

## **Statement of Work Three-Engine GenSet Road Switcher Locomotives**

This Statement of Work specifies the manufacture and delivery of new engine-generator set (GenSet) road switcher locomotives and the conversion of GG20B locomotives to GenSet locomotives equipped with three Tier II, ultra-low emission certified diesel engines and a complete range of technical data, materials, and equipment necessary to ensure compliance, operations, support, and maintenance for the locomotives. The term “GenSet “ as referred to in this specification means that the locomotive’s traction motors are powered directly from the engine-generator sets. The road switcher locomotives required for this solicitation shall each have three engine-generator sets capable of providing 2,000 continuous horsepower per locomotive. The design shall be such that for relatively light loads only one engine-generator set will operate, as the load increases two or three engine-generator sets will operate. The locomotive shall remain operable in the event of one or two engine-generator sets not functioning or removed from the locomotive for service, repair, etc. Inspection of potential Government furnished equipment (GFE) may be requested via E-mail to the Contracting Officer at [Guy.Hillman@dot.gov](mailto:Guy.Hillman@dot.gov) this request must be made within ten days after release of this combined synopsis/solicitation. This Statement of Work (SOW) calls for the quantity of up to three new GenSet locomotives or a combination of converted GG20B locomotives and new GenSet locomotives with documentation and training described herein as the base item and one option for additional training.

### Compliance

The locomotive(s) must satisfy the following:

- a. Association of American Railroads (AAR) Manual of Standards and Recommended Practices Section-M, Locomotives and Locomotive Equipment.
- b. AAR Interchange Rules.
- c. The Official Railway Equipment Register.
- d. Code of Federal Regulations (CFR), Title 49, Transportation.
- e. American Society of Mechanical Engineers (ASME), Boiler and Pressure Code Section IX, Welding Qualifications.
- f. American Welding Society (AWS), D15.1 - Railroad Welding Specification.
- g. American Iron and Steel Institute (AISI) Standards.

### Order of precedence

In the event of a conflict between the text of this document and the references cited herein, the text of this document takes precedence. Nothing in this document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

### Technical Requirements

#### General Configuration Requirements

- a. Model Type – New and/or converted GG20B locomotive into three-engine four-axle GenSet road switcher locomotives with a combined continuous power of at least 2,000 horsepower per locomotive and low hood configuration. Not to exceed 280,000 pounds.

- b. Emissions - Qualified as an Ultra-low Emitting Locomotive (ULEL) by the California Air Resources Board (CARB). In compliance with EPA Tier-II Locomotive Standards (CFR Part 92) and Tier III Non-road Compression Engine Standards (CFR Part 89).
- c. AAR Standard, alignment control type (self-aligning), type E or F shelf couplers, on both ends, top operated as outlined in rule 18
- d. 390/391 series draft gears or similar, AAR approved for road-switcher locomotives
- e. Operable/automatic sanders
- f. Automatic drain valves on bottom of drain on primary air system along with a manual drain.
- g. Locomotive(s) shall not be equipped with toilets.
- h. Contractor shall provide maintenance item consumables and spare parts for each locomotive for the proper operation for one year of operating service after locomotive delivery to final destination. This does not include fuel and lube oil.
- i. Contractor shall provide locomotive operator and maintenance training at location of delivery. Training requirements include hands-on operations with on-site personnel within ten (10) calendar days following delivery of the locomotive(s).
- j. Conform to AAR Plate-L clearance dimensions.
- k. Under normal service arrangements, have the ability to remove one engine-generator set and return the locomotive to service (minus one GenSet) within one workday.
- l. Have the ability and provide for common design that like locomotives may exchange engine-generator sets as common practice without non-compatibility issues.
- m. Fuel tanks to meet or exceed AAR S-5506

#### Air Brakes

- a. New York Air Brake (NYAB) CCB26 electronic air brake system or other electronic air brake system compatible with the 26L air brake schedule.
- b. Basic duplex air end connection.
- c. New or completely rebuilt brake rigging with single shoe design or double acting clasp design.
- d. New composition brake shoes (if brake shoes are worn more than 50% during transport to final destination a set of new brake shoes must be delivered)
- e. Emergency brake valve located in cab

#### Cab

- a. Cab heater
- b. Federal Railroad Administration(FRA) card holders (for Blue card and Daily card)
- c. Window awnings and wind deflectors (two)
- d. wiper motors and blades on all four corners of cab
- e. steel fabricated cab and hood, short nose design
- f. AAR standard control stand operating console
- g. Cab noise shall conform to CFR-49 sect. 229.121
- h. High impact window glazing to comply with CFR-49 section 223
- i. One operator seat and two sidewall mounted helper seats
- j. Non-skid flooring shall be applied on floor

- k. Cab lighting to provide sufficient illumination for all control instruments, meters, and gauges to enable the engine crew to make accurate readings from their normal positions in the cab. Cab lighting shall conform to 49CFR 229.127.

#### Electrical/Electronics

- a. Automatic ground relay system (fault history capable)
- b. All circuits tested for continuity and load capacity
- c. Locomotive(s) shall be equipped with a working event recorder and non-resetable duty cycle recorder, Quantum Model Q1067D or equal (non-resetable duty cycle hour meter shall have the following function, Notch Location (Idle and positions 1-8) and Total Hours per notch location). All software required to download history data and cables required to interface are also required.
- d. Locomotive(s) shall be equipped with a speed indicator which is accurate to within +/- 3 miles per hour (MPH) for speeds of 10 to 30 MPH and accurate to within +/- 5 MPH at speeds above 30 MPH. Speed indicators must be clearly readable from the operator's normal position under all lighting conditions.
- e. Quantum alerter compatible with speed indicator and event recorder
- f. New batteries,
- g. New wiring and cabling insulated and approved per AAR
- h. Locomotive(s) shall have a console mounted programmable AAR radio with handset and handset holder.
- i. There shall be on-board provisions for connecting a laptop computer to monitor as many system parameters and fault data as practical. The software and cables required for this shall be included.
- j. Roof mounted alerting strobe light (Amber Color) near front center such that it can be seen at a height of 5-feet above rail 10-feet away from the front and sides of the locomotive.
- k. Locomotive(s) shall be equipped with operative crossing bell and horn in compliance with CFR49 Part 229.129.
- l. Active ditch lights pneumatically switched to automatically flash when crossings are approached in accordance with CFR Title 49 section 229.125. The flashing shall be capable of manual activation or deactivation by the locomotive operator.
- m. New electrical cabinet
- n. All doors and cover plates guarding high voltage equipment shall be marked "Danger High Voltage" or "Danger".

#### Multiple Unit Operation

- a. Locomotive(s) shall be wired to AAR standard 27-wire train line, basic AAR pin arrangement, and be ready for Multi-Unit Operation with other locomotives similarly configured and equipped with MU operation. 27-pin receptacles shall be located on both ends of the locomotive. Dummy receptacles shall be placed on the opposite side of the working 27-pin receptacles.
- b. MU jumper cable shall be supplied (two per locomotive).

### Wheels and Traction

- a. D77 or equivalent traction motors (four) with new support bearing seal rings
- b. Microprocessor controlled wheel slip protection and traction control
- c. Individual traction motor isolation/cut-out
- d. Gear Ratio, 62:15
- e. 40-inch diameter, Multi-Wear Type, new or used wheels provided there is not less than 1½ -inches of tread remaining. Wheel sets shall conform to 49CFR 229.73.
- f. Cooling system for traction system shall be supported with documentation that includes all parts with corresponding part numbers.

### GenSets

- a. Three diesel engine-generator sets with the structural integrity appropriate for locomotive operations and sized to achieve continuous locomotive power rating of 2,000 horsepower and also meet the environmental constraints listed above.
- b. Built-in engine protectors (voltage, frequency, current, temperatures, oil, and water) with auto shutdown and audible alarm feature.
- c. Provide the ability of GenSet removal and replacement with a suitably sized and equipped fork-lift truck.

### Fuel Tanks

- a. To be of high impact resistant design which meet or exceed current AAR Manual of Standards and Recommended Practices (S-5506)
- b. Snyder fuel fitting
- c. Sight fuel level gauges shall be located on both sides of the fuel tank

### Special Tools and Procedures

- a. The contractor shall identify Test, Measurement and Diagnostic Equipment (TMDE) that will insure the ability of the locomotive(s) to perform to the maximum extent practicable. Maintenance concepts shall include optimum use of accurate on-board diagnostic capability to include Built-in Test (BIT)/Built-in Test Equipment (BITE) to the maximum extent possible. The contractor shall maximize the use of embedded BIT/BITE dialogistic capability, fully document and support embedded systems and software; software shall not contain proprietary restrictions.
- b. All special cabling and connectors for downloading diagnostic results including passwords for obtaining rights to access self-diagnostic software shall be presented during training.
- c. Any tests associated with the mechanical or electrical aspects of the locomotive shall be clearly defined including all tools required to perform the tests.
- d. Two sets of tools including entry door lock keys and hood door keys that are unique to this type of locomotive and are required to perform maintenance shall be delivered with the locomotive
- e. Basic Items such as filters and tools required to perform regular maintenance shall be identified with part numbers and tracked in appropriate documentation.
- f. Any software required to perform maintenance shall be provided.

- g. The blue cab card will denote: “Event Recorder Equipped” and “Locomotive Handbrake Tested, Inspected and Lubricated at Annual Inspection” per Requirements of 49CFR 232.105(c)”.
- h. Item Unique Identification Tags (IUID) are required (one per locomotive) to be located on the manufacturer’s build plate. The IUID tag shall contain Part number, Serial number and Commercial and Government Entity (CAGE) code information.

#### Other Provisions

- a. Contractor shall mount a Manufacturer’s Builder data plate at the right front and left rear side sill of locomotive with the following data:
  - 1. Unit number
  - 2. Model
  - 3. Serial number
  - 4. Build Date
  - 5. Engine type
  - 6. Horsepower
  - 7. Gross Weight on rail
  - 8. Manufacturer
  - 9. Customer
  - 10. Contract number
  - 11. Contractor
  - 12. One 2-D matrix IUID tag. A description can be found here:  
[http://www.iuidtoolkit.com/defense\\_suppliers/suppliers7.php](http://www.iuidtoolkit.com/defense_suppliers/suppliers7.php)
- b. Two (2) 20-lb. BC-type fire extinguishers shall be provided (one cab mounted and one engine room mounted)
- c. One first-aid kit shall be mounted in the cab
- d. One flair box (may be mounted in cab or low hood)
- e. Hand railings provided on all exterior walkways. Throughways shall have chains with breakaway links installed.
- f. Car body shall be designed to direct effluents to a retention tank with a minimum capacity of 75-gallons.

#### Training

The contractor shall provide operator training, hands-on maintenance, service and troubleshooting training, and a training package of materials. Two sets of special tools per locomotive including software required to perform all maintenance functions will be provided during training, technical manuals and other applicable documents used to identify parts and service manuals required to perform maintenance shall be utilized during the training activities. Training shall take place within 10 calendar days following locomotive delivery. Training tools, manuals, and software are required for each locomotive delivered to Ft. Lewis, Washington. There shall be a total of three training packages made available for each training session.

Painting and Stenciling

Contractor shall follow AAR Requirements for surfaces that are not to be painted. Ferrous metal surfaces to be painted shall be cleaned by sandblasting, commercial grade grit blasting, or mechanical or chemical means to remove all existing loose paint or other materials. Ferrous surfaces requiring finish painting shall be primed with one coat of rust inhibiting high solids, low volatile organic compound (VOC) urethane compatible primer. Dry film thickness to be in accordance with the paint manufacturer's instructions. Finish paint shall be two coats dry film thickness of each coat to be 1.2 to 1.8 mils. Paint thickness shall be 4-mil minimum dry thickness combined primer and topcoat or in accordance with the paint manufacturer's instructions. The paint system compliant status total volatile organic compounds (VOC) shall be less than 3.5-lbs/gal (0.419 kg/liter).

Paint Specifications for Locomotives, shall conform to AAR Standard M-1001 Section C, Part II, Section 5.2.

|                                |   |
|--------------------------------|---|
| Paint Classification:          | Polyurethane  |
| Substrate:                     | Primed Steel  |
| Pre-treatment:                 | Sandblasted   |
| Federal Color Standard (595B): | White # 17925<br>Black # 17038<br>Yellow # 13538<br>Red # 11105 |

Application to Locomotives:

- a) Locomotive body: Red
- b) Underframe: Black
- c) Handrails and steps: Yellow
- d) Trucks: Black (fog coat only)
- e) Cab interior: Manufacturer's beige, gray or tan enamel
- f) Stenciling: Yellow locomotive number on cab and yellow (United States Army) to be located on both sides of low hood configuration (no smaller than 9-inch tall lettering). Black for all other stenciling required by AAR.
- g) Chevron striping on front (angled 45-degree, downward toward the center) 6-inch yellow stripes equally spaced.
- h) Locomotive Identification shall comply with 49 CFR section 229.11.

Additional markings shall be in accordance with AAR Section L- Lettering and Marking of Cars, as applicable. Adhesive backed film markings must be applied at surface temperatures between 40 and 100-degrees Fahrenheit (4 °C and 37.8 °C).

Grab irons, uncoupling levers, and sill steps shall be painted safety yellow. Only component supplier will paint telescoping portions of uncoupling lever.

Locomotive shall comply with Reflectorization Rules, 49 CFR Section 224.

### Documentation

(Note: all electronically formatted documentation shall be compatible with Adobe Acrobat Reader and have the ability to be electronically reproduced for Government use).

- a. The contractor will register (including fees) all cars in the AAR Universal Machine Language Equipment Register (UMLER) System for interchange movements and ownership. Two copies of the registration will be provided to the Volpe Center prior to transporting the railcars to destinations.
- b. The Contractor shall provide all available locomotive historical records, including ownership titles and deeds, logs and maintenance records.
- c. The Contractor shall provide commercial off the shelf (COTS) original equipment manuals (OEM) for all major components and subassemblies including but not limited to engines, motors, compressors, HVAC and generators. Contract product acceptance will be subject to documentation review and approval of the COTR.
- d. The Contractor shall provide parts manuals, service manuals and operator's manuals that meet the requirements described below as a minimum. Contract product acceptance will be subject to documentation review and approval of the COTR.
- e. Technical data descriptions used to describe parts, assemblies and equipments shall consist of data such as specifications, standards, drawings, photographs, sketches, and descriptions, and the necessary assembly and general arrangement drawings, etc. required to indicate the physical characteristics, location, and function of the item.

### Parts/Service Manual

The locomotive parts/service manual shall be designed to provide quick access to information for the experienced and novice user. The parts/service manual will provide parts pages and component illustration pages and shall provide a description for all mechanical assemblies and all special tools required to perform the repair if failure occurs. Safety will be announced in appropriate areas. This description shall describe and illustrate the assembly and/or subassemblies contained in all main assemblies. The subassemblies will be illustrated in exploded view style and the breakout of parts will be cross-referenced by item number to provide identification by name and part number and quantity required. The part number is the manufacturer's number for the component. This manual will also contain a description and tools required for the removal/replacement of each engine-generator. Manual quantities are described in the following Sections.

### Operator's Procedure Manual

The Contractor shall supply a stand alone Operator's Procedure Manual. The GenSet locomotive operator's Procedure Manual will contain a step-by-step process for starting and shutting down the locomotive for all conditions (cold start, short downtime, limiting the number of Gensets to operate, etc.). This shall include all safety warnings and safety related operations. This Operator's Manual shall also identify the limitations (time, amperages, temperatures, etc.) for when the locomotive is operating with one or two Gensets physically removed from service. Manual quantities are described in the following sections.

### Documentation Package

The complete documentation package consists of the following:

- a. Locomotive dimensions and capacities
- b. Component (part) identification

- c. Maintenance Manual (including troubleshooting guide)
- d. Operator's Procedure Manual (described above)
- e. Parts/Service Manual (described above)
- f. Lubrication Orders
- g. Electrical schematics and wiring diagrams
- h. Diagrams of all water, fuel, air, lube and fire suppression systems.
- i. All certifications, tests, repairs and inspections
- j. Safety Certification Form (attached)
- k. Manufacturer's Parts catalog (with pricing index if available)

**Prior to Locomotive Delivery:**

After contract award but not less than one (1) week prior to delivery of locomotive(s) to destination(s) the contractor shall provide complete Documentation Packages (as described above) for the locomotive(s) by road number per locomotive to the CO and one package to the COTR along with the following. Documentation Package quantities and locations are described below:

- a. One (1) CD-ROM copy and one (1) hard copy in binder form to the Volpe Center, Cambridge, MA.
- b. One (1) CD-ROM copy and one (1) hard copy in binder form to the U.S. Army Tank-automotive and Armaments Command, Warren, MI.
- c. One (1) CD-ROM copy to Installation Management Command Rail Operations Officer, Arlington, VA.
- d. Two (2) hard copies in binder form and one (1) CD-ROM copy to Defense Generator and Rail Equipment Center at Hill Air Force Base, Utah

The contractor shall also provide to the Volpe Center and the U.S. Army Tank-automotive and Armaments Command AMSTA-LC-AF-IM, the authority to copy and distribute for their use, the documentation described herein.

**To Be Submitted With Offer:**

- a. The contractor shall include with their offer, one copy of all permits (State, local, EPA, etc.) and the AAR certifications for all shops that will be used for the remanufacturing, reconditioning, or re-qualifying of the locomotives and components.
- b. Specific delivery schedule for locomotive(s)
- c. Descriptions of the locomotive(s)
- d. Spare parts list – The bidder shall provide a list of parts required to support the locomotive(s) for one-year.
- e. Quality Assurance Plan – The bidder shall provide a description of the procedure they will use to guarantee the quality assurance of the end product and the testing procedures and quality of their vendor's equipment and supplies.
- f. Commitment to commercial warranty (see Warranty section)

**With Delivery of Locomotive(s)**

Two copies of complete Documentation Packages total (one copy shall be a hard paper copy in binder form; the other copy shall be on CD-ROM).



### Inspection

All manufacturing, inspection and tests must be conducted and documented by a shop which uses AAR approved practices and procedures and is recognized by the railroad industry. The contractor's facilities must be serviced by a railhead and be serviced by a recognized railroad. The facilities must also meet the OSHA and EPA recognized standards. Each locomotive shall be examined by the contractor and certified in writing that each locomotive meets the specifications and minimum requirements of the specifications contained herein. The contractor is required to sign the Safety Certification form (attached). The Government reserves the right to inspect the locomotive(s) prior to any re-work/repair work proposed. Inspections may occur at the location of the repair or manufacture. Final acceptance will take place at the destined U.S. Army installation facility (Ft. Lewis, Washington). The Government shall verify specification compliance at the point of final acceptance. The following check list shall apply:

#### Exterior

- a. General overall appearance is clean and structurally correct as originally designed
- b. Structural damage is nonexistent
- c. No evidence of locomotive body sag or twist
- d. Must be free from any corrosion or oxidation.
- e. Must be properly stenciled according to AAR interchange rules.
- f. Hood, doors and end arrangements conform to standards and operate properly

#### Underframe

- a. The underframe shall be damage-free and structurally intact and have legible manufacturer's builder plates.

#### Couplers

- a. Check coupler castings and coupler pockets for repairs or cracks.
- b. Check for proper height of coupler (34½ inches (87.6 cm) from top of rail to center).
- c. Check and measure coupler knuckle for operation and condition.
- d. Check for self aligning couplers

#### Brakes

- a. Check air brake cylinders and valves for proper size and type and operation.
- b. Check reservoirs, both emergency and main.
- c. Check angle cocks, both A and B end.
- d. Check all brake rigging for cotter pins and worn out lever pins.
- e. Check hand brake for operation and correct application.
- f. Check all safety hangers.
- g. Check for correct AAR/DOT pneumatic piston travel.
- h. Air brakes shall be tested and adjusted until satisfactory performance is obtained to comply with current AAR interchange Rules, AAR Field Manual, and 49 CFR 229.

#### Safety Appliances

- a. Check for proper clearances and applications.
- b. Check to ensure handholds and sill steps installed are secured properly.
- c. Check Strobe light visibility

Trucks

- a. Gear Ratios
- b. Wheel size
- c. Springs
- d. Wheels and tire defects per 49CFR 229.75
- e. Trucks per 49CFR229.67

Cabs, floors and passageways

- a. Per 49CFR 229.119

Miscellaneous

- a. MU equipment
- b. Speed recorder
- c. Bell and horn
- d. Sanders
- e. Safety devices and markings including reflective tape
- f. Cooling system
- g. Protective devices
- h. Low voltage circuits and equipment
- i. Water tightness
- j. Communications equipment

Contractor Ability

- a. As a minimum, the contractor shall have the following facilities and capabilities:
  1. Personnel who have been trained and are technically qualified to manufacture these locomotives
  2. Personnel who have been trained and are technically qualified to perform operation and maintenance training on these locomotives
  3. Field services to include personnel who have been trained and are qualified to perform field repairs for the period when the warranty is in effect
  4. Capability to sandblast locomotive in accordance with OSHA standards
  5. Facility to paint locomotive in accordance with OSHA standards
  6. Trackage leading to shops and connecting to a major railroad
  7. Facilities required to fulfill requirements of this contract
  8. Familiar with AAR/FRA Rules, Standards and Recommended Practices
  9. Facility to remove oil and fuel to meet OSHA standards
  10. Proof of similar previous work performance
  11. The capability of validating the accuracy and usability of all publication deliverables
  12. Documented Quality Assurance process and inspections to ensure technical accuracy
  13. Locomotives shall be moved over rail, not trucked
  14. Capability to supply all required technical documentation including service manuals, parts lists and operating manuals for the locomotive(s)
  15. Facility capable of load testing for tractive effort

- b. If applicable, the Offerors shall provide with their description of the procedures involved, the criteria used in component evaluation and the certifications applicable for re-qualifying a locomotive.
- c. Contractors shall notify the Volpe Center ten (10) calendar days prior to any testing so the Volpe Center can exercise the option of sending a representative to the facility to witness any and all tests.
- d. The delivery period for the locomotive(s) after the award of this contract is 360 calendar days maximum. It is highly desirable to shorten this to 270 calendar days or less.
- e. Areas to be inspected for compliance with AAR Interchange and 49-CFR at locomotive's acceptance may include, but not be limited to the following.
  1. Start and check for leaks
  2. Shutdown and check temperatures
  3. Run in 2<sup>nd</sup> notch (loaded) for 30-minutes, shutdown and check temperatures
  4. Run in 4<sup>th</sup> notch (loaded) for 30-minutes, shutdown and check temperatures
  5. Run in 6<sup>th</sup> notch (loaded) for 30-minutes, shutdown and check temperatures
  6. Run in 8<sup>th</sup> notch (loaded) for 30-minutes, periodically check temperatures
  7. Locomotive shall operate for two hours performing the following: switching, hauling freight, setting out cars, picking up cars

### Spare Parts

The contractor shall submit a recommended spare parts list with the proposal. Spare parts are those items recommended by the contractor and manufacturer to be kept on hand for quick and immediate maintenance access. This list shall identify the parts required to support the locomotive for one-year of service.

A one-year supply of spare parts as identified in the spare parts list shall be delivered with each locomotive and shall be inspected for completeness before acceptance.

### Warranty

The contractor shall warrant all items delivered from defects and product failures for one year. The warranty shall start on the same day the locomotive is accepted by the Volpe Center at the final destination.

### **Option: Additional Training**

This option shall cover one training session that shall take place within one year following contract award at the Government's convenience. The contractor shall train up to eight people at the contractor's facility on GenSet locomotive operation, maintenance and troubleshooting. This option is in addition to the training described in the Statement of Work. Training shall include classroom and hands-on activities. Training shall be long enough to fully cover the requirements. It will encompass all serviceable parts and highlight safety. It shall support the commercial technical manuals provided by subassembly component manufacturers. The Contractor shall supply eight hard copies of training manuals which consist of work books, part descriptions including part numbers, basic maintenance procedures, checklists and other pertinent information required to support and maintain the locomotive. Training shall consist of but not be limited to the following:

- a. Frame:
  - 1. Description of any frame modifications if the frame was modified to accommodate new components
- b. Braking system:
  - 1. Type, maintenance and overall operation
  - 2. Setting devices (regulator, pressure switches, valves, etc.)
  - 3. Brake shoe inspection, replacement
- c. Engines:
  - 1. Electronics: downloading electronic information and troubleshooting
  - 2. Filling (oil, fuel, etc)
  - 3. Level checks (oil, fuel, etc)
  - 4. Oil pressure
  - 5. Engine temperature
  - 6. Checks and replacements of filters (air, fuel, oil, etc.)
  - 7. Safety and inspection checks
  - 8. Cleaning of cooling system
  - 9. Inspection, setting and replacement of belts
  - 10. Valve settings
  - 11. Fuel lines and water drain
  - 12. Engine mounting hardware
  - 13. Removal and replacement of a GenSet unit
- d. All tools required for servicing locomotive
- e. Air compressor:
  - 1. Oil fill and level
  - 2. Clean, replace pneumatic filters
  - 3. Draining of tanks and condensation separator
- f. Electronic equipment
  - 1. Maintenance and troubleshooting
  - 2. Fault indicators
  - 3. Diagnostics
- g. Operating
  - 1. Start up procedures
  - 2. Car spotting
  - 3. Pulling a consist
  - 4. Shutting down
  - 5. Multiple Unit operation (MU)
- h. Use and maintenance of auxiliary equipment
- i. Regular inspections and general maintenance work
  - 1. Type and quantities of lubricant, etc
  - 2. Intervals and scheduling
  - 3. Horns, lights, wipers, etc.