

REPLACEMENT PARTS AND PROCEDURES

FOR

ENGINES - DIESEL - GENERAL MOTORS

SERIES 71 SETS - KS-5574

1. GENERAL

1.01 This section covers KS-5574, General Motors, Series 71, 2-cycle diesel engines, driving 10, 30, 40, and 60-kw alternators. It is also applicable to the earlier Series 71 sets furnished prior to the issuance of this KS specification. The earlier sets probably had some features not covered by these instructions, in which cases these differences should be treated as exceptions.

1.02 This section is reissued to bring it up to date with the equipment as furnished by the manufacturer. Changes or additions in this revision have been indicated with arrows. Power Data sheets showing lists of recommended spare parts have been omitted as being of little value to the maintenance. Due to constantly changing parts numbers, it is impractical to keep these lists up to date in the Bell System Practice.

1.03 Part 2 of this section is called "Replacement Parts" and covers the method of ordering parts.

1.04 Part 3 of this section is called "Replacement Procedures" and covers procedures for replacing those parts most likely to need replacement.

1.05 Replacement of parts should be made with the engine stopped, unless specifically authorized to the contrary.

1.06 Some sections of the manufacturer's manual cover the use of gasoline for cleaning various engine parts. Gasoline is prohibited in Telephone Buildings and in its place, petroleum spirits or fuel oil should be used for the cleaning of these parts. In working around an engine, particularly near any part of the fuel system, do not use an open flame and do not use a portable lamp without a protecting guard.

2. REPLACEMENT PARTS

2.01 When ordering parts give the name or description of the part, the part number if known, full nameplate data including the specification number, the manufacturer's name and model, and the engine serial number.

Example: (Quantity) (Name of Part)
Part (No.) for KS-5574 L (No.)
General Motors Series 71 (No.)
Cylinder Engine, Serial (No.)

2.02 The manufacturer's maintenance manual, attached to Section A401.232, indicates the parts which are replaceable and should be followed in giving the name of the part or its description when ordering.

2.03 Piston rings should be ordered in complete sets. They should be of regular size unless the cylinder liner is honed or rebored, in which case rings and pistons, available in 0.010, 0.020, 0.030, 0.040, and 0.050-inch oversizes, should be installed. However, it is not felt that the normal wear on the piston or cylinder liner will be sufficient to require oversize piston or rings. If a new cylinder liner is installed new rings should be installed at the same time.

2.04 When an engine has been in use long enough to require replacement of the piston, piston rings, or piston pin due to normal wear, other damage such as a scored cylinder liner, worn bearings, or sprung crankshaft may have occurred. Under any of these circumstances the engine will necessarily be out of service for a period of time. It is therefore recommended that the engine be given a general inspection by a man thoroughly familiar with this type of engine, preferably a representative of the manufacturer, to determine the new parts, including gaskets, required for a general reconditioning.

2.05 Ready made gaskets are to be preferred but in some instances satisfactory gaskets such as hand hole gaskets and cover gaskets can be made up on the job.

3. REPLACEMENT PROCEDURES

3.001 List of Tools, Replacement Parts, and Materials (Equivalents may be substituted if desired)

Tools

The tools listed below are furnished with each engine by the manufacturer. In each case the tools furnished are of a size and design recommended by the engine supplier for use with the particular engine.

No.	Tool No.		Part
	G.M.	Kent-Moore	
1	5155973	-	Bar, cranking, for turning engine by hand
1	3223914	KMO-236	Brush, cleaning, for fuel hole
1	3223915	KMO-237	Brush, cleaning, for rack hole
1	3290535	-	Brush, cleaning, filter, Skinner
1	3291913	J-1227-2	Bushing, valve-lifter
1	3223916	J-1242-1	Case, cloth, for injector tools
1	3223912	J-1242	Gauge, timing
1	3223907	J-1227-1	Remover, injector, and valve spring compressor
1	3223913	J-1243	Reamer, spray-tip
1	3290536	-	Scraper, filter, Skinner
1	3223911	KMO-238	Stone, oil
1	3223910	KMO-235	Vise, pin, with 6 inches of 0.006" spring wire for spray tip
1	3223901	J-1722	Wrench, double end, flat, 5/16" and 7/16"
1	3223908	J-1238	Wrench, injector nut
1	3223904	KMO-240	Wrench, socket, 9/16"
1	5158928	KMO-233B	Gauge, exhaust valve feeler 0.011-0.013 inch

In addition to the tools furnished with the engine, it is desirable to have additional tools as listed below.

Bellows, hand
 Bit, screwdriver, A.T.&T.Co. Spec. 6597N
 Brace, ratchet, sweep 10 inch, A.T.&T.Co. Spec. 6213N
 File, flat, pillar, #2 cut, 6 inch
 Hammer, ball peen, 1 pound, A.T.&T.Co. Spec. 6258N
 Oiler, hand
 Pliers, combination
 Screwdriver, regular, 5 inch
 Wrenches, hex. flat, open, double end, 7/32-1/4, 3/8-5/16, 7/16-5/8, 1/2-3/4, 15/16-1

Materials

Cloth, cleaning, twill jean, D-98063
 Lead, red
 Packing, asbestos, 1/16 inch
 Packing "Garlock" No. 605
 Packing, Pyroid, 1/16 inch
 Pail, galvanized, (for waste oil)
 Petrolatum
 Shellac or Day 16462 Insulating Varnish
 Spirits, petroleum

→ For list of lubricating oils and other miscellaneous materials see Section A401.232.

3.002 When scheduling repairs on an engine, it is important to take all reasonable precautions to insure the continuity of telephone service. If the power company is doing any construction or other work either at the power house or on the transmission system, which would tend to increase the risk of power failure, it may be that the repair on the engine should be postponed until a more favorable time. Seasonal and weather conditions such as floods, sleet, etc. may also make it desirable to postpone the work. Steps should be taken to make sure that the regular charging equipment is in good condition. The office battery should be fully charged before work is started on the engine and kept approximately fully charged during the work to insure a maximum battery reserve. It is desirable that all information, tools, parts, materials, etc., be on hand before disassembling the engine.

3.003 Whenever it becomes necessary to replace major parts, such as cylinder liners, pistons, piston rings, crankshaft or blower assemblies, etc., the engine should be overhauled generally at that time, such as tightening main bearings, connecting rod bearings, etc. This calls for a man of considerable experience in this type of work, not only from the standpoint of workmanship, but also from the standpoint of having the engine out of running condition a minimum of time. For these reasons, it is recommended that this work be performed by a man thoroughly familiar with this work, preferably a representative of the engine manufacturer. The manufacturer's maintenance manual is attached at the end of Section A401.232 and gives in detail the correct procedures to follow in the replacement of parts and should be referred to where the work is performed locally.

3.004 Before making any replacements, the set should be removed from service. In making replacements where there is danger of shorting battery leads, make sure that battery voltage is removed. Care should be exercised when disassembling parts to prevent unnecessary damage to gaskets and packing when it is expected that these will be reused. Packing and spare gasket material should be available. All parts should be reassembled by following the reverse procedure from taking down. When assembling, care should be taken to be sure that every part fits in its correct position without abnormal binding or strain. When more than one screw or nut holds a part, particularly castings such as the cylinder head, they should be tightened in rotation a little at a time until all are firm.

3.005 After making any replacements, check any adjustments affected in accordance with Section A401.232.

3.006 The cooling system will ordinarily contain rust inhibitor solution and sometimes antifreeze. Consideration should be given to saving the solution if the cooling system is drained. For further information regarding treatment of the cooling system refer to Section A501.231.

3.007 The following clearance data on the engine is for new parts and may be applied as required.

	<u>Inches</u>	
	<u>Min.</u>	<u>Max.</u>
Valve, push rod (tappet), exhaust	See A401.232	
Valve seat width, exhaust	.047	.078
Valve stem in guide	.001	.003
Idler bearing	.002	.0035
Crankshaft main bearing	.0014	.0044
Crankshaft end thrust	.004	.011
Connecting rod bearing	.0014	.0044
Connecting rod bearing end	.005	.010
Accessory drive gear back lash	.003	.008
Crankshaft gear back lash	.003	.008
Oil pump gear back lash	.005	.020
Idler gear back lash	.003	.008
Piston	.006	.007
Top piston ring (to groove)	.010	.0125
Second piston ring (to groove)	.008	.0105
Third and fourth piston ring (to groove)	.006	.0085
Oil ring (to groove)	.0015	.0055
Compression ring gap	.020	.025
Oil ring gap	.010	.020
Piston pin	.0025	.0034
Camshaft and balance shaft bearings	.0015	.003
Camshaft and balance shaft end thrust	.005	.010
Oil pump gears to housing (radial and endwise)	.002	.0045
Cylinder block for loose liner	4.6265	4.6275

3.008 In instances where a telephone company makes a complete overhaul of an engine, a list of all tools necessary for such overhaul is given below and these tools are available on order.

<u>Tool No.</u>	<u>Description</u>
341	Valve Stem Guide Reamer (Roughing)
J-129-2	Valve Stem Guide Reamer (Finishing)
J-978	Fuel Line Flaring Tool
J-1227	Valve Spring Compressor and Injector Remover Furnished with each engine Consists of J-1227-1 Valve Spring Compressor J-1227-2 Bushing; Valve Lifter
J-1229	Injector Tube Flanger and Driver

<u>Tool No.</u>	<u>Description</u>
J-1231	Injector Tube Reamer Set
J-1891	Injector Tube Remover
J-1233	Valve Stem Guide Remover and Replacer
J-1238	Injector Nut Wrench Furnished with each engine
J-1241-A	Injector Service Set Furnished with each engine Consists of J-1242 Timing Gauge J-1243 Spray Tip Reamer KMO-235 Spray Tip Hole Cleaner KMO-236 Fuel Hole Cleaning Brush KMO-237 Rack Hole Cleaning Brush KMO-238 Spray Orifice Cleaning Tool Stone J-1242-1 Cloth Case
J-1261-A	Injector Body Vise Jaws with Popping Tool
J-1290	Injector Spring Lifter
J-1291-A	Spray Tip Driver and Injector Bushing Cleaner
J-1319-A	Cylinder Compression Gauge
J-1330	Injector Valve Lapping Block
J-1359	Flywheel Housing Oil Seal Expander
J-1471	Blower Drive Gear Flexible Coupling Spring Spreader
J-1472	Main Bearing Cap Puller
J-1508	Fuel Pump Tool Set Consists of J-1508-1 Oil Seal Remover J-1508-2 Oil Seal Replacer J-1508-3 Rotor Shaft Installer
J-1509	Cam Shaft Oil Seal Protector (Single-cylinder engine only)
J-1652	Mechanical Governor Spring Retainer Nut Wrench (Single-cylinder engine only)
J-1682-A	Rotor Blower Service Tool Set
J-1698	Blower Clearance Feeler Set
J-1699	Socket Head Screw Wrench
KMO-122	Valve Guide Cleaner
KMO-231	Piston Ring Compressor
KMO-232	Piston Ring Remover and Replacer
KMO-167-D	Eccentric Seat Grinder Set
KMO-239	Valve Lapper
KMO-240	Injector Filter Cap Wrench Furnished with each engine
KMO-320	Fuel Pressure Gauge
KMO-322	Cylinder Head Bolt Socket
KMO-323	Fan Pulley Adjusting Nut Wrench
KMO-326-A	Fuel Pump Wrench
KMO-328	Exhaust Manifold Heat Pyrometer
J-1228-41	Special Bolts and Adapters
5158928	Gauge, exhaust valve feeler 0.011-0.013 inch (Furnished with each engine)

3.01 Gaskets

(1) In the replacement of parts, the affected gaskets should in general,

be replaced with new ones using either the gaskets furnished by the manufacturer or as cut out on the job from the same type of material used originally. Any old packing or gasket material should, in all cases, be scraped off and the parts cleaned before adding new gaskets. In replacing the paper type gaskets, shellac or equivalent should be used on only the side next to the removable part. In the case of cylinder head gaskets, both sides should be given a coat of engine oil.

3.02 Engine Parts

(1) Replacement of engine parts shall follow the procedures as outlined in the manufacturer's maintenance manual which is attached at the end of Section A401.232.

↗ (2) Fuel injectors, equipped with spherical spray tip valves, should release or pop on 1000-1800 pounds pressure while those equipped with flat spray tip valves should function similarly on a pressure of 350-700 pounds.

(3) A change in valve lash or injector timing may be caused by a worn cam roller assembly. If radial or lateral looseness of a roller exceeds 0.005 inch, the roller assembly must be replaced.

(4) When installing new oil rings, make sure that the lower or #6 ring is in the double scraper position, i.e. all hooks facing downward similar to oil ring #5. This new arrangement improves the scraper action of the lower oil ring.

3.03 Alternator Parts

(1) Brushes may be replaced by removing the screw which fastens the pigtail to the holder, raising the brush finger, and withdrawing the old brush with its pigtail. Insert a new brush, connect the pigtail, and fit the brush. Be sure that the brush slides freely in its holder. For method of fitting brushes see Section A401.232.

(2) To replace a coupling or machine bearing will require that the machine leads be disconnected, the machine loosened on its subbase, and moved to a position such that the parts to be replaced will be accessible. In moving the machine on its subbase, its position should be marked and the position of all dowels and shims noted to facilitate realigning the machine.

(3) Replacement of a bearing or machine rotor is a major operation and should preferably be done by moving the machine to a shop equipped for such operations. If done locally, it should be done by a person thoroughly familiar with this type of work and only upon authorization of a supervisor. If oil ring bearings are to be replaced, take care not to injure the oil rings and support the rotor in such a manner as not to cause injury to the stator and windings. After replacement of parts check requirements in accordance with Section A401.232.

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