GE
Transportation

Воздушный компрессор 5GYA28, приводной мотор и ступица в сборе

Документ № GEK-76330 (MI-26000), Ред. B

imagination at work

Описание редакций документа

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СОДЕРЖАНИЕ

1. DESCRIPTION

The 5GYA28 Air Compressor Motor (Figure 1) is an AC machine which is powered by the locomotive auxiliary alternator.

The motor stator mounts directly to the compressor crankcase. The motor rotor mounts on the air compressor crankshaft extension. The motor has no internal bearings other than those which are part of the air compressor.

For a more complete description of the operation of the 5GYA28 Air Compressor Motor, see **Running Maintenance Manual, Section 1**.

2. UP-GRADE INFORMATION

Any motor that is going through the disassembly and inspection procedure as described in this publication should be upgraded to the latest model configuration (A3). To convert from an A1 or A2 to an A3 model, replace the stator assembly with an A3 stator assembly. The A3 stator assembly has added coil-to-coil insulation and improved end winding ties.

3. DISASSEMBLY

3.1. MOTOR END (Figure 2)

For air compressor and 5GYA28 air compressor motor removal and installation, see **Running Maintenance Manual, Section 1**.

NOTE: Tooling shown is GE Part No. 41D795629G2 and G3.

1. Bolt or clamp the air compressor to a secure assembly table.
2. Loosen speed sensor locknut and remove speed sensor.
3. Remove motor fan shroud by removing the bolts and lockwashers.
4. Remove the six fan mounting bolts and washers and remove the fan from rotor.
5. Remove nut and hardened washer from the motor end of the compressor shaft.
6. Mount the ring on the rotor and assemble the hydraulic cylinder and pipe spacers to rotor ring, tighten bolts (Figure 3).
7. Pump pressure on REMOVAL gage until rotor is released from shaft fit.
8. Remove hydraulic cylinder and pipe spacers.
9. Mount the shaft extension on the air compressor drive shaft (Figure 4).
10. Carefully pull the rotor onto the shaft extension. Use a nylon sling to lift the rotor off of the shaft extension and place rotor on a flat surface for cleaning and inspection. Remove the ring from the rotor.

Revisions are indicated by marginal bars.

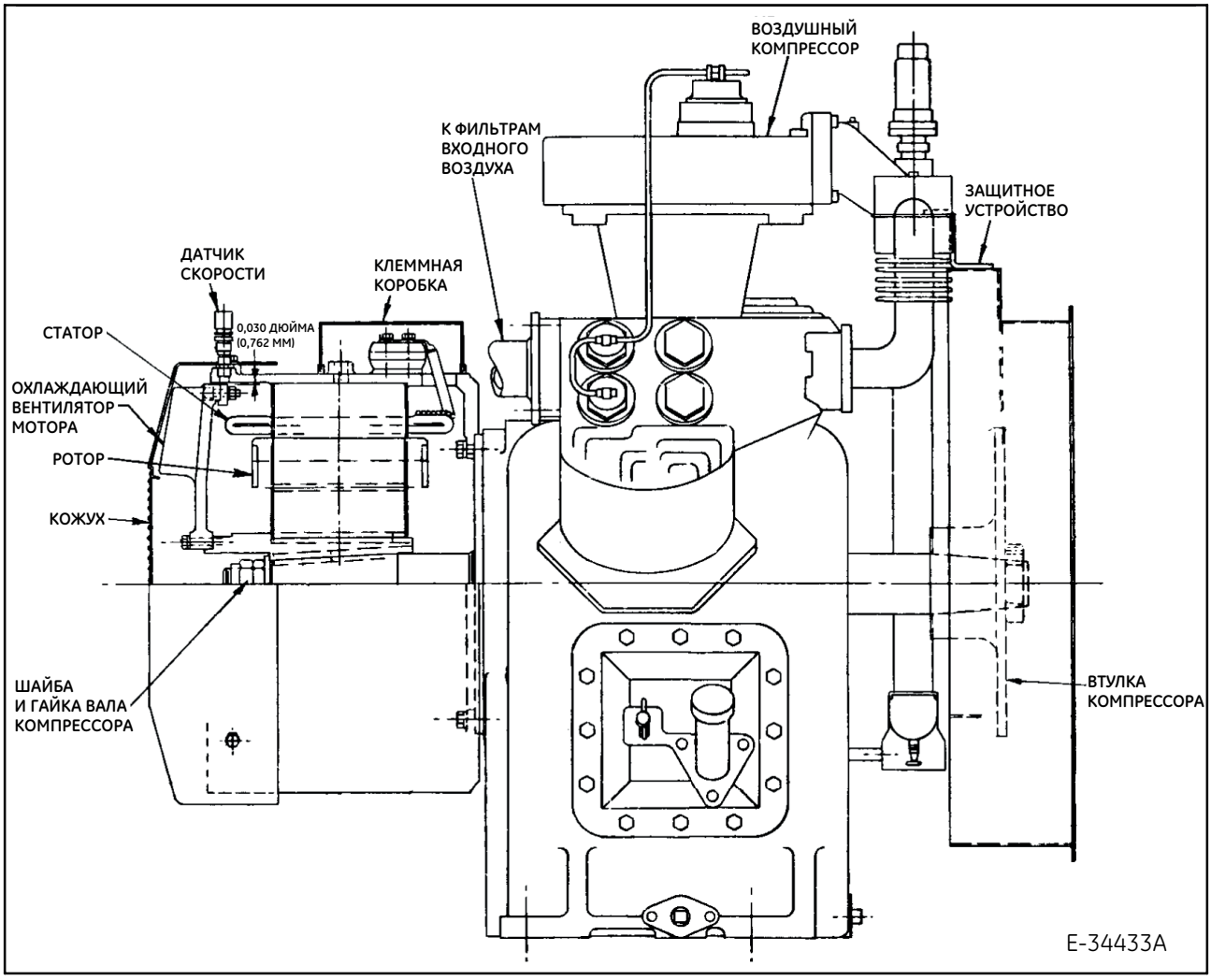

Figure 1. Air Compressor and Motor Arrangement

NOTE: The rotor weight is approximately 375 lb. (170,1 Kg).

11. Assemble an eyebolt to the tapped lifting hole in the top of the stator. Keep jib crane line taut to support stator (Figure 4).

12. Remove eight stator mounting bolts and washers and remove stator from air compressor housing.

NOTE: Three threaded jacking holes are provided in the stator to aid in the removal of the stator from the compressor crankcase.

4. INSPECTION

4.1. STATOR

1. Inspect the stator for insulation damage. Special attention should be given to insulation on the stator end winding.

2. Check to be sure that the studs which hold the terminal insulators in place are tight.

3. Check stator resistance six times:
   T_1 - T_2, T_1 - T_3, T_2 - T_3, T_4 - T_5, T_4 - T_6, T_5 - T_6.

Resistance:
at 77°F (25°C): . . . . . 0.0647 Ω Max.; 0.0609 Ω Min.
R_{MAX} - R_{MIN} difference limit is 0.0005 Ω.

4. Replace stator assembly if damaged or resistance is out of limits.

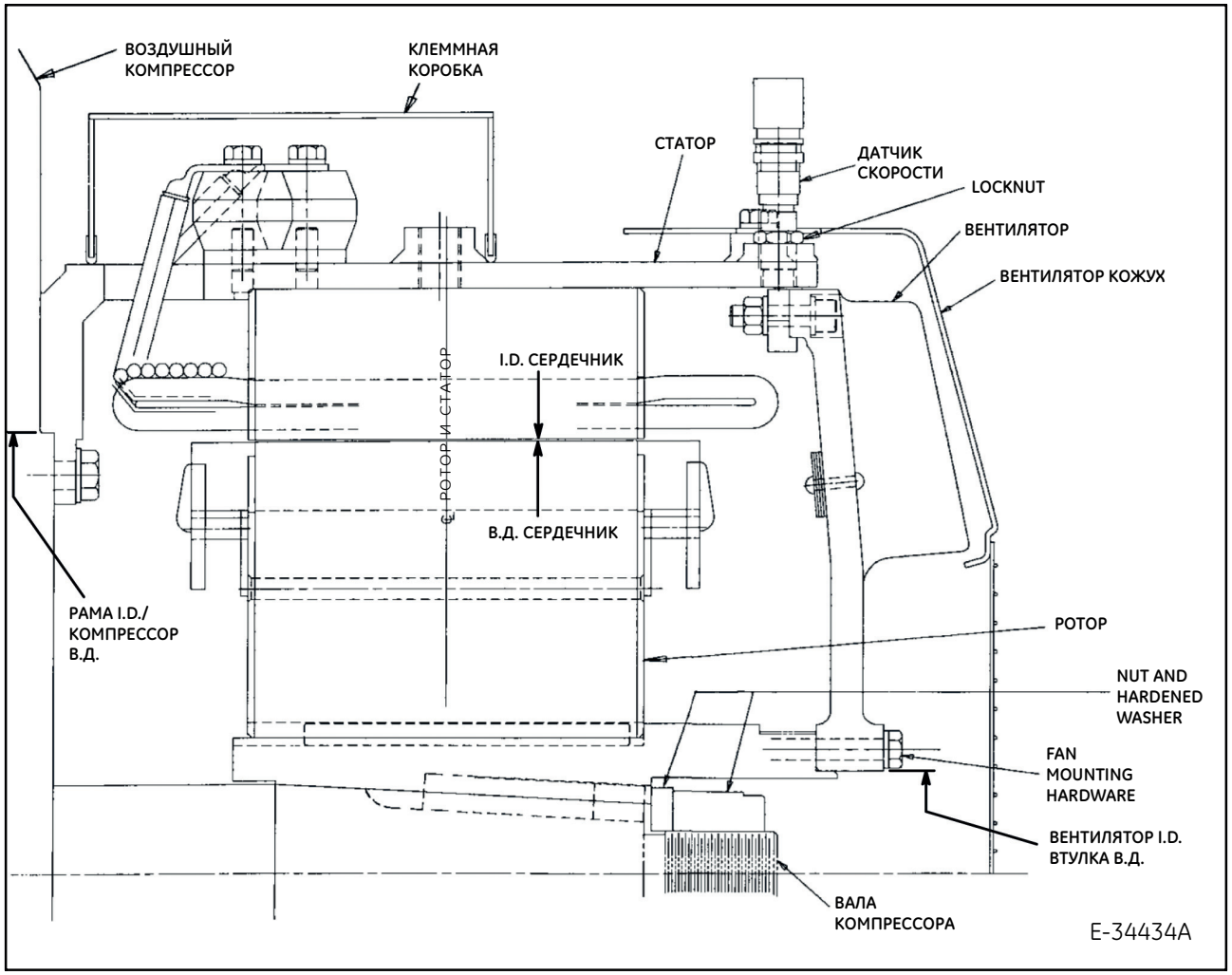

Figure 2. 5GYA28 Air Compressor Motor - Longitudinal Cross Section

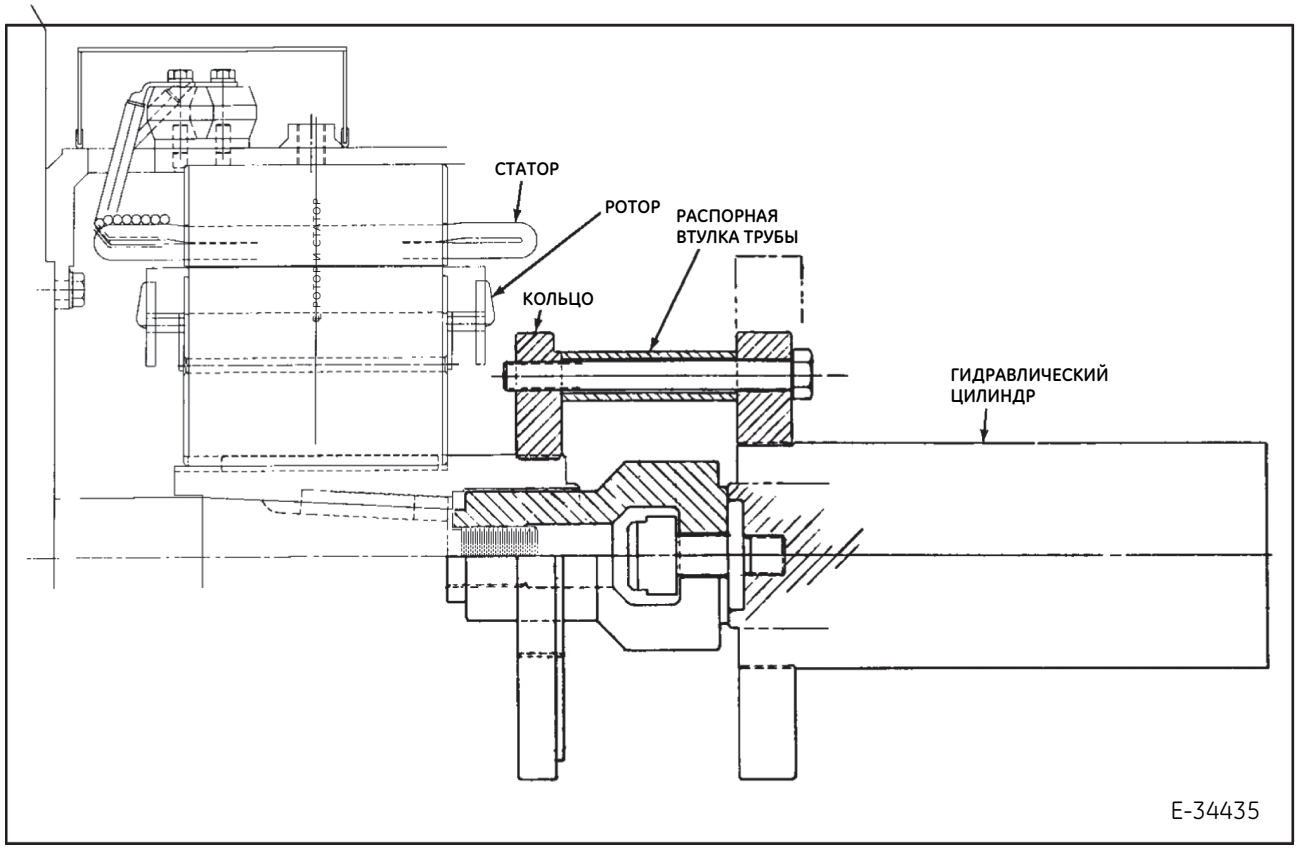

Figure 3. Hydraulically Remove Rotor From Air Compressor Shaft

4.2. ROTOR

1. Carefully examine both ends of the rotor "squirrel cage" for cracks in the aluminum welds and bars.

2. Replace the rotor if any damage is found.

5. CLEANING

5.1. ROTOR AND STATOR

If steam cleaning of the rotor and stator is required, such as after lengthy service, the following steam cleaning procedure (for both external and internal, metal and insulated parts) is recommended.

1. The combination of steam (not in excess of 30 psi 2,11 Kg/cm2), water 160 to 180°F (70 to 80°C) and approximately 2 oz. (56,7 g) of a commercial non-caustic cleaner, such as Oakite* Speedet (*Manufactured by Oakite Products, Inc.) or equivalent, are the cleaning ingredients.

⚠ WARNING ***Personnel performing cleaning operation must wear suitable clothing, gloves and eye protection to avoid injury. When using compressed air, observe all railroad and U.S. government regulations.***

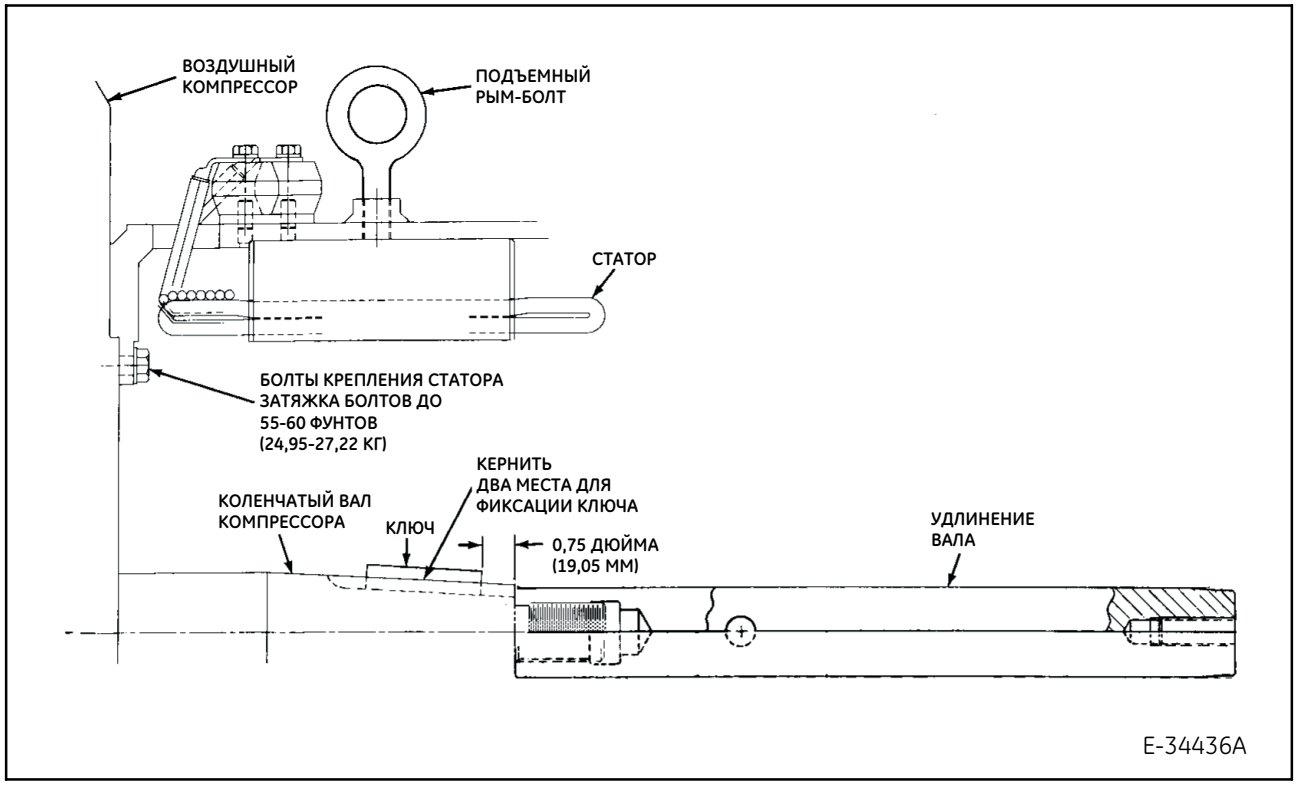

Figure 4. Stator Mounting and Compressor Shaft Extension

2. Suspend the part in a position accessible from all directions to a direct flow of steam from the hose.

3. Rinse all residue from parts with a mixture of clean steam and water.

4. Bake insulated parts for at least four hours at 250°F (120°C) to remove all moisture.

5. If a VPI facility is available, VPI the stator support assembly. Following the VPI treatment, all machined surfaces, threaded holes and terminal connections must be properly cleaned and free of varnish. The inside diameter of the core must also be free of varnish buildup.

6. Hi-pot the stator winding to ground at 2,000 volts, 60 Hz for one minute.

6. ASSEMBLY

6.1. MOTOR TO AIR COMPRESSOR

NOTE: Tooling shown is GE Part No. 41D795629G2 and G3.

1. Bolt or clamp the air compressor to a secure assembly table.

2. Remove the protective covering from both air compressor shaft extensions. Clean the compressor shaft extensions and stator mounting face with thinner.

⚠ CAUTION ***Do not allow thinner to contact varnished surfaces.***

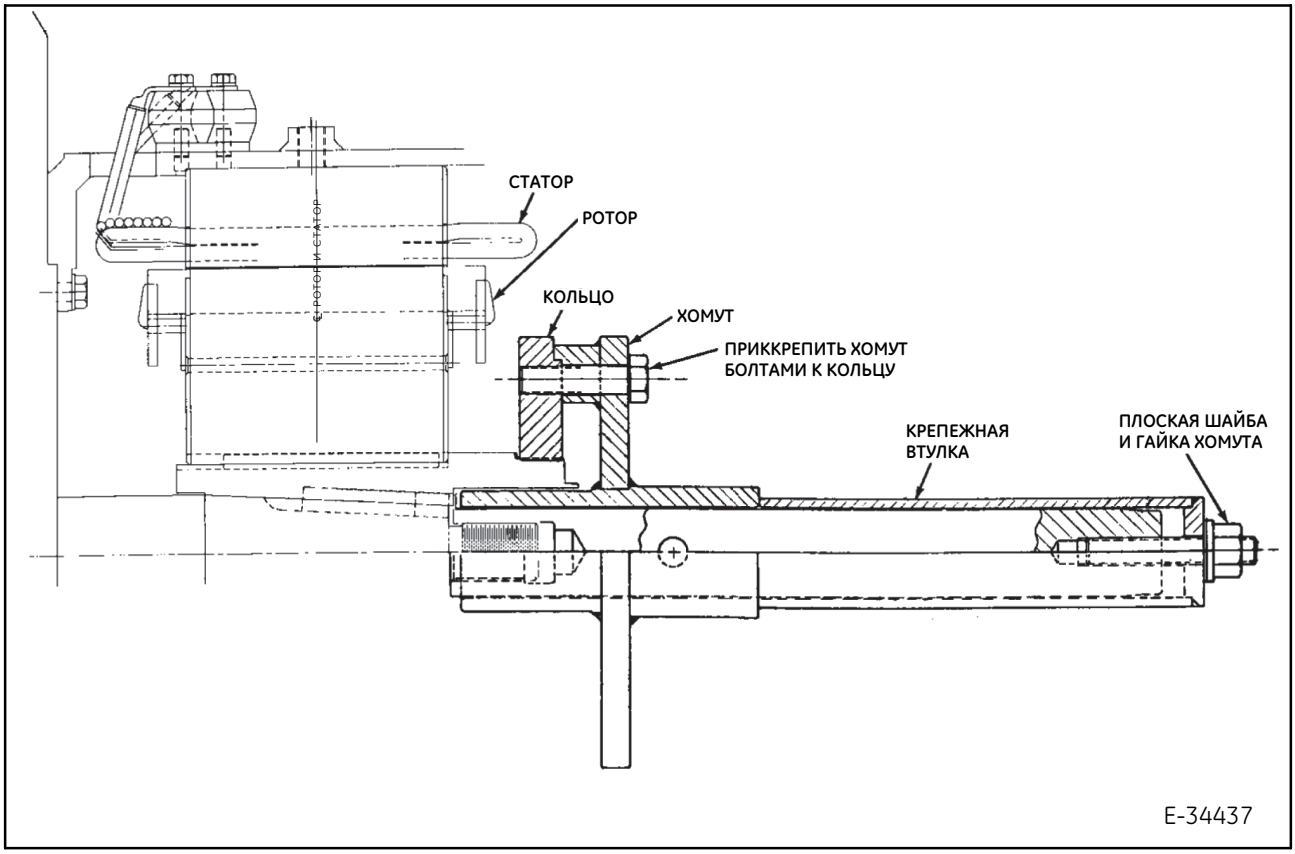

Figure 5. Rotor Mounted on Compressor Shaft

3. Thoroughly clean the rotor bore, the stator mounting surface and the speed sensor mounting hole with thinner.

4. Lightly sand the radius on the end of the key. Apply Loctite** (**Product of Loctite Corporation) High Strength Threadlocker 271 on key. Position the key 0.75 in. (19,05 mm) from the end of the keyway and prick punch two places on both sides of the key at the keyway, tap punches flat (Figure 4).

5. Assemble an eyebolt to the tapped lifting hole in the top of the stator.

NOTE: The stator weighs approximately 450 lb. (204,12 Kg).

6. Using two locating pins, mounted in the air compressor housing to help guide the stator into place, assemble stator to compressor face. Apply Loctite** (**Product of Loctite Corporation) 242 to the bolt threads and assemble eight bolts and hardened washers to hold stator in place. Torque bolts to 55-60 lb.-ft. (74,59-81,38 Nm) (Figure 4).

7. Mount the shaft extension on the air compressor drive shaft (Figure 4).

NOTE: The rotor weight is approximately 375 lb. (170,1 Kg).

8. Pick up rotor with nylon strap and jib, position rotor on extension shaft.

9. Line up the keyway in the rotor with the key in the shaft.

10. Push rotor into the stator to engage the key.

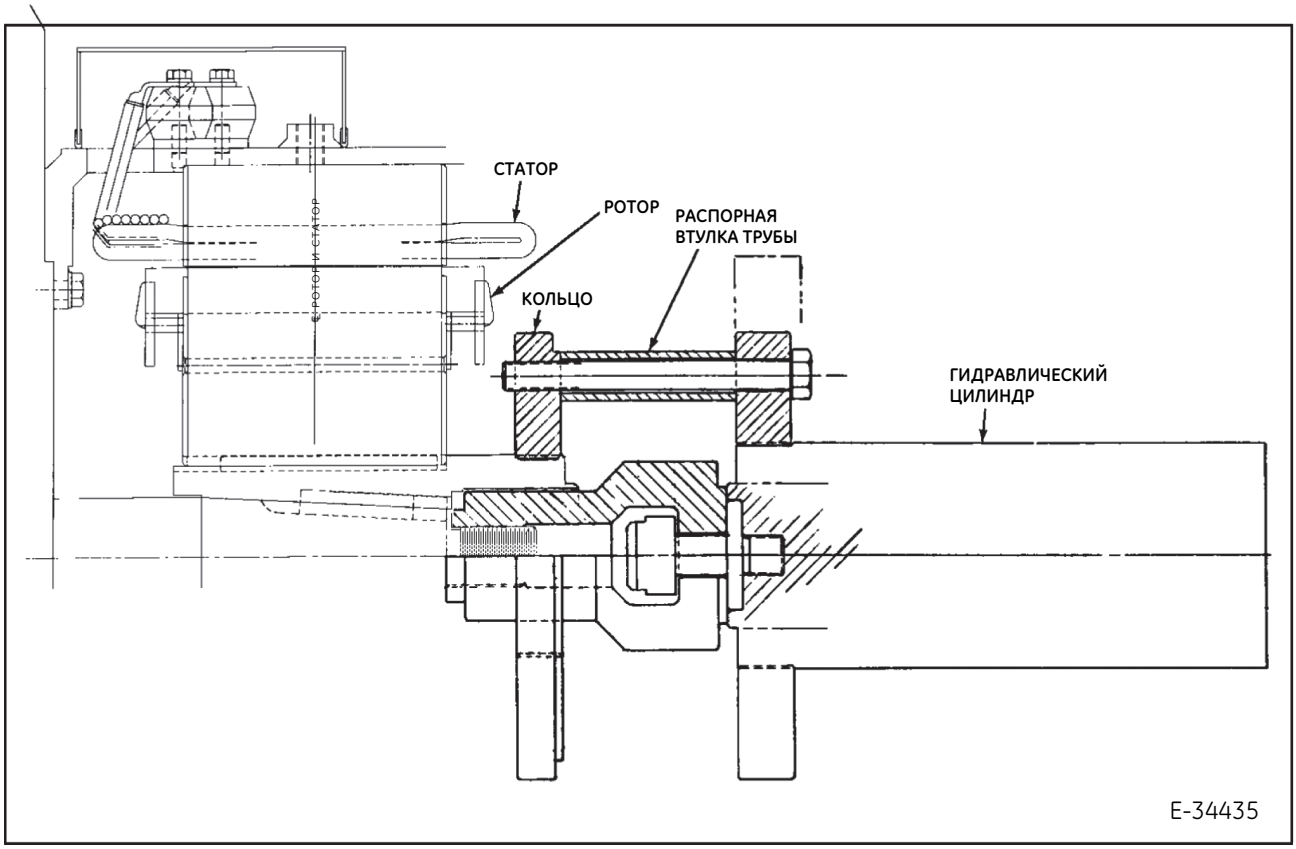

Figure 6. Hydraulically Seat Rotor on Air Compressor Shaft

11. Mount ring on rotor (Figure 5) and slide collar over shaft extension. Bolt collar to ring using three bolts.

12. Push rotor assembly onto the compressor shaft to seat the rotor.

13. Install the mounting sleeve over the shaft extension and place the flat washer and collar nut on the stud at the end of the shaft extension (Figure 5).

14. Using 1/2 in. impact wrench, tighten the collar nut to seat the rotor on the shaft.

15. Remove the collar nut, flat washer, mounting sleeve, collar and shaft extension. Leave the ring fixture on the rotor (Figure 5).

16. Using a depth micrometer, measure the distance from the end of the rotor to the end of the compressor shaft. Record this reading (Figure 7).

17. Assemble hydraulic cylinder fixture and pipe spacers to rotor ring, tighten mounting bolts with an impact wrench (Figure 6). Pump pressure to 7000 psi (492,26 Kg/cm2) on the ASSEMBLY gage then release.

18. Remove fixture, take depth reading at the same position as in Step 16 and record. Advance should be 0.010 to 0.018 in. (0,254 to 0,457 mm).

NOTE: Advance is the difference in the reading taken in Steps 16 and 18.

19. Reassemble the hydraulic cylinder fixture and pipe spacers to rotor ring, tighten bolts with an impact wrench. Pump pressure to 1100 psi (77,36 Kg/cm2) on the REMOVAL gage then release.

20. If rotor pops off, repeat Steps 13 through 19.

21. Check radial gap between stator and rotor with feeler gage. Minimum gap is 0.015 in. (0,381 mm). Sweep feeler gage all around rotor (Figure 7).

22. Assemble a hardened washer and high strength elastic stop nut to the end of the air compressor shaft (Figure 2). Torque nut to 500 lb.-ft. (678,13 Nm).

23. Assemble motor fan (Figure 2) to rotor. Apply Loctite 242 to bolts before assembly. Torque bolts to 21-24 lb.-ft. (28,48-32,55 Nm).

24. Check the radial gap between the fan O.D. and stator frame with feeler gage at four places 90 degrees apart. Minimum gap is 0.020 in. (0,508 mm).

25. Assemble speed sensor at top of stator (Figure 2). Turn sensor in until it contacts the surface of the fan, then take depth reading.

26. Rotate the rotor and air compressor crankshaft to take three additional readings, 90 degrees apart. Set sensor 0.030 to 0.040 in. (0,762 to 1,016 mm) above the highest reading and tighten sensor locknut.

⚠ CAUTION ***Measure gap from highest points on sensor ring (Figure 8).***

27. Assemble motor fan shroud and torque four mounting bolts to 21- 24 lb.-ft. (28,48-32,55 Nm).

6.2. HUB TO AIR COMPRESSOR

6.2.1. Hub Removal - Using Hydraulic Pump

1. Loosen the setscrews and back-off the nut 0.25 to 0.5 turn, to act as a back-up plate when the hub pops off.

2. Remove the plug from the hydraulic removal port.

3. Insert the adapter into the threaded hole in the center of the shaft, and connect it with tubing to the hydraulic pump.

⚠ CAUTION ***Do not heat the hub before removal or use a steel hammer to drive the hub off the shaft. Damage to the equipment bearing or shaft may result.***

4. Pump up enough pressure to force oil into the shaft groove. Ten to twenty strokes is normally sufficient for hub removal.

5. Remove pump assembly from the shaft.

6. Remove nut and slide the hub off the shaft.

6.2.2. Hub Fitting

To prevent the hub from slipping, it should have at least a 75 percent fit on the shaft; that is, at least 75 percent of the tapered bore of the hub is to contact the tapered fit on the shaft. Before heating a hub for mounting, check and correct the fit as follows:

1. Lightly cover the bore of the hub with blueing compound, such as Permatex Non-Drying Prussian Blue* (*Product of Watson Standard Co.) oil pigment.

2. Snap the cold hub on the shaft. Do not twist the hub after it is in place.

3. Mark the relative position of the hub on the shaft with chalk, then remove the hub.

4. Inspect the taper fit on the shaft; blueing of hub bore should have transferred to and should now show on the shaft. If at least 75 percent of the shaft surface shows traces of blueing, the fit is satisfactory. If, however, only a few spots of blueing show on the shaft, the fit is insufficient.

5. Where necessary, dress down the blue spots on the shaft very lightly, using a fine emery cloth such as No. 400A Triemite** (**Product of 3M Co.).

⚠ CAUTION ***Do not use a lapping compound under any circumstances, since lapping will produce a shoulder at the large end of the tapered fit. This shoulder will prevent a proper fit when the hub is mounted hot in advanced position.***

6. Blue the hub again as in **Step 1**, wipe blueing off the shaft end, and repeat **Steps 2, 3** and **5**. Be careful to place the hub on the shaft in the same position as indicated by the chalk marks.

The fit generally will be improved, but the procedure given in **Steps 1 through 6** may have to be repeated several times.

6.2.3. Hub Mounting

⚠ WARNING ***"MEK"(Methyl-Ethyl-Ketone) is a volatile, flammable solvent. The fumes should not be inhaled. Use only in a well-ventilated area and take adequate precautions to protect eyes, skin and hands.***

Proper hub mounting is essential for successful operation of the compressor. Proceed as follows:

1. Thoroughly clean the hub fit on the shaft and the bore of the hub using MEK or equivalent.

NOTE: Do not use kerosene or other cleaner which will leave an oil film.

2. Wipe the hub bore and shaft fit dry with Scott No. 150, C-fold paper towels. Other paper towels are often produced of recycled stock which may leave a residue of sizing, clay, or other materials from the reclaimed paper used to make them.

3. Remove any scarring on the shaft or hub bore.

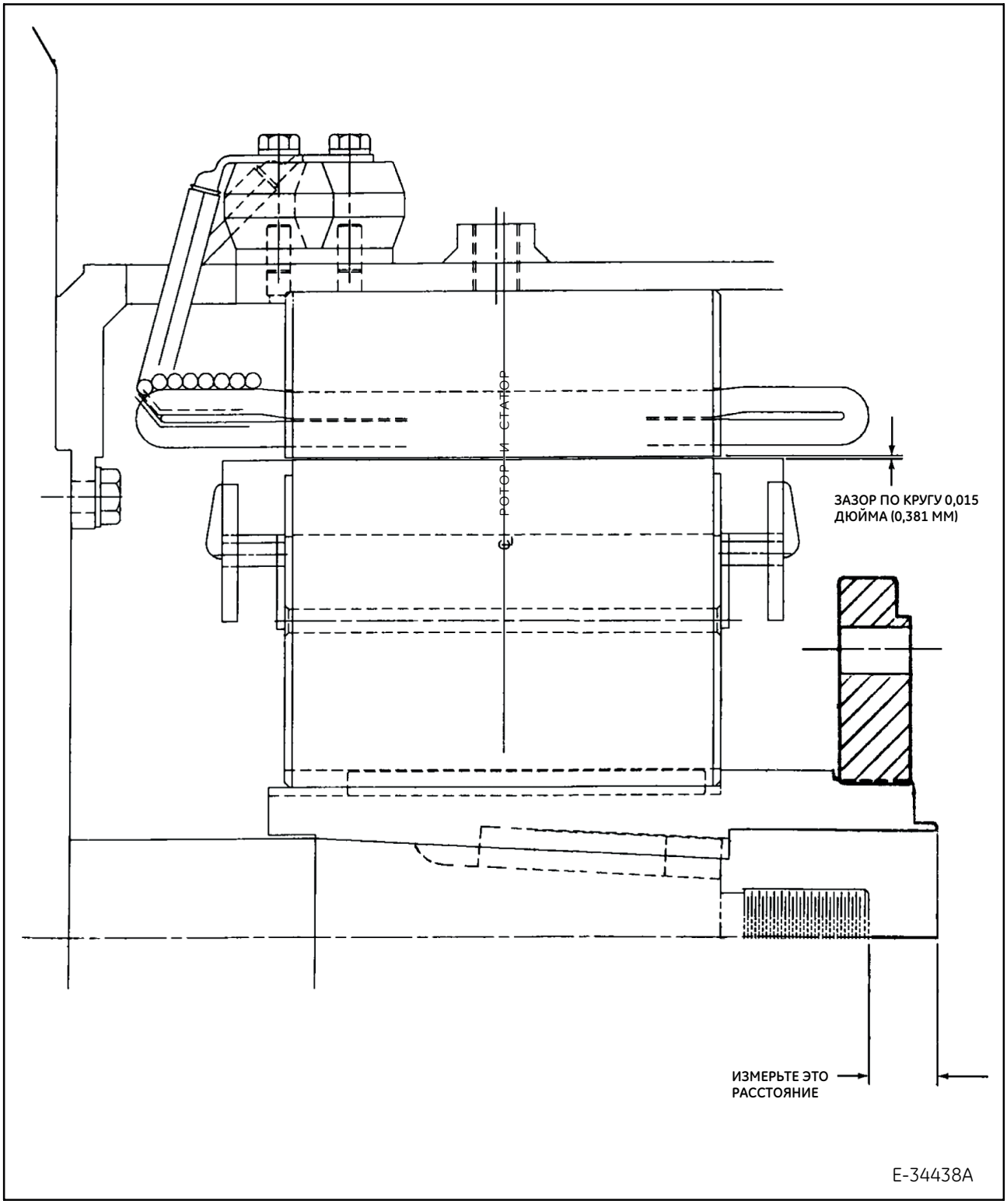

Figure 7. Measure Distance Between End of Rotor and End of Compressor Shaft

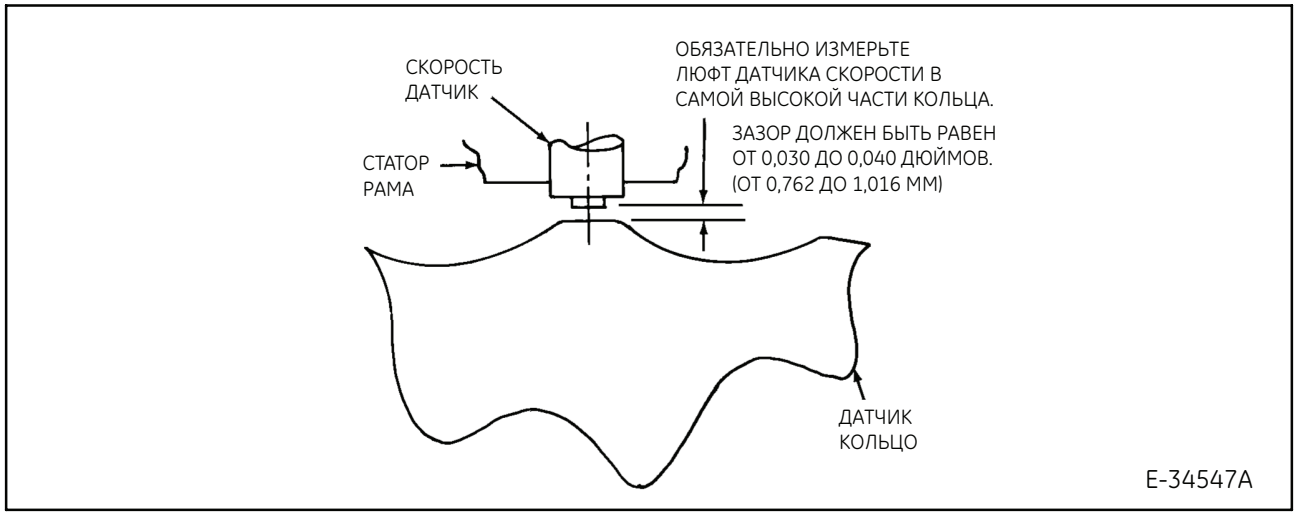

Figure 8. Measuring Speed Sensor Gap

4. Spot the cold hub on the shaft by hand, and check for at least 75 percent fit. See section 6.2.2., *HUB FITTING*.

5. Trial mount the hub on the shaft. Measure and record the position of the hub with respect to the shaft. Make measurements with a depth micrometer or a pinion advance gage. Mark the points of measurement across the end of the shaft and hub face so the hub, when heated, can be mounted in exactly the same angular position and the advance measurement can be made at the same point.

⚠ WARNING ***Nalco RC contains a small percent of alcohol, giving it a low flash point. Keep away from open flame.***

NOTE: The towel should not be wet enough to cause dripping or runs. If runs or drips are present, the Nalco RC will dry out too heavy and must be cleaned off with MEK.

6. Remove the hub from the shaft. Wet a Scott No. 150 towel with Nalco RC.

7. Wipe the Nalco RC onto the hub in an even coat.

8. Let the Nalco RC dry; DO NOT wipe off. A barely visible white haze will be present on the surface.

9. Heat fan hub to 250 to 300°F (121 to 149°C) above measured shaft temperature.

Some accurate method must be used to measure the hub and shaft temperatures quickly before mounting the hub. This can be done best with a pyrometer (See Tool Catalog). Measure the temperature of the shaft with the same instrument.

NOTE: The hub must be applied with a firm snap. The Nalco RC will impede "sliding"; this tends to limit the advance.

10. Quickly mount the hot hub on the shaft in the same angular position as when cold, using the chalk marks as a guide. When the hub is ready for engagement with the taper fit (not in actual contact), SNAP it forcibly into place with a quick push. It is important that the hub be instantly snapped into position before it has cooled appreciably; otherwise, it will freeze to the shaft and further advance will not be possible without removing the hub and beginning the process again.

11. Check the hot (or shrunk-on) position of the hub on the shaft with a gage, located in the same relative position as used to measure the hub before it was heated, see **Step 5**.

12. Proper advance is 0.045 to 0.055 in. (1,143 to 1,397 mm). If advance is not within limits, remove the hub and repeat the procedure. Cool to room temperature.

NOTE: Insufficient advance can result from not soaking hub at elevated temperature for sufficient time or not having temperature high enough. Remember, the temperature given is the difference that the oven should be above the shaft temperature. Insufficient advance can cause a slipped hub. Less often achieved, but just as great a problem, is the case of over-advancement. This can cause cracked hubs and resulting failure.

13. Assemble the hex nut on the end of the compressor shaft. Torque nut to 500 lb.-ft. (678,13 Nm).

14. Assemble two setscrews to compressor fan retaining nut. Torque to 20-22 lb.-ft. (27,13-29,84 Nm).