BELL SYSTEM PRACTICES
Outside Plant Construction and Maintenance

SECTION G97.015.3
Issue 1, January, 1952
AT&T Co Standard

AIR COMPRESSOR
CHICAGO PNEUMATIC

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1. GENERAL

1.01 This section contains descriptive data, operation and service instructions covering the Chicago Pneumatic Air Compressor.

1.02 If additional information is desired consult your motor vehicle supervisor or the nearest branch office of the manufacturer.

2. SAFETY PRECAUTIONS

2.01 All general safety precautions shall be observed while operating the compressor and compressed air tools.

2.02 Make sure that no loose bars, parts, etc., are lying about or on any part of the compressor or engine as they could cause serious damage or wreckage of the unit or bodily injury to any one near.

3. DESCRIPTION

3.01 The Chicago Pneumatic Portable Air Compressors, Models 105 PG-20 and 160 PG-40 are of the two stage air cooled design. Both units have one low and one high pressure cylinder. The air passes from the first stage through an air cooled intercooler of the radiator type where its temperature is reduced to intake conditions and any moisture is condensed and trapped.

3.02 The Model 105 delivers 105 cubic feet of free air per minute and the Model 160 will deliver 160 cubic feet of free air per minute.

3.03 The portable compressor is available mounted on either a two wheel or four wheel trailer.

4. PRECAUTIONS WITH NEW UNITS

4.01 Before starting a new unit make sure that the radiator is full of clean water and that all water connections and water drains are tight.

4.02 During cold weather add anti-freeze to radiator as outlined in Section entitled Anti-Freeze Solutions.

4.03 The oil is drained from the crankcase of the machine before it leaves the factory and it will be necessary to fill the crankcase of the engine and compressor to the top notch of the gauge with the proper grade of lubricating oil. The grade of oil to be used is as follows:

Temperature	Engine Grade	Compressor Grade
100°F. and higher	SAE 40	SAE 30
+32°F. to 100°F.	SAE 30	SAE 30
+32°F. and lower	SAE 20	SAE 20

4.04 New machines should be allowed to operate under less than full load pressure for an hour or more to make sure that all bearings are being lubricated and are not running hot.

4.05 The crankcase oil in both the engine and compressor should be drained and new oil added after the first 50 hours of operation.

5. OPERATION OF COMPRESSOR

5.01 The following procedures apply to both types of air compressors described above.

5.02 See that all grease cups are filled and turned down.

5.03 Fill the fuel tank with clean fuel of proper grade. See that the shut-off valve, which is incorporated in the gasoline strainer, is open.

5.04 See that the clutch is disengaged, that is, with the handle toward the radiator.

5.05 See that the service valves on the air receiver are open until after the compressor is running. They should again be opened before the compressor is shut down. This helps to prevent the accumulation of moisture and oil.

5.06 See that the radiator and intercooler fan belts are properly adjusted.

6. STARTING THE GASOLINE ENGINE

6.01 Turn the magneto switch to (OFF) position. Choke the carburetor by pulling the choke wire toward the crank. Move the Throttle Controller Hand Operating Lever to its "CLOSED" position, then open it up about 1/8 inch and fasten it in this position by tightening the wing nut.

6.02 Crank the motor a couple of times, open the choke half way, and then turn the magneto switch to "ON" position and crank again. The engine should start.

6.03 Since the magneto has a fixed spark no adjustment is necessary.

6.04 **See that the oil pressure gauge for the engine shows pressure.**

6.05 As soon as the engine has started, loosen the wing nut on the operating lever. This will allow the engine to run at full speed under control of the governor.

6.06 Then open the choke all the way. In cold weather it may be necessary to keep the choke partially closed for a few minutes after loading the compressor.

6.07 Do not run the engine for long periods without the compressor running.

7. STARTING THE AIR COMPRESSOR

7.01 Before starting the compressor refer to instructions in Part 5.

7.02 Engage the clutch by shifting the handle toward the compressor. Let the compressor run a few minutes before attempting to build up pressure as this allows the compressor to warm up and improves lubrication before loading.

7.03 See that the oil pressure gauge for the compressor shows pressure. Close the drain cocks on the bottom of the air receiver and on the intercooler, then gradually close the service valves on the receiver until a pressure of 40 or 50 pounds is reached.

7.04 Let the compressor run this way for a few minutes. The unit is now ready for work and will be automatically controlled by the Variable Capacity Control.

8. STOPPING THE COMPRESSOR

8.01 Open the drain valve in the bottom of the air receiver and on the side of the intercooler. Slow down the motor by closing the Throttle Controller Hand Operating Lever. Turn the ignition to "OFF" position.

8.02 Always have the clutch in its engaged position while the unit is not in operation, as this relieves the tension on the clutch springs and prevents dirt from gathering on the clutch faces.

8.03 Drain air receiver and intercooler.

9. LUBRICATING THE COMPRESSOR

9.01 In general the compressor crankcase should be drained while hot and filled with new oil of the grade specified in Paragraph 4.03 after each 200 hours of operation.

9.02 The water pump should be lubricated with a good grade of grease that will stand hot water, and should have a half turn of the grease cup each day. This grease is commonly known as waterproof grease.

9.03 The clutch shifter yoke should be greased daily with a good grade of cup grease.

9.04 The fan bearings should be lubricated with cup grease after each 100 hours of operation.

9.05 Never use gasoline, kerosene or solvents to clean or flush out the compressor crankcase as its use may cause vapors to get into the receiver and cause an explosion.

9.06 On the Models 105 and 160 the compressor is lubricated by a full pressure system. The pump draws oil from a screened opening in the oil sump and delivers it under pressure through ports in the crankshaft and connecting rods to the

crankshaft bearings and piston pin bushings. In compressors having sleeve type main bearings, the pump is submerged in the oil contained in the sump. In compressors having tapered roller type main bearings, the oil pump is mounted in the main bearing housing at the intercooler end, and is directly driven by having one of the two oil pump gears mounted on the crankshaft. Either type is normally self-priming even though the crankcase has been drained.

9.07 An adjustable spring controlled pressure regulator (By-Pass Valve) is incorporated in the main bearing housing.

9.08 When the quantity of oil delivered by the pump is in excess of that required to lubricate the moving parts, the excess pressure automatically raises the ball valve against the regulator spring, discharging the surplus oil through a pipe to the oil pan.

10. INTERCOOLER

10.01 The intercooler which is similar to an engine radiator cools the air between stages. Air from the low pressure discharge enters the left-hand header, passes through the inside of the coils and is discharged to the high pressure cylinder from the right-hand header. An intercooler fan draws air through the sections cooling the air compressed in the first stage.

10.02 A safety valve is located between the low pressure discharge and the intercooler to protect the intercooler in case the pressure should rise higher than normal. **This valve should be operated daily by hand to make sure it is in operating condition.**

10.03 Twice each day the drain valve located at the bottom of the intercooler should be opened and all moisture drained off. This should also be done whenever the compressor is shut down to prevent freezing in cold weather.

11. AIR VALVES

11.01 The air valves should require little attention, but they must not be neglected. The most important care they require is to be kept clean. It is advisable to have them examined and cleaned at weekly intervals for a few months until it is determined from experience how often they require cleaning.

11.02 If there is much dust in the air the valves will require more frequent cleaning than if the intake air is clean and free from dirt.

12. VARIABLE SPEED REGULATOR

12.01 The variable speed regulator automatically varies the speed and therefore the output of the compressor in direct proportion to the demand for air, down to 50-60 per cent of full speed. Thus the compressor operates at 100 per cent speed when 100 per cent of its capacity is required; at 70 per cent speed when 70 per cent capacity is needed, and so on down to 50-60 per cent capacity. When the demand for air is below 50-60 per cent of full capacity, the compressor unloads and the engine idles at about 40 per cent of full speed. The machine never operates at a speed higher than necessary to deliver the amount of air required at any one instant.

12.02 The setting of the adjusting screw on the pressure transformer determines the operating pressure of the machine. To change the operating pressure, remove the plug, loosen the lock nut and back out the adjusting screw to lower the operating pressure or turn it in to increase the pressure. No adjustments of the throttle controller or unloader are necessary to change the operating pressure.

12.03 The drain plug in the bottom of the transformer should be opened twice daily, or after each run, to avoid accumulating oil and moisture which might be carried over and impair the operation of the unloader.

13. FANS

13.01 On each fan hub will be found a grease plug which should be removed and the fan bearings lubricated with cup grease after every 100 hours of operation.

13.02 The "V" belts on the radiator fans should not be adjusted as tight as one would tighten a flat belt. A correctly adjusted "V" belt will appear loose on the slack side when running under load.

14. CLEANING

14.01 The machine should be kept clean. When cleaning, all parts should be inspected. Insufficient lubrication, loose bolts, nuts, or keys, etc., and parts requiring adjustment are thereby nearly always discovered in time to prevent trouble.

Caution: Do not use gasoline or kerosene to clean any parts of the compressor.

14.02 Make sure that all joints in the air-line are tight. If a leak develops, repair it at once. Leaks are costly.

14.03 **Test the safety valves at least once a day** to make sure that they are in proper working order.

14.04 **Open the drain valve on the air receiver after each run** to remove any condensation or moisture that has been deposited.

14.05 The compressor air cleaners should be cleaned thoroughly, washed, dried and supplied with fresh oil after every 50 operating hours. Never allow an excessive amount of dirt to accumulate in the cleaners.

14.06 With regard to the engine air cleaner follow carefully the instructions on the plate attached to the cleaner body.

15. RUNNING GEAR

15.01 Wheels and steering gear of trailer mounted compressors should be lubricated periodically. Maximum safe towing speeds for the various standard mountings are as follows:

Pneumatic tire wheels with no springs	—	20 mph
Pneumatic tire wheels with springs	—	30 mph

16. TROUBLES AND REMEDIES

16.01 In case of trouble with the engine, such as difficult starting, stalling, knocking or overheating, consult the engine instruction book supplied by the manufacturer for detailed information.

16.02 The more common compressor troubles are listed below with possible remedies which in most cases may be made in the field.

(1) Intercooler Not Cooling the Air

(a) Clean fan, tighten fan belt, if loose, and blow air through the intercooler section fins.

(2) Low Intercooler Pressure

(a) Leaking pipe between cylinders and intercooler—tighten.

(3) Unloader Fluttering

(a) Dirty strainer or filter in line between air receiver and unloader. Take out and clean.

(4) Compressor Fails to Slow Down and Unload

(a) Pressure transformer adjusting screw set for too high operating pressure. Back off adjusting screw to desired pressure.

(b) Check air-line between pressure transformer and throttle controller for leaks.

(5) Bearings overheating
  (a) Dirty lubricating oil—change crankcase oil.
  (b) Insufficient lubrication—maintain oil level near "full mark."

(6) No Oil Pressure at Starting
  (a) No oil in reservoir—fill to proper level.
  (b) Broken oil line—inspect.
  (c) Clogged oil tube—remove oil tube and test with compressed air.
  (d) Broken or defective oil gauge—replace.
  (e) Dirty or improperly adjusted oil pressure regulator. (See Part 9.)

(7) Compressor Overheating
  (a) Intercooler fan belt slipping. Adjust.
  (b) Intercooler not cooling air properly. Blow dust from intercooler fins with air hose, to give a stream of air in a direction opposite to the air flow created by the fan.
  (c) Compressor intake filter dirty or stopped up. Remove and clean.

(8) Gasoline Engine Overheating
  (a) Fan belt slipping. Adjust.
  (b) Radiator dirty or rusty. Clean as outlined in Section entitled Engine Cooling Systems—Rust Prevention.
  (c) Insufficient cooling water.
  (d) Air intake filter stopped up or dirty. Remove and clean.

17. MAJOR REPAIRS

17.01 If other repairs not covered in this section or overhaul become necessary, such repairs should be referred to the motor vehicle repairman in accordance with local practices. Detailed information with regard to the maintenance and repair of the compressor is contained in Section on Motor Vehicles and Construction Apparatus.