

Generator Oil Centrifuge Statement of Work
Kampala, Uganda
U.S. Embassy Compound

1.1. DESCRIPTION —The contractor shall provide and install one (1) total oil cleaning centrifuge, per the attached schedule, in the capacity ratings indicated for the engine-generator. The centrifuge on the schedule shall conform to the specifications contained herein. The contractor shall sample and test oil on three (3) engine-generators.

1.1.1 Each oil cleaning centrifuge shall be a passive bypass filtration device, including: centrifuge turbine assembly, bearing tube, cover assembly, and base assembly. The unit shall be configured to consist of an internal screen, centrifugal rotor, mechanically sealed body, and base level control hardware. The unit shall be manufactured complete with all necessary accessories to make the oil cleaning centrifuge fully operational. All equipment shall be as specified but shall not be limited to the items specified herein. All material shall be delivered and installed at the U. S. Embassy, Kampala, Uganda.

1.1.2 Provide for integral engine-mounting hardware, supply lines, maintenance isolation valve, return lines, and back-flow check valve:

(1) A maintenance isolation valve shall be a full-opening ball valve installed at the centrifuge oil inlet so that the centrifuge unit can be manually isolated for service without shutting down the engine.

(2) A check valve shall be located at the centrifuge base oil discharge to prevent back-flow when the centrifuge is being serviced.

1.1.3 Volume and filtration ratings shall meet requirements herein.

1.1.4 Provide engine oil analysis and reports, as required in 2.2, oil sampling and testing will be carried out in intervals of two months. Each generator shall therefore have its oil tested six times per year.

1.2. REQUIREMENTS

1.2.1 The contractor implementing this SOW shall provide for the timely supply, delivery, and installation of all equipment per this SOW. Also to be included is a one-year warranty, O&M Manuals, training, and testing.

1.3 SUMMARY OF EQUIPMENT

1.3.1 Industrial Oil Cleaning Centrifuge.

1.3.2 Oil Supply and Oil Return Lines.

1.3.3 Engine Mounting Hardware.

1.3.4 Maintenance Isolation Valves.

1.3.5 All equipment supplied for Oil Supply Lines, Oil Return Lines, Engine Mounting Hardware, and Maintenance Isolation Valves (1.3.2, 1.3.3, and 1.3.4) shall be UL listed. UL is Underwriters Laboratories Inc.

1.3.6 In addition the contractor shall supply any special tools required for the operation and maintenance of the centrifuge including but not limited to:

- Spatula for sludge removal, and
- Metric Calipers for measuring component deformities.

The contractor shall provide a list and prices of all other tools not listed here that are required for general operation and maintenance of the centrifuge.

1.4 OPERATION

1.4.1 Centrifuge oil flow volume and particle filtration capacity characteristics shall at a minimum meet the performance requirements in 1.4.2 and 1.4.3.

1.4.2 Centrifuge oil flow volume will be a minimum of four (4) gallons per minute (gpm) at sixty (60) psi (pounds per square inch) that is 3.785 liters per minute (lpm) at 413.685 kilo-Pascals (kPa).

1.4.3 The centrifuge particle filters must remove particles less than 1 micron (1×10^{-6} meter) and store up 2,000 cubic centimeters (cm^3) of particulate matter.

2.0 OIL CLEANING CENTRIFUGE

2.1 CENTRIFUGE

The oil cleaning centrifuge shall be equivalent to

1. T.F. HUDGINS SPINNER II model Model 200 HD (Attachment A) or
2. MANN + HUMMEL model FM200-21 (Attachment B).

2.1.2 The centrifuge shall accept hot engine oil from the engine crankcase at temperatures of at least 212 degrees Fahrenheit (100 degrees Celsius) for the centrifuge inlet.

2.1.3 The contractor shall install a maintenance isolation valve at the centrifuge inlet. The maintenance isolation valve shall be a full-opening ball valve installed such that the centrifuge unit can be manually isolated for service without shutting down the engine. The contractor shall install all valves and lines required to enable full engine operation while the centrifuge unit is out of service.

2.1.4 The contractor shall mount the centrifuge unit on the engine-generator as close to the existing oil filter as possible to allow gravity draining of the centrifuge return line.

2.1.5 The contractor shall install a check valve at the centrifuge oil discharge to prevent back-flow when the centrifuge is serviced for maintenance.

2.1.6 The contractor shall install all hardware without blocking access to existing engine components, gauges, dip-sticks, filters, or other operational parts of the engine and generator.

2.1.7 The contractor shall not weld any hardware to the engine.

2.1.8 The contractor shall provide a means for removing the centrifuge and restoring the engine's OEM configuration.

2.1.9 Definitions - The following definitions apply for the purpose of this procurement and any resulting contract:

Oil Cleaning Centrifuge – Is a machine that uses centrifugal force to remove contaminants and particles from the engine’s oil. Centrifuges can be either passively powered by the momentum of the lubricant or externally powered by a motor.

Oil Analysis - Is the analysis of a lubricant's properties, suspended contaminants, and wear debris. Oil analysis is performed in a specialized laboratory.

2.2 OIL ANALYSIS

2.2.1 The contractor shall collect oil samples from all three generators and test the oil samples for impurities and contaminants.

2.2.2 The contractor shall provide all labor and material required to collect and transport the oil to the test laboratory. The contractor shall not re-use oil sample collection bottles.

2.2.3 The contractor shall dispose of all material as required by local regulations.

2.2.4 The contractor shall test the oil samples in an ISO 17025 certified oil testing laboratory.

2.2.5 The contractor shall conduct a detailed oil analysis and provide a report for each generator listing the total weight and volume of impurities and contaminants. The report shall list each chemical-compound name and quantity in parts-per-million (ppm), metric milliliters (mL), and weight. The report shall provide a trend chart for each generator. Analysis and Charts shall include but not be limited to the following:

- viscosity,
- fuel dilution,
- water contamination,
- coolant (ethylene glycol),
- total solids, and
- spectrographic analysis.

2.2.6 The contractor shall provide a report of recommendations for each generator to either KEEP or REPLACE the oil in each generator. The recommendation shall list the benchmark used for decision making.

2.2.7 The contractor shall provide other operations and maintenance recommendations for each generator based on the results of the oil analysis.

2.2.8 The contractor shall deliver the results, reports, and recommendations from the oil analysis within ten calendar days of the collecting the oil sample. For example, the contractor collects oil on August 1, 2012 then the required oil analysis results, reports, and recommendations are due on or before August 11, 2012.

2.2.9 The contractor shall deliver all results, reports and recommendations at the United States Embassy, Kampala, Uganda. The contractor shall deliver one hard copy report and one electronic copy on CD. The electronic copy shall be in Adobe portable document format (pdf) or MS Word (doc) format. The oil analysis results, reports, and recommendations are each a separate deliverable item.

3.0 MEASUREMENTS AND VERIFICATION (M&V)

3.1 GENERAL

3.1.1 The contractor shall measure, record, and verify the total monthly and annual oil consumption of all three generators. The contractor shall measure oil consumption in metric liters (L). The contractor shall track, record, and verify the total number of oil filters consumed for all three generators. The contractor shall track, record, and verify the total cost of oil consumption and filters for all three generators. The contractor shall record oil and filter costs in U.S. Dollars (USD).

3.2 REPORT

3.2.1 The contractor shall provide a monthly M&V report for all three generators.

3.2.2 The contractor shall provide an annual M&V report for all three generators.

3.2.3 The contractor shall include a quantitative analysis between the generator with the Oil Cleaning Centrifuge and the generators that do not have the Centrifuge installed.

3.2.4 The contractor shall calculate the net consumptions and costs of operating the generator with the centrifuge and compare to the net consumptions and costs of those generators without the centrifuge.

3.2.5 The contractor shall calculate shall project the net consumptions and costs of operating all three generators with the centrifuge and the net consumptions and costs of operating all three generators without the centrifuge.

3.2.6 The contractor shall include both a current and cumulative cost comparison for each monthly report and the annual report.

3.2.6 The contractors shall provide all reports using the format provided by the Federal Energy Management Program M&V (FEMP M&V) guidelines found at:

- <http://mnv.lbl.gov/keyMnVDocs/femp> or
- <http://www1.eere.energy.gov/femp>

3.2.7 The contractor shall deliver each monthly report shall be within ten calendar days after the end of each month. For example the report for September 2012 is due on or before 10 October 2012 and so on.

3.2.8 The contractor shall deliver the annual report not later than fifteen calendar days after the end of the 12-month reporting period. For example the report for September 2012 through September 2013 is due on or before 15 October 2013.

3.2.9 The contractor shall deliver all reports at the United States Embassy, Kampala, Uganda. The contractor shall deliver one hard copy report and one electronic copy on CD. The electronic copy shall be in Adobe portable document format (pdf) or MS Word (doc) format. The monthly and annual M&V reports are each deliverable items.

4.0 MISCELLANEOUS

4.1 FACTORY TESTING

4.1.1 The factory test data sheet shall identify all tests (PASSED or FAILED) and accompany each Oil Cleaning Centrifuge. This will be reviewed by the Department of State Representative (DOSREP) before written acceptance is provided.

4.2 OWNERS MANUALS

4.2.1 Two (2) hard copy sets of owner's manuals specific to the centrifuge and products supplied shall be located with each unit and accompany the equipment. General operating instruction, preventive maintenance, connection diagrams, schematics and parts exploded views specific to this model shall be included. A PDF version of the owner's manuals shall also be provided on a compact disc and shipped with each centrifuge.

4.3 TRAINING

4.3.1 Two (2) recorded digital video discs (DVD) product training lessons specific to the products supplied shall be located with each unit and accompany the equipment. General installation, operation, preventative maintenance and replacement specific to this model shall be included. Training shall be in standard English with subtitles.

4.4 SUBMITTALS

4.4.1 Provide two complete sets (for each rating of machine) of Engineering Submittal for approval, prior to production release, showing all components, in addition to the centrifuge. Submittals shall include complete system mounting and connection diagrams and manufacturer's warranty form indicating compliance with these specifications.

4.5 SPARES

General parts: Provide one set of maintenance (spare) parts for each centrifuge ordered under this contract. An order of maintenance parts is defined as all items necessary to perform scheduled maintenance functions for 2000 operating hours plus replacement parts for each centrifuge used on the genset and any other like items that the manufacturer deems desirable. Package these maintenance parts in

polyethylene bag, and pack with the centrifuge for which they are intended. This group of parts shall include a complete list of all vendors recommended spares, including, but not limited to, the items listed below:

1. Filter inserts.
2. Cover assembly.
3. Nut assembly-cover with pin, collar and seal.
4. Centrifuge turbine assembly.
5. Clamp with tee handle-cover to base.
6. Bearing tube assembly-centrifuge.
7. Base assembly with spindle.
8. Cut-out valve kit with gasket.
9. Base-level control with hardware and seal/gasket.
10. Oil supply line.
11. Oil return line.
12. Bypass/Isolation valves.
13. Check valve.
14. Spatula for sludge removal.
15. Metric calipers.

For the 2000-hour requirement for replacement parts, one replacement cycle for all filters and associated gaskets shall be 250 engine-hours. The offer shall include a complete list of all vendors recommended spares. The offer shall explicitly identify each Table I line item by packaged dimensions, weight and price.

4.6 WARRANTY

The offeror shall provide a one-year warranty on parts, which starts from the date the equipment is commissioned on-site. This requirement shall not modify or change the standard contract warranty agreement.

4.7 DELIVERY

The industrial oil cleaning centrifuge, oil supply-and-return lines, engine mounting hardware, maintenance isolation valves, and spare parts are being imported duty free under the diplomatic duty free status of the American Embassy, the goods will be considered delivered once received and inspected by the Receiving Officer at the United States Embassy, Kampala, Uganda.

Generator Oil Centrifuge Statement of Work
Kampala, Uganda
U.S. Embassy Compound

GENERATOR SERVICES SCHEDULE
Kampala, Uganda

<u>Engine Model#</u>	<u>Prime Rating, KVA</u>	<u>Services</u>
VTA-28-G5 (GXX201)	625	Install one (1) centrifuge,
ALL (3 each)	ALL	Oil Analysis and Reports
ALL (3 each)	ALL	Measurement and Verification Reports

SPINNER II®

OIL CLEANING CENTRIFUGE

Model 200 HD	4 gpm at 60 psig 2,000 cc Dirt Capacity
Installation Instructions	
Parts List	
Service Instructions	



SPINNER II®

OIL CLEANING CENTRIFUGE

Model 200 HD Installation Instructions

Oil Supply to Centrifuge

Oil supply should, in general, be taken from the highest pressure, hottest source available on the dirty side of the full-flow oil filter. A ½-in. pipe or #8 hose supply line should be used with a full-opening ball valve installed at the centrifuge oil inlet so that the unit can be isolated for service without shutting down the engine. Preferred pressure is 60 to 80 psig but the Spinner II centrifuge will operate efficiently at 40 to 90 psig. Below 35 psig, an internal idle cut-out valve will close to prevent low oil pressure during low-speed operation.

Clean Oil Return to Sump

Using Level Control Base (LCB) — PREFERRED

The air-operated control in Part No. 71602 LCB permits the Spinner II centrifuge to be installed on the frame rail, base plate or deck in any convenient location near the engine, above or below the sump oil level. First, mount the Spinner II unit with Part No. 70916 seal to the LCB using the four cap screws and washers supplied and install the Part No. 71050 air regulator into the air cartridge 71603. Then securely mount the complete assembly using four ½-in. bolts through the holes in the LCB base. See the *parts list on the next page*.

The clean oil drain line to the sump should be 1-in. minimum diameter, *unrestricted* hose or pipe to a 1-in. connection located above oil level if possible — alternate oil fill openings or drilled-and-tapped holes in crankcase doors are possibilities. A below-oil-level return drain requires that a 1-in. swing check valve be located at the LCB oil discharge to prevent back-flow when the centrifuge is being serviced. Only low-pressure-drop swing check valves are permitted in the drain line — **shut-off valves must never be used**.

Control Air Supply. The control in the LCB maintains the proper oil level for maximum centrifuge speed and efficiency. Compressed air to operate the LCB may be obtained from any 2 to 125 psi unregulated air source, as 0.02SCFM is minimal. Any inlet pressure exceeding 125 psi must be regulated using P/N 71050. This regulator should be installed as shown, with a ¼-in. air line connected to it using liquid sealant on threaded connections. In the absence of compressed air, it may be possible to use bleed air from the engine turbocharger or air from a positive displacement scavenging blower. This requires modifying the LCB for low-pressure operation. Remove regulator P/N 71050 and connect air supply directly into cartridge P/N 71603. This revised P/N 71603 is marked with wide band on hex. Use of 71246 Pre-Filter is recommended.

Using Gravity Drain — Engine Mounted Only

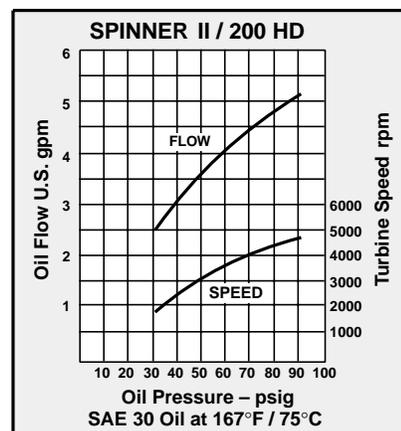
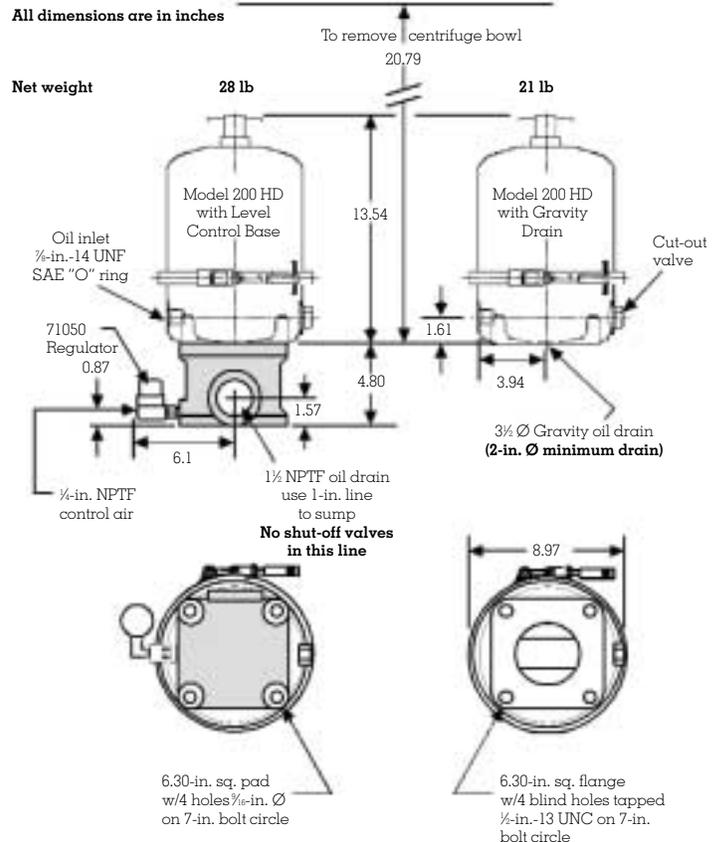
For a gravity drain without the LCB, the Spinner II centrifuge must be close-coupled to the sump with an unrestricted 2-in. I.D. drain which must return above the normal sump oil level. The drain line must be sloped downward from the centrifuge outlet and be free of sharp bends or traps. A crankcase door can be modified to provide a suitable drain opening and mounting point. Be sure the sump side of the drain opening is clear and that the drain oil does not impinge on moving parts of the engine. Mounting elbows are available from Spinner II Products.

Mechanical Considerations

Spinner II centrifuges are high-speed devices and should be securely mounted to prevent excessive vibration. Operation up to 10 degrees from vertical is permitted.

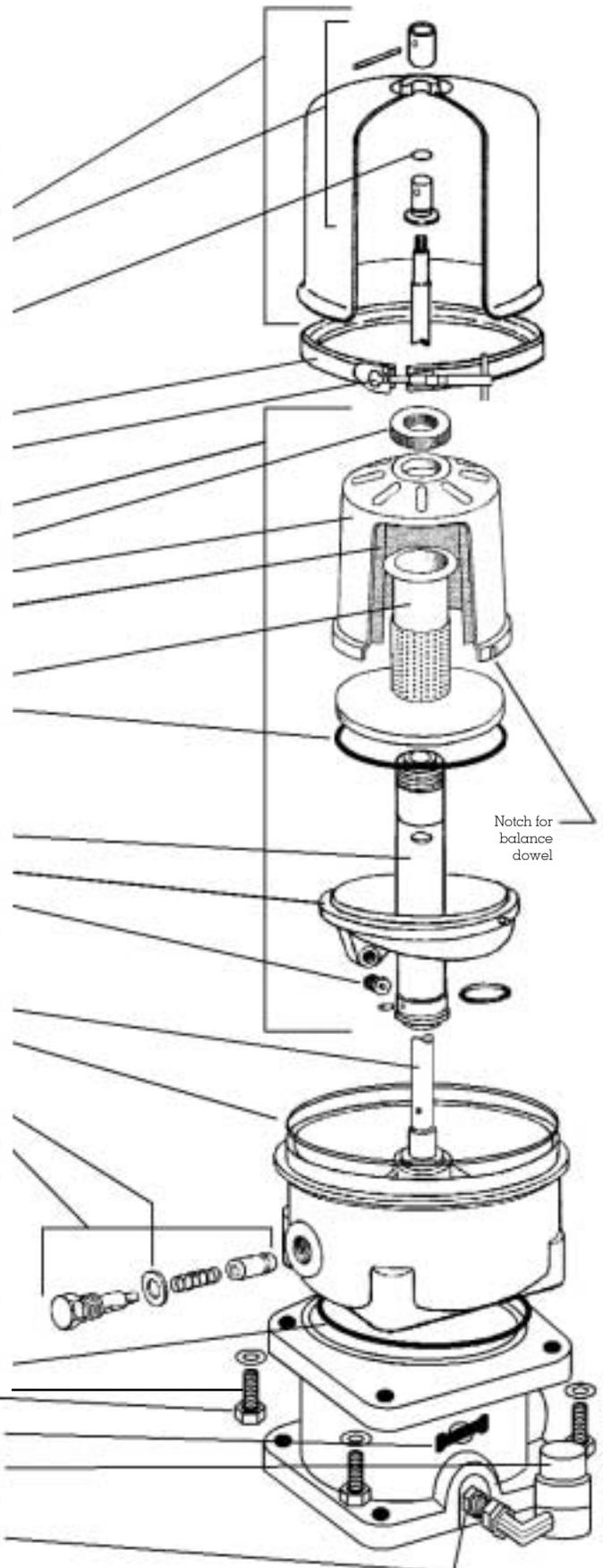
Detailed Information Available

For optimum performance of your centrifuge, specific installation drawings for almost any engine can be requested from your distributor.



Model 200 HD Parts List

Description	Part number
Only items shown with part numbers are available.	
Bold denotes assembly	
Centrifuge, Spinner II/200 HD with 71602 level control base...	71404
Centrifuge, Spinner II/200 HD only	71403
Cover assembly (no clamp)	71510
Nut assembly-cover	71511
(includes pin, collar and seal)	
Seal-cover nut	70868
Clamp with tee handle-cover to base	71514
Tee bolt and handle-clamp	71515
Centrifuge turbine assembly	70870
Nut-centrifuge bowl	70871
Bowl-centrifuge (part of 70870)*	
Insert-centrifuge bowl (package of 25)	70974
Baffle/screen-centrifuge	70873
Seal-centrifuge bowl (Viton®)	70874
Bearing tube assembly-centrifuge	70976
Turbine (part of 70870)*	
Nozzle turbine (2 required)	70975
Tool, centrifuge disassembly (not shown)	70950
Base assembly with spindle (no clamp)	71516
Seal-base to cover (Viton)	70878
Seal-idle cut-out valve	70881
Kit-repair, idle cut-out valve	70880
Gasket-base flange (gravity drain only)	71959
Fitting-straight inlet 7/8-in. SAE x 1/2-in. F pipe (not shown)	70955
Fitting-straight inlet 7/8-in. SAE x #8 hose (not shown)	70953
Base-level control with hardware	71602
Seal-level control base (included) (Viton)	70916
Bolts 1/2-in.-13 UNC x 1 1/4-in. and washers (4 each included)	
Cock-safety drain	71057
Regulator-air for 71602	71050
Kit, repair-control float assembly (not shown)	71609
Cartridge-air valve, industrial	71603



*Individually match balanced to bowl — not interchangeable.

1. Shut off control air. Shut off oil supply or stop engine and allow centrifuge turbine assembly to come to a complete stop. **CAUTION:** Open safety drain cock on side of the Level Control Base (if equipped) and be certain that the unit is not pressurized. If cock is under pressure, locate the source and remove before proceeding. *Check especially for unauthorized shut-off valves in the oil drain line to the sump and remove if found.*
2. Remove cover clamp, unscrew cover nut and remove cover assembly.
3. Partially withdraw centrifuge turbine assembly from the base assembly and allow oil to drain from nozzles before removing completely. Carefully separate centrifuge bowl from turbine. (An optional tool, Part No. 70950, is available to facilitate the disassembly process.) *Do not strike the nut or bushings with or against a hard surface or damage will result.* Remove baffle/screen.
4. Carefully remove the dirt cake from the centrifuge bowl using a wooden spatula or other non-damaging tool. Wipe out bowl with solvent and wash baffle/screen and other parts.
5. Clean turbine and examine top and bottom bearings for excessive wear. Replace bearing tube assembly (Part No. 70876 or 70976), if diameters exceed 0.593-in. (15.06 mm) top or 0.854-in. (21.69 mm) bottom. Check turbine nozzles to ensure free passage of oil. Inspect centrifuge bowl seal and replace if damaged. The seal is Viton and can be reused several times.
6. Seat baffle/screen in turbine, replace bowl (using the optional Part No. 70974 insert liner if desired) and reassemble, tightening the bowl nut securely *using finger pressure only*. Make sure that the bowl seal is uniformly seated all the way around. **Important:** The turbine and bowl are supplied only as factory-balanced assemblies; match balance codes and dowel pin location and *do not interchange turbines and bowls*.
7. Examine spindle journals for damage or excessive wear. Replace base assembly (complete with spindle) if diameter is less than 0.590-in. (14.98 mm) top or 0.852-in. (21.63 mm) bottom. The spindle is pressed into the centrifuge base and aligned at the factory, and cannot be properly serviced in the field.
8. If the Level Control Base is used, check the control mechanism by using a thin wire with a hook formed on one end to engage the float arm on the bracket side. Raise the float. Air should flow into the control mechanism. Air flow should stop when the float is lowered. If the air control is defective, it must be repaired using Part 71603 (air cartridge assembly) or Kit 71609 (float assembly kit), following the instructions in the kits.
9. **Install the centrifuge turbine assembly on spindle, being careful of the bushings. Be sure it rotates freely.**
10. Clean and inspect cover, paying special attention to the cover nut assembly. The seal should be replaced if it shows signs of leaking. **Note:** To disassemble, remove the roll pin and the collar from the *top*, and withdraw the nut from the *bottom*.
11. Examine the base-to-cover seal and replace if damaged. The seal is Viton and can be reused several times.
12. Replace the cover assembly and tighten the cover nut securely *by hand pressure only*. Make sure that the cover seats on the base assembly evenly all around so that the cover seal is properly compressed. Replace the cover-to-base clamp and tighten the clamp nut securely by hand. Check all centrifuge and Level Control Base mounting bolts for proper tightness.
13. Close safety drain cock on the Level Control Base. Open air supply and oil supply to centrifuge. With engine running, check all connections and joints for leaks. Repeat assembly if vibration is excessive.

Note: All centrifuge turbines are correctly balanced before leaving the factory. An out-of-balance condition can occur as a result of uneven build-up of dirt in the bowl or as a result of excessive bearing or spindle journal wear. Depending on conditions, wear will eventually take place on the spindle and bearings, requiring replacement of the appropriate assemblies.

Sales and Service

SPINNER II®
PRODUCTS



T. F. HUDGINS
INCORPORATED

Tel: 713-682-3651 or 800-231-7746
 Fax: 713-681-9702
 Mail: P.O. Box 920946
 Houston, Texas USA 77292-0946
 Warehouse: 4405 Directors Row
 Houston, Texas USA 77092
 Web Site: www.Spinnerii.com

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 Litho in U.S.A. Bulletin 71578/9-02

MANN+HUMMEL FM200 Oil Cleaning Centrifuge Maintenance Procedure

Applicable for the FM200-21 IND Centrifuge Range

The MANN+HUMMEL FM200 Oil Cleaning Centrifuge should be cleaned at regular intervals ensuring that the thickness of the dirt deposit inside the rotor does not exceed approximately 35mm. This operation is normally carried out after a specified period of operational use and may be combined with other maintenance procedures.

Maintenance Procedure

1. Stop the flow of oil to the centrifuge by either stopping the engine or closing the centrifuge isolating valve (if fitted). Ensure the centrifuge has come to a complete stop before proceeding.
2. Remove the band clamp, unscrew the cover nut and remove the centrifuge cover assembly.
3. Allow the oil to drain out of the rotor assembly. This may be assisted by raising the rotor on the spindle. Withdraw the rotor assembly vertically upwards from the spindle. The rotor should be removed and replaced on the spindle with care in order to ensure that the rotor bearings are not damaged.
4. Secure the rotor assembly on the rotor disassembly tool (Part N^o. 6890690601). Unscrew the rotor cover nut and separate the rotor cover from the rotor body.
5. Remove the standtube.
6. Remove sludge deposits from the inside of the rotor cover using a spatula. Clean the rotor components using a suitable cleaning fluid. Ensure that all rotor components (including the two nozzles located in the rotor body), are thoroughly cleaned and free from debris before re-assembly.
7. Examine the rotor assembly O ring for damage and renew if necessary (Kit N^o. 6899078701)
8. Fit a new paper insert (Part N^o. 6890322001) into the rotor cover.
9. Reassemble the rotor assembly ensuring that the rotor cover slot and rotor body pin is aligned. **Do not interchange rotor covers.**
10. Replace the rotor on the spindle and check that the rotor spins freely.
11. Examine the centrifuge body O ring for damage and renew if necessary (Kit N^o. 6899078701)
12. Replace the centrifuge cover and fasten the centrifuge cover nut hand tight.
13. Replace the band clamp and tighten hand tight. The band clamp must be securely fitted during operation of the centrifuge.
14. With the centrifuge running, check all joints for leaks.

Important Notes

The Mann+Hummel Oil Cleaning Centrifuge is designed to provide extended service without the need to replace major components. However, after extended periods of operation wear and damage to the centrifuge spindle and rotor assembly may become evident. For this reason it is recommended that the centrifuge spindle and rotor assembly bearings are visually inspected for damage and wear during the cleaning process. If excessive wear or bearing play is evident, the rotor assembly and/or the centrifuge body assembly should be replaced.

All FM200 centrifuge assemblies are fitted with a cut off valve (C.O.V.), which is located in the filter body. The C.O.V. is designed to protect the engine by stopping the supply of lube oil to the centrifuge at start-up and during periods when the oil pressure is below the C.O.V. rating. This item is intended to provide maintenance free operation for extended periods and should only be disassembled and inspected for damage if a problem becomes evident.

Maintenance Action

Every Oil Drain Interval:

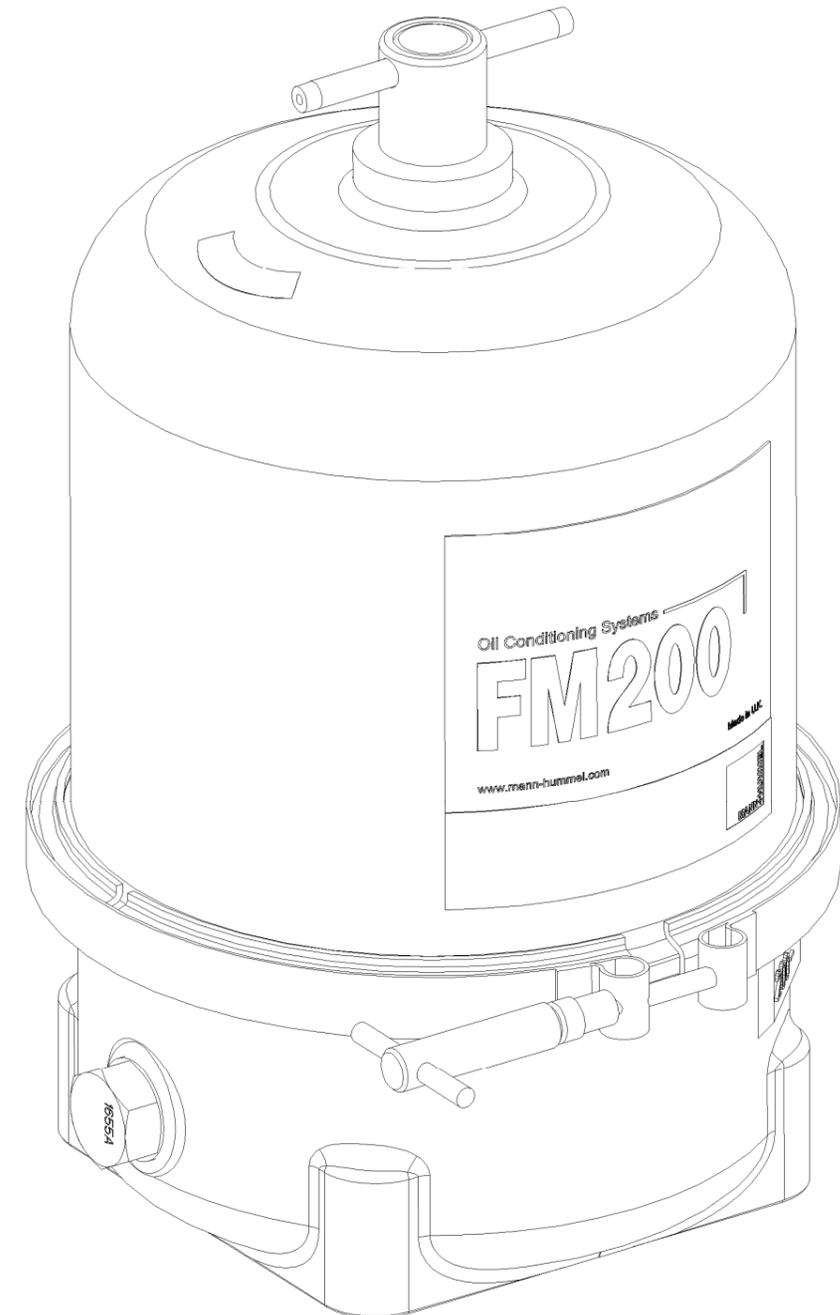
- Clean Rotor Assembly / Replace Paper Insert (Part N^o. 6890322001)
- Inspect Centrifuge Body O Ring & Rotor Body O Ring. Replace if Damaged (Kit N^o. 6899078701)
- Check Cover Nut O Ring for leaks and replace if necessary (Kit N^o. 6899078701).
- Inspect Rotor Bearings for wear and replace Rotor Body Assembly if necessary
- Inspect Spindle for wear and replace Centrifuge Body Assembly if necessary

Engine Overhaul:

- Replace Centrifuge

Please note that this should be used as a guide only. Maintenance intervals for the centrifuge are dependent on a number of factors and differ with engine type and operational environment.

OIL CONDITIONING SYSTEMS SPARE PARTS LIST



FM200 - 21 IND

Spare Parts List

FM200	PART No.	QTY	FM200-21IND (6899142301)
CUT OFF VALVE RATING (BAR)			2.5
OIL INLET THREAD SPEC.			1/2" BSP

BODY ASSEMBLY	6899224401	1	●
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ROTOR ASSEMBLY	6899411701	1	●
NOZZLE	6890490402	2	●
BEARING TUBE ASSEMBLY	6899053601	1	●
STAND TUBE	6890313601	1	●
CIRCLIP	6890121816	1	●
PIN	6890102116	1	●
ROTOR COVER NUT	6890184701	1	●
PAPER INSERT	6890322001	1	●
STIFFENER PLATE	6893312201	1	●

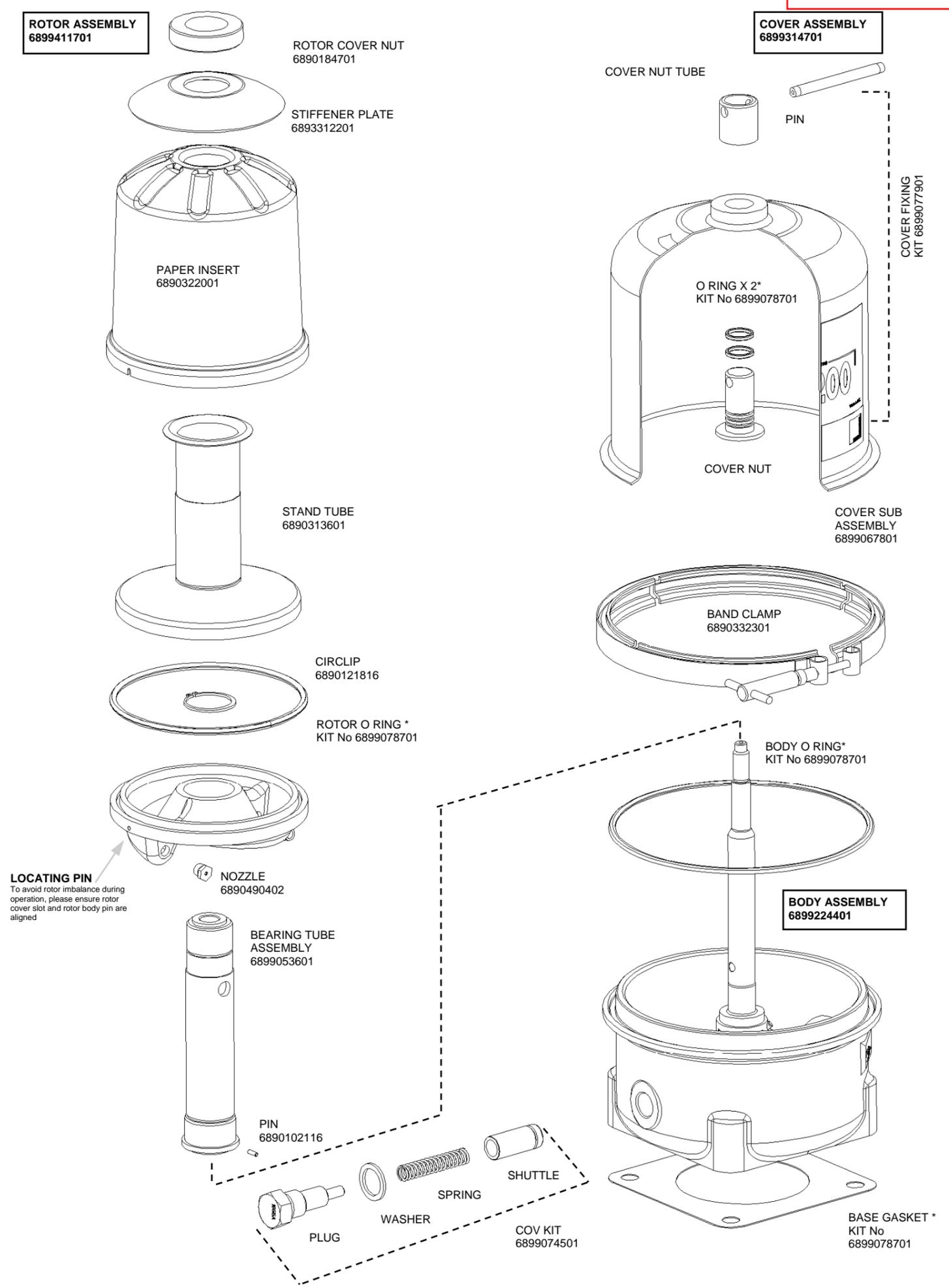
COVER ASSEMBLY	6899314701	1	●
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BAND CLAMP	6890332301	1	●
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FM200 KITS	PART No.	QTY	FM200-21 IND (6899142301)
CUT OFF VALVE KIT	6899074501	1	●
COVER NUT FIXING KIT	6899077901	1	●
SEALS KIT	6899078701	1	●

MANN + HUMMEL (UK) LTD.
 Units 11 - 15 Chard Business Park
 Leach Road, Chard
 Somerset, TA20 1FA
 Tel: +44 (0) 1460 238900
 Fax: +44 (0) 1460 238997
 Email:ocs@mann-hummel.com

MANN+HUMMEL FILTER TECHNOLOGY (S.E.A)
 PTE LTD
 3 Toh Tuck Link
 #03-02/03 German Districentre
 Singapore 596228
 Tel: +65 (6586) 81 81
 Fax: +65 (6586) 81 80
 Email:ftsg@mann-hummel.com.sg



*SEALS KIT (6899078701) COMPRISES OF: C.O.V. WASHER, CENTRIFUGE BODY O RING, ROTOR O RING, COVER O RING X 2 & BASE GASKET