other wire is connected to motor leads T₂, T₄ and T₈.</p>
9. Conduit lock nut (8)	Remove	
10. Conduit connector (9) and wires (7)	Pull out of conduit box.	
11. Conduit box cover	Replace	
12. Motor (10)	Lift from base.	

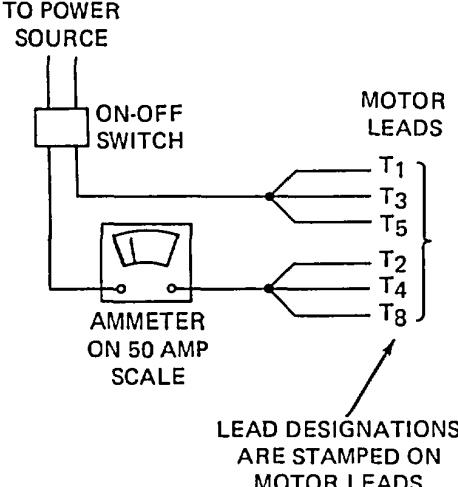
ELECTRIC MOTOR (cont)

LOCATION/ITEM	ACTION	REMARKS
<p>9-6. DISASSEMBLY</p> <p style="text-align: center;">NOTE</p> <p>Before beginning disassembly, slowly rotate motor shaft by hand to check out bearings. If you notice any rough spots or binding, bearings are bad and must be replaced. Bearings are sealed and cannot be visually inspected.</p> <p>1. Capacitor case (1)</p> <p>2. Capacitor (2)</p> <p>3. End bells (3 and 4) and frame (5)</p> <p>4. Thru bolts (6)</p> <p>5. End bells (3 and 4)</p> <p>6. Rotor and shaft assembly (7)</p> <p>7. Bearings (8 and 9)</p> <p>8. Fan (10)</p> <p>9. Baffle (11)</p> <p>10. Rotary switch (12)</p> <p>11. Stationary switch (13)</p>	<p>Remove</p> <p>Disconnect from leads and remove.</p> <p>Mark them so they can be correctly reassembled.</p> <p>Remove</p> <p>Remove</p> <p>Remove</p> <p>Remove from end bells.</p> <p>Remove</p> <p>Remove</p> <p>Remove</p> <p>Remove</p>	 <p>Pry loose with screwdriver if they don't separate easily.</p> <p>Remove only if proven bad before disassembly.</p>

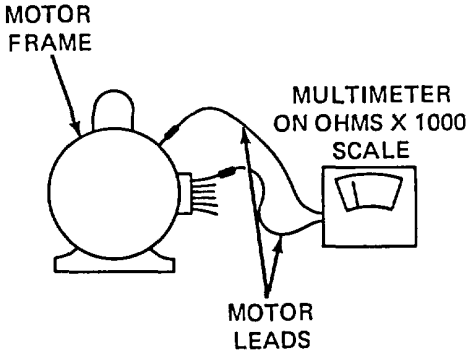
ELECTRIC MOTOR (cont)

LOCATION/ITEM	ACTION	REMARKS
<p>9-7. CLEANING, INSPECTION AND REPAIR</p> <p>1. Capacitor (2)</p> <p>2. End bells (3 and 4)</p> <p>3. Stator and frame assembly (5)</p> <p>4. Grommets (14)</p> <p>5. Stationary and rotary switch (13 and 12)</p> <p>6. Rotor and shaft (7) assembly</p>	<p>a. Inspect for corroded terminals.</p> <p>b. Clean with emery cloth if corrosion is present.</p> <p>Clean loose dirt from vent holes.</p> <p>WARNING</p> <p>Eye protective equipment must be worn when scraping rust and loose paint.</p> <p>a. Remove corrosion and loose paint with wire brush from frame exterior.</p> <p>b. Prime and repaint affected areas.</p> <p>c. Inspect leads and stator winding for evidence of burning.</p> <p>d. Replace stator and frame assembly if burned windings are found.</p> <p>e. Remove loose dirt from interior of stator with bristle brush or vacuum cleaner.</p> <p>Replace if missing.</p> <p>a. Inspect for burned or pitted contacts.</p> <p>b. If pitting is minor, remove with small file.</p> <p>c. If pitting can't be removed, replace switches.</p> <p>a. Inspect shaft for wear on bearing contact surfaces.</p> <p>b. Replace if wear is evident.</p> <p>c. Inspect keyway for nicks or deformation.</p> <p>d. Remove small nicks with file.</p> <p>e. Replace if keyway is damaged so the pulley won't seat securely.</p>	 <p>Grommets prevent wire insulation from being cut by sharp edges.</p> 

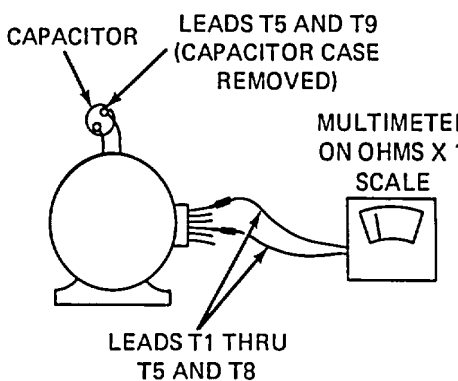
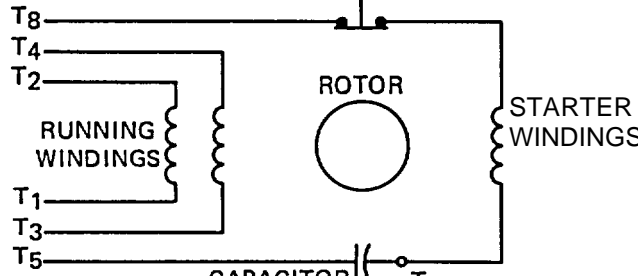
ELECTRIC MOTOR (cont)

LOCATION/ITEM	ACTION	REMARKS
7. Bearings (8 and 9)	If bearings checked out bad before disassembly (see note at beginning of para 9-6). Replace.	
9-8. TEST	<p style="text-align: center;">NO LOAD CURRENT TEST (TEST FOR INTERNAL SHORT)</p> <p>Preliminary conditions</p> <ul style="list-style-type: none"> • Motor must be completely assembled and mounted on a firm surface • Drive belts must be removed from motor so motor can run without load. 	If motor is run under load, test readings may be high.
1. Electric power to motor	Disconnect	A good motor will only draw 27 amps when running, but when the motor is first turned on it draws a lot more than its rated current. This initial current surge can damage the meter movement if the meter is not turned to a high enough scale.
2. Ammeter	<p>a. Set on maximum amp scale (50 amp minimum)</p> <p>b. Connect to motor as shown.</p> <p style="text-align: center;">WARNING</p> <p>Voltages present in motor under power can cause death or injury. Do not touch any bare wires while motor is under power.</p> <p style="text-align: center;">CAUTION</p> <p>When hooking up the multimeter, make sure no bare wires or test probes touch any metal surfaces or shorts may occur.</p>	 <p style="text-align: center;">TO POWER SOURCE</p> <p style="text-align: center;">ON-OFF SWITCH</p> <p style="text-align: center;">MOTOR LEADS</p> <p style="text-align: center;">T1 } T3 } T5 } T2 } T4 } T8 }</p> <p style="text-align: center;">AMMETER ON 50 AMP SCALE</p> <p style="text-align: right;">LEAD DESIGNATIONS ARE STAMPED ON MOTOR LEADS</p>

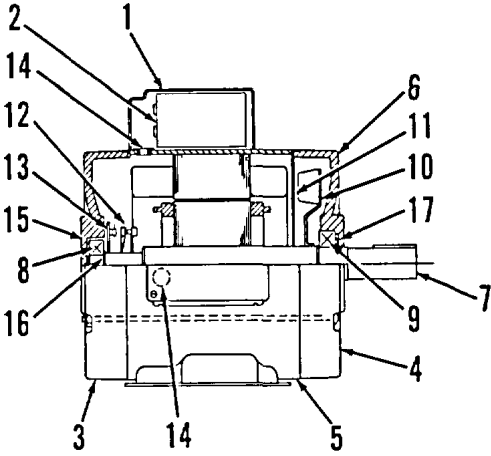
ELECTRIC MOTOR (cont)

LOCATION/ITEM	ACTION	REMARKS
<p>3. Electric power</p> <p>1. Multimeter</p> <p>2. Multimeter test leads</p>	<p>Connect to motor.</p> <p>TEST FOR WINDING TO FRAME SHORTS</p> <p>Preliminary conditions</p> <ul style="list-style-type: none"> • Motor leads disconnected from power source. <p>Set to ohms x 1000 scale.</p> <p>Connect one test lead to the motor frame and one test lead to each of the motor leads in turn.</p> <p>NOTE</p> <p>Make sure the lead connected to the motor frame is touching bare metal. If necessary, scratch through the paint to get metal to metal contact.</p>	<p>Motor should run and multimeter should read 27 amps or less. A reading of more than 27 amps means that the motor windings are shorted.</p>  <p>MULTIMETER ON OHMS X 1000 SCALE</p> <p>Multimeter should read ∞ (infinite). If meter reads between infinity and zero, the stator windings are shorted and must be replaced.</p>

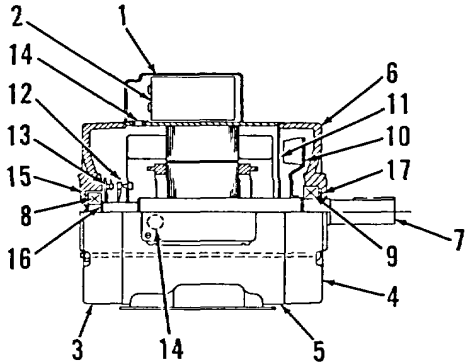
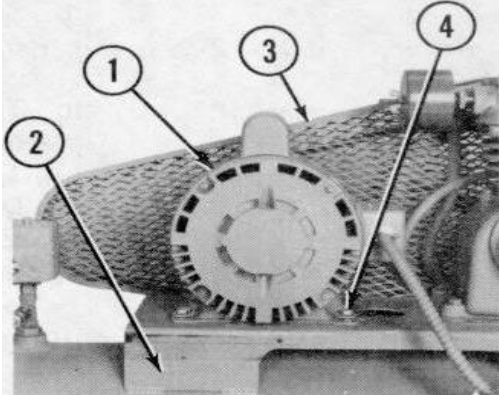
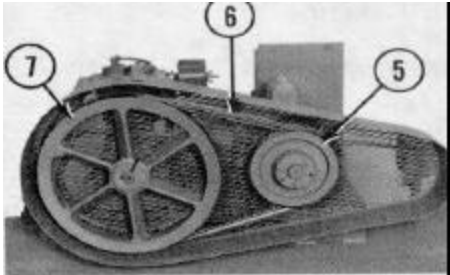
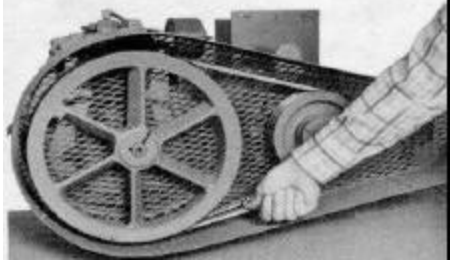
ELECTRIC MOTOR (cont)

LOCATION/ITEM	ACTION	REMARKS															
<p>1. Multimeter</p> <p>2. Multimeter test leads</p>	<p>TEST FOR OPEN STATOR WINDINGS</p> <p>Preliminary conditions</p> <ul style="list-style-type: none"> • Motor fully assembled. • Motor leads disconnected from power source. • Capacitor case removed to capacitor accessible. <p>Set to OHMS x 1 scale.</p> <p>Connect to motor leads as shown in table.</p>	 <p>CAPACITOR LEADS T5 AND T9 (CAPACITOR CASE REMOVED)</p> <p>MULTIMETER ON OHMS X 1 SCALE</p> <p>LEADS T1 THRU T5 AND T8</p>															
	<table border="1"> <thead> <tr> <th data-bbox="574 764 688 852">Step</th> <th data-bbox="688 764 870 852">Connect test leads to</th> <th data-bbox="870 764 1019 852">Reading</th> </tr> </thead> <tbody> <tr> <td data-bbox="574 852 688 884">1</td> <td data-bbox="688 852 870 884">T1 and T2</td> <td data-bbox="870 852 1019 884">0</td> </tr> <tr> <td data-bbox="574 884 688 915">2</td> <td data-bbox="688 884 870 915">T3 and T4</td> <td data-bbox="870 884 1019 915">0</td> </tr> <tr> <td data-bbox="574 915 688 947">3</td> <td data-bbox="688 915 870 947">T9 * and T8</td> <td data-bbox="870 915 1019 947">0</td> </tr> <tr> <td data-bbox="574 947 688 978">4</td> <td data-bbox="688 947 870 978">T5 and T8</td> <td data-bbox="870 947 1019 978">∞</td> </tr> </tbody> </table>	Step	Connect test leads to	Reading	1	T1 and T2	0	2	T3 and T4	0	3	T9 * and T8	0	4	T5 and T8	∞	<p>A reading of infinity in steps 1 or 2 means that one of the windings is open. A reading of infinity in step 3 means that either the starter winding or the centrifugal switch is open. A reading of 0 in step 4 means that the capacitor is shorted.</p>
Step	Connect test leads to	Reading															
1	T1 and T2	0															
2	T3 and T4	0															
3	T9 * and T8	0															
4	T5 and T8	∞															
<p>1. Multimeter</p> <p>2. Multimeter test leads</p>	<p>*Tag is one of the capacitor leads</p> <p>CAPACITOR TEST</p> <p>Set to OHMS x 1000 scale.</p> <p>Connect to two capacitor leads.</p> <p>CENTRIFUGAL SWITCH (CLOSED WHEN ROTOR IS NOT TURNING)</p>	<p>Multimeter should read infinity. When you first touch the leads to the capacitor, there might be a small deflection of the meter needle because the capacitor is being charged up. A reading of 0 means the capacitor is shorted out.</p>															
	 <p>T8</p> <p>T4</p> <p>T2</p> <p>RUNNING WINDINGS</p> <p>T1</p> <p>T3</p> <p>T5</p> <p>ROTOR</p> <p>STARTER WINDINGS</p> <p>CAPACITOR T9</p>																


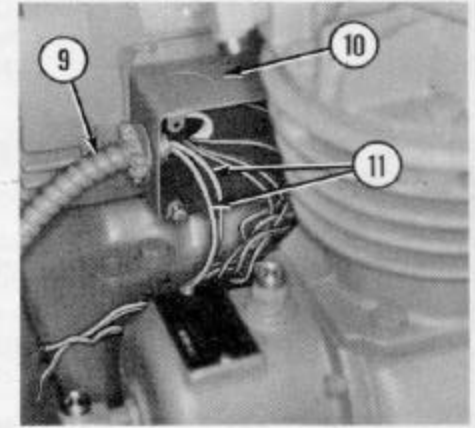
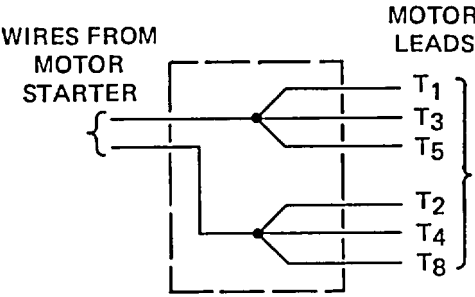
ELECTRIC MOTOR (cont)

LOCATION/ITEM	ACTION	REMARKS
<p>3. Capacitor</p>	<p>Connect to a capacitance meter.</p>	<p>Reading should be 815 to 975 mfd. If you think the capacitor is bad and a meter is not available, try substituting a good 890 mfd capacitor for the one you think is bad and the motor should</p>
<p>9-9. ASSEMBLY</p> <p>1. Shim (15)</p> <p>2. Bearing (8)</p> <p>3. Stationary switch (13)</p> <p>4. Rotary switch (12)</p> <p>5. Bearing spacer (16)</p> <p>6. Shaft and rotor assembly (7)</p> <p>7. End bell (3)</p> <p>8. Baffle (11)</p> <p>9. Fan (10)</p> <p>10. Wavy spring (17)</p> <p>11. Bearing (9)</p> <p>12. Thru bolt (6)</p> <p>13. End bell (4)</p>	<p>Install in end bell (3).</p> <p>Install in end bell (3).</p> <p>Mount on end bell (3).</p> <p>Install on shaft (7).</p> <p>Install on shaft (7).</p> <p>Slide into frame and stator assembly (5).</p> <p>Slide onto end of shaft (7)</p> <p>Slide onto shaft (7) until it touches frame.</p> <p>Slide onto shaft (7).</p> <p>Install in end bell (4).</p> <p>Install in end bell (4).</p> <p>a. Use to line up holes in end bell (3) and baffle (11).</p> <p>Slide onto shaft (7).</p>	 <p>End bell should be mounted with ventilation slots toward bottom. Also observe alinement marks made before disassembly on end bell and frame.</p> <p>Alinement marks on end bell and frame must line up.</p>

ELECTRIC MOTOR (cont)

LOCATION/ITEM	ACTION	REMARKS
14. Thru bolts (6) 15. Capacitor (2) 16. Capacitor case (1)	Install and tighten. a. Connect to stator leads. b. Slide into case (1) Mount on frame.	
<p>9-10. INSTALLATION</p> 1. Motor (1) 2. 4 mounting screws (4), washers, lockwashers and nuts 3. Pulley (5) 4. 2 belts (6) 5. Belts (6) 6. Mounting screws (4)	Position on base (2) with shaft into the belt guard (3) Install, but do not tighten. Install on shaft. Install over pulley and flywheel (7). Adjust tension by moving motor so belts can be pushed down 1/2 inch halfway between pulley and flywheel. Tighten	 <p>Motor must be free to move until belts have been installed.</p>  

ELECTRIC MOTOR (cont)

LOCATION/ITEM	ACTION	REMARKS
7. Belt guard cover (8)	Install	
8. Conduit (9) 9. Starter wires (11)	Connect to conduit box (10). a. Connect to motor wires. b. Starter wire from T ₂ terminal of starter is joined with motor wires T ₁ , T ₃ , T ₅ c. The other starter wire is connected to motor wires T ₂ , T ₄ and T ₈ . d. Double check wiring. Incorrect wiring will cause defective operation of motor.	
10. Conduit box cover	Install	
11. Main power	Connect	 <p>MOTOR LEADS ARE MARKED WITH WIRE DESIGNATION</p>
12. Drain cock on air tank	Open until motor starts, then close again.	A properly wired motor will start up and turn counterclockwise as viewed from the pulley end.

CHAPTER 10

AIR RECEIVER AND AIR DISCHARGE SYSTEM

10-1. CHAPTER OVERVIEW

This chapter covers maintenance of air receiver and air discharge system. The air receiver and discharge system consists of:

- Air tank.
- Check valve.
- Pressure gage.
- Drain cock.
- Air hose.
- Inflator gage.

Section I covers troubleshooting of the system. Section II covers maintenance of the system.

Section I. TROUBLESHOOTING PROCEDURES

10-2. GENERAL

The main problem with the air receiver and discharge system is air leakage. You can find leaks by putting soap solution in the area of the suspected leak. If the leak can't be stopped by tightening fittings, replace the part. Use sealing tape on pipe fittings to get a good seal. Do not use sealing tape on hose fittings which are self-sealing.

10-3. TROUBLESHOOTING CHART

The troubleshooting chart has three headings:

- **MALFUNCTION.** Malfunctions listed are the ones most likely to happen. Not all possible malfunctions can be foreseen and listed.
- **TEST OR INSPECTION.** Tests or inspections are listed to help you find the cause of the malfunctions. The tests that are easiest to do are listed first. The tests that are hardest to do are listed last.
- **CORRECTIVE ACTION.** Corrective actions are listed to help you eliminate the malfunction. Where the corrective action is too complicated to be listed in full detail, the paragraph number of the detailed procedure is given in parentheses.

Troubleshooting

MALFUNCTION	
	TEST OR INSPECTION
	CORRECTIVE ACTION

1. AIR RECEIVER LOSES PRESSURE

Step 1. Check for air leaks with soap solution.

- a. Tighten loose fittings.
- b. Replace leaky parts.

**Section II. AIR RECEIVER AND AIR DISCHARGE SYSTEM
MAINTENANCE INSTRUCTIONS**

10-4. MAINTENANCE SUMMARY

This task covers:

- a. Removal.
- b. Cleaning.
- c. Inspection.
- d. Repair.
- e. Installation.

INITIAL SETUP

Special Tools

None

General Safety Conditions

Bleed air from system before starting on maintenance.

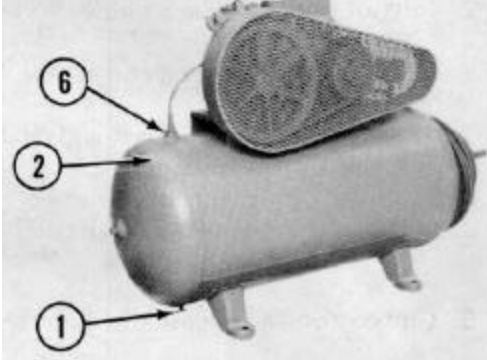
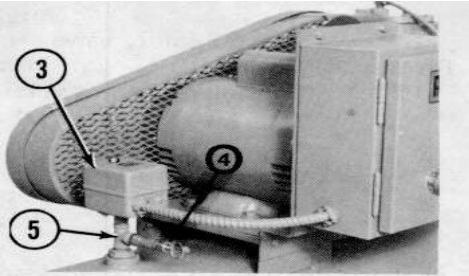
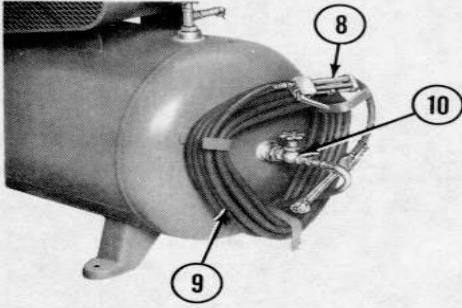
Personnel Required

1

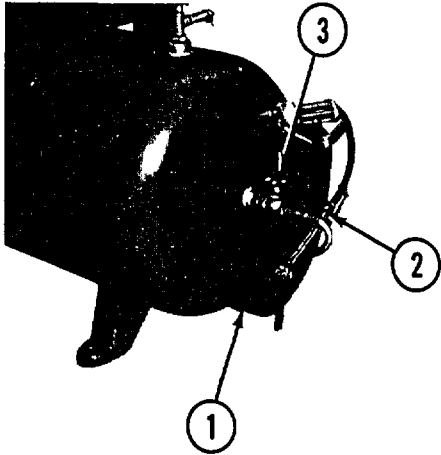
TASK SUMMARY

No	Task	Ref	Remarks
1	Remove pressure switch	10-5	
2	Remove safety valve	10-5	
3	Remove check valve	10-5	
4	Remove pressure gage	10-5	
5	Remove inflator gage	10-5	
6	Remove air hose	10-5	
7	Remove globe valve	10-5	
8	Clean, inspect and repair	10-6	
9	Install globe valve	10-7	
10	Install air hose	10-7	
11	Install inflator gage	10-7	
12	Install check valve	10-7	
13	Install pressure gage	10-7	
14	Install safety valve	10-7	
15	Install pressure switch	10-7	

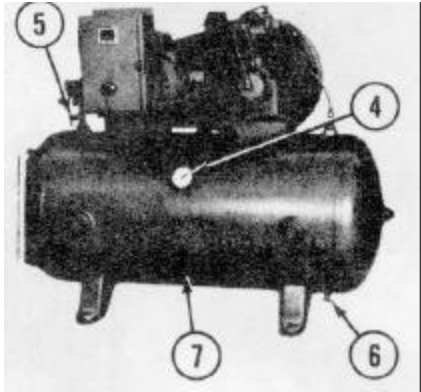
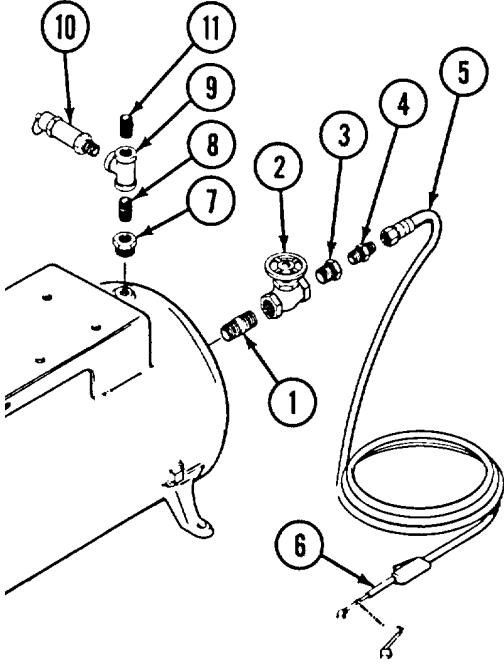
AIR RECEIVER AND AIR DISCHARGE SYSTEM

LOCATION/ITEM	ACTION	REMARKS
10-5. DISASSEMBLY		
1. Main power	Disconnect	To eliminate electrical shock hazard. To prevent accidental startup of compressor.
2. Drain cock (1)	Open to release air, then unscrew from tank (2).	Air in tank must be discharged before system can be disassembled.
3. Pressure switch (3) 4. Safety relief valve (4) 5. Pipe nipples & tee (5) 6. Check valve (6) (Model 20-904) 6A. Check valve (6) (Model 20-911)	Remove Remove Unscrew Unscrew	 <p>See para 6-11 for procedure.</p>
7. Gage (7)	Unscrew	
8. Inflator gage (8)	Unscrew from hose (9).	
9. Hose (9)	Unwind and unscrew from globe valve (10).	
10. Globe valve (10)	Unscrew	

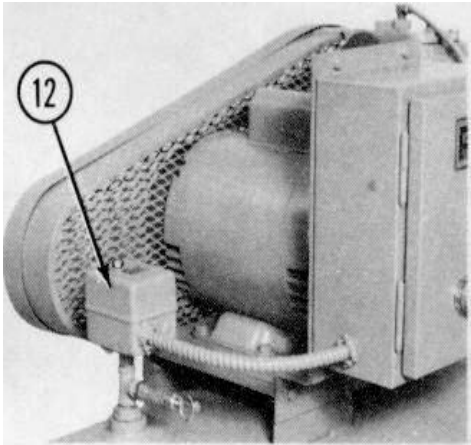

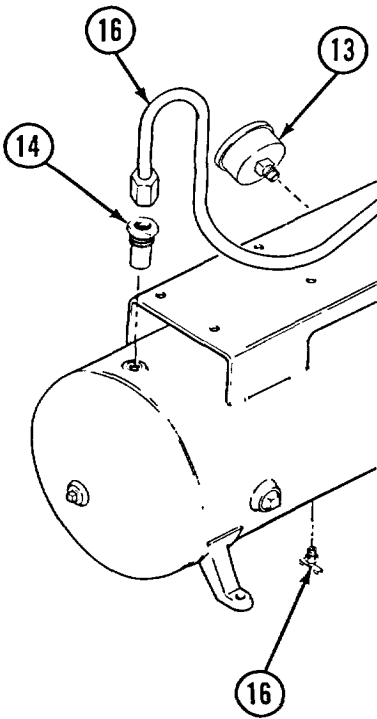
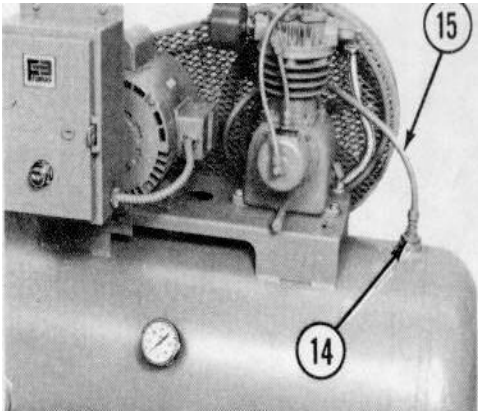
AIR RECEIVER AND AIR DISCHARGE SYSTEM (cont)

LOCATION/ITEM	ACTION	REMARKS
<p>10-6. CLEANING, INSPECTION AND REPAIR</p> <p>1. Air hose (1)</p> <p>2. Inflator gage (2)</p> <p>3. Globe valve (3)</p> <p>4. Pressure gage (4)</p> <p>5. Safety relief valve (5)</p>	<p>a. Inspect for:</p> <p>(1) Cuts</p> <p>(2) Damaged threads on fittings causing air leakage.</p> <p>b. Replace hose if it shows any of these defects.</p> <p>a. Inspect for:</p> <p>(1) Cut hose whip</p> <p>(2) Cracked gage glass.</p> <p>(3) Unreadable gage.</p> <p>(4) Conditions which would cause leaks.</p> <p>(5) Damaged threads;</p> <p>b. Replace inflator gage if it shows any of these defects.</p> <p>a. Inspect for:</p> <p>(1) Resistance to turning of hand wheel.</p> <p>(2) Damaged threads.</p> <p>b. Replace valve if it shows either of these defects.</p> <p>a. Inspect for:</p> <p>(1) Cracked glass.</p> <p>(2) Bent needle.</p> <p>(3) Unreadable scale.</p> <p>(4) Fluid leak.</p> <p>b. Replace gage if it shows any of these defects.</p> <p>a. Inspect for:</p> <p>(1) Corrosion of internal pans.</p> <p>(2) Damaged threads.</p> <p>(3) Missing lead and wire seal.</p> <p>b. Replace valve if conditions (1) or (2) are found.</p> <p>c. Check adjustment if condition (3) is found.</p>	 <p>Indication that factory adjustment has been changed.</p>

AIR RECEIVER AND AIR DISCHARGE SYSTEM (cont)

LOCATION/ITEM	ACTION	REMARKS
6. Drain cock (6)	a. Inspect for: (1) Damaged threads. (2) Corrosion. b. Replace if either of these defects are found. c. Clean up minor corrosion with wire brush.	
7. Air tank (7)	a. Inspect for corrosion and peeling paint. <p style="text-align: center;">WARNING Eye protective equipment must be worn when scraping rust and loose paint.</p> b. Remove corrosion and loose paint with wire brush. c. Prime and repaint affected areas.	
<p>10-7. INSTALLATION</p> 1. Pipe nipple (1) 2. Globe valve (2) 3. Reducer bushing (3) 4. Adapter (4) 5. Hose (5) 6. Inflator gage (6) 7. Reducer bushing (7) 8. Nipple (8) 9. Tee (9) 10. Safety relief valve (10) 11. Nipple (11)	Screw into tank. Screw onto nipple. Screw into globe valve. Screw into bushing. Screw onto adapter. Screw onto hose. Screw into air tank. Screw into bushing. Screw onto nipple. Screw into tee. Screw into tee.	

AIR RECEIVER AND AIR DISCHARGE SYSTEM (cont)

LOCATION/ITEM	ACTION	REMARKS
12. Pressure switch (12)	Install on nipple.	See para 6-13 for procedure.
13. Pressure gage (13)	Screw into air tank.	
14. Check valve (14)	Screw into tank.	
15. Aftercooler (15)	a. Connect to check valve. (1) Screw fitting to check valve. (2) Connect aftercooler tube nut to fitting.	
16. Unloader tube (16) (Model 20-911 only)	Connect to check valve	
		<p>The aftercooler fitting comes in two pieces.</p> 

APPENDIX A

REFERENCES

A-1. MAINTENANCE

TM 5-4310-362-24P

Organizational, Direct Support and General Support Repair Parts and Special Tools List for Compressor, Reciprocating, Air; Electric Motor Driven, 5 cfm, 175 psi, NSN 4310-01-064-2386

TM 38-750

The Army Maintenance Management System (TAMMS)

A-2. DESTRUCTION TO PREVENT ENEMY USE

TM 750-244-3

Procedures for Destruction of Equipment to Prevent Enemy Use

A-3. ADMINISTRATIVE STORAGE

TM 740-90-1

Administrative Storage of Equipment

A-4. PRESERVATION AND PACKAGING

TM 38-230

Preservation, Packaging, and Packing of Military Supplies and Equipment

APPENDIX B

COMPONENTS OF END ITEM LIST

Section I. INTRODUCTION

B-1. SCOPE

This appendix lists Integral Components of and Basic Issue Items (B11) for the Air Compressor to help you inventory items required for safe and efficient operation.

B-2. GENERAL

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

a. Section II. Integral Components of the End Item. These items, when assembled, comprise the Air Compressor 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 Air Compressor in operation, to operate it and to perform emergency repairs. Although shipped separately packed, they must accompany the Air Compressor 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 Tables) 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: "USABLE ON" codes are included to help you identify which component items are used on the different models. Identification of the codes used in this list are:

CODE

USED ON

g. Quantity Required (Qty Reqd): This column list 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		(2)	(3)	(4)	(5)	(6)	(7)	(8) QUANTITY			
(a) FIGURE NO.	(b) ITEM NO.	NATIONAL STOCK NUMBER	PART NO. & FSCM	DESCRIPTION	LOCATION	USABLE ON CODE	QTY RECD	RCV'D	DATE	DATE	DATE
		4720-00-874-3179	2538A (11568)	Hose Assembly, Air							
		4910-00-030-2365	61J21506 (94894)	Inflator Gage, Assembly							

Section III.

BASIC ISSUE ITEMS

(1) ILLUSTRATION		(2)	(3)	(4)	(5)	(6)	(7)	(8) QUANTITY			
(a) FIGURE NO.	(b) ITEM NO.	NATIONAL STOCK NUMBER	PART NO. & FSCM	DESCRIPTION	LOCATION	USABLE ON CODE	QTY RECD	RCV'D	DATE	DATE	DATE
				TM 5-4310-362-14 Operators Organizational, Direct Support, and General Support Maintenance Manual for Compressor, Reciprocating, Air; Electric Motor Driven, 5 cfm, 175 psi			1				

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. The Maintenance Allocation Chart (MAC) in 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 lists the special tools and test equipment required for each maintenance function as referenced from Section II.

d. Section IV contains supplemental instructions on explanatory notes for a particular maintenance function.

C-2. MAINTENANCE FUNCTIONS

a. Inspect. To determine the serviceability of an item by comparing its physical, mechanical and/or electrical characteristics with established standards through examination.

b. Test. To verify serviceability and detect incipient failure by measuring the mechanical or electrical characteristics of an item and comparing those characteristics with prescribed standards.

c. Service. Operations required periodically to keep an item in proper operating condition, i.e., to clean (decontaminate) , to preserve, to drain, to paint, or to replenish fuel, lubricants, hydraulic fluids, or compressed air supplies.

d. Adjust. To maintain, within prescribed limits, by bringing into proper or exact position, or by setting the operating characteristics to specified parameters.

e. Align. To adjust specified variable elements of an item to bring about optimum or desired performance.

f. Calibrate. To determine and cause corrections to be made or to be adjusted on instruments or test measuring and diagnostic equipments used in precision measurement Consists of 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.

g. Install. The act of emplacing, seating, or fixing into position an item, part, or module (component or assembly) in a manner to allow the proper functioning of an equipment or system.

h. Replace. The act of substituting a serviceable like type part, subassembly, or module (component or assembly) for an unserviceable counterpart.

i. Repair. The application of maintenance services (inspect, test, service, adjust, align, calibrate or replace) or other maintenance actions (welding, grinding, riveting, straightening, facing, remachining or resurfacing) to restore serviceability to an item by correcting specific damage, fault, malfunction, or failure in a part, subassembly, module (component or assembly) , end item, or system.

j. Overhaul. That maintenance effort (services/actions) necessary to restore an item to a completely serviceable/operational condition as prescribed by maintenance standards (i.e., DMWR) in appropriate technical publications. Overhaul is normally the highest degree of maintenance performed by the Army. Overhaul does not normally return an item to like new condition.

k. Rebuild. Consists of those services/actions necessary for the restoration of unserviceable equipment to a like new condition in accordance with original manufacturing standards. Rebuild is the highest degree of materiel maintenance applied to Army equipment The rebuild operation includes the act of returning to zero those age measurements (hours/miles, etc.) considered in classifying Army equipments/components.

C-3. COLUMN ENTRIES USED IN THE MAC

a. Column 1, Group Number. Column 1 lists group number, the purpose of which is to identify components, assemblies, subassemblies, and modules with the next higher assembly.

b. Column 2, Component/Assembly. Column 2 contains the names of components, assemblies, subassemblies, and modules for which maintenance is authorized.

c. Column 3, Maintenance Functions. Column 3 lists the functions to be performed on the item listed in Column 2. (For detailed explanation of these functions, see paragraph D-2.)

d. Column 4, Maintenance Level. Column 4 specifies, by the listing of a "work time" figure in the appropriate subcolumn (s) , the lowest level of maintenance authorized to perform the function listed in Column 3. This figure represents the active time required to perform the maintenance function at the indicated level of maintenance. If the number or complexity of the tasks within the listed maintenance function vary at different maintenance levels, appropriate work time figures will be shown for each level. The number of man-hours specified by the work time figure represents the average time required to restore an item (assembly, subassembly, component, module, end item, or system) to a serviceable condition under typical field operating conditions. This time includes preparation time, troubleshooting time, and quality assurance/quality control time in addition to the time required to perform the specific tasks identified for the maintenance functions authorized in the maintenance allocation chart. The symbol designations for the various maintenance levels are as follows:

- COperator or crew
- OOrganizational maintenance
- F.....Direct support maintenance
- HGeneral support maintenance
- DDepot maintenance

e. Column 5, Tools and Equipment Column 5 specifies, by code, those common tool sets (not individual tools) and special tools, test, and support equipment required to perform the designated function.

f. Column 6, Remarks. This column contains a letter code in alphabetic order which is keyed to the remarks contained in Section IV.

C-4. COLUMN ENTRIES USED IN TOOL AND TEST EQUIPMENT REQUIREMENTS

- a. Column 1, Tool or Test Equipment Reference Code. The tool and test equipment reference code correlates with a maintenance function on the identified end item or component.
- b. Column 2, Maintenance Level. The lowest level of maintenance authorized to use the tool or test equipment c. Column 3, Nomenclature. Name or identification of the tool or test equipment.
- d. Column 4, National/NATO Stock Number. The National or NATO stock number of the tool or test equipment.
- e. Column 5, Tool Number. The manufacturer's part number.

C-5. EXPLANATION OF COLUMNS IN SECTION IV

- a. Reference Code. The code scheme recorded in Column 6, Section II.
- b. Remarks. This column lists information pertinent to the maintenance function being performed as indicated on the MAC, Section II.

Section II. MAINTENANCE ALLOCATION CHART

(1) Group Number	(2) Component/Assembly	(3) Maintenance Function	(4) Maintenance Level					(5) Tools and Equipment	(6) Remarks
			C	O	F	H	D		
			01	MOTOR CONTROLS					
0101	Starter, Electric Motor and Wiring	Inspect Replace Repair		0.1 0.5 0.5				A	
0102	Pressure Switch	Inspect Adjust Replace Repair		0.1 0.2 0.5				B	
02	COMPRESSOR DRIVE								
0201	Guard Assembly Belt	Inspect Replace Repair	0.1	0.2 0.2			T1 T1, T4	C	
0202	Belts, V, Matched Set	Inspect Replace	0.1	0.2			T1		
0203	Pulley, Drive	Inspect Replace	0.1	0.2			T1, T4		
03	COMPRESSOR ASSEMBLY	Inspect Replace Repair Overhaul		0.2 0.8	1.0	4.0	T1 T1 T1, T2 T1, T3	A,D	
0301	Air Cleaner	Inspect Replace Service	0.1 0.2 0.2				T1	E	
0302	Oil Filler, Cap, and Plugs	Inspect Replace	0.1 0.2				T1		
0303	Flywheel	Inspect Replace		0.2 0.3			T1 T1, T4		
0304	Tube Assemblies	Inspect Replace		0.2 0.3			T1 T1		
0305	Intake and Exhaust Valves	Inspect Replace Repair		0.2 0.3 0.6			T1, T4 T1, T4 T1, T4	A,H	
0306	Centrifugal Unloader	Inspect Replace Repair		0.2 0.3 0.5			T1,T4 T1, T4 T1, T4	A	

(1) Group Number	(2) Component/Assembly	(3) Maintenance Function	(4) Maintenance Level					(5) Tools and Equipment	(6) Remarks
			C	O	F	H	D		
0307	Pistons, Connecting Rods and Cylinder Block	Inspect Replace Repair			0.3 0.5 2.0			T1, T2 T1, T2 T1, T2	A
0308	Crankshaft, Bearings and Oil Seals	Inspect Replace Repair			0.4 0.6 2.5			T1, T2 T1, T2 T1, T2	A
04	MOTOR, ELECTRIC	Inspect Service Test Replace Repair		0.1 0.2 0.3 0.8		1.0		T1 T1 T1, T4 T1 T1, T2	F
05	AIR RECEIVER SYSTEM								
0501	Safety Valve	Inspect Replace		0.1 0.2				T1 T1	
0502	Check Valve	Inspect Replace Repair		0.1 0.2 0.2				T1 T1	G
503	Pressure Gage	Inspect Replace		0.1 0.2				T1 T1	
0504	Drain Cock	Inspect Replace		0.1 0.1				T1 T1	
0505	Globe Valve	Inspect Replace		0.1 0.2				T1 T1	
0506	Air Tank	Inspect Replace	0.1	0.4				T1	
06	AIR DISCHARGE SYSTEM								
0601	Hoses	Inspect Replace	0.1	0.2				T1	
0602	Inflator Gage	Inspect Replace	0.1	0.2				T1	

Section III. TOOL AND TEST EQUIPMENT REQUIREMENTS

(1) Reference Code	(2) Maintenance Level	(3) Nomenclature	(4) National/NATO Stock Number	(5) Tool Number
T1	C, O, F, H	Tool Kit, General Mechanic, Automotive	5180-00-177-7033	
T2	F	Shop Set, Automotive Repair,	4910-00-754-0705	
T3	H	Field Maintenance, Basic Shop Set, Machine: Field Maintenance, Heavy	3470-00-754-0738	
T4	O	Shop Equipment Automotive Maintenance and Repair: Organization, Common NO1	4910-00754-0654	

**Section IV.
REMARKS MAINTENANCE ALLOCATION CHART**

Reference Code	Remarks
A	Repair by replacing components
B	Repair by using second set of contacts or by replacing switch or diaphragm as needed
C	Repair by replacing riv-nuts, welding and or hammering out dents as needed.
D	Overhaul consists of any or all of the repair tasks required to put the compressors in a like new condition.
E	Service consists of cleaning the air filter element.
F	Repair consists of replacing the bearings, brushes, springs, and spacers as needed.
G	Repair by replacing the spring or disc as needed.
H	Repaired on model 20-904 only.

APPENDIX D

ADDITIONAL AUTHORIZATION LIST

Section I. INTRODUCTION

D-1. SCOPE

This appendix lists additional items you are authorized for the support of the Air Compressor.

D-2. GENERAL

This list identifies items that do not have to accompany the Air Compressor and that do not have to be turned in with it. These items are authorized to you by CTA, MTOE, TDA or JTA.

D-3. EXPLANATION OF LISTING

Not Applicable.

Section II. ADDITIONAL AUTHORIZATION LIST

(1) NATIONAL STOCK NUMBER	(2) DESCRIPTION		(3) U/M	(4) QTY AUTH
	PART NUMBER & FSCM	USABLE ON CODE		
4210-00-555-8837	Extinguisher, Fire			1

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Chief of Staff


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DISTRIBUTION:

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RECOMMENDED CHANGES TO EQUIPMENT TECHNICAL MANUALS



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

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SOMETHING WRONG WITH THIS MANUAL?

PUBLICATION NUMBER
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DATE
1 Jul 80

TITLE
Compressor, Reciprocating,
Air: Electric Motor Driven, 5CFM

BE EXACT... PIN-POINT WHERE IT IS				IN THIS SPACE TELL WHAT IS WRONG AND WHAT SHOULD BE DONE ABOUT IT:
PAGE NO.	PARA-GRAPH	FIGURE NO.	TABLE NO.	

TYPED NAME, GRADE OR TITLE, AND TELEPHONE NUMBER

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The Metric System and Equivalents

Linear Measure

- 1 centimeter = 10 millimeters = .39 inch
- 1 decimeter = 10 centimeters = 3.94 inches
- 1 meter = 10 decimeters = 39.37 inches
- 1 dekameter = 10 meters = 32.8 feet
- 1 hectometer = 10 dekameters = 328.08 feet
- 1 kilometer = 10 hectometers = 3,280.8 feet

Weights

- 1 centigram = 10 milligrams = .15 grain
- 1 decigram = 10 centigrams = 1.54 grains
- 1 gram = 10 decigrams = .035 ounce
- 1 dekagram = 10 grams = .35 ounce
- 1 hectogram = 10 dekagrams = 3.52 ounces
- 1 kilogram = 10 hectograms = 2.2 pounds
- 1 quintal = 100 kilograms = 220.46 pounds
- 1 metric ton = 10 quintals = 1.1 short tons

Liquid Measure

- 1 centiliter = 10 milliliters = .34 fl. ounce
- 1 deciliter = 10 centiliters = 3.38 fl. ounces
- 1 liter = 10 deciliters = 33.81 fl. ounces
- 1 dekaliter = 10 liters = 2.64 gallons
- 1 hectoliter = 10 dekaliters = 26.42 gallons
- 1 kiloliter = 10 hectoliters = 264.18 gallons

Square Measure

- 1 sq. centimeter = 100 sq. millimeters = .155 sq. inch
- 1 sq. decimeter = 100 sq. centimeters = 15.5 sq. inches
- 1 sq. meter (centare) = 100 sq. decimeters = 10.76 sq. feet
- 1 sq. dekameter (are) = 100 sq. meters = 1,076.4 sq. feet
- 1 sq. hectometer (hectare) = 100 sq. dekameters = 2.47 acres
- 1 sq. kilometer = 100 sq. hectometers = .386 sq. mile

Cubic Measure

- 1 cu. centimeter = 1000 cu. millimeters = .06 cu inch
- 1 cu. decimeter = 1000 cu. centimeters = 61.02 cu inches
- 1 cu. meter = 1000 cu. decimeters = 35.31 cu. feet

Approximate Conversion Factors

To change	To	Multiply by	To change	To	Multiply by
inches	centimeters	2.540	ounce-inches	newton-meters	.007062
feet	meters	.305	centimeters	inches	.394
yards	meters	.914	meters	feet	3.280
miles	kilometers	1.609	meters	yards	1.094
square inches	square centimeters	6.451	kilometers	miles	.621
square feet	square meters	.093	square centimeters	square inches	.155
square yards	square meters	.836	square meters	square feet	10.764
square miles	square kilometers	2.590	square meters	square yards	1.196
acres	square hectometers	.405	square kilometers	square miles	.386
cubic feet	cubic meters	.028	square hectometers	acres	2.471
cubic yards	cubic meters	.765	cubic meters	cubic feet	35.315
fluid ounces	milliliters	29.573	cubic meters	cubic yards	1.308
pints	liters	.473	milliliters	fluid ounces	0.34
quarts	liters	.946	titers	pints	2.113
gallons	liters	3.785	liters	quarts	1.057
ounces	grams	28.349	liters	gallons	.264
pounds	kilograms	.454	grams	ounces	.035
short tons	metric tons	.907	kilograms	pounds	2.205
pound-feet	newton-meters	1.365	metric tons	short tons	1.102
pound-inches	newton-meters	.11375			

Temperature (Exact)

°F	Fahrenheit temperature	5/9 (after subtracting 32)	Celsius temperature	°C
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