Doosan Infracore
Portable Power

Ingersoll Rand

Truck Mounted Equipment

PTO DRIVEN
CATEGORY 2

100/220 CFM

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This manual contains important safety information.

Do not destroy this manual.

This manual must be available to the personnel who operate and maintain this machine.

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MVP verified member

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Foreword

Foreword

The contents of this manual are considered to be proprietary and confidential to Doosan Infracore Portable Power (herein referred to as “Portable Power”) and should not be reproduced without the prior written permission of Portable Power.

Nothing contained in this document is intended to extend any promise, warranty or representation, expressed or implied, regarding the products described herein. Any such warranties or other terms and conditions of sale of products shall be in accordance with the standard terms and conditions of sale for such products, which are available upon request.

This manual contains instructions and technical data to cover all routine operation and scheduled maintenance tasks by operation and maintenance staff. Major overhauls are outside the scope of this manual and should be referred to an authorized Portable Power Service Department. All components, accessories, pipes and connectors added to the compressed air system should be:

- of good quality, procured from a reputable manufacturer and, wherever possible, be of a type approved by Portable Power.
- clearly rated for a pressure at least equal to the machine maximum allowable working pressure.
- compatible with the compressor lubricant/coolant.
- accompanied with instructions for safe installation, operation and maintenance.

Details of approved equipment are available from the Portable Power Service departments. The use of repair parts other than those included within the Portable Power approved parts list may create hazardous conditions over which Portable Power has no control. Therefore, Portable Power cannot be held responsible for equipment in which non-approved repair parts are installed.

Portable Power reserves the right to make changes and improvements to products without notice and without incurring any obligation to make such changes or add such improvements to products sold previously.

The intended uses of this compressor system are outlined below and examples of unapproved usage are also given. However, Portable Power cannot anticipate every application or work situation that may arise. If in doubt, consult supervision. This compressor system has been designed and supplied for above ground operation to be used for compression of normal ambient air containing no additional gases, vapors or particles within the ambient temperature range specified in the “General Data/Specifications” of this manual.

This machine should not be used:

A. For direct or indirect human consumption of the compressed air.
B. Outside the ambient temperature range specified in the general data section of this manual.
C. When an actual or foreseeable risk of hazardous levels of flammable gases or vapors exists.
D. With other than Portable Power approved components.
E. With guards, or controls or switches missing or disabled.

This company accepts no responsibility for errors in translation of this manual from the original English version.

Safety

Safety

Failure to heed warnings or misuse of the compressor, even though not expressly mentioned herein, may result in severe injury or death, property damage and/or mechanical failure, for which Portable Power cannot be held responsible.

If an operator cannot read or understand the safety and operating instructions, we strongly suggest the employer read (translate) and explain this information to the operator.

A. Onboard Power Solutions PTO compressors are utilized as a component of a system or vehicle manufactured by others. It is not possible for Portable Power to foresee all of the various types of applications that our compressor packages might be utilized in. For this reason, these guidelines apply to most installations. It is very important that users become familiar with, and complies with, all of the instructions and precautions of the manufacturer of the vehicle in order to supplement the guidelines presented here.

B. Failure to follow the instructions, procedures and safety precautions in this manual may result in accidents and injuries.

C. Install, use and operate this air compressor only in full compliance with all pertinent O.S.H.A. requirements and all pertinent federal, state, and local codes or requirements, and with Onboard Power Solutions PTO compressor instructions.

Safety Precautions

General Information

Ensure that the operator reads and understands the decals and consults the manuals before maintenance or operation.

Ensure that the Operation and Maintenance manual, and the manual holder if equipped, are not removed permanently from the machine.

Ensure that maintenance personnel are adequately trained, competent and have read the manuals.

Make sure that any protective covers are in place during operation.

The specification of this system is such that the compressor is not suitable for use in flammable gas risk areas. If such an application is required then all local regulations, codes of practice and site rules must be observed. To ensure that the system can operate in a safe and reliable manner, additional equipment such as gas detection, exhaust spark arrestors, and intake (shut-off) valves may be required, dependent on local regulations or the degree of risk involved.

Air discharged from this compressor may contain carbon monoxide or other contaminants, which will cause serious injury or death. Do not breathe this air.

Compressed air can be dangerous if incorrectly handled. Before doing any work on the unit, ensure that all pressure is vented from the system and that the machine cannot be started accidentally.

Ensure that the compressor is operating at the rated pressure and that all relevant personnel know the rated pressure.

All air pressure equipment installed in or connected to the machine must have safe working pressure ratings of at least the system safety valve rating.

If more than one compressor is connected to one common downstream tool, effective check valves and isolation valves must be fitted and controlled by work procedures, so that one machine cannot accidentally be pressurized or over pressurized by another.

Compressed air must not be used for a feed to any form of breathing apparatus or mask.

The discharged air contains a very small percentage of compressor lubricating oil and care should be taken to ensure that downstream equipment is compatible.

If the discharged air is to be ultimately released into a confined space, adequate ventilation must be provided.

When using compressed air, always use appropriate personal protective equipment.

All pressure containing parts, especially flexible hoses and their couplings, must be regularly inspected, be free from defects and be replaced according to the Manual instructions.

Avoid bodily contact with compressed air.

Never operate unit without first observing all safety warnings and carefully reading the operation and maintenance manual shipped from the factory with this compressor system.

Never operate this vehicle mounted compressor system inside a building without adequate ventilation. Avoid breathing exhaust fumes when working on or near the machine. Do not alter or modify this equipment.

This machine may include such materials as oil and oil/air filters, which may require proper disposal when performing maintenance and service tasks. Contact local authorities for proper disposal of these materials.

High Pressure Air can cause serious injury or death. Relieve pressure before removing filler plugs/caps, fittings or covers.

Air pressure can remain trapped in air supply line, which can result in serious injury or death. Always carefully vent air supply line at tool or vent valve before performing any service.

This system may produce loud noise while operating or with service valve vented. Extended exposure to loud noise can cause hearing loss. Always wear hearing protection when doors are open or service valve is vented.

Never inspect or service unit without first disconnecting vehicle battery cable(s) to prevent accidental starting.

Do not use petroleum products (solvents or fuels) under high pressure as this can penetrate the skin and result in serious illness. Wear eye protection while cleaning unit with compressed air to prevent debris from injuring eye(s).

Disconnected air hoses whip and can cause serious injury or death. Always attach a safety flow restrictor to each hose at the source of supply or branch line in accordance with OSHA Regulation 29CFR Section 1926.302(b).

Rotating shaft(s) can cause serious injury. Do not operate without guards in place. Ensure that no personnel are under the vehicle at any time while unit is operating.

Use care to avoid contacting hot surfaces (engine exhaust manifold and piping, air receiver and air discharge piping, etc.).

Never operate unit with guards, covers or screens removed. Keep hands, hair, clothing, tools, blow gun tips, etc. well away from moving parts.

Whenever the machine is stopped, air will flow back into the compressor system from devices or systems downstream of the machine unless the service valve is closed. Install a check valve at the machine service valve to prevent reverse flow in the event of an unexpected shutdown when the service valve is open.

Hazardous Substance Precaution

The following substances are used in the manufacture of this compressor system and may be hazardous to health if used incorrectly.

Precaution: Avoid ingestion, skin contact and breathing fumes for the following substances: Compressor Oil, Preservative Grease and Rust Preventative.

The following substances may be produced during the operation of this compressor and may be hazardous to health:

Avoid build-up of Engine Exhaust Fumes in confined spaces.

Avoid breathing Exhaust Fumes.

Avoid breathing Vehicle Brake Lining Dust during maintenance.

O.B.P.S. Safety Quick Reference Guide:

Transporting Preparations for Vehicle

- Check entire running gear and all braking
- Inspect drive train components
- Disconnect all air hoses
- Remove wheel chocks
- Release parking brakes
- Don't exceed speed limits

Before You Start the Compressor

- Apply parking brake
- Park on level ground and chock the wheels
- Check fluid levels
- Check for possible leaks
- Use adequate hose and couplings with safety locks or pins
- Relieve any pressure in receiver tank

Use of Compressor and Compressed Air

- Air from this system is not fit for human consumption-do not use air for breathing or food processing
- Never operate in an enclosed area
- Never use compressed air to clean your clothes; and never direct it at another person - it can kill
- Wear eye protection
- Install Check valve ("OSHA" valve) upstream of hose

Other Safety Precautions

- Do not touch hot surfaces or moving parts, such as exhaust or drive train components
- Do not adjust or restrict relief valves
- Do not disconnect or alter shutdown sensors or switches.

Servicing

- Before servicing compressor, relieve receiver pressure and allow to cool
- Disconnect vehicle battery if mechanical work is to be performed
- Wipe up all spills resulting from servicing

Safety Labels

Look for these signs on machines shipped to international markets outside North America, which point out potential hazards to the safety of you and others. Read and understand thoroughly. Heed warnings and instructions. If you do not understand, inform your supervisor.

Corrosion risk

Hot surface

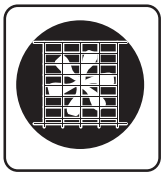
Lifting point.

WARNING: Electrical shock risk

Parking Brake

No open flame

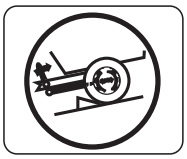
Diesel Fuel.
No open flame



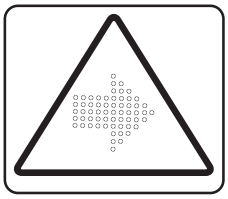
Do not operate the machine without guard being fitted.

Lifting point.

WARNING - Flammable liquid



When parking use prop stand, handbrake and wheel chocks



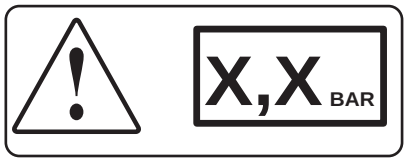
Air/gas flow or Air discharge.

WARNING - Hot and harmful exhaust gas.

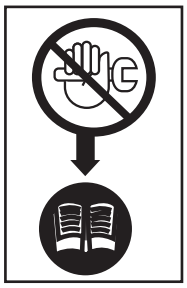
Tie down point

Do not breathe the compressed air from this machine

Read the Operation and Maintenance manual before operation or maintenance of this machine is undertaken.



WARNING - Maintain correct tire pressure (Refer to the *GENERAL INFORMATION* section of this manual.

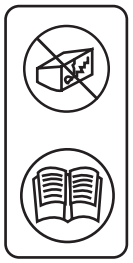


WARNING - Consult the operation and maintenance manual before commencing any maintenance.

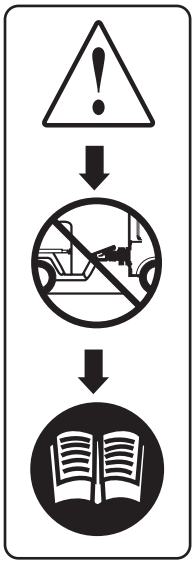
Rough Service Designation
Wet Location Operation

Do not stack.

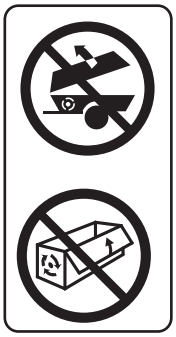
Do not use fork lift truck from this side.



Replace any cracked protective shield.



WARNING - Before connecting the tow bar or preparing to tow, consult the operation and maintenance manual.

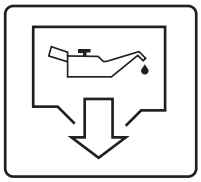


Do not operate with the doors or enclosure open

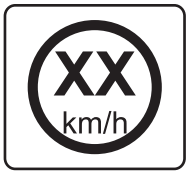
On (power).

Off (power).

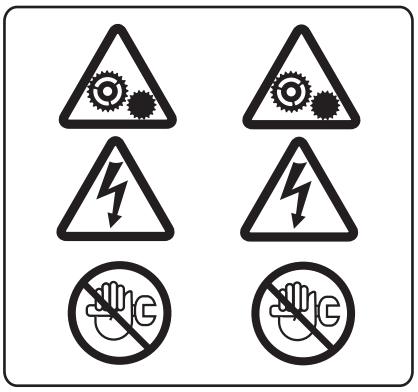
Emergency stop



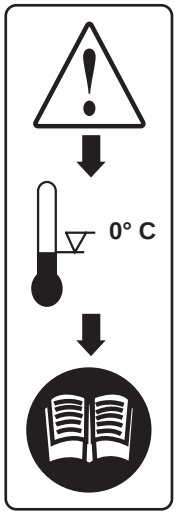
Oil Drain



Do not exceed the speed limit.



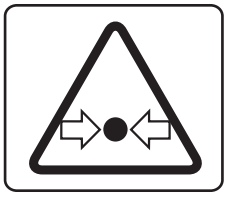
WARNING - Do not undertake any maintenance on this machine until the electrical supply is disconnected and the air pressureis totally relieved.



WARNING - For operating temperature below 0° C, consult the operation and maintenance manual

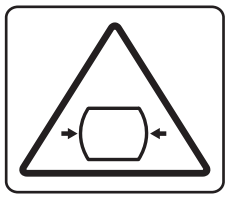
Read the Operation and Maintenancemanual before operation or maintenance of this machine is undertaken.

Do not remove operating and maintenance manual and manual holder from this machine.



Pressurized vessel.

Use fork lift truck from this side only



Pressurized component or system.

Look for these signs on machines shipped to international markets outside North America, which point out potential hazards to the safety of you and others. Read and understand thoroughly. Heed warnings and instructions. If you do not understand, inform your supervisor.

(Red Background)

Indicates the presence of a hazard which WILL cause serious injury, death or property damage, if ignored.

(Orange Background)

Indicates the presence of a hazard which CAN cause serious injury, death or property damage, if ignored.

(Yellow Background)

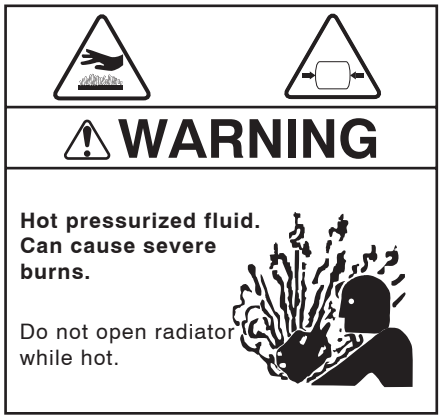
Indicates the presence of a hazard which WILL or can cause injury or property damage, if ignored.

(Blue Background)

Indicates important set-up, operating or maintenance information.


DANGER
Discahrged air can contain carbon monoxide or other contaminants. Will cause serious injury or death.
Do not breathe this air.


WARNING
Trapped air pressure. Can cause serious injury or death
Close service valve and operate tool to vent trapped air before performing any service


WARNING
Hot pressurized fluid. Can cause severe burns.
Do not open radiator while hot.


WARNING
High pressure air. Can cause serious injury or death.
Relieve pressure before removing filler plugs/caps, fittings or coverrs.

⚠WARNING

Improper operation of this equipment.
Can cause serious injury or death.

Read Operator's Manual supplied with this machine before operation or servicing.

Modification or alternation of this machine.
Can cause serious injury or death.

Do not alter modify this machine without the express written consent of the manufacturer.

105 km/h

⚠WARNING

Collapsing jackstand.
Can cause serious injury.

Insert locking pin completely.

Excessive towing speed.
Can cause serious injury or death.

Do NOT exceed 65 mph (105 km/hr.)

⚠WARNING

Rotating fan blade.
Can cause serious injury.

Do not operate without guard on place.

⚠WARNING

Falling of machine.

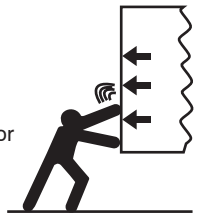
Can cause serious injury or death.

Access lifting bail from inside machine.

⚠WARNING

Door under pressure.
Can cause serious injury.

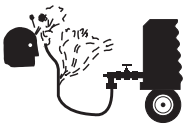
Use both hands to open door when machine is running.



⚠WARNING

Disconnected air hoses whip.

Can cause serious injury or death.



When using air tools attach safety device (OSHA valve) at source of air supply for each tool.

CAUTION

DO NOT WELD.

ELECTRONIC DAMAGE WILL OCCUR.

This engine is equipped with an electronic engine controller and other electronic components.

⚠WARNING

Combustible gas.

Can cause serious burns, blindness or death.

Keep sparks and open flames away from batteries.

CAUTION

DO NOT USE ETHER.

ENGINE DAMAGE WILL OCCUR.

This engine is equipped with an electric heater starting aid.

USE DIESEL FUEL ONLY

NOTICE

COOLANT FILL INSTRUCTIONS

Adding:

Do NOT remove radiator cap. Top offat overflow reservoir. Use same anti-freeze mixture as in radiator.

Replacing:

With system cool, remove radiator cap. Drain coolant and close drain. At radiator, refill system. Replace radiator cap. At reservoir, fill to "HOT" level. Run for 30 minutes. Stop and allow to cool. At reservoir, add coolant as necesary to reach "COLD" level.

FREE SAFETY DECALS!

To promote communication of Safety Warnings on products manufactured by the Portable Compressor Division in Mocksville. N.C., Safety Decals are available **free** of charge. Safety decals are identified by the decal heading: **DANGER, WARNING or CAUTION.**

Decal part numbers are on the bottom of each decal and are also listed in the compressor's parts manual. Submit order for Safety Decals to the Statesville Parts Service Department. The no charge order should contain only Safety Decals. Help promote product safety! Assure that decals are present on the machines. Replace decals that are not readable.

Description

Description

Introduction

Your new Onboard Power Power Solutions PTO air compressor system will provide superior performance and reliability along with a minimal amount of required maintenance.

Contact Onboard Power Power Solutions Parts and Service Departments at 1-800-633-5206 (U.S. and Canada) if you have further questions.

Description of Components

The PTO compressor system includes a positive displacement, oil flooded, rotary screw compressor, compressor inlet system, cooling and lubrication system, compressor discharge system, instrument panel, electrical system, and an engine speed control system (optional).

The majority of the compressor system is mounted within the vehicle frame and higher than the lowest point of the differential. In addition, with underdeck installation, valuable space is gained in the truck bed.

Remote mounting of all major components of the PTO compressor system makes access to such items as fluid filters, receiver/sump tank, compressor air inlet filter, and controls very easy for servicing. Refer Section 8 “Maintenance” of this manual when servicing of these components is necessary.

Compressor Unit, Functional Description

The Portable Power PTO Compressor system is a single stage, positive displacement, oil flooded, rotary screw compressor.

Oil is injected directly into the compressor mixing with the air being compressed.

The oil has three primary functions:

1. Provides cooling to counteract the heat of compression.
2. Seals leakage paths between the rotors and housing and between the rotors themselves.
3. Acts as a lubricating film between the rotors.

Split Shaft PTO Functional Description (If equipped)

The split shaft PTO, mounted in the chassis drive line is capable of transmitting full torque through the transmission to the rear axle in “Road Mode”, or with the transmission in “PTO Mode” transmitting sufficient power to the compressor unit.

Portable Power no longer supplies components for or supports split-shaft PTO applications. Any such application of PTO compressor products driven via a split-shaft PTO system is the full responsibility of the installer.

Side Mount PTO Functional Description (If equipped)

The side mount PTO, mounted on the side of the vehicle transmission, is capable of transmitting torque through the transmission to the compressor unit.

Electric switch operated shifting is accomplished by means of a mechanical wire control, air solenoid, or hydraulic solenoid valve with the vehicle transmission in park or neutral.

Compressor Cooling and Lubrication System Functional Description

Water/Oil Cooling and Lubrication System:

Refer to Figure 4.1. The cooling system will provide adequate lubrication as well as maintaining a proper operating temperature for the compressor unit. In addition to the heat exchanger, the system consists of a compressor oil filter.

Oil is used in this system as a coolant and lubricant. The oil is housed in the receiver/sump tank. The remote-mounted heat exchanger is a compact plate type cross flow design that uses vehicle engine coolant to cool or heat the compressor oil. The heat exchanger is small enough to fit easily within typical 8" frame rails.

At shutdown, the compressor inlet valve located at the compressor inlet immediately closes, isolating fluid flow to the compressor unit.

Air/Oil Cooling and Lubrication System:

Refer to Figure 4.2. The Optional Air/Oil Fan Cooler is used on trucks with small cooling systems that are unable to handle the heat load of the compressor system.

The fan cooler is a remote mounted radiator with fan shroud, 12V electric fan, a temperature sensitive fan turn-on switch, relay, and circuit breaker. This unit is NOT to be mounted in-line with the vehicle’s radiator.

Compressor Discharge System, Functional Description

The compressor unit discharges a compressed air/oil mixture to the sump (Receiver/ Separator Tank).

The receiver/separator tank has thee important functions:

1. Acts as a primary oil separator
2. Serves as the compressor oil sump
3. Dampens air pressure pulsations

The compressed air/oil mixture enters the receiver/separator tank and is directed against the sidewall. By change of direction and reduction of velocity, larger droplets of oil fall to the bottom of the tank. The fractional percentage of oil remaining in the compressed air collects in the external separator element as the air travels through this separator. As more and more oil

collects within the element, it descends to the bottom of the separator. A return line (scavenge tube) leads from the bottom of the separator to the low-pressure port of the compressor unit. This oil is returned to the compressor through an orifice to assure proper flow.

The receiver/separator tank is ASME coded, rated at 250 psig (1724 kPa). A minimum pressure valve assures that no less than 80 psig (559 kPa) is provided and it also eliminates undue restriction at normal operating conditions.

Included in the discharge system is a pressure relief valve and temperature switch. The pressure relief valve is set to open if the tank pressure exceeds a specified value above rated pressure (safety valve settings will vary based on the rated operating pressure of the compressor system). The temperature switch (located in the compressor discharge) is set to shut the compressor down if the fluid discharge temperature reaches 248°F. This temperature switch is normally closed. If overheating occurs, the switch will interrupt the electrical supply to the truck ignition and stop the engine, or interrupt the power to the PTO solenoid shutting off the PTO (On some units, an additional temperature switch is located in the bottom of the separator tank.)

On some units, a magnetic shutdown switch will be used. This temperature switch works in the same fashion as described above. However, the temperature sensor will always be mounted in the bottom of the receiver/separator tank with a capillary line to the temperature gauge. Based on the 248°F set point on the gauge, the magnetic switch will break connection in an over-temp situation, interrupting electrical power to either the truck ignition or the PTO solenoid. This temperature shutdown method will have a reset switch located on the instrument panel.

The system also utilizes a start-up protection system that will not allow the PTO to engage with air pressure in the separator tank. Using a pressure switch, the PTO is electrically prevented from being engaged until the separator tank air pressure is less than 20 psig. That means that the system must be allowed to completely blow-down before the unit can be restarted. This safety function prevents the operator from starting the unit incorrectly and potentially causing damage to the compressor at start-up.

Fluid is added to the receiver/separator tank via a fill cap located on the side of the tank. A sight glass enables the operator to visually monitor the sump’s fluid level.

Figure 4.1

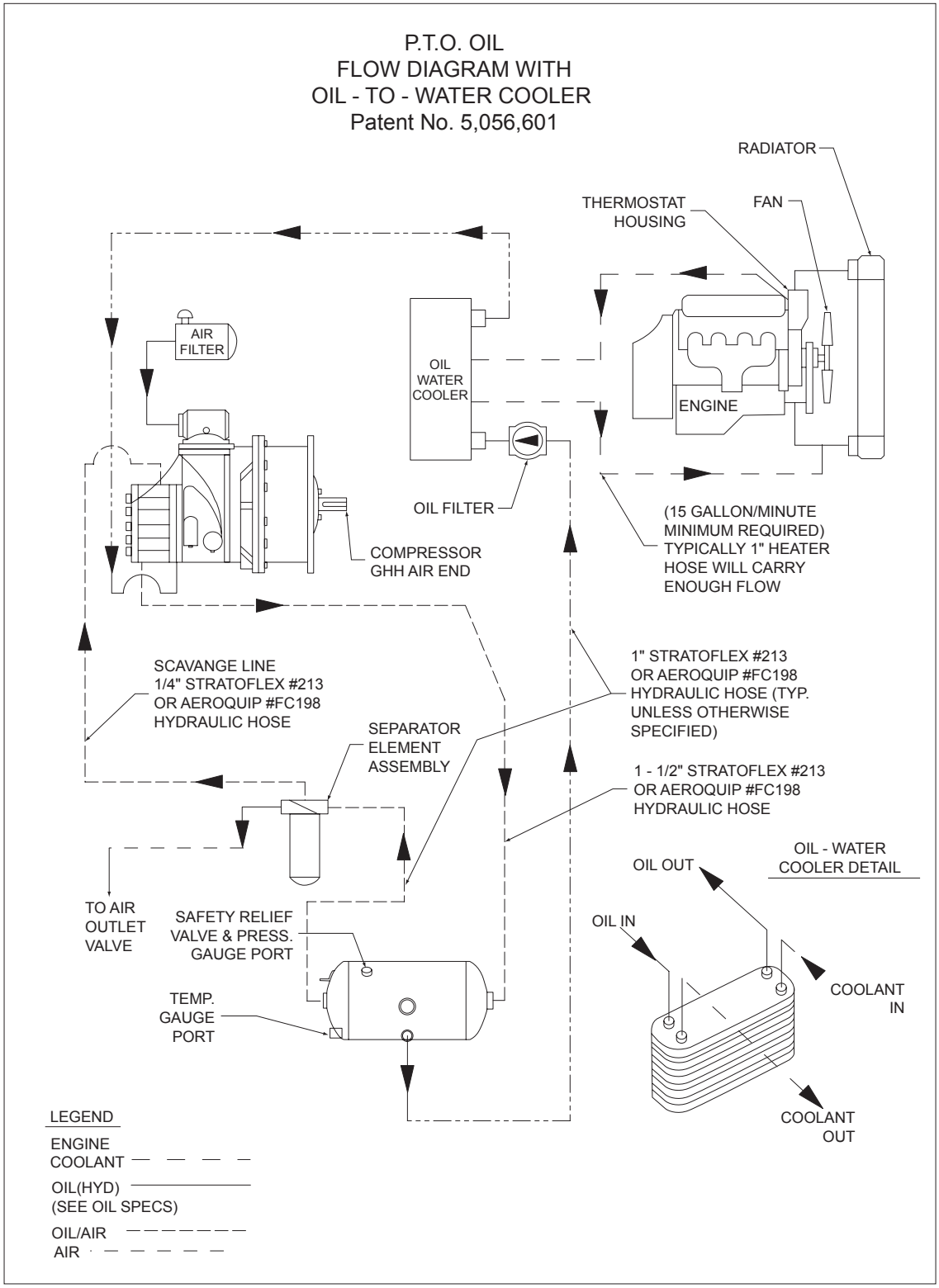
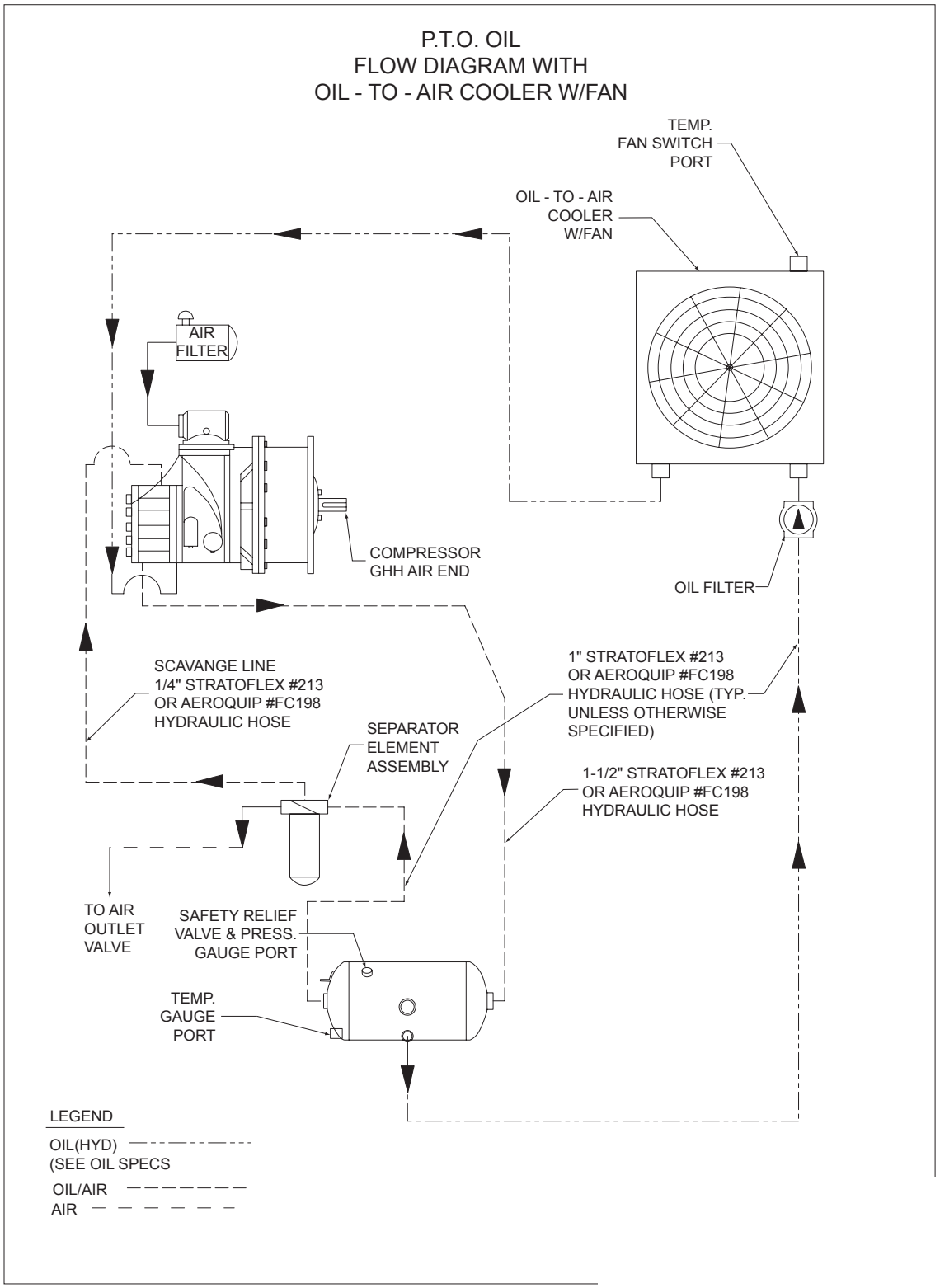

P.T.O. OIL
FLOW DIAGRAM WITH
OIL - TO - WATER COOLER
Patent No. 5,056,601
RADIATOR
THERMOSTAT HOUSING
FAN
AIR FILTER
OIL WATER COOLER
ENGINE
OIL FILTER
(15 GALLON/MINUTE MINIMUM REQUIRED) TYPICALLY 1" HEATER HOSE WILL CARRY ENOUGH FLOW
COMPRESSOR GHH AIR END
SCAVANGE LINE 1/4" STRATOFLEX #213 OR AEROQUIP #FC198 HYDRAULIC HOSE
1" STRATOFLEX #213 OR AEROQUIP #FC198 HYDRAULIC HOSE (TYP. UNLESS OTHERWISE SPECIFIED)
SEPARATOR ELEMENT ASSEMBLY
1 - 1/2" STRATOFLEX #213 OR AEROQUIP #FC198 HYDRAULIC HOSE
OIL - WATER COOLER DETAIL
OIL OUT
OIL IN
COOLANT IN
COOLANT OUT
TO AIR OUTLET VALVE
SAFETY RELIEF VALVE & PRESS. GAUGE PORT
TEMP. GAUGE PORT
LEGEND
ENGINE COOLANT
OIL(HYD) (SEE OIL SPECS)
OIL/AIR
AIR

Figure 4.2


P.T.O. OIL
FLOW DIAGRAM WITH
OIL - TO - AIR COOLER W/FAN
TEMP.
FAN SWITCH
PORT
OIL - TO - AIR
COOLER
W/FAN
AIR
FILTER
COMPRESSOR
GHH AIR END
OIL FILTER
SCAVANGE LINE
1/4" STRATOFLEX #213
OR AEROQUIP #FC198
HYDRAULIC HOSE
1" STRATOFLEX #213
OR AEROQUIP #FC198
HYDRAULIC HOSE (TYP.
UNLESS OTHERWISE
SPECIFIED)
SEPARATOR
ELEMENT
ASSEMBLY
1-1/2" STRATOFLEX #213
OR AEROQUIP #FC198
HYDRAULIC HOSE
TO AIR
OUTLET
VALVE
SAFETY RELIEF
VALVE & PRESS.
GAUGE PORT
TEMP.
GAUGE
PORT
LEGEND
OIL(HYD)
(SEE OIL SPECS
OIL/AIR
AIR

Control System, Functional Description

The purpose of the control system is to regulate the amount of air intake in accordance with the amount of compressed air being used. The control system consists of a compressor inlet control valve, pressure regulating valve, engine speed control (optional), and blow down valve. The compressor inlet valve controls the amount of air entering the compressor unit by means of a pressure-regulating valve so that any air delivery desired from 0 to full-rated capacity can be obtained automatically. (Refer to Air/Oil Piping Diagram in Parts Manual).

Portable Power offers three different types of engine speed controls. For electronic Diesel engines (also called “drive by wire”) Portable Power uses a total electronic speed control, which interfaces with the vehicle manufacturer’s Electronic Control Module (ECM) and operates the engine throttle electronically. These electronic speed controls are offered as either fixed speed or truly proportional variable speed (depending on the type of truck and engine). The fixed speed, electronic throttle control will allow the engine to modulate between a set high idle engine speed (when no air is being used) and a maximum engine speed (when there is an air demand). It will also allow a third operating engine speed set point for applications with an electrical accessory option. This throttle control does not proportionally adjust engine speed based on air demand on the compressor system. The function, installation and calibration are explained in the individual throttle control information provided with this manual.

The truly proportional, variable speed throttle control modulates engine speed based on the air demand of the compressor system. Based on a pressure signal from the transducer, the throttle control will adjust the engine speed proportionally to compensate for the amount of air being used. When available, this option reduces the amount of wear and tear on the vehicle’s engine, and also reduces the rate of fuel consumption of the vehicle while using the compressor system.

The functional description of the control systems is described in three distinct phases of operation. The description will apply to all standard PTO control systems with the exception of stated pressures, which may vary depending on the specific pressure requirements. The pressures stated will be in accordance with a machine having an operating pressure range of 100 to 110 psig (689-758 kPa).

Control System (Continued)

Start

When the system is placed in the PTO mode, the compressor receives power from the PTO. The system pressure will quickly rise. During this period the compressor inlet valve has received no air signal from the pressure regulator allowing the compressor to work at full capacity. As the compressor operates at full rated capacity, the engine speed control remains fully open enabling the truck's engine to run at full pre-set speed.

As the demand for air decreases, the receiver pressure rises, and when this pressure exceeds the set point of the pressure regulator, pressure will be directed to the compressor inlet valve and to the modulating cylinder at the engine speed control or electronic speed control module which will reduce engine speed (except in the case of fixed speed throttle control applications).

Normal Operation - 100 psi

As the receiver pressure rises, air is delivered to the service line. The pressure regulator stays inoperative, allowing the inlet control valve to remain fully open for maximum compressor air output. The engine continues to run at full speed during this phase.

Shutdown

Once shutdown occurs, a blow down valve (located on the pressure regulator and blow down manifold) will open on a pressure signal from the compressor unit's inlet control valve, and vents system pressure to atmosphere. The compressor inlet control valve closes totally stopping the flow of air.

Air Inlet System, Functional Description

Refer to Air/Oil Piping diagram in Parts Manual. The compressor air inlet system consists of an air filter and a compressor inlet control valve.

The air filter is a 2-stage, dry element-type filter capable of cleaning extremely dirty air. However, in cases when the compressor is used under very extreme conditions, more frequent checks of the filter element are needed. Refer Section 8 "Maintenance" under Air Filter maintenance procedures.

Instrumentation, Functional Description

Your Ingersoll Rand PTO unit is equipped with an air pressure gauge, air temperature gauge, and an hour meter. The air pressure gauge is connected to the receiver tank and continually monitors the tank pressure at various loaded and/or unloaded conditions. The air temperature gauge registers the temperature of the compressor discharge air as taken at the receiver tank. The hour meter registers the actual running time of the compressor, which is useful for planning and logging service schedules.

Electrical System, Functional Description

Refer to wiring diagrams in Section 6 for appropriate system on type of vehicle used. The electrical system is comprised of the necessary equipment required to operate the PTO/ Compressor system, and also to shut the machine down in the event of a malfunction. The components of the electrical system are a circuit breaker and compressor discharge temperature switches (which will shut the compressor down or disengage the PTO, should the compressor temperature exceed 248°F (118°C). The system also includes a pressure switch, which will not allow the unit to be engaged on start-up with air pressure in the separator tank. This prevents starting the unit against a pressure load.

General Data/Specifications

General Data/Specifications

Unit Model.....Category 2

Max Air Delivery - cfm (litres/sec) 220 (104)

Compressor

Compressor Speed ..... Refer to table (on page 42)

Standard Rated Operating Pressure - psi (kPa) 100 (689)

Standard Safety Valve Setting - psi (kPa)..... 50 (1034)

Net Weight (pounds) ..... approximately 450

Fluid Capacities

Compressor Lubricant:

Reservoir.....5 gal (18.9 liters)

System .....6 gal (22.6 litres)

⚠ CAUTION

Any departure from the specifications may make this equipment unsafe.

Primary Maintenance Items

Compressor Oil Filter 24906141

Compressor Oil Separator Element 22233100

Air Cleaner Element (Primary) 24906968

Air Cleaner Element (Safety) 24906976

Ingersoll Rand Onboard Power Solutions Underdeck PTO compressors are shipped in kit form for dealer installation. Factory installation is also available at an additional charge.

These kits include:

1. Rotary Screw Compressor and Mounting Brackets
2. Air/Oil Receiver/Separator Tank and Mounting Brackets
3. Compressor Oil Cooling System and Mounting Brackets
4. Engine Speed Controller Assembly (optional)
5. Air Inlet Filtration System
6. PTO (Only when factory installed)
7. Instrument Panel (Air Pressure Gauge, Oil Temp Gauge and Hour meter)
8. Oil Filter Assembly
9. Decals and Instructions

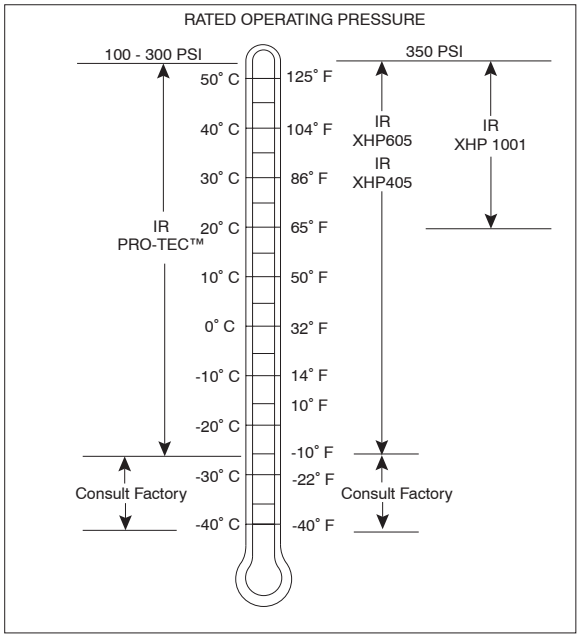
Portable Compressor Fluid Chart

Refer to these charts for correct compressor fluid required. Note that the selection of fluid is dependent on the design operating pressure of the machine and the ambient temperature expected to be encountered before the next oil change.

NOTE: Fluid listed as "preferred" are required for extended warranty. Compressor oil carryover (oil consumption) may be greater with the use of alternative fluids.

Design Operating Pressure	Ambient Temperature	specification
100 psi to 300 psi	-10°F to 125°F (-23°C to 52°C)	preferred: **IR Pro-Tec™** Alternate: ISO Viscosity Grade 46 with rust and oxidation inhibitors, designed for air compressor service.
350 psi	-10°F to 125°F (-23°C to 52°C)	preferred: **IR XHP 605** Alternate: IR XHP 405 ISO Viscosity Grade 68 group 3 or 5 with rust and oxidation inhibators designed for air compressor service.
	65°F to 125°F (-18°C to 52°C)	preferred: **XHP605** **IR XHP 1001**

Preferred Ingersoll Rand fluids - Use of these fluids with original IR fillers can extend airend warranty. Refer to Operator's manual warranty section for details or contact your IR representative.



Ingersoll Rand Preferred Fluid	1 Gal. (3.8 Litre)	5 Gal. (19.0 Litre)	55 Gal. (208.2 Litre)	220 Gal. (836 Litre)
Preferred:				
IR Pro-Tec™	36899698	36899706	36899714	36899722
IR XHP605	-	22252076	22252050	22252068
IR XHP1001	-	35612738	35300516	-
XHP405	-	22252126	22252100	22252118
Engine Oil	54480918	36875938	36866903	-

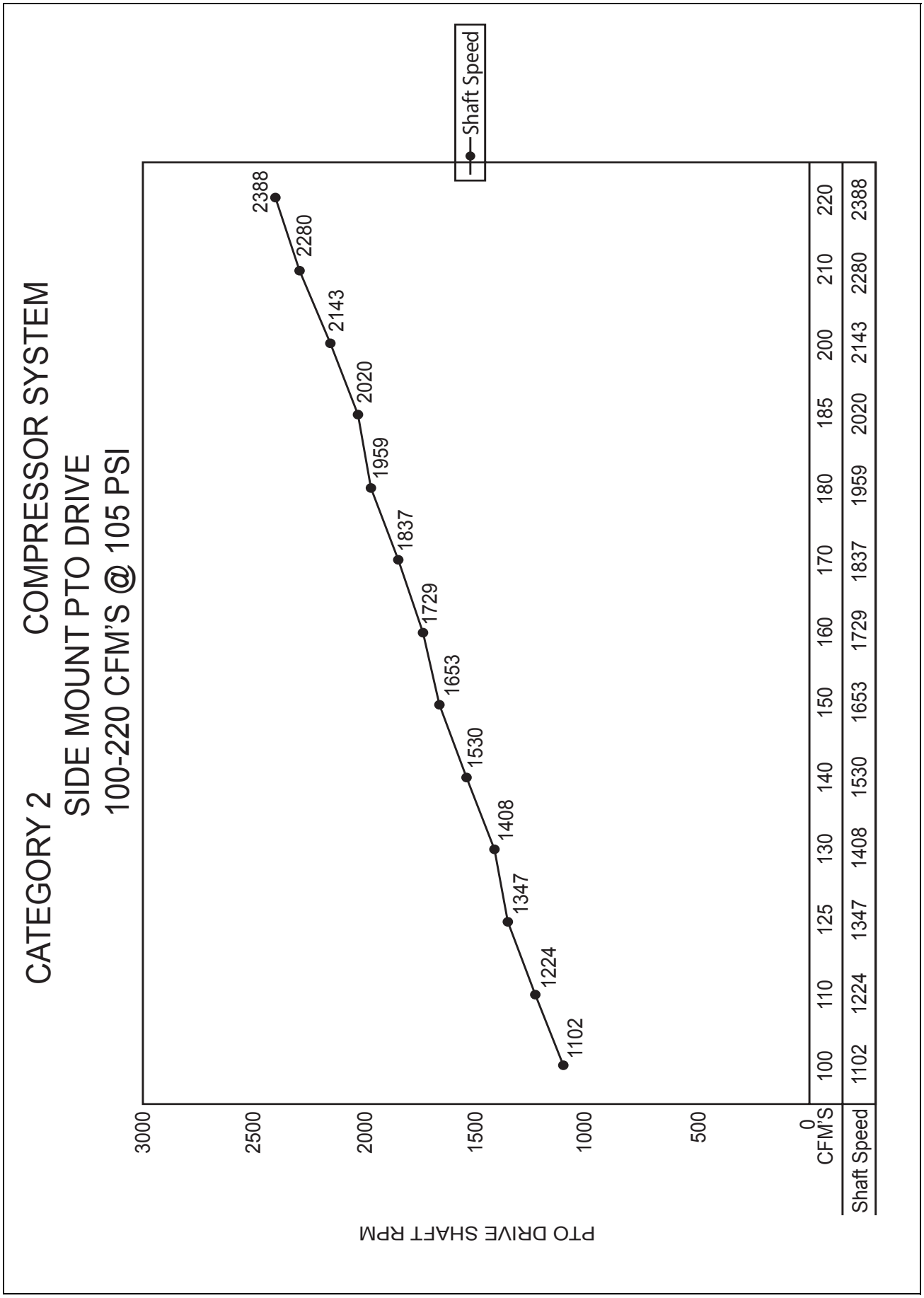
Torque Required Chart

COMPRESSOR SYSTEM

100-220 CFM's

CF Compressor, 3.267 Gear Ratio

Discharge Pressure-psi	Airflow CFM	HP Required	Torque Required lb-ft	Compressor RPM
105	110	25.0	107.24	1224
	120	27.7	109.24	1326
	130	30.3	111.23	1428
	140	33.0	113.23	1530
	150	35.3	113.60	1632
	160	37.7	113.98	1735
	170	40.0	114.35	1837
	180	42.8	114.68	1960
	185	44.2	114.85	2021
	190	45.6	115.02	2082
	200	48.6	116.20	2192
	210	51.8	118.21	2290
	220	55.0	120.22	2388
205	110	37.4	154.89	1266
	120	40.8	156.06	1372
	130	44.3	157.22	1477
	140	47.6	158.15	1580
	150	50.8	158.86	1679
	160	54.1	159.57	1778
	170	57.8	160.72	1888
	180	62.4	162.51	2016
	185	65.0	163.51	2079
	190	67.0	164.30	2143
	200	71.0	165.88	2241
	210	75.0	167.46	2339
	220	79.0	169.04	2437


CATEGORY 2 COMPRESSOR SYSTEM
SIDE MOUNT PTO DRIVE
100-220 CFM'S @ 105 PSI
Shaft Speed
PTO DRIVE SHAFT RPM
3000
2500
2000
1500
1000
500
0
CFM'S
Shaft Speed
100 110 125 130 140 150 160 170 180 185 200 210 220
1102 1224 1347 1408 1530 1653 1729 1837 1959 2020 2143 2280 2388
2388
2280
2143
2020
1959
1837
1729
1653
1530
1408
1347
1224
1102

Installation

Installation

General

The overall installation of your Onboard Portable Power Solutions PTO/Compressor should be handled in various stages to make the job much easier and efficient.

The following sequence should be adhered to when installing our PTO/Compressor:

1. Install the PTO. Follow the installation instructions supplied with the PTO, particularly with regard to gear backlash clearance and mounting bolt torques.
2. Install the compressor and mounting brackets.
3. Install Electrical Accessory (Generator, Welder/Generator, or Jumpstarter), if applicable.
4. Install the drive shaft. While waiting for the PTO drive shaft to be made to the proper length you may advance to the other steps of installation.
5. Install the air/oil separator tank and separator element.
6. Install the oil/water heat exchanger or oil/air cooling system.
7. Install the oil filter.
8. Install the instrument panels.
9. Install the engine speed control, if included (optional).
10. Install air cleaner.
11. Make up and install the hoses.
12. Make up and install the electric wiring.
13. Adjust Regulation Setting.
14. Speed control adjustment.

The following gives detailed instructions for each of the above stages of installation:

Install the PTO

The manual supplied with each PTO gives clear installation instructions. Because of the high level of vibration encountered by the PTO, particular attention must be given to proper tightening of all studs, nuts and cap screws. Using a thread-locking compound is good insurance in this area.

Ensure that the PTO output rotation is the correct rotation direction for the compressor system. The correct rotation of the air compressor is clockwise when facing the compressor drive shaft and turning it by hand.

Side Mount PTO

If a PTO with a forward and reverse gear has been selected, a mechanical block must be added to the outside of the PTO to prevent the PTO from being shifted into the wrong gear. Keep in mind that clearances to other vehicle components should be large enough for normal engine/transmission movement on their mounts.

The PTO engaging cable, if applicable, must be routed such that it is not in close proximity to the engine exhaust pipes or muffler. This cable must be very rigidly attached to the PTO due to the high level of vibration of the PTO.

For electronically shifted PTO applications, refer to PTO manufacturer's recommended wiring instructions. IF a PTO harness is not provided, refer to Figure 7.4 (Hot Shift PTO) or (Air Shift PTO) for suggested PTO wiring. Also, refer to Figure 7.4, Figure 7.1 and Figure 7.2 to appropriately include the safety switches in the PTO wiring.

NOTE: Be sure the propeller-shaft used is of slip-joint design. Frame deflection, temperature changes and other factors may cause a propeller shaft without a slip joint to produce severe axial loads on bearings, damaging the PTO.

Install the Compressor and Mounting Bracket

The Portable Power PTO Compressor can be adapted to mount on the right or left side of the vehicle; either for a side-mount or a split-shaft PTO. The compressor-mounting bracket is universally designed for this purpose. As shipped from the factory, the compressor and bracket are oriented for a left-side mounting application. To change to a right-side mounting orientation, simply remove the bolts, washers, and lock-washers holding the compressor to the mounting bracket, turn the compressor to face in the opposite direction, and then refasten the compressor to the mounting bracket using the same bolts, washers, and lock-washers that were previously removed. Be sure to use an adequate amount of LocTite on the bolts holding the compressor to the mounting bracket.

In order to insure long trouble-free service of the drive train, the compressor must be located such that the angle requirements of the drive shaft(s) are met (see Figure 7.1). Otherwise, excessive vibration will occur which may result in short life of the universal joints, shortened life of the PTO, or premature airend seal or bearing failure. The compressor should be located such that the compressor drive shaft operating angle does not exceed three degrees (3°). Keeping this angle at a minimum extends the service life of the universal joints. (Note: A minimum drive shaft angle of one-half degree (1/2°) is essential for proper operation of U-joints. All operating angles should be between 1/2° and 3°). Also, there should be no more than one degree (1°) difference between the operating angles on each end of the shaft. The PTO shaft and compressor shaft should be as close to parallel as possible. If the operating angles cannot be kept within these tolerances, contact Portable Power Onboard Power Solutions for application support.

Before positioning the compressor under the truck to determine its proper mounting location, determine the optimum orientation of the air inlet valve. As mounted to the compressor from the factory, the air inlet valve will be facing away from the frame rail toward the center of the truck. This orientation may not be suitable for every application. If necessary, reorient the air intake valve by removing the bolts fastening it to the compressor. Reposition the valve in the desired orientation, and remount the air inlet valve and gasket onto the compressor with the fasteners provided. Use LocTite on the bolts that hold the inlet valve to the compressor. Take into account the direction that the inlet valve should face to allow for routing the air intake hose.

> **NOTE: The inlet valve has ports on both sides that can be used depending on the orientation of the valve. Fittings may need to be moved to the opposite side of the valve, or reoriented to make some of the piping connections easier. When repositioning or reorienting any of these fittings, remember to use pipe dope or thread sealer on all pipe thread connections. If the small check valve in the side of the inlet valve is repositioned, ensure that the ARROW on the CHECK VALVE points TOWARD the INLET VALVE (AIR FLOW GOES TO THE INLET VALVE).**

Using a transmission jack (or other appropriate, safe apparatus) lift the compressor and bracket assembly into place under the truck. Using a protractor or an angle gauge, measure the angle of the PTO output shaft. Adjust the angle of the compressor shaft such that the compressor shaft is parallel with the PTO output shaft.

To avoid a horizontal offset between the PTO shaft and the compressor shaft, the compressor may need to be repositioned on the compressor mounting bracket. The compressor is mounted on the bracket from the factory in the most commonly used mounting holes.

However, for some applications, it may be necessary to move the compressor either closer or farther away from the frame rail than it would be as positioned on the mounting bracket from the factory.

Measure the distance from the center of the PTO shaft to the frame rail. Next, measure the distance from the compressor shaft to the inside of the frame rail (or to the face of the vertical section of the mounting bracket and subtract ¼"). If these distances vary by more than two inches, then it may be advantageous to reposition the compressor on the mounting bracket for better shaft alignment. To reposition the compressor on the mounting bracket, remove the bolts holding the mounting bracket to the compressor. The mounting bracket has several holes along the mounting plate, allowing the compressor to be placed either closer to or further from the frame rail. Remount the compressor to the mounting bracket in the holes that best align the compressor shaft and PTO shaft. Use the same fasteners that originally held the compressor to the bracket plus appropriate amounts of LocTite on the bolts, when remounting the compressor to the mounting bracket.

Typically, ground clearance is an issue with any under-chassis equipment. Ensure that the compressor system is installed as high as possible, leaving the truck ample ground clearance for off-road applications. To do this, the mounting bracket supplied may need to be modified (cut to be shorter). Also, if this system will be coupled with a belt driven electrical accessory (generator, welder/generator, etc.), be sure to take into account belt clearances and possible interferences. Due to possible interferences, always position both the electrical accessory unit and the compressor simultaneously; making sure that each unit is installed in the highest possible location.

With the compressor assembly in place under the truck, make sure that there will not be any interference with hoses and piping for the compressor. Check to make sure all ports in the compressor are accessible. Ensure there is ample space for the air intake hose. Check to make sure there will be no interferences with running a drive shaft from the PTO shaft to the compressor shaft. Also, make sure that there are not any fuel lines, brake lines, brackets, etc. mounted on the truck's frame rail that may cause interferences when bolting the compressor-mounting bracket to the frame rail.

> **NOTE: Take into account the direction each fitting should be facing once installed (to allow for shorter hoses with minimal bending). It may be necessary to reorient some of the compressor fittings to make some of the piping easier. When reorienting any of these fittings, remember to use pipe dope or thread sealer on all pipe thread connections. Also, make sure all fittings are tight and secure to prevent leaks.**

After positioning the compressor, remeasure the shaft angles on both the PTO and the compressor, adjusting as necessary to ensure that the two shafts are parallel. Next, measure from each shaft end to the floor/ground (the floor/ground where the installation is taking place should be a flat, level surface). These distances correspond to measurements "B" and "C" in Figure 7.1. Measure the horizontal length between the PTO and compressor shafts (distance corresponds to measurement "D" in Figure 7.1). To calculate the drive shaft angle with respect to the horizontal plane, use the following equation:

$$\alpha = \tan^{-1}\left(\frac{C - B}{D}\right)$$

Measuring the vertical angle (x) of the drive shaft can be greatly simplified using an angle master or protractor and a solid straight edge. By laying a solid straight edge (broom handle, metal rod, etc.) between the PTO shaft and the compressor shaft, an acceptable surface is in place to measure the drive shaft angle rather than calculate this angle. It is still good practice to complete the calculation of this angle to ensure no measurement errors have occurred.

To find the true vertical angle with respect to the PTO and compressor shaft centerlines, use the following:

$$\beta = Shaft\ angle$$
$$true\ vertical\ angle = |\beta - \alpha|$$

Remember that all angles should be measured as either positive or negative. If the shaft is angled upward relative to the horizontal, the angle is positive. If the shaft is angled downward relative to the horizontal, the angle is negative.

After calculating the true vertical angle, next calculate the true horizontal operating angle. Measure from both the compressor and PTO shafts to the frame rail (assuming the frame rail is straight). These distances correspond to measurements “E” and “F” in Figure 7.1. Keeping measurement “D” from before, calculate the following:

$$true\ horizontal\ angle = \tan^{-1}\left(\frac{E\ -\ F}{D}\right)$$

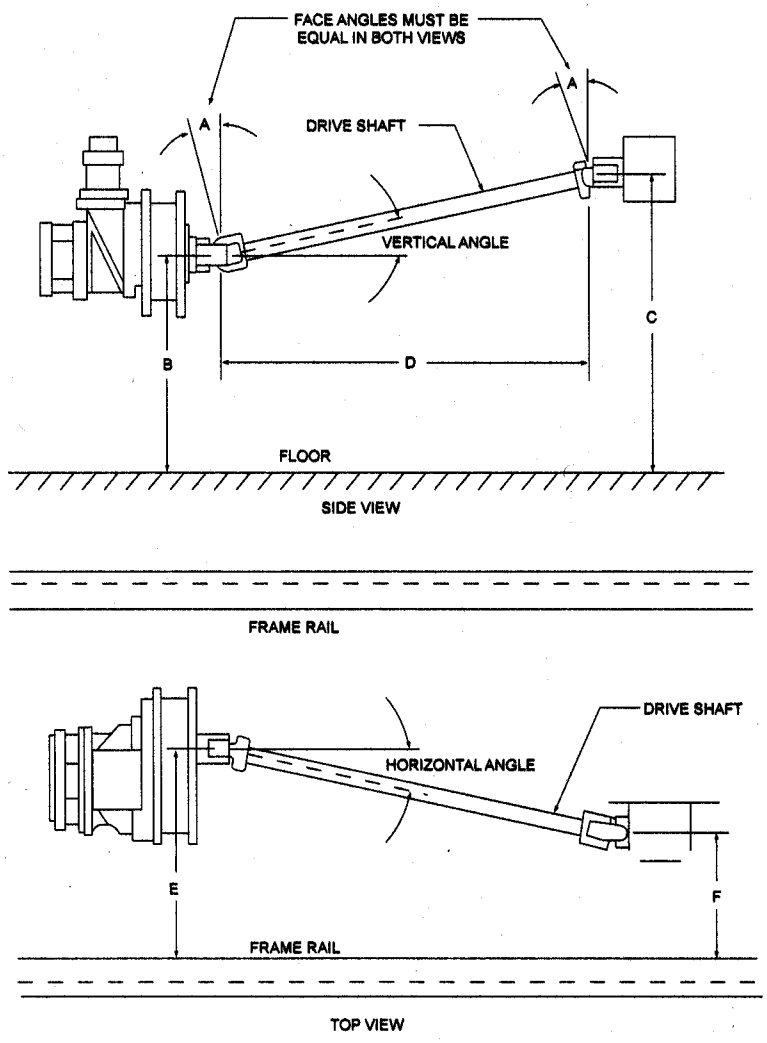
This calculation assumes that both shafts are parallel to the frame rail. If they are not, any offset angle must be compensated for in the same manner as for the true vertical angle. To find the true overall operating angle, make the following calculation:

$$true\ operating\ angle = \sqrt{(\ true\ vertical\ angle\ )^2 + (\ true\ horizontal\ angle\ )^2}$$

The true operating angle must be between one-half degree (1/2°) and three degrees (3°). If it is not, reposition the compressor and recalculate the true operating angle until it is within tolerances.

Once the true operating angle has been calculated successfully and is within tolerance, mark and drill mounting holes in the bracket and the frame rail (mounting holes can be drilled in the compressor-mounting bracket before calculating the angle, but after selecting the approximate positioning of the air compressor). Lower the compressor assembly to drill holes. Once the holes are drilled, then reposition the compressor assembly, bolt the compressor assembly to the frame rail, and remove the jack from under the compressor assembly. Verify all angles and measurements. If any angles have changed such that the overall operating angle is no longer within tolerance, some of the holes in the bracket may need to be slotted or oversized to make the proper adjustments.

FIGURE 7.1



To find true drive shaft (U-JOINT) operating angle:

1. Find the verticle angle

$$\alpha = \tan^{-1}\left(\frac{C - B}{D}\right)$$

2. Find the horizontal angle

$$true\ horizontal\ angle = \tan^{-1}\left(\frac{E - F}{D}\right)$$

3. Calculate the true operating angle (TOA)

$$true\ operating\ angle = \sqrt{(\ true\ vertical\ angle\ )^2 + (\ true\ horizontal\ angle\ )^2}$$

Install Electrical Accessory Option (if applicable)

Ingersoll Rand Onboard Power Solutions offers the option of having a belt-driven electrical accessory unit installed under the truck's chassis along with the compressor system. If one of these electrical accessory units (Generator, Welder/Generator, or Jumpstarter) is to be installed on this truck, it should be done so at this time, after the compressor has been installed. As mentioned in the previous section, the electrical accessory unit MUST be positioned simultaneously with the compressor to ensure both units are mounted as high as possible and that there are no interferences.

For most electrical accessory units, mounting brackets will be provided from the factory. On some units, however, these brackets may have to be provided by the installer or modified by the installer for the particular application. Once the mounting brackets have been obtained, mount the brackets to the unit. The rear bracket (opposite of shaft end) will typically mount to the bottom of the unit. The front bracket (shaft end of unit) may mount to either the top or bottom of the unit. The front housing on the unit may be removed and rotated 180° to place the mounting holes on top of the unit.

> **NOTE: When rotating the front housing on the electrical accessory unit, it may be necessary to pull the shaft and winding assembly out of position as the front housing is pulled away from the body of the unit. If the shaft and winding assembly is moved/removed from the body, remove the brush assembly (if applicable) in the rear of the unit before replacing the winding assembly. The brushes are spring-loaded and can easily be broken as the shaft and winding assembly is repositioned. After the shaft and winding assembly has been repositioned, and the front housing has been rotated, replace the brush assembly before continuing with the installation of the electrical accessory unit.**

With the brackets mounted to the electrical accessory unit, position the unit under the chassis using a transmission jack or other appropriate, safe apparatus. Since this step was done previously when positioning the compressor, the approximate unit position should already be known. Once in position, check the angle of the electrical accessory unit's shaft. This shaft MUST be parallel to the compressor shaft. Mount the appropriate pulley and tapered bushing onto the electrical accessory unit's shaft. The bolts holding the pulley and bushing together should be installed using LocTite, and if possible, the pulley edge should be flush with the end of the shaft of the unit. Loosely install the compressor pulley and drive shaft adapter onto the compressor shaft. Keeping the shaft angles parallel, adjust the position of the electrical accessory unit to properly align the pulleys. Ensure that there is no offset in any direction for the two pulleys.

With the pulleys aligned and the shafts parallel, hold the belt-tensioning bracket in place against the frame rail. Check for any possible belt interferences, mounting interferences, etc. Once the electrical accessory unit has been located and no interferences are evident, mark and drill the mounting holes for the unit. As with mounting the compressor, lower the unit to drill the holes in the frame rail of the truck. Once the mounting holes are drilled, reposition the unit, mount the assembly to the frame rail, and remove the support out from under the unit. Recheck the shaft angle and pulley alignment and adjust as necessary (to make adjustments at this point, some holes may have to be slotted or oversized).

Belt-Tensioning Bracket Installation:

Once the compressor and electrical accessory unit are in place and properly oriented, the belt-tensioning bracket should be installed on the frame rail. A belt-tensioning bracket has been provided that will work for most applications. When installing the belt-tensioning bracket, the shaft of the idler pulley MUST be parallel (at the same angle) to the electrical accessory unit shaft and the compressor shaft. The idler pulley must also be properly aligned with the other pulleys on the electrical accessory unit and the compressor. A straight edge may be helpful to assist in properly aligning the pulleys. It may also be helpful to use a slightly oversized (length-wise) belt to ensure proper pulley alignment and to ensure there are no belt interferences.

After the belt-tensioning bracket has been properly positioned and aligned, mark and drill the mounting holes in the frame rail. Use the provided fasteners to mount the bracket to the frame rail.

With all components securely mounted (compressor, electrical accessory unit, and belt-tensioning bracket), install the drive belt onto the pulley system. Since each installation is different, a belt has not been provided with this kit. Any automotive, five-grove (six-rib), multi-V belt sized to the proper length for the application will work for this system.

To tighten the belt-tensioning bracket assembly, slightly loosen the bolts in the slotted holes. Begin tightening the adjusting screw in the top of the bracket. When the belt is properly tightened (it should have about ½" to 1" of movement when pushed on with your fingers), tighten the jam nuts on the adjusting screw against the bracket to prevent any loosening during operation.

Install Drive Shaft and Components

Ingersoll Rand Onboard Power Solutions does not supply the PTO and drive shaft components. The installer must provide these items. The compressor is furnished with a companion flange, to be mounted on the compressor shaft, which will accept a yoke flange that mates to a Dana Corporation Drive Train Components Division, Series 1310 drive shaft and universal joints. Typically, Dana flange # R2-2-479 is used to mate to the compressor drive shaft adapter flange, and Dana flange # R2-4-533 is used to mate with the PTO shaft (1 ¼" diameter shaft → use Dana flange # R2-4-473 for 1" diameter PTO shafts). If the drive shaft must be longer than 62 inches, a hanger bearing and two drive shafts must be used in order to reduce vibration. Failure to use this arrangement will cause early failure of the universal joints.

Once the correct length is established, the drive shaft must be cut and welded by a certified driveline shop. The cutting and welding operation is very critical and must be done by a shop that has the equipment and experience to properly align and balance the shaft. Balancing the drive shaft is very critical to the life of the compressor system, PTO, and transmission. An unbalanced drive shaft will result in excessive vibration during operation of the unit.

Always use a slip type (telescoping) drive shaft assembly. One end of the drive shaft has a splined slip yoke assembly. This end must be attached to the PTO, not the air compressor. Always align the U-joints at each end of the drive shaft to be in phase with each other.

Install the Air/Oil Receiver Tank and Separator Element

The air/oil receiver tank is designed to be mounted ONLY horizontally. The vessel is approximately 12 inches in diameter and 25 inches in length. The tank is provided with two “saddle mount” straps and two additional brackets mounted to the straps for mounting the receiver tank to the frame rail. The tank is typically mounted outside of the truck’s frame rail, or under one of the steps on larger trucks. The tank may also be mounted in between the frame rails behind the rear axle. However, if the tank is mounted in between the frame rails, the installer must provide additional brackets for this application.

When choosing a mounting location for the tank, **remember that the oil level in the tank cannot be higher than the base of the intake valve on the compressor**. If the tank is mounted in a position where the oil level is above the inlet valve, the compressor may eject oil out through the inlet valve and blowdown orifice during shutdown.

When mounting the tank, take careful consideration of the oil fill port and the oil level sight gauge. The sight gauge MUST be in a position where the operator can quickly and easily view the oil level in the tank. The oil fill port MUST be positioned to allow room to pour oil into the port from a one-gallon container through a funnel. If these considerations are not made, routine maintenance and daily checks of the unit may become extremely difficult.

> **NOTE: The oil fill and sight gauge assembly, the safety valve and pressure gauge piping, and the fittings in the bottom cross bar of the tank may all be repositioned to ease installation. The oil fill and sight gauge assembly may be moved to the opposite side of the tank than as installed from the factory. The safety valve and pressure gauge piping can be moved to the additional boss on the tank 90° from where this piping is installed from the factory. And the fittings in the bottom crossbar of the tank may be swapped if necessary. When repositioning any of these fittings, use an appropriate amount of “pipe dope” or “thread sealer” on all pipe thread connections. DO NOT use “pipe dope” or “thread sealer” on any O-ring fittings.**

Once an appropriate location has been selected for the receiver tank, mark and drill all necessary mounting holes in the frame rail of the truck. Install the tank securely to the frame rail (fasteners not provided).

Next, mount the Separator Element. A bracket has been provided to mount the separator element head to the outside of the frame rail of the truck. This bracket may be modified or re-fabricated, if required, to mount the separator element inside the frame rail or to some other sturdy mounting location. Be sure the element hangs vertically downward from the element head. Any other orientation may prevent proper scavenging of oil from inside the element. The element should be shielded from road debris, and should be located such that it is accessible for routine maintenance.

> **NOTE: Always mount the separator element assembly to a metallic structure that is directly grounded to the truck’s chassis. Add a ground strap if necessary. Never mount the separator element assembly to a plastic or rubber support.**

(Refer to Air/Oil Piping Diagram in Parts Manual for proper piping sequence.)

Install the Compressor Oil Cooler

Oil/Water Heat Exchanger:

Onboard Portable Power Solutions offers a unique, patented oil-to-water heat exchanger for cooling the compressor oil. It is a compact, plate type, cross flow heat exchanger that uses vehicle engine water to cool the compressor oil. The heat exchanger is small enough to fit easily within typical 8" frame rails.

Brackets for mounting the oil-to-water heat exchanger are provided with the kit. The heat exchanger should be mounted so that the coolant hoses always slope up to the engine. This is to avoid trapping air in the heat exchanger or the hoses. The heat exchanger should also be located close to the receiver tank and compressor to keep the high pressure oil lines as short as possible.

The oil-to-water heat exchanger has been sized to provide adequate cooling for the compressor oil even when using 195°F coolant from the vehicle engine. The key requirement is adequate coolant flow that is **not** shut OFF by the engine thermostat. When properly installed, the engine cooling system will maintain the compressor oil within the desired temperature range without the need for an oil circuit thermostatic valve.

Because a variety of gasoline and Diesel engines are used in each type of vehicle, the following plumbing guidelines are nonspecific. Adequate testing of the complete installation will help avoid problems.

The oil-to-water heat exchanger must be plumbed for “cross flow” of the compressor oil and the engine coolant. Figure 7.2 shows how this is done. This is necessary for the heat exchanger to operate properly.

FIGURE 7.2

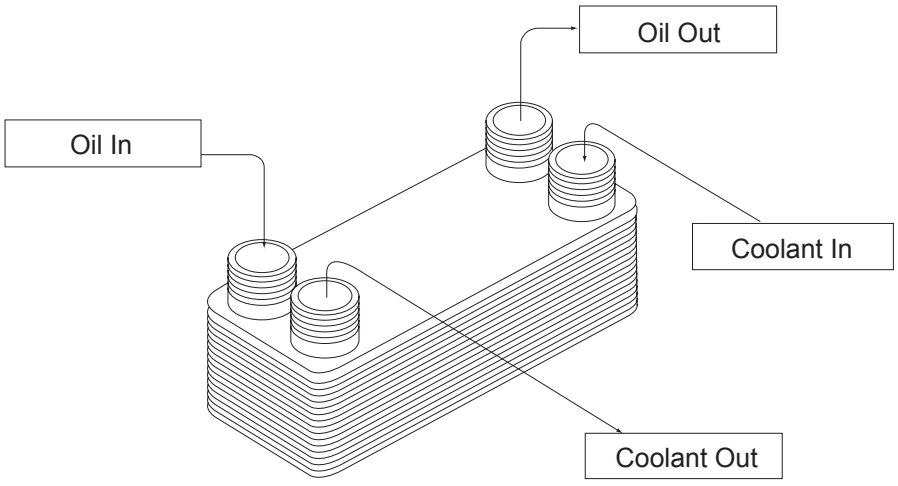


Figure 7.1 shows how to make the coolant connections to the engine. The best way of making the connection is by locating a port on the coolant manifold in the block. This is typical of heavy-duty engines. If this is not available an alternate connection can be taken at the engine thermostat housing before the thermostat. It is important that there is coolant flow to the heat exchanger even when the thermostat is closed. This type of circuit should be used when a better source of coolant is not available on the engine. In both cases the coolant is returned to the engine at the inlet of the coolant pump.

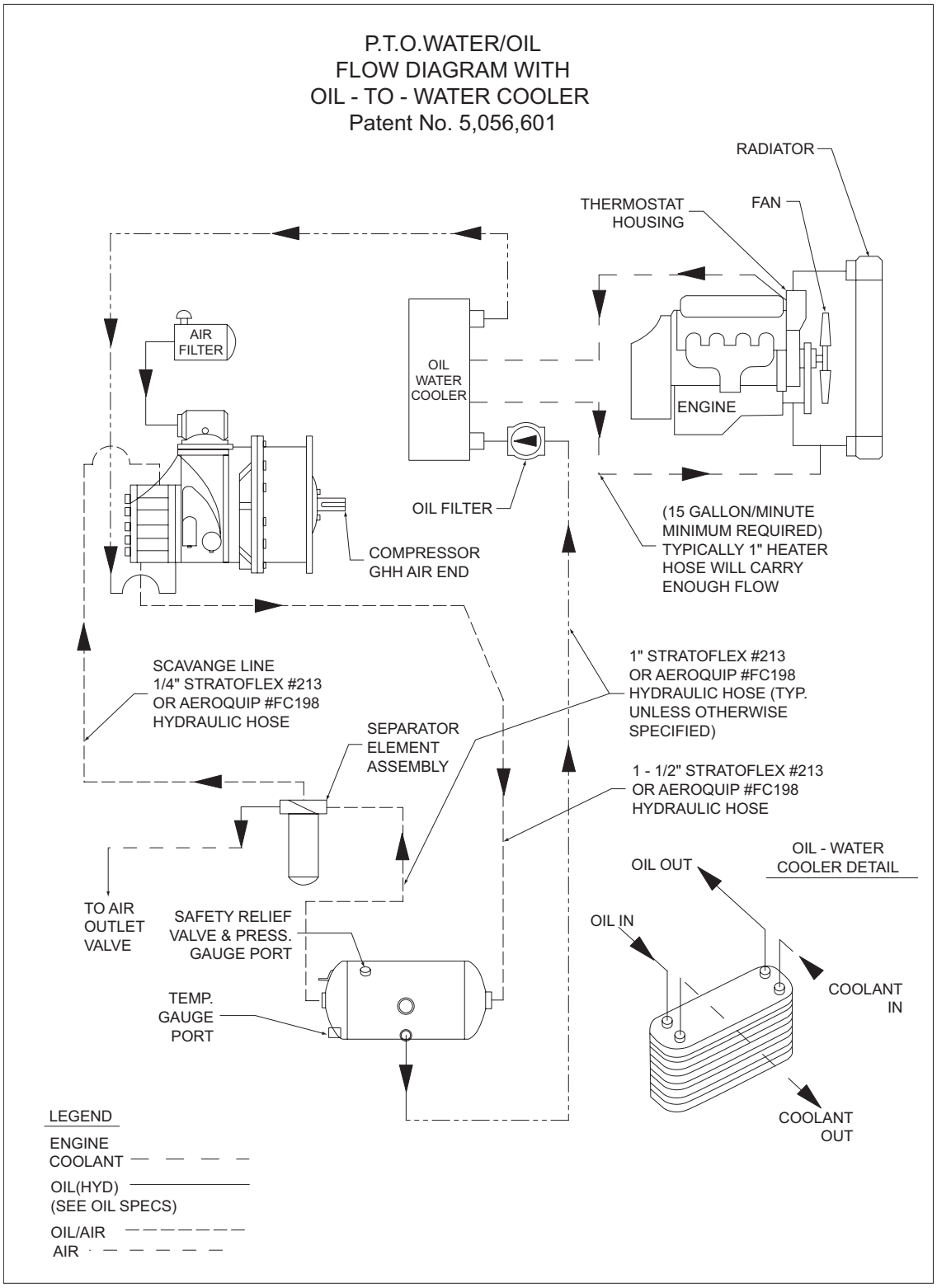
The coolant flow through the heat exchanger must be at least 15 gallons per minute. This should be checked by measuring the coolant pressure into and out of the heat exchanger. The difference in these two pressure headings should be a least 2 psi. This measurement must be made when the engine is running at compressor idle speed. This is not the same as normal engine idle speed. If the pressure difference is less than 2 psi, larger hoses and/or different water supply and return locations on the engine may be necessary.

The amount of heat added to the engine coolant is approximately:

100 CFM	1148 BTU/min
220 CFM	1488 BTU/min

This is a small amount compared to total engine heat rejection. However, vehicles with engines smaller than 200 hp may require an engine fan with higher airflow. This is to make up for the lack of ram airflow when operating the compressor.

FIGURE 7.3


P.T.O.WATER/OIL
FLOW DIAGRAM WITH
OIL - TO - WATER COOLER
Patent No. 5,056,601
RADIATOR
THERMOSTAT HOUSING
FAN
AIR FILTER
OIL WATER COOLER
ENGINE
OIL FILTER
(15 GALLON/MINUTE MINIMUM REQUIRED) TYPICALLY 1" HEATER HOSE WILL CARRY ENOUGH FLOW
COMPRESSOR GHH AIR END
SCAVANGE LINE 1/4" STRATOFLEX #213 OR AEROQUIP #FC198 HYDRAULIC HOSE
1" STRATOFLEX #213 OR AEROQUIP #FC198 HYDRAULIC HOSE (TYP. UNLESS OTHERWISE SPECIFIED)
SEPARATOR ELEMENT ASSEMBLY
1 - 1/2" STRATOFLEX #213 OR AEROQUIP #FC198 HYDRAULIC HOSE
OIL - WATER COOLER DETAIL
OIL OUT
OIL IN
COOLANT IN
COOLANT OUT
TO AIR OUTLET VALVE
SAFETY RELIEF VALVE & PRESS. GAUGE PORT
TEMP. GAUGE PORT
LEGEND
ENGINE COOLANT
OIL(HYD) (SEE OIL SPECS)
OIL/AIR
AIR

Oil/Air Heat Exchanger W/ 12VDC Fan:

For under-chassis compressor systems that do not utilize an oil/water heat exchanger, Ingersoll Rand provides a radiator type heat exchanger with a 12VDC fan. This heat exchanger utilizes air pushed across the oil filled cooler to cool the compressor oil. Brackets are provided for mounting the cooler, and will be applicable in most situations. However, for some application, these brackets may need to be modified or new brackets may need to be fabricated for secure and proper installation of the cooler.

When choosing a mounting location for the cooler, take very careful consideration of all airflow restrictions. Ensure that the cooler is mounted in such a way that the outlet air from the cooler does not recirculate back into the inlet air. This is done by ensuring that the outlet air is able to freely flow away from the cooler without deflecting against any obstructions. It is helpful to channel the exhaust air away from the cooler with baffles or ducts. Make sure the cooler has adequate spacing on both sides (air flow inlet and outlet) for unrestricted airflow. Generally, it is recommended that each face of the cooler have at least eight (8) inches of free unrestricted space.

The inlet air to the cooler must be as close to ambient temperature as possible. Ensure that there is no preheating of the inlet air to the cooler by eliminating recirculation of outlet air from the cooler (as mentioned above), preventing any air restrictions on either the cooler inlet or outlet airflow, and by ensuring the exhaust air from the truck's cooling system does not circulate through the compressor oil cooler. The best place to mount the cooler is on top of the truck body. **DO NOT mount the cooler between the frame rails beneath the truck**. There is typically not enough free space between the frame rails to allow unrestricted airflow, nor is the air under the truck free from preheating due to the truck's exhaust and the warm air being blown under the truck by the truck's engine fan.

When making the electrical connections to the fan, use **AT LEAST 10 GAUGE WIRE OR LARGER**. Any wire size smaller than 10 gauge will be too small to carry the current needed for the rated fan speed of the cooler. If the correct wire size is not used, the system WILL OVERHEAT.

Mount the fan temperature switch into the oil inlet header of the cooler. With the fan temperature switch in this location, it ensures that when the compressor oil temperature reaches 170°F that the fan will be turned on and begin to cool the oil.

Install the Oil Filter

Water-Cooled System:

The oil filter assembly is designed to mount directly onto the heat exchanger oil inlet port, and has been provided preassembled with the cooler. However, if it is necessary, the oil filter assembly may be remotely mounted with installer provided hardware. Make sure the oil filter is installed in a manner that will allow easy access to the oil filter for routine maintenance and servicing, whether remotely mounted or mounted with the heat exchanger.

Air-Cooled System:

For units with an air-cooled heat exchanger, the oil filter assembly is mounted remotely using the factory supplied bracket, and should be located in an area that is easily serviceable.

Install the Instrument Panels

The air pressure gauge, oil temp gauge, and hour meter are furnished preassembled in an instrument panel, and can be located where desired, keeping in mind that a tube for the pressure gauge and electric wires have to be connected. If the system includes an electrical accessory unit, the panel will also include cutouts for the related hardware for the electrical accessory unit (receptacles, welding connections, etc.).

The instrument/control panel should be located in an accessible area on the truck using installer provided mounting hardware. However, it must be located in an area that is dry and well protected from accidental contact. For compressor only systems, the panel may be installed in the cab of the truck or in a toolbox compartment in the body of the truck. For systems that include an electrical accessory option, it is recommended that the panel be installed in a toolbox compartment in the body of the truck. **DO NOT install the panel in a location where it will be exposed to moisture**.

Install the Engine Speed Control (optional accessory)

For electronic throttle controls see instructions with accompanying Engine Throttle Control Manual.

> **NOTE: Many truck manufacturers offer electronic means of controlling the engine speed via programmable parameters within the engine ECM. These methods are feasible to use with the Ingersoll Rand Onboard Power Solutions products, and can usually be setup by the truck dealership where the vehicle was purchased (or the nearest vehicle service center). However, if any damage to the Ingersoll Rand equipment occurs due to over speeding or some other programmable engine parameter malfunction, Ingersoll Rand will not be held responsible for warranting either the damaged Ingersoll Rand equipment or the vehicle.**

Install Air Cleaner

The air cleaner assembly consists of a heavy-duty 2-stage dry-type air cleaner (suitable for horizontal mounting), rubber connections, clamps, mounting bands, and rain cap. Locate the air cleaner at a point where it can draw in cool, clean air. DO NOT mount the air cleaner under the chassis of the truck. Also, ensure that the intake of the air cleaner is located such that no moisture can be drawn into the air cleaner during operation or forced in during road driving of the vehicle. A length of three-inch diameter air duct is included with the kit. Take into consideration the length of air duct required, and the routing of the air duct when choosing a mounting location for the air cleaner assembly.

Make Up and Install the Hoses

Refer to air and oil piping diagram in Parts Manual for proper hose sizes and locations. For makeup of the hydraulic hose assemblies, a simple four-step procedure is used.

1. Put hose in vise just tight enough to prevent it from turning. Cut hose square with fine-tooth hack-saw or cut-off wheel. Clean hose with compressed air.
2. Screw socket counterclockwise onto hose until it bottoms. Back off 1/4 turn.
3. Oil nipple threads and screw clockwise onto socket and hose, leaving 1/32 to 1/16 inch clearance between nipple box and socket.
4. Clean assembly by blowing with compressed ai

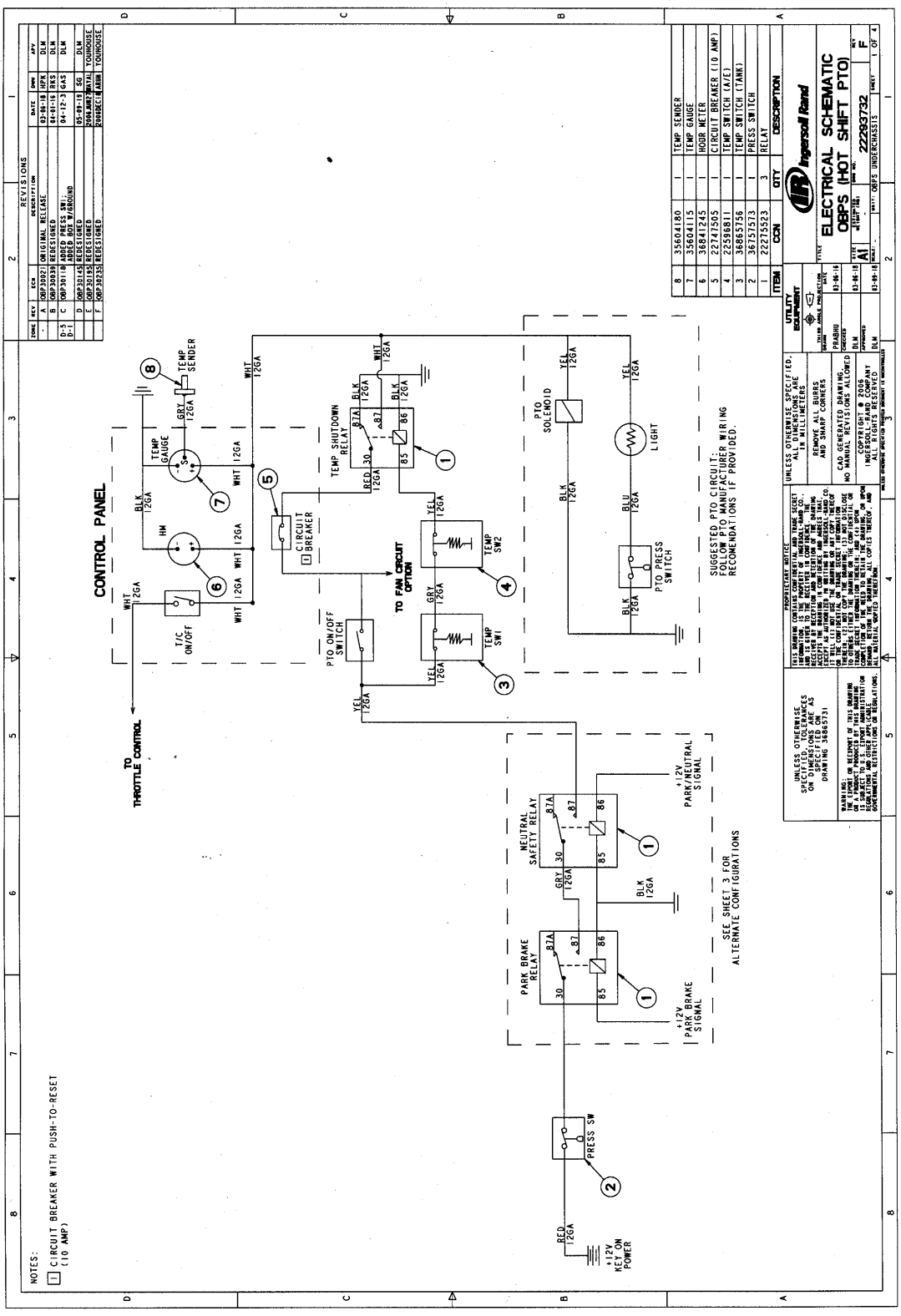
Make Up and Install the Electric Wiring

All wiring (#12 gauge automotive type unless otherwise stated), inline fuse (minimum 6 amp slo-blo), and connections are to be supplied by the installer. Connect wiring as shown in wiring diagrams in Figure 7.4 thru 7.6 for system on type of vehicle used.

Schematic Reference:

Figure 7.4	Hot Shift PTO Electrical Schematic
Figure 7.5	Fan Circuit (Air Cooled Option)
Figure 7.6	Electrical Symbol Cross Reference
Figure 7.7	Safety Relay Diagram
Figure 7.8	Overtemp Shutdown (Manual PTO)
Figure 7.9	Generator Option Electrical Schematic (120V)
Figure 7.10	Generator Option Electrical Schematic (120V/240V)

FIGURE 7.4 Hot Shift PTO Electrical Schematic



ITEM	QTY	DESCRIPTION
8	1	TEMP SENDER
7	1	TEMP GAUGE
6	1	HOUR METER
5	1	CIRCUIT BREAKER (10 AMP)
4	1	TEMP SWITCH (A/E)
3	1	TEMP SWITCH (TANK)
2	1	PRESS SWITCH
1	3	RELAY
	CCN	

FIGURE 7.5

FAN CIRCUIT (AIR COOLED OPTION)

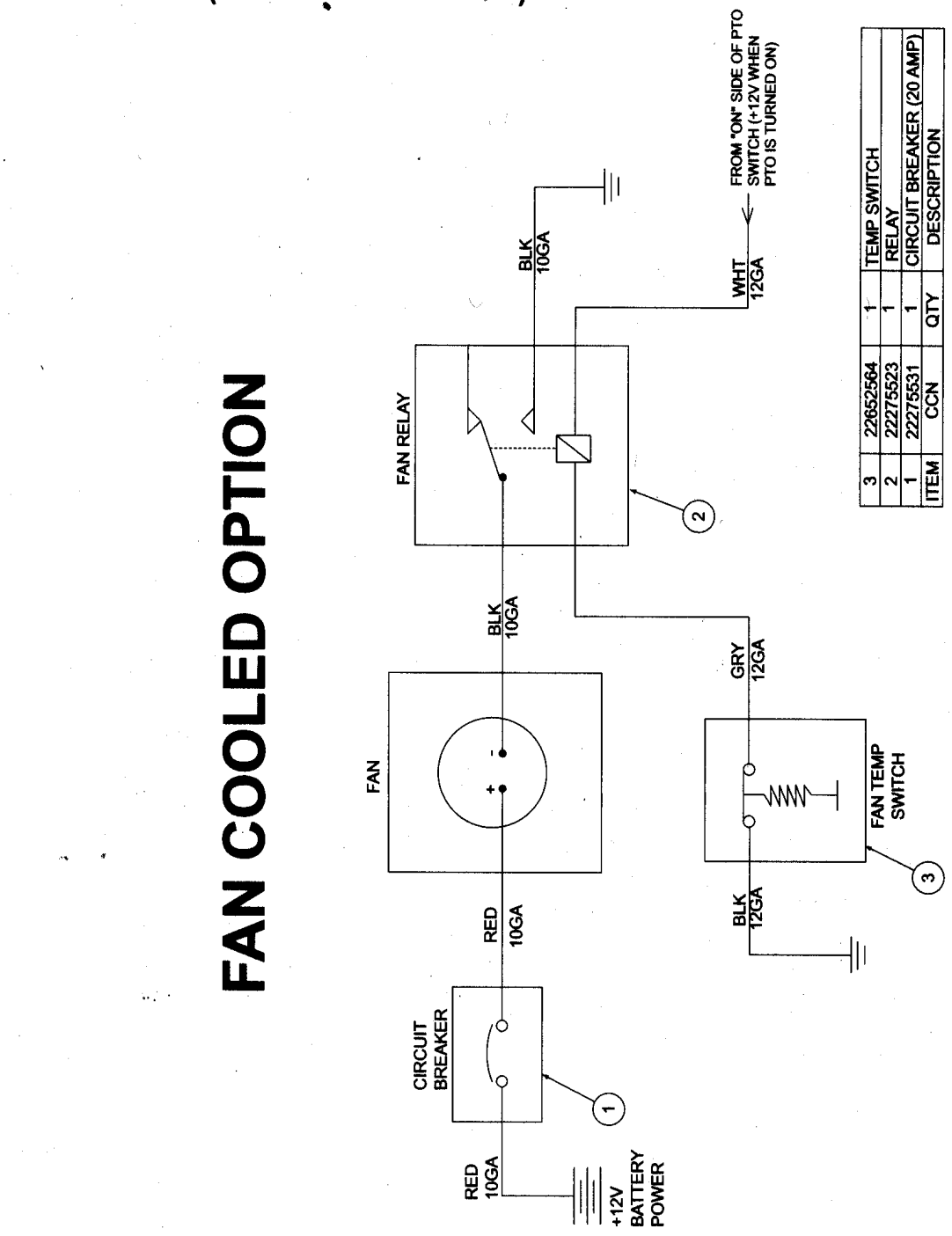


FIGURE 7.6

ELECTRICAL SYMBOL CROSS REFERENCE

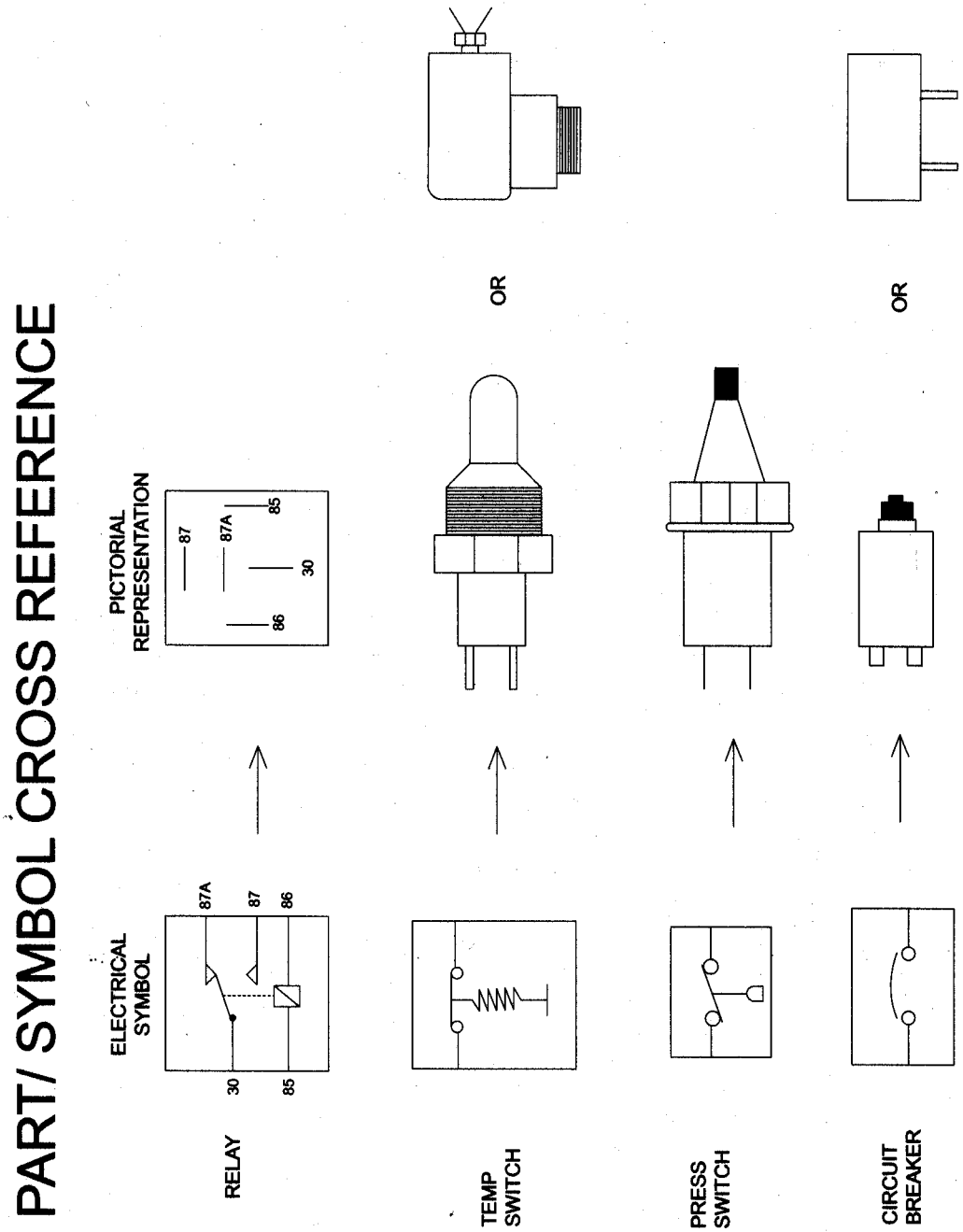


FIGURE 7.7

SAFETY RELAY DIAGRAM

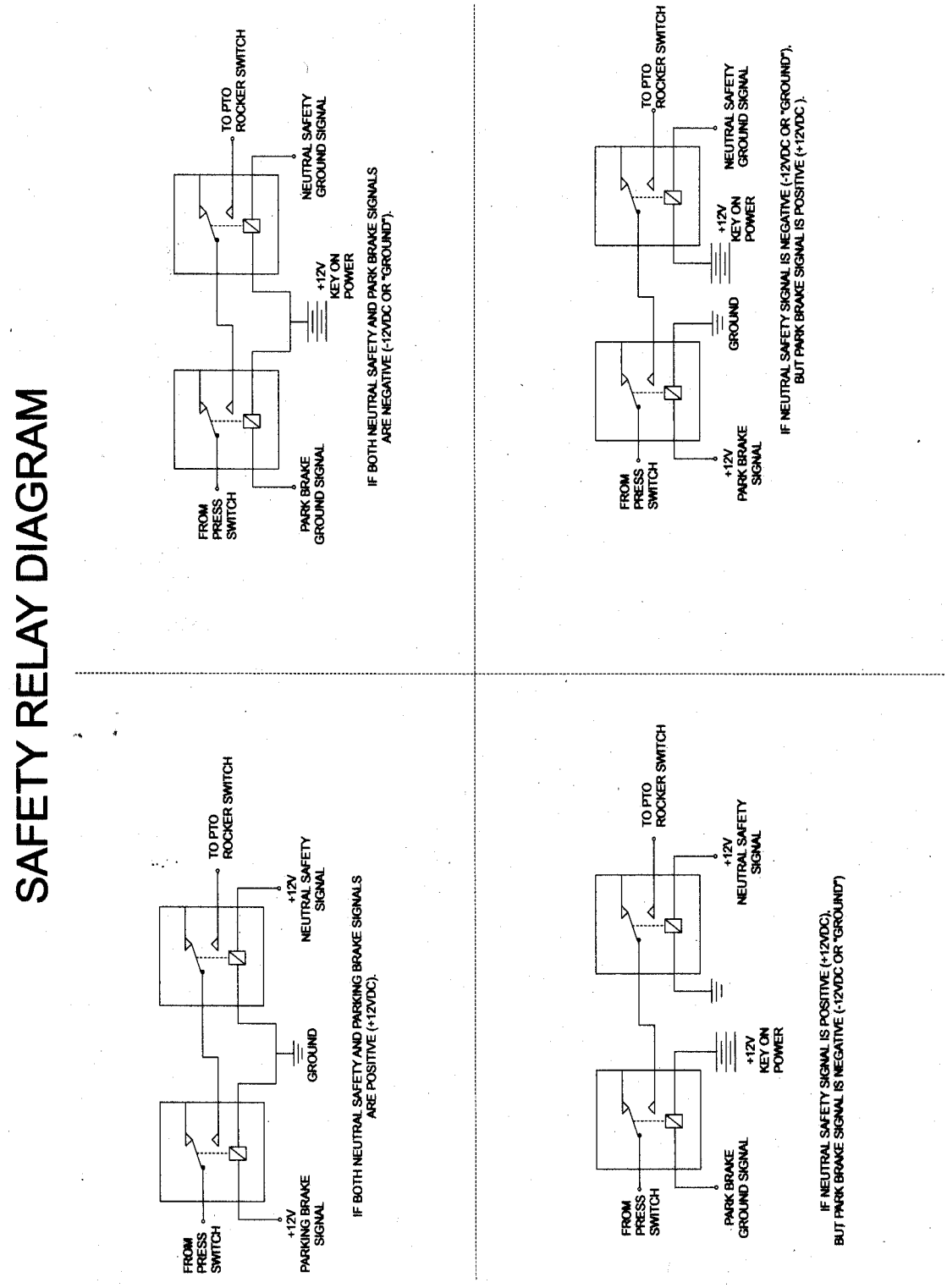


FIGURE 7.8

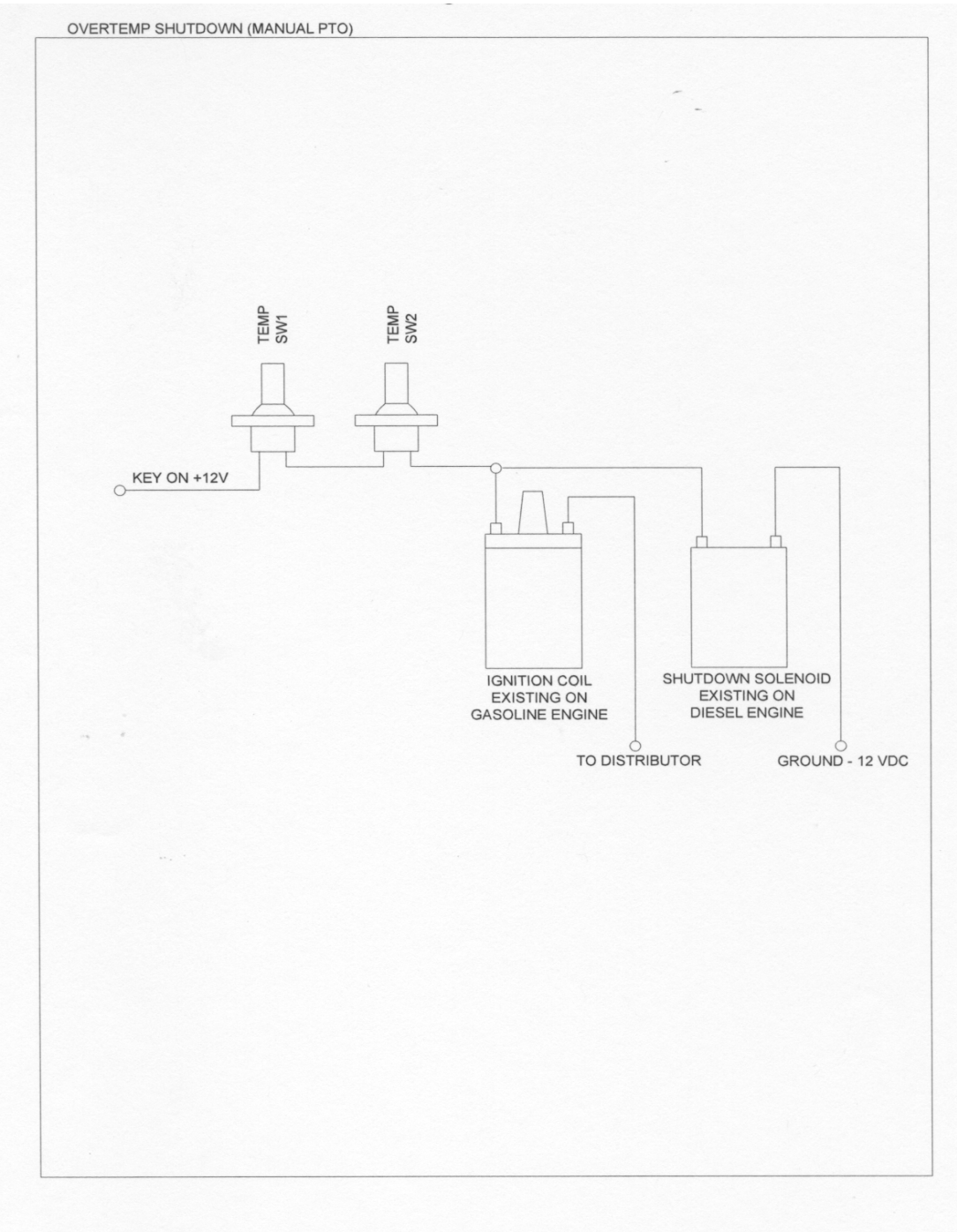

OVERTEMP SHUTDOWN (MANUAL PTO)
TEMP SW1
TEMP SW2
KEY ON +12V
IGNITION COIL EXISTING ON GASOLINE ENGINE
SHUTDOWN SOLENOID EXISTING ON DIESEL ENGINE
TO DISTRIBUTOR
GROUND - 12 VDC

FIGURE 7.9

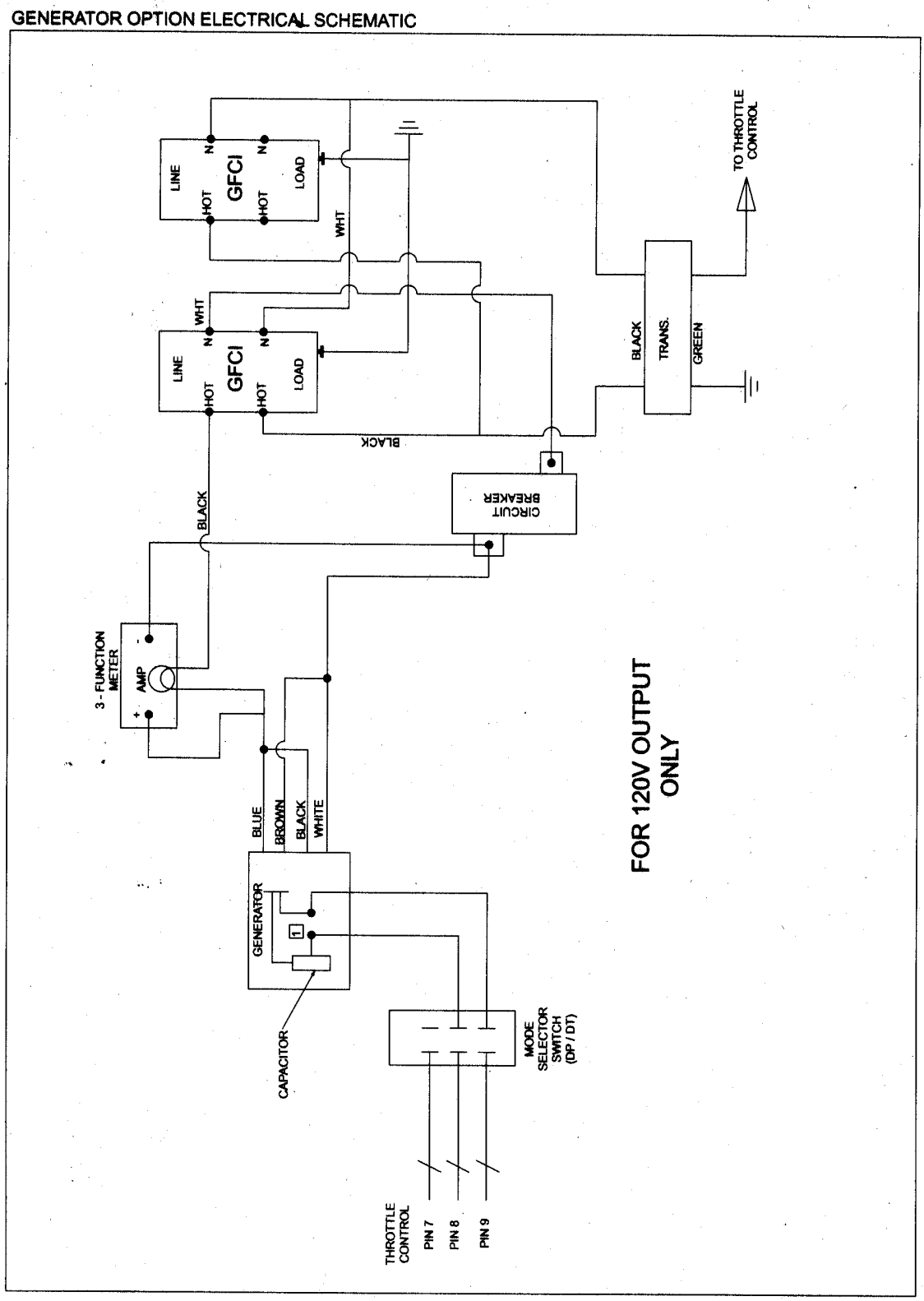
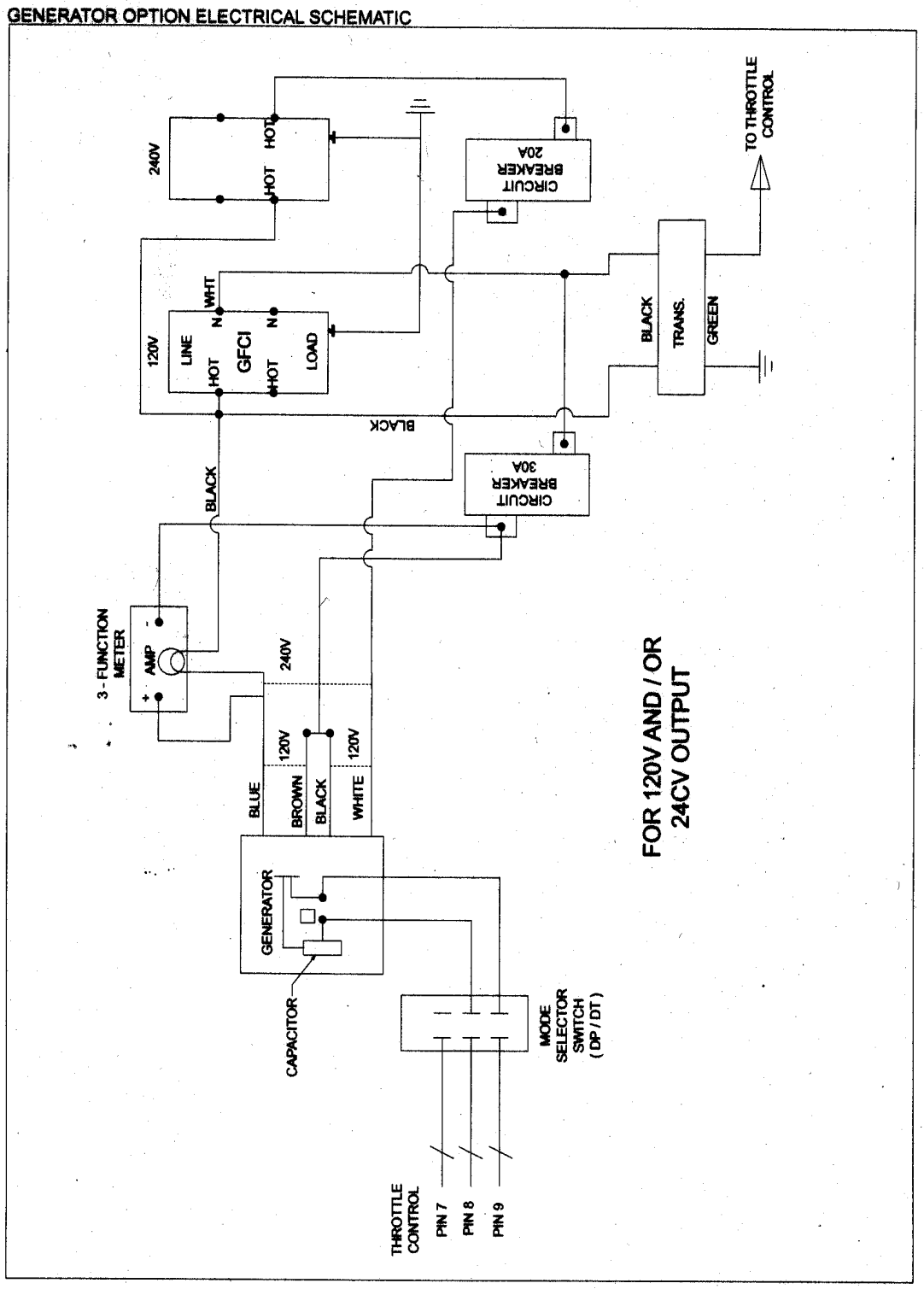

GENERATOR OPTION ELECTRICAL SCHEMATIC
LINE
HOT
N
GFCI
HOT
N
LOAD
WHT
TO THROTTLE CONTROL
BLACK
TRANS.
GREEN
BLACK
CIRCUIT BREAKER
3 - FUNCTION METER
AMP
BLUE
BROWN
BLACK
WHITE
GENERATOR
CAPACITOR
MODE SELECTOR SWITCH (DP / DT)
THROTTLE CONTROL
PIN 7
PIN 8
PIN 9
FOR 120V OUTPUT ONLY

FIGURE 7.10


GENERATOR OPTION ELECTRICAL SCHEMATIC
240V
HOT
HOT
CIRCUIT BREAKER 20A
TO THROTTLE CONTROL
120V
LINE
HOT
GFCI
HOT
LOAD
N
N
WHT
BLACK
TRANS.
GREEN
BLACK
BLACK
CIRCUIT BREAKER 30A
3 - FUNCTION METER
AMP
240V
120V
120V
BLUE
BROWN
BLACK
WHITE
GENERATOR
CAPACITOR
MODE SELECTOR SWITCH (DP / DT)
THROTTLE CONTROL
PIN 7
PIN 8
PIN 9
FOR 120V AND / OR 24CV OUTPUT

Ingersoll Rand PTO Drive Operating & Safety Relay System (Auto Trans.)

The function of the system is to prevent the PTO for the compressor from operating unless two safety interlocks are in place. The transmission on a hot shift PTO must be in the NEUTRAL or PARK position and the EMERGENCY BRAKE must be set. (Refer to Figure 7.2)

The current flow is as follows:

1. +12V key on power from fuse box or other suitable source feeds power to high temp shut down switches.
2. It then goes to terminal #30 on 1st safety relay.
3. Terminal #86 is grounded by signal from park brake or transmission (depending on which relay is being wired in first).
4. Terminal #85 gets +12V key-on power.

   NOTE: If you have a vehicle on which the Neutral Safety Switch is +12V in PARK or NEUTRAL, you must remove the +12V key-on power wire from Terminal #85 and put a ground signal to that terminal per page 2 of wire schematic (Figure 7.2).
   This also holds true if you have a +12V signal wire on the EMERGENCY Brake Switch (i.e some Fords).

5. If wiring is correct for the 1st safety relay, you will have a +12V signal coming out of Terminal #87 on the relay.
6. This wire now goes to Terminal #30 on the 2nd safety relay.
7. Wire 2nd safety relay similar to the 1st (with terminals #85 & #86 wired properly with one at +12V DC and the other grounded).
8. If all wiring is correct, there will be a +12V DC signal at Terminal #87 on 2nd safety relay.
9. Run wire from Terminal #87 on 2nd safety relay to provide power to PTO Rocker switch.
10. Also run wire from PTO Rocker switch output to throttle control on/off switch input.

Test the System:

1. Turn on the Rocker Switch to activate the PTO.
2. Move shifter to DRIVE or REVERSE. Solenoid should shut down again. This should also shut down SPEED CONTROL.
3. Shift back to PARK or NEUTRAL. Release EMERGENCY BRAKE pedal. Solenoid should shut down again. This should also shut down SPEED CONTROL.
4. Reset brake.
5. You may run system or use voltmeter to check power to White wire to terminal #3 on the throttle control box (electronic throttle control only).

   NOTE: Some vehicles, PTO systems, and throttle controls already take these safety settings into account. After installing the PTO system and throttle control, test the system (as indicated above). If one or both of these safety settings are already in place, there is no need to install an additional relay for the particular safety setting already in place.

Pressure Regulator Adjustment

With the compressor operating at idle engine speed (approximately 1000-1200 RPM for most systems) set the pressure regulator valve to obtain between 110 psig (758 kPa) and 120 psig (827 kPa) receiver tank pressure (for a 100 psig rated system). For systems rated above 100 psig, the pressure regulator setting should be between 10 psi and 20 psi above rated operating pressure. Turning the adjusting screw on the regulating valve clockwise increases the pressure and counterclockwise decreases the pressure.

Speed Control Adjustment

Electronic Throttle Control:

For detailed instructions concerning setup and calibration of the electronic throttle control, please refer to the separate manual included with this system entitled ENGINE THROTTLE CONTROL MANUAL.

Final Check

At this time the control system should be adjusted. However, a final check of all pressures and speeds must be made. Follow the steps below for a thorough check:

1. Check the compressor several times from full speed to idle making certain that speeds are set correctly.
2. No significant adjustment in engine speed should occur when using a small amount of air. If this occurs, reset the idle spring tension (pneumatic/ mechanical throttle control) or adjust the psig potentiometer (electronic throttle control).
3. Disengage the compressor. The engine should return to normal truck idle without significant over speed. (Consult manufacturer's specs). Using a pneumatic/mechanical throttle control, if the truck idle speed is not obtained, the throttle cable is too tight; select a longer position and reset the engine speed control. If over speed occurs, check for mechanical interference with any part of the control assembly or lack of blow down pressure to the engine speed control. Using an electronic throttle control, if the truck idle speed is not obtained, ensure that power to the throttle control has been disabled when the PTO is disengaged.
4. With the engine off, operate the engine throttle's full travel to be sure no interference with normal operation occurs. If there are noticeable differences in throttle response compared to throttle response before installation of the compressor system, check the following:

   - Make sure there are no throttle cable interferences (pneumatic/mechanical throttle control)
   - Make sure that all electrical connectors and plugs are in good contact (electronic throttle control). It may be necessary to use tie-wraps around connectors/plugs to prevent them from accidentally coming loose.

Operation

Operation

Transporting

Preparing to Transport

1. Inspect entire running gear on vehicle including drive train and all braking, steering, mechanical, pneumatic, hydraulic, and electrical systems, to make sure they are in good operating condition.

⚠ WARNING

If inspection shows any worn or damaged parts, do not operate vehicle until repairs are made.

2. Make sure all windows and rear view mirrors are clean and properly adjusted. Always use seat belts and shoulder restraints.

Transportation

1. Observe all local and federal traffic laws, including those specifying minimum speed.
2. Transport at the vehicle's manufacturer's maximum recommended speed.
3. Adjust speed to reflect weather and road conditions.

Choosing Parking Site

1. Park the vehicle in an open, well ventilated area. Park as level as possible. In warm weather operation, park in a shaded area if possible.

⚠ WARNING

Never park on a grade of more than 15 degrees (27%). If you must park on any grade, park across the grade so that the vehicle does not tend to roll.

2. Park so that the wind carries exhaust fumes and radiator heat away from the compressor inlet.
3. Park away from work site dust.

Parking Procedures

1. Set the vehicle's brake, and chock or block the wheels.
2. Immediately erect hazard indicators, barricades, and if working at night, light flares to keep others clear of the vehicle.

Operating

Flow Limiting Valves

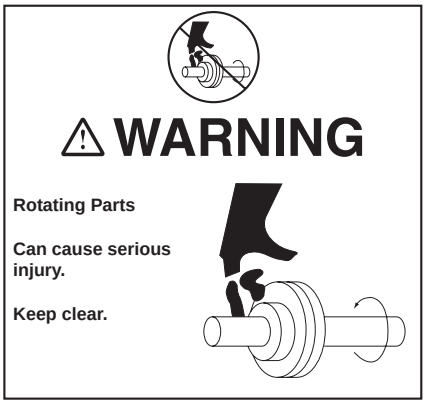
1. Install an appropriate flow-limiting valve for each air hose that exceeds 1/2" inside diameter.

Moving Parts and other hazards

1. Be aware of moving parts.

WARNING

Make sure all personnel are clear of compressor before starting it.



2. Relieve pressure before removing filler plugs, caps, fittings or covers.

3. Stay clear of electrical power lines. Keep the vehicle, hoses, tools and all personnel at least 10 feet from power lines and buried cables.

WARNING

Make repairs only in clean, dry and well lighted and well ventilated areas. Keep all parts of the body and any hand held tools or other metal objects away from exposed live parts of the electrical system.

Compressor Oil Level

Check the compressor oil level in the sight glass located on the separator tank. Oil level should be ¼ to ½ of the sight gauge with the compressor not running. **The oil level for this machine cannot be checked while the unit is running.**

Ambient Air

The air going into the compressor inlet and through the cooler (fan cooled units) must be relatively free of oil, dirt, soot and other debris. It must be no more than 10°F (5°C) over the ambient temperature.

Before Starting

⚠ WARNING

Unrestricted airflow from a hose will result in a whipping motion of the hose, which can cause severe injury or death. A safety device must be attached to the hose at the source of supply to reduce pressure in case of hose failure or other sudden pressure release. Reference: OSHA regulation 29 CFR Section 1926.302 (b).

Before Starting:

Open service valve(s) to ensure pressure is relieved in receiver-separator system. Close valve(s) in order to build up full air pressure and ensure proper oil circulation.

Check the vehicle engine oil level. Maintain per marks on dipstick.

Check the vehicle fuel level. Use only the fuel(s) specified by vehicle owners manual.

Check the compressor lubricating oil level in the sight glass located on the separator tank.

⚠ WARNING

This machine may produce loud noise during operation. Extended exposure to loud noise can cause hearing loss. Wear hearing protection when the under-chassis system is in use.

Initial Startup Procedure

The following procedure should be adhered to when initially starting your PTO Compressor:

1. Position the truck on a level surface so that proper amounts of liquid can be added.
2. (For Split-Shaft PTO only) fill gear case per the manufacturer's recommendation. Do not over fill!
3. Fill the compressor with PRO-TEC™ Compressor Fluid. System capacity is 6 gallons (22.6 liters).

   NOTE: System capacity may vary depending on hose lengths.

4. Check the truck’s engine oil level and add if necessary.
5. Ensure there is no air pressure in the receiver tank before start-up.
6. Close all service valves.

7. Start truck and engage PTO per instructions given in the Quick Reference Guide at the end of this section (use the format that applies to your truck and type of installation).
8. After the initial run, shut the PTO Compressor OFF per instructions in Operation Section, and re-check the PTO and compressor sump fluid levels. Top off as needed. Tighten any loose fittings and check belt tension (units with electrical accessory option)
9. Restart the compressor system as indicated in step 7. Let the system idle for at least five minutes before opening service valve.
10. Open service valve and begin using air.

Stopping

1. Close air service valve.
2. Turn Throttle Control Switch and PTO Switch to "OFF" position.
3. When the engine stops, automatic blow down valve should relieve system air pressure.
4. Never allow unit to sit under pressure when engine is not running.

⚠ WARNING

Since the service valve is closed, air downstream of the valve may be trapped. A vent hole in the service valve will slowly bleed air from the hose. Do not disconnect hoses until all pressure has been vented.

NOTICE

Do NOT wire around or bypass a shutdown sensor or switch.

All units in this family of machines are protected by sensors or switches at the following locations:
High Discharge AIR Temperature

1. At the airend outlet.
2. Separator tank. (Cat-2 Only)

⚠ WARNING

DO NOT depress accelerator foot pedal while PTO is engaged! If the accelerator pedal is depressed, even momentarily, an over-speed condition could occur. This condition will cause damage to the PTO, compressor drive-line, and air compressor. This could also result in catastrophic failure of the drive-line, causing significant damage to the PTO, compressor, transmission, and other components mounted under the truck.

Starting/Stopping PTO Quick Reference Guide

Side-Mount PTO with Manual Transmission:

Starting Procedure

1. Set parking brake and chock wheels
2. Check compressor oil level (add if low)
3. Close all service valves
4. Remove all electrical outlet connections (if equipped with an electrical accessory option)
5. Depress clutch and hold it
6. Place transmission in neutral and start engine
7. Engage the PTO
8. Let out clutch
9. Turn on throttle control (switch on control panel), if equipped

Shutdown Procedure

1. Close service valves
2. Turn off throttle control (switch on control panel), if equipped
3. Depress clutch
4. Disengage PTO

Side-Mount PTO with Automatic Transmission:

Starting Procedure

1. Set parking brake and chock wheels
2. Check compressor oil level (add if low)
3. Close all service valves
4. Remove all electrical outlet connections (if equipped with an electrical accessory option)
5. Place transmission in Park (or Neutral if there is not a Park position) and start engine
6. Engage the PTO
7. Turn on throttle control (switch on control panel), if equipped.

Shutdown Procedure

1. Close service valves
2. Turn off throttle control (switch on control panel), if equipped
3. Disengage the PTO

Maintenance

Maintenance

General

⚠ CAUTION

Any unauthorized modification or failure to maintain this equipment may make it unsafe and out of factory warranty.

Use extreme care to avoid contacting hot surfaces (engine exhaust manifold and piping, air receiver and air discharge piping, etc.).The chart does not attempt to list all of the troubles that may occur, nor does it attempt to give all of the answers for correction of the problems. The chart does give those problems that are most apt to occur. To use the trouble shooting chart:

Never operate this machine with any guards removed.

Inch and metric hardware was used in the design and assembly of this unit. Consult the parts manual for clarification of usage.

NOTICE

Disregard any maintenance pertaining to components not provided on your machine.

In addition to periodic inspections, many of the components in these units require periodic servicing to provide maximum output and performance. Servicing may consist of pre-operation and post-operation procedures to be performed by the operating or maintenance personnel. The primary function of preventive maintenance is to prevent failure, and consequently, the need for repair. Preventive maintenance is the easiest and the least expensive type of maintenance. Maintaining your unit and keeping it clean at all times will facilitate servicing.

Scheduled Maintenance

The maintenance schedule at the end of this section is based on normal operation of the unit. This page can be reproduced and used as a checklist by the service personnel. In the event unusual environmental operating conditions exist, the schedule should be adjusted accordingly.

Compressor Oil

The lubricating and cooling oil must be replaced every 500 hours of operation or six (6) months, whichever comes first.

Check the compressor oil level in the sight glass located on the separator tank. Oil level should be ¼ to ½ of the sight gauge with the compressor not running. **The oil level for this machine cannot be checked while the unit is running.**

General

The life and proper operation of the compressor is dependent on adequate and clean compressor oil.

⚠ CAUTION

Do not mix oil types

Adding Oil

⚠ DANGER

Adding oil to the compressor system MUST be done ONLY when the compressor system is not in use (PTO disengaged, truck not running)

1. Level the compressor system to assure oil level indicator will be accurate.
2. Remove any dirt around fill cap, which is located on or near the air/oil receiver and then remove the fill cap itself.
3. Inspect the O-ring in the fill cap for damage and cleanliness. Replace if necessary.
4. Fill with PRO-TEC™ compressor oil until oil level is between ¼ and ½ levels on sight gauge.
5. Replace fill cap securely - never put cap on without tightening immediately.

Changing Compressor Oil

Before changing the compressor oil, make sure the unit is off (PTO disengaged, truck not running), and the there is no air pressure in the system (discharge pressure gauge reads zero).

To change the compressor oil:

1. Drain all the oil out of the system. When draining oil, remove plug or hose connector from bottom of separator tank. Allow the oil to drain into an approved oil collection container and dispose of used oil properly.
2. When oil has finished draining, replace (make tight) plug or connector on separator tank.
3. Follow the above procedure for “Adding Oil.”

⚠ CAUTION

Never operate this unit without appropriate amounts of lubricating/ cooling oil. Failure to regularly check, change, and add oil to this system will cause damage to the compressor.

Air Cleaner

On a weekly basis, squeeze the rubber valve (precleaner dirt dump) on the air cleaner housing to ensure that it is not clogged.

To service the air cleaners on all units proceed as follows (with the system not running):

1. Release cover latches, and remove cover.
2. Remove air filter elements.
3. Inspect air cleaner housing for any condition that might cause a leak and correct as necessary.
4. Wipe inside of air cleaner housing with a clean, damp cloth to remove any dirt accumulation, especially in the area where the element seals against the housing.
5. Inspect element by placing a bright light inside and rotating slowly. If any holes or tears are found in the paper, discard this element. If no ruptures are found, the element can be cleaned.
6. If a new air filter element is to be used check it closely for shipping damage.
7. Place cleaned or new elements back into the air cleaner housing.
8. Install cover and fasten latches.

Cleaning Air Filter Element

In the event that the filter element must be reused immediately, compressed air cleaning (as follows) is recommended since the element must be thoroughly dry. Direct compressed air through the element in the direction opposite to the normal air flow through the element.

Move the nozzle up and down while rotating the element. Be sure to keep the nozzle at least one inch (25.4 mm) from the pleated paper.

> **NOTE: To prevent damage to the element, never exceed a maximum air pressure of 100 psi (700 kPa).**

In the event the element is contaminated with dry dirt, oil or greasy dirt deposits, and a new element is not available, cleaning can be accomplished by washing, using the air cleaner element manufacturer's recommendations.

> **NOTE: It is recommended that replacement elements be installed in the unit. The elements just removed for cleaning can be washed and stored as future replacement elements.**

In addition, the air cleaner system (housing and piping) should be inspected every month for any leakage paths or inlet obstructions. Make sure the air cleaner mounting bolts and clamps are tight. Check the air cleaner housing for dents or damage, which could lead to a leak. Inspect the air transfer tubing from the air cleaner to the compressor for leaks.

Make sure that all clamps and flange joints are tight.

Gauges

Inspect the gauges prior to start-up. During operation, observe the gauges and any lamps for proper functioning. Refer to Operating Controls, for the normal readings.

⚠ WARNING

Do not operate this unit without properly functioning gauges!

Compressor Oil Cooler

(Air-Cooled Units)

Use clean compressed air to remove small particles lodged in the airflow path of the cooler. Be careful not to damage any of the cooling fins or the cooler core. It is critical to keep the cooler fins free from dirt, grease, and other small particles. Restricted air flow through the cooler will cause overheating issues.

In the event foreign deposits, such as sludge and lacquer, accumulate in the oil cooler to the extent that its cooling efficiency is impaired, a resulting high discharge air temperature is likely to occur, causing shut down of the unit. To correct this situation it will be necessary to clean it using a cleaning compound in accordance with the manufacturer's recommendations.

Hoses

Each month it is recommended that all of the intake lines to and from the air cleaners, the cooling system hoses and all of the flexible hoses used for air and oil be inspected.

To ensure freedom from air leaks, all rubber hose joints and the screw-type hose clamps must be absolutely tight. Regular inspection of these connections for wear or deterioration is necessary.

Premature wear of the compressor is ASSURED whenever dust-laden air is permitted to enter the compressor intake.

The flexible hoses used in the oil and air lines on these units are primarily used for their ability to accommodate relative movement between components. It is important they be periodically inspected for wear and deterioration. It is also important the operator does not use the hoses as convenient handhold or steps. Such use can cause early cover wear and hose failure.

Piping systems operating at less than 150 psi (1050 kPa) may use a special nylon tubing. Some of the associated fittings are also of a special "push-in" design. If so, features are as follows:

Pulling on the tubing will cause the inner sleeve to withdraw and compress, thus tightening the connection. The tubing can be withdrawn only while holding the sleeve against the fitting. The tubing can be removed and replaced numerous times without losing its sealing ability.

To install the nylon tubing, make a mark (with tape or grease pencil) approximately 7/8 inch from the end of the tubing. Insert the tubing into the sleeve and "push-in" past the first resistance to the bottom. The mark should be approximately 1/16 inch from the sleeve, for the 3/8 inch O.D. tubing; 1/8 inch for the 0.25 inch O.D. tubing. This will ensure that the tubing is fully engaged in the sealing mechanism.

Compressor Oil Filter

The oil filter must be replaced every 500 hours of operation or six (6) months, whichever comes first. To service the oil filters it will first be necessary to shut the unit down. Wipe off any external dirt and oil from the exterior of the filter to minimize any contamination from entering the lubrication system. Proceed as follows:

⚠ WARNING

High pressure air can cause severe injury or death from hot oil and flying parts. Always relieve pressure before removing caps, plugs, covers or other parts from pressurized air system.

1. Open the service air valve(s) to ensure that system is relieved of all pressure.
2. Close the service valve(s).
3. Turn the spin-on filter element counterclockwise to remove it from the filter housing. Inspect the filter.

NOTICE

If there is any indication of formation of varnishes, shellacs or lacquers on the oil filter element, the compressor oil should be immediately changed.

4. Inspect the oil filter head to be sure the gasket was removed with the oil filter element. Clean the gasket seal area on the oil filter head.

NOTICE

Installing a new oil filter element when the old gasket remains on the filter head, will cause an oil leak and can cause property damage.

5. Lubricate the new filter gasket with the same oil being used in the machine.
6. Install new filter by turning element clockwise until gasket makes initial contact. Tighten an additional 1/2 to 3/4 turn.

NOTICE

Mechanical over-tightening may distort threads or damage the filter element seal.

7. Start unit and allow to build up to rated pressure. Check for leaks before placing unit back into service.

Fasteners

Visually check entire unit in regard to bolts, nuts and screws being properly secured. Spot check several capscrews and nuts for proper torque. If any are found loose, a more thorough inspection must be made. Take corrective action.

Receiver-separator Systems

Replace the Compressor Oil Separator Element every 1000 hours or after 12 months, whichever comes first.

⚠ WARNING

High-pressure air can cause severe injury or death from hot oil and flying parts. Always relieve pressure before removing caps, plugs, covers, etc. from pressurized air system.

To replace the element proceed as follows:

1. Open service valve(s).
2. Ensure discharge air pressure gauge reads zero (0) and that no air will discharge from the service valve.
3. Turn the spin-on filter element counter-clockwise to remove it from the filter housing. Inspect the filter.
4. Inspect the filter element head to be sure the gasket was removed with the element. Clean the gasket seal area on the head.
5. Lubricate the new element gasket with compressor oil.
6. Install new element by turning clockwise until gasket makes initial contact. Tighten an additional ½ to ¾ turn.
7. Start unit and allow to build up to rated pressure. Check for leaks.
8. Open service valve. Ensure that discharge air does not contain excessive amounts of oil. If excessive amounts of oil are found in discharge air the element is defective (assuming this condition did not occur with the previous element). Replace element as stated by the steps above.

Drive Line Universal Joints

The “U” joints on the PTO compressor system have lube fittings and should be lubricated after every 100 hours of operation and every time the truck itself is lubricated.

PTO

Check PTO hoses, wiring, etc. after every 100 hours of operation.

Service per PTO manufacturer’s recommended service intervals and procedures.

Scavenge Line

The scavenge line runs from the combined orifice/drop tube in the separator element, to the orifice fitting located in the airend.

Examine the orifice, check valve and hoses at every service or in the event of oil carryover into the discharge air.

It is good preventative maintenance to check that the scavenge line and tube are clear of any obstruction each time the compressor lubricant is changed as any blockage will result in oil carryover into the discharge air.

⚠ WARNING

High pressure air can cause severe injury or death from hot oil and flying parts. Always relieve pressure before removing caps, plugs, covers, etc. from pressurized air system.

The scavenge line originates at the separator element head and terminates at the compressor airend. An orifice check valve is located on the scavenge tube.

Once a year or every 1000 hours of operation, whichever comes first, replace the separator element and clean the scavenge orifice/check valve.

Excessive oil carry-over may be caused by an oil-logged separator element. Do not replace element without first performing the following maintenance procedure:

1. Check oil level. Maintain as indicated earlier in this section.
2. Thoroughly clean scavenge line, any orifice and check valve.
3. Assure minimum pressure valve/orifice is operational.
4. Run unit at rated operating pressure for 30 to 40 minutes to permit element to clear itself.

Maintenance Schedule

These time periods should be reduced if operating in extreme conditions (very hot, cold, dusty or wet).

Table 8.1

	Daily	Weekly	Monthly	3 MOS. 250 hrs.	6 MOS. 500 hrs	12 MOS. 1000 hrs.
****Hydraulic Oil Level**		C			R	
Compressor Oil Level	C					
****Radiator Coolant Level**	C					
Gauges/Lamps	C					
Air Cleaner Precleaner Dumps		C				
Electrical Accessory Belts		C				
Hoses (oil, air, intake, etc.)			C			
Automatic Shutdown System (Test)			C			
Air Cleaner System Visual		C				
Compressor Oil Cooler Exterior			C	CL		
****Engine Radiator Exterior**			C	CL		
Fasteners, Guards				C		
Air Cleaner Elements				C	R	
***Compressor Oil Filter Element**				C	R	
***Compressor Oil**					R	
PTO & Universal Joints			C			
Scavenge Orifice & related parts						CL
Oil Separator Element				C	C	R
**** Disregard if not appropriate for this particular machine.**						
R = replace, **C** = check (adjust if necessary), **CL=**Clean						

Refer to specific sections of the operator's manual for more information.

Trouble Shooting

Trouble Shooting

Introduction

Trouble shooting for an air compressor is an organized study of a particular problem or series of problems and a planned method or procedure for investigation and correction. The troubleshooting chart that follows includes some of the problems that an operator may encounter during the operation of a portable compressor.

The chart does not attempt to list all of the troubles that may occur, nor does it attempt to give all of the answers for correction of the problems. The chart does give those problems that are most apt to occur. To use the trouble shooting chart:

A. Find the "complaint" depicted as a bold heading.

B. Follow down that column to find the potential cause or causes. The causes are listed in order to suggest an order to follow in trouble shooting.

Action Plan

Think Before Acting

Study the problem thoroughly and ask yourself these questions:

a. What were the warning signals that preceded the trouble?

b. Has a similar trouble occurred before?

c. What previous maintenance work has been done?

d. If the compressor will still operate, is it safe to continue operating it to make further checks?

Do the Simplest Things First

Most troubles are simple and easily corrected. For example, most complaints are "low capacity" which may be caused by too low an engine speed or "compressor over- heats" which may be caused by low oil level.

Always check the easiest and most obvious things first; following this simple rule will save time and trouble.

NOTE: For trouble shooting electrical problems, refer to the Wiring Diagram Schematic.

Double Check Before Disassembly

The source of most compressor troubles can be traced not to one component alone, but to the relationship of one component with another. Too often, a compressor can be partially

disassembled in search of the cause of a certain trouble and all evidence is destroyed during disassembly. Check again to be sure an easy solution to the problem has not been overlooked.

Find and Correct Basic Cause

After a mechanical failure has been corrected, be sure to locate and correct the cause of the trouble so the same failure will not be repeated. A complaint of "premature breakdown" may be corrected by repairing any improper wiring connections, but something caused the defective wiring. The cause may be excessive vibration.

Contact Ingersoll Rand for Technical Assistance

Should your problem persist after making the recommended checks, consult the Ingersoll Rand Onboard Power Solutions factory by calling 1-800-633-5206

Trouble Shooting Chart

Bold Headings depict the COMPLAINT - Subheadings depict the CAUSE

NOTE: Subheadings suggest order to follow in cause of troubleshooting.

Short Air Cleaner Life:
Dirty operating conditions
Inadequate element cleaning
Defective service indicator (if applicable)
Incorrect stopping procedure
Wrong air filter element

Oil In Air Cleaner:
Incorrect stopping procedure

Excessive Oil In Air:
High oil level
Out of level > 15 degrees
Clogged scavenge orifice
Scavenge tube blocked
Clogged or defective regulation orifice (at inlet valve)
Defective scavenge check valve
Sep. tank blown down too quickly (air valve open at previous shutdown)
Defective minimum pressure valve
Defective separator element

Excessive Compressor Oil Consumption:
Oil reservoir over-filled
Leak in compressor oil system
Oil scavenge line not removing oil from separator element
Separator element damaged
Compressor undersized for air equipment

Low Air Capacity (Low CFM):
Compressor undersized for air requirement
Engine speed low
Leaks in air system
Air intake restricted
Compressor hose pinched or blocked (check hose routings)
Faulty drive shaft

Engine RPM Low:
Clogged fuel filter
Operating pressure too high
Incorrect pressure regulator adjustment Dirty air filter
Malfunctioning speed control cylinder (Pneumatic/ Mechanical Throttle Control)

Discharge Pressure Too High:
Defective gauge
Leaks in regulation piping
Pressure regulator not properly adjusted
Malfunctioning pressure regulator
Malfunctioning inlet unloader valve
Ice or other restriction in control lines
Loose, broken, or pinched control line

Unit Not Achieving Rated Pressure:
Defective gauge
Air demand too great
Blow down valve open/malfunctioning
Faulty drive shaft

Safety Valve Relieves:
Leaks/Restrictions in regulator piping
Incorrect pressure regulator adjustment
Malfunctioning pressure regulator
Malfunctioning inlet unloader valve
Defective separator element
Ice in regulation lines/orifice
Defective safety valve

Won't Start/Run:
Air pressure in tank (Unit has not fully blown down)
low battery voltage
Blown fuse
Malfunctioning start switch
Vehicle out of fuel
Clogged fuel filters
Compressor oil temp. too high
Engine water temp. too high
Engine oil pressure too low
Loose wire connection(s)
Defective switches
Malfunctioning relay
Engine malfunctioning
Compressor oil temp. too high
Engine water temp. too high
Engine oil pressure too low
Airend malfunctioning
Defective pressure transducer (Electronic Proportional Throttle Control)
Defective separator element
Ice in regulation lines/orifice
Engine malfunctioning
Airend malfunctioning

Excessive Vibration:
Low engine RPM
Out of balance drive shaft
Engine malfunctioning
Airend malfunctioning

Engine Temperature Lamps Stays On:
Broken engine fan belt
Ambient temperature too high
Dirty operating conditions
Dirty cooler
Malfunctioning light

Premature Shutdown (Truck or Compressor):
Out of fuel
Fuel filter restricted
Safety shut-down switches activated
Defective safety shut-down switch

Unit Fails To Shutdown:
Defective switches
Defective shutdown solenoid/switches
Malfunctioning relay

Throttle Control Not Functioning Properly:
NOTE: For Pneumatic/ Control Mechanical Throttle Control. If electronic, see Electronic Speed info)
Ice in system
Controls sticking
Set screws loose
Cable end loose
Mounting brackets loose
Air cylinders defective
Cable defective
Regulator Faulty
Control hose pinched or cut

Compressor Overheating:

Compressor oil level low
Compressor oil filter dirty or restricted
Truck being operated in an area with limited fresh air
Fan belt(s) loose or broken
Dirty radiator fins
Engine coolant level low (Water Cooled Systems)
Restriction in compressor oil lines
Cooler restricted internally
Faulty or incorrect radiator cap on truck radiator (Water Cooled Systems)
Faulty water pump
Vehicle more than 15º out of level

Always use Ingersoll Rand Replacement parts!*

Doosan Infracore
Portable Power

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