Standardized Technical Specification

Bi-Level Passenger Rail Cars
for
Intercity Corridor Service

Chapter 22
Training and Documentation

Revision C
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22.0 Training and Documentation

22.1 Overview

This chapter describes the requirements for the development and delivery of project documentation, including manuals, drawings and photographs, and for the implementation of a post-delivery training program to familiarize operating, mechanical, supervisory and administrative personnel with all aspects of the operation, inspection, maintenance, repair and supply of parts for the fleet of cars.

The Contractor shall be fully responsible for the completeness, accuracy and readability of the manuals, drawings and schematics, and to ensure that these documents meet the requirements for all systems, subsystems, components and operations to perform as intended for the duration specified.

The Contractor shall develop and provide a training program that accurately and completely reflects the requirements of the manuals, and be structured and implemented so that the Customer and its designated maintenance and operations provider have access to all necessary resources to properly and successfully operate, maintain, repair and administer the vehicles as required by the Contractor, the FRA, Amtrak and others.

22.2 General Requirements

The material in the maintenance manuals and the illustrated parts catalog shall be organized and sequenced with a standard numbering system or alternative numbering system as approved by the Customer. Sharp, clear drawings shall be used throughout the documents for illustration. Photographs may be used only where explicitly approved by the Customer. The operator's manual binder shall be lightweight plastic, which can be easily opened for page revisions. The operator's manual shall use a page size of 6.75 in. tall by 3.875 in. wide, vertical format. All other documents shall be 8.5 in. wide by 11 in. high, vertical format, unless specified otherwise. A complete table of contents shall be given at the beginning of each publication, and a complete page-numbered index at the end. Plastic coated tabs shall be used to segregate sections within each publication.

All publications must be reviewed in detail by the Contractor to ensure completeness and accuracy of information and quality prior to any submittal to the Customer for approval. Chapter numbers shall be consistent for all documents.

Manual information shall be kept up-to-date to the car configuration and operation during the full period of the Contract. As information becomes available and changes occur, the Contractor shall incorporate the changes and supply the information in updated electronic editable and Portable Document Format (PDF) files in an organized, timely manner based on a regular schedule to be approved by the Customer. Each updated information submittal shall be accompanied by a file containing a revised list of effected pages for the manual set being changed.

Engineering changes that affect any potential safety issue, or may significantly affect car operation in scheduled service, shall be published in the form of an Engineering Change Service Bulletin (ECSB). ECSBs shall be used in the interim until the official changes in the
maintenance manual and illustrated parts catalog have taken place. The creation of ECSBs shall be included within the Contractor's engineering change procedures and engineering change proposal system. ECSBs shall be stand-alone documents, provided in both editable document and PDF formats. Each ECSB shall detail the reason, instructions and illustrations to make the change. Associated parts information shall also be included. A system to control ECSBs shall be developed between the Contractor and the Customer to control ECSBs, such as using note tools on the existing electronic PDF versions and/or the development of master lists of outstanding ECSBs.

22.2.1 Contractor Responsibility

The Contractor shall provide documents such as drawings, 3-D Computer-Aided Design (CAD) models, photographs and a family of operating and service manuals which shall provide the Customer with the information necessary to properly operate and provide all maintenance functions for the given fleet of vehicles. These include drawings and manuals to safely and properly conduct:

- Operation
- Service and inspection
- Troubleshooting
- Running maintenance
- Heavy repair/overhaul (vehicle and system/component level)
- Part identification (to the lowest repairable level)
- Wreck repairs
- Modification of equipment (documenting as-built configuration)

22.3 As-Built Drawings

The Contractor shall provide the Customer with a full set of component, system, arrangement and installation drawings, schematics and specifications for all parts and assemblies as provided on each type of car. These drawings shall be in a Customer-approved format and shall meet the requirements of Amtrak Specification 700. This also includes providing a complete set of all as-built drawings for top assemblies, subassemblies and detail drawings used to manufacture all equipment used therein. Outline drawings of boxes, components and devices will not be sufficient. Each assembly, subassembly and arrangement drawing shall include a complete bill of material and parts list describing all items (including weight, original component manufacturer name and part number of the actual supplier of the part.) that form a part of the assembly. All assemblies and subassemblies are to be fully detailed. The drawing package shall also include drawings of every special gage, tool, jig or fixture used to correctly install these items.

All dimensions shall be shown in standard imperial units of inches and decimals, with a metric equivalent shown in parentheses adjacent to the imperial dimension. If a component or subassembly uses metric units as the primary system of measurement, then imperial equivalents shall be provided in parentheses.
22.3.1 Drawing Availability

Preliminary drawings needed to perform maintenance, repairs, testing or measurements shall be supplied prior to the delivery of the first completed car of each type.

A complete set of as-built drawings shall be delivered within 30 days after the delivery of the first car of each type.

A complete bill of material for the car, in standard 8.5 in. by 11 in. size, and on Compact Disk (CD), covering all major components and hardware, shall also be provided within 30 days after the completion of the last car of the base order.

The Contractor shall make available, for the life of the equipment, and without charge, hard copy drawings or electronic files that are required by the Customer to conduct equipment modifications, conduct overhauls or make extraordinary repairs, such as those arising from accidents, etc.

22.3.2 Drawing Originals

The Contractor shall submit to the Customer for review and approval, within 30 days after completion of first car of each base type and then again after completion of all modifications as-built drawings and 3-D CAD models of all assemblies, sub-assemblies and arrangements in accordance with this section. If the Contractor decides not to maintain the drawing originals, they shall be supplied to the Customer at no cost. Likewise, if the Contractor terminates operations, all drawings pertaining to this project CAD files or any other Customer approved media, shall be provided to the Customer free of charge.

22.3.3 Compact Disks (CDs)

Within 30 days of the delivery of the last car of the base order of equipment, the Contractor shall provide four sets of CDs of all the drawings, 3-D CAD models and Finite Element Models (FEMs), the bill of material, as-built specification training materials and operation and maintenance manuals.

22.3.4 Photograph Book

The Contractor will furnish, within 30 days of the delivery of the first car of each car type, two bound volumes of not less than 50 different color photographs, 8 in. by 10 in., showing the progression of construction of the first car of each type. The images shall also be supplied in digital format.

22.3.5 Photographs of Completed Cars

The Contractor shall furnish, within 30 days of the delivery of the first car of each car type, 10 sets of un-mounted color and 10 sets of un-mounted black and white photographs, at least 8 in. by 10 in., in size, of the first completed and painted car of each type of equipment, showing at least four different views of each car of equipment, including full front, 3/4 side, top and rear views.
22.3.6 Digital Format

All photographs shall be taken in digital format (jpeg), at high resolution (2400 x 3000 pixels). All photographic prints and files will be submitted to the Customer within 30 days following completion and acceptance of the first car of each base type.

22.4 Conformed Specification

Within 30 days after completion of the last pilot car, the Contractor shall revise this Specification to provide an as-built specification and contract document. The revised document shall require Customer review and approval. One reproducible hard copy and four CD copies of the approved version shall be provided.

The conformed specification shall include all changes to the specification made via approved waivers, variances and change orders. Subsequent changes to the specification made prior to the end of the warranty period shall require the conformed specification be revised.

22.5 Manuals

The Contractor shall provide a complete family of operating and maintenance manuals. The following manuals are required:

- Operator’s Manual
- Service and Inspection Manual
- Troubleshooting Guide
- Running Maintenance Manual
- Heavy Maintenance Manual
- Integrated Schematic Manual
- Illustrated Parts Catalog

The manuals shall include full descriptions of all systems and components requiring maintenance or servicing. The manuals to be supplied shall contain information required for effectively understanding operation of the car as well as performing scheduled maintenance including general servicing, lubrication and inspections, system equipment testing, troubleshooting and adjustments, and repair/replacement of components and major subassemblies.

The Contractor is responsible for ensuring that subcontractors comply with this Specification and that they also provide the appropriate manuals. Contracts between the Contractor and subcontractors shall include appropriate language to ensure these documents are provided as required.

All manuals shall have, at a minimum, the following information on the front cover:

- Contractor name
- Customer name
- Type of equipment
22.5.1 Manual Review and Availability

The Contractor shall develop a master plan and schedule for the development and completion of the manuals. This manual development plan shall be submitted to the Customer no more than 180 days after NTP, and shall include the Contractor’s plan for the development and acquisition of the manual content from suppliers and vendors, the schedule for the major completion points of the manuals, and a method to track the development of each manual that can be reviewed at the periodic project management meetings.

A full set of draft manuals, including those provided to the Contractor by suppliers, shall be submitted for Customer review no less than 90 days prior to the release of the first car. If the manuals require revision, as determined by the Customer, the Contractor shall revise and resubmit the draft manuals until all requirements are met. The first car shall not be released from the Contractor’s facility until the Customer has approved the final draft of the manuals. The Contractor shall provide 10 full sets of manuals to the Customer prior to Customer acceptance of the first car.

22.5.2 Manual Updates

After delivery of the first car, and continuing through the end of the warranty period, should any changes to the car, components or maintenance requirements occur, the Contractor shall revise and update all affected manuals and shall submit hard and electronic copy manual updates to the Customer. Upon the completion of the warranty period, the Contractor will issue 10 sets of finalized manuals to the Customer, reflecting all changes made to the vehicles during production, delivery and operation, and the status of all cars at the time of warranty expiration.

Revisions to final draft and approved manuals shall be recorded on a control list in the front of each manual. The list shall be issued with each revision and shall show the date of each revision and the page reference. Updated lists and revisions shall be maintained in the manuals by the Contractor until the warranty period expires.

22.5.3 Work Management System

If specified by the Customer, the manuals will be used electronically in Amtrak’s Work Management System (WMS). The Contractor shall work with the Customer and Amtrak to ensure that this is implemented successfully.

22.5.4 Operator’s Manual

The Contractor will develop operating manuals for use by train operating personnel, including the Engineer, Conductor and food service Lead Service Attendant (LSAs). Operator’s manuals shall contain all information needed for the operation of the car, including definitions giving nomenclature, function, location and operation of all indicators, controls, components and subsystems utilized in the operation of the car. This shall include preparing the car for operation, securing the car from operation and operation of the car individually and as a train.
Emergency procedures and safety precautions of a specific nature applicable to the car shall be included. The manual shall give troubleshooting and diagnostic procedures sufficient to isolate faults and problems which are capable of repair by the operator and train crew, arranged in a format to allow ease of use under emergency and time-sensitive situations.

The operator's manual shall be divided into chapters as follows:

1. Introduction
2. Communications
3. Inspecting
4. Operating
5. Fault Isolation
6. On-the-Road Repair
7. General Description

The fault isolation and on-the-road repair sections of the operator's manual shall include, in summary form, all fault isolation and on-the-road repair procedures. These two sections shall include:

- Index
- Safety instructions
- Instructions for communications during fault isolation
- Authorized fault isolation procedures
- Authorized on-the-road repairs
- Equipment location diagrams

The operator's manual shall accurately portray and clearly illustrate all information required by the operator and train crew to correctly, efficiently and safely carry out their duties on the car in all possible consist configurations. Illustrations shall include layouts of the equipment, showing major components and controls referenced in the text and their locations on the car.

An alphabetical index of subjects and equipment not mentioned in the table of contents shall be provided. All operating conditions shall be taken into account by the manual's description of unit functions. A fault isolation section shall be provided to list all possible unit or system malfunctions that are detectable by the train crew without the aid of test equipment. This shall include fault codes and corrective information supplied by the diagnostic system. This information shall be presented in tabular format listing each symptom with corresponding potential causes, test, checks and corrective actions. The goal of these fault isolation tables shall be to allow the train crew to identify operational problems and, where possible, isolate faults from consists to car, car to system and, in some cases, from system to subsystem.

### 22.5.5 Service and Inspection Manual

The Service and Inspection (S&I) manual shall contain all pertinent information that operating and maintenance personnel will require in order to perform all periodic inspections on the vehicles as required by the Contractor, subcontractors, Amtrak and the FRA for all periodic inspections including those occurring daily, every 30 days, every 120 days and annually (every 368 days). Additional or differing intervals such as 92 days and 184 days shall be included if
used by the Customer’s maintenance provider. Inspections and servicing activities occurring on an interval that is not used by the Customer's maintenance provider shall be included in the tasks shown for the next more frequent interval.

The inspection tasks described in this manual shall include, but are not limited to the following:

- Item or system requiring inspection
- Frequency or period of inspection
- Inspection procedure, including location and description of system being inspected
- Pass/fail criteria for inspection
- Special tools, conditions or other requirements for inspection to be performed
- Source of inspection requirement (Contractor, Amtrak, FRA, etc)
- Reference for inspection requirement (CFR, maintenance manual, etc)

Inspection tasks shall be listed in order of frequency of inspection requirements, from daily to annual. A summary table shall be provided for quick reference that lists the item or system, frequency, source and reference for all required inspections.

This manual will also provide complete instructions for all pertinent maintenance activities for the routine operation of the cars that are required every 30 days, or more frequently, including:

- Fresh water filling
- Waste tank draining
- Removal of trash and recyclables
- Installation and replacement of consumables
- Inspection and replacement of filter elements
- Cleaning and lubrication
- Replacement of brake shoes and pads

This manual shall be provided in a comb-bound format approximately 5 in. wide by 8 in. tall. The cover of the manual shall reference the Customer name, car numbers, reporting marks and types, the Contractor name, issuance date and revision level.

22.5.6 Troubleshooting Guide

This manual will contain detailed troubleshooting procedures, including those requiring the use of diagnostic test equipment and those that do not require such equipment, for all major systems, subsystems and components in the following categories:

- Carbody
- Trucks
- Coupler and Draft Gear
- Brakes
- Door System
- Interior
This manual shall provide procedures for the identification, diagnosis and proper correction of car failures and malfunctions. Procedures shall be organized so that maintenance personnel can isolate faults down from consist to car, from car to system, and from system to subsystem, assembly, subassembly or component. These procedures shall include determination of the cause and isolation of the fault to replaceable parts, interface wiring or mechanical linkage. Diagrams of the relationships shall be provided to enhance comprehension. Troubleshooting procedural format shall include fault codes for each system with built-in diagnostics and fault information and corrective actions displayed by the diagnostic system. All fault codes are to be included, and diagnosed, in the troubleshooting manual. When there is more than one probable cause for a system or equipment malfunction, the most likely to have failed shall be considered first; however, consideration shall be given to accessibility and ease of replacement when the likelihood is equally shared by two or more causes.

Each chapter of the troubleshooting procedures shall contain the following sections:

- Introduction, including general information, safety precautions, and definition of warnings, cautions, and notes with specific details
- Operational and functional system descriptions
- Troubleshooting
- Corrective maintenance procedures

When there is more than one probable cause for a system or equipment malfunction, the most likely to have failed shall be considered first; however, consideration shall be given to accessibility and ease of replacement when the likelihood is equally shared by two or more causes. The troubleshooting and corrective maintenance procedures shall contain:

- Identification of the system covered
- A concise explanation of the troubleshooting format and how to use the procedure
- Test equipment required
- Safety precautions that must be taken
- A reference to the supporting block diagrams
- Preliminary tasks that must be performed prior to initiating troubleshooting

When applicable, each section shall indicate and list the applicable safety warnings and precautions, test equipment required, special tools required, and any consumables required. The manual format shall utilize diagrams and illustrations as required to enhance understanding. All procedures shall be proved out in the field on the pilot cars and shall be revised as necessary.
22.5.7 Running Maintenance Manual

The running maintenance manual shall contain an overview of the vehicle operation and a detailed description and analysis of the vehicle and its assemblies/subassemblies. The manual shall also contain, in a convenient form, all information required for on-car testing, troubleshooting, servicing and replacement of equipment down to the lowest level replaceable item. The running maintenance manual shall provide technicians with the maintenance procedures that are performed at the running repair level. Running maintenance is defined as that maintenance that can be performed on the inspection track or does not require taking the train out of service. The manual is to be divided into three volumes as listed below.

Running maintenance manual procedures shall be supported by illustrations. They shall be used to simplify, clarify or shorten the text. Illustrations shall be located on the same page or facing page of the text they support. A sequence of illustrations may be used in order to clarify or simplify a complex procedure. When one of several possible positions is described by text for a device, the position described shall be the same as the one shown by the illustration. Unless the location and access to the item is obvious, a locator view shall be included, or the assembly diagram provided at the beginning of the chapter may be referenced to ensure that the equipment orientation is clearly described.

Functional post-inspection testing and checkout test procedures shall be provided to verify serviceability or to detect failures of a system, subsystem, assembly, subassembly or component. Pretest setup instructions shall be included. Test procedures shall be used as a prerequisite for the generation of fault isolation procedures to fault isolate to a system, subsystem, assembly, subassembly or component. The types of tests that can be performed fall into the following categories:

- Operational Test - Procedure required to ascertain only that a system or equipment is operable. These tests should require no special equipment or facilities other than that installed on the car and shall be comparable to the tests performed by the Operator. It is not intended that the operational test of the unit meet the specifications and tolerances ordinarily established for overhaul or major maintenance periods.

- Functional Test - Procedure required to ascertain that a system or equipment is functioning in all aspects in accordance with minimum acceptable system or unit design specifications. These tests may require supplemental support equipment and shall be more specific and detailed than an operational test. The test shall contain all necessary information to ensure system or unit operational reliability, without reference to additional documents.

- System Test - Procedure containing all adjustment specifications and tolerances required to maintain system and unit performance at maximum efficiency and within design specifications. The test shall be self-contained and may duplicate other tests.

22.5.8 Heavy Maintenance Manual

Heavy maintenance is defined as the maintenance that may be performed on the shop track or one of the heavy maintenance tracks if the train is taken out of service. Heavy maintenance tasks will generally require more than one 8 hour shift to complete. The Heavy Repair Manual shall contain a detailed description and analysis of all mechanical, electrical and electronic assemblies/subassemblies so that Caltrans overhaul facilities can effectively and safely service, inspect, adjust, troubleshoot, repair, overhaul and test these assemblies. Contractor and sub-suppliers shall provide all information needed for comprehensive repair and overhaul work at least as comprehensive as that used by the suppliers’ own service and repair shops, whether
the car parts were manufactured by them or purchased from others. The manual shall provide information for the test, repair and overhaul of each repairable component of the assembly. No component shall be considered disposable or deemed non-repairable except where agreed to by the Customer.

Installation and removal of equipment in full detail, down to the lowest level of replacement items (assembly, subassembly or component). The procedures shall clearly describe the step-by-step operation in a logical, work flow sequence to safely gain access to, and subsequently remove the item. Prerequisite operations, inclusive of access panel or plate openings, removal of other obstructing components, and deactivation of power and other pertinent safety precautions and/or warnings shall be included or appropriately referenced. Exact quantities of attaching hardware to be removed shall be included in the procedures. The statement "reverse of remove" may be used judiciously. Installation procedures that are basically the same as the removal procedure, but require some additions, such as torque values for bolts, replacement of O-rings and lubrication of a component, can be handled within highlight statements to that effect in the removal procedure. If this is done, the statement "reverse of remove" may still be used. Installation instructions for procedures that are complex and require additional step-by-step detail, or are significantly different from that removal procedure must be provided.

Exact quantities of hardware shall be identified. If, during the prove-out or validation of a "replace" task, the highlighted data do not enable the maintenance technician to correctly install the subject item, the highlighted information shall be deleted from the removal procedure. A step-by-step installation procedure shall be added to the "replace" task. Step-by-step procedures shall be provided for any adjustment or alignment required as a result of replacement of any equipment, or to determine that a system, subsystem, assembly, subassembly or component meets required standards. Detailed procedures shall be provided to determine the accuracy of, and to correct and adjust instruments, diagnostic equipment and test measuring devices used for precision measurement. Calibrations are to be performed with an instrument that is certified to a standard of known accuracy to detect and adjust any discrepancy in the accuracy of the instrument being calibrated.

The manual shall include descriptions of how each assembly/subassembly operates within the car system. Each shall include:

- Block diagrams
- Signal flow diagrams
- Simplified schematics
- Functional wiring and piping diagrams
- Completely detailed overhaul procedures
  - Test and evaluation procedures equivalent to that performed by the original manufacturer, including the requirements for specialized test equipment. The Contractor is to procure or fabricate and provide to Caltrans all such specialized test equipment.
  - Rewinding procedures in full detail for all rotating and wire-wound apparatus, except as agreed to otherwise by the Customer.
  - Disassembly/assembly procedures required for the disassembly and assembly of assemblies, subassemblies and components at the heavy repair level of maintenance shall be provided. Assembly instructions shall include all pertinent assembly criteria, including clearances, backlash dimensions, torque values and
similar data. Final testing, with pass/fail criteria, of the end item shall be provided by reference.

- For overhauls, the maintenance action required to restore an item to a completely serviceable and operational condition. Overhaul is not normally performed on the car and does not necessarily return an item to like-new condition.

- Rebuilds include those services and actions necessary for the restoration of equipment to like-new condition in accordance with original manufacturing standards. Rebuild is the highest degree of material maintenance applied to Caltrans equipment. The rebuild operation allows returning to zero those age measurements including, but not limited to, hours and miles, considered in classifying Caltrans equipment and components.

- Complete instructions for use, drawings and parts information for all special tools that are required to be provided to Caltrans by the Contractor.

- The weights of all components and assemblies that weigh more than 50 lbs. In addition, the weights of major component assemblies shall be supplied such as the truck, air conditioning compressor, air compressor, etc.

- Maintenance, calibration and adjustment, repair and overhaul of all diagnostic test equipment.

22.5.9 Integrated Schematic and Wiring Manual

The integrated schematic manuals shall include all electrical, hydraulic, pneumatic, mechanical, refrigerant and waste water system schematic diagrams as used on each car type, broken down by major system. The manual shall provide schematic and wiring diagrams including (but not limited to) the following:

- Electrical power distribution
- Trainline assignments and connections to car-borne equipment
- Door control system
- Lighting system (interior and exterior, in normal, standby and emergency modes)
- Communications system, including PA, intercom and passenger information system
- HVAC system, including chiller units in the café-lounge car (electrical, refrigerant and air flow schematics)
- Brake system (electrical, mechanical and pneumatic)
- Main reservoir air distribution system
- Fresh water distribution and waste retention systems (electrical, pneumatic and water routing)
- Wheelchair lift (electrical and hydraulic, if used)
- Food service galley equipment, including the elevator and all galley appliances (electrical, water distribution)
- Cab and controls

The schematics shall include all required information for maintenance, troubleshooting and repairs, including specific identification of wires (size, type and label), circuits, components, junction boxes and termination points, locations of components, voltages and pressures, hoses
and pipes (size, type and rating), filters, adjustment points, direction of flow, function, and other information as necessary.

The integrated schematic manual shall be supplied in tabloid format, 11 in. tall by 17 in. wide, horizontal format, spiral bound with a protective laminated cardstock front and back cover.

22.5.10 Illustrated Parts Catalog (IPC)

The Illustrated Parts Catalog (IPC) shall enumerate, illustrate and describe every item used on the cars, along with the diagnostic test equipment and special tools with its related parts, down to the Lowest Level Replaceable Unit (LLRU). The LLRU is defined as the lowest level of component assembly which consists of a separate individually fabricated part, including all hardware items required to assemble, disassemble, repair or overhaul the component. Each listing shall include the accepted generic modified noun name description, the original supplier, the original supplier’s part number and name and the Contractor’s part number. An appendix giving the original supplier’s complete address and telephone numbers for their offices responsible for parts ordering shall be included. Each component that can be disassembled included all printed circuit board components and items which may have been purchased by the Contractor as a subassembly, must be broken down in illustrations to fully indexed parts. The Customer shall have the right to make direct purchase from the sources listed by the Contractor.

Identical parts, regardless of where used in the car, shall use only one part number. Each part or other item shall be identified as being part of the next higher assembly. In the case of hardware such as nuts, bolts, washers, etc., information relative to material, coating if any, all dimensions and types shall be included. All assemblies shall be listed alphabetically by name with reference to corresponding figure number.

The IPC shall include two cross-reference lists that sort all listed parts as follows:

- Sorted alphanumerically by part number
- Sorted alphabetically by part name

These cross-reference lists shall include the part name, manufacturer part number, manufacturer or supplier, contractor part number, and the page and illustration number where found in the IPC.

Illustrations shall be located on the same page or facing page of the text they support. A sequence of illustrations may be used in order to clarify or simplify a complex procedure. When one of several possible positions is described by text for a device, the position described shall be the same as the one shown by the illustration. Unless the location and access to the item is obvious, a locator view shall be included, or the assembly diagram provided at the beginning of the chapter may be referenced to ensure that the equipment orientation is clearly described. If the same drawing is used in both the illustrated parts catalog and either the running maintenance or heavy repair manual, the reference index in both manuals must identify the same parts.
22.5.11 Manual Quantities to be Provided

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<td>Heavy Maintenance Manual</td>
<td>10 sets</td>
</tr>
<tr>
<td>Illustrated Parts Catalog (IPC)</td>
<td>10 sets</td>
</tr>
<tr>
<td>Integrated Schematic Manual</td>
<td>10 sets</td>
</tr>
</tbody>
</table>

Manual quantities are subject to change.

22.6 Vehicle History Books

The Contractor shall produce a vehicle history book for each completed rail car. The vehicle history books shall be a specific record of production, testing, inspection and relevant documentation for each individual vehicle.

The vehicle history book shall contain original documents unless specified otherwise.

All documents shall be marked with the carshell serial number, the production sequence number or the road number for the completed vehicle.

The Contractor shall provide one electronic and three paper sets of the vehicle history book for each car; one that contains the original documents, and two copies. The volume with the original documents shall be appropriately labeled. Vehicle history books shall be provided in three-ring binders. Documents shall be copied double-sided where practical.

At a minimum, each vehicle history book shall contain the following:

- Table of contents
- Production control cross-reference sheet, listing:
  - Carshell serial number
  - Shop order/production sequence number
  - Final car reporting marks and road number
- Production schedule for each car showing start and end dates for each major stage of manufacturing
- List of all production drawings by number and revision status (release date, current revision, and outstanding engineering change requests at time of production)
- List of all parts by supplier and part number (bill of material)
- List of all serialized components
- Truck records (separate set of records for each truck)
  - Inspection records
  - Truck assembly sequence
Training and Documentation

• Truck assembly weight certificate
• Wheel/axle pressing graphs
• Truck to carbody attachment record
• Log of all non-conformances including status
• Component test certificates
• Test records:
  • Master test plan
  • Test procedures
    o Production tests
    o Acceptance tests
• Record of measurements and results
• Critical dimensional inspection report
  • Carshell dimensional inspection (prior to production)
  • Carbody leveling, balancing and centering record
  • Carbody overall dimension measurement, including compliance with clearance diagram
  • Coupler height measurement
  • Scale certificate for completed car (dry weight)
• Records of all required inspections
• USPHS Certification
• FRA documentation
  • Copies of required cab/baggage car inspection forms (originals are to be installed in the appropriate form holders in the cab of the cab/baggage car)
  • Record of compliance with FRA regulations
• Completed pre-shipment checklist
• Shipping approval form
• Customer acceptance form
• Transfer of title of the car from Contractor to Customer (with original wet-ink signature of Contractor’s representative).

The vehicle history book shall be produced in an electronic format as either as a Microsoft Word, Excel, FileMaker Pro or an Adobe PDF file on a CDROM. Procedures, electronic signatures and controls shall be established to ensure the validity of information in this document at all times.

Each vehicle history book shall be presented to the Customer prior to the car being released from the Contractor’s facility.

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22.7 Training

The Contractor shall organize and present formal instruction programs for personnel who will operate, maintain, repair and troubleshoot the rail cars. In addition, the Contractor shall provide instruction and training materials for personnel who shall train others in the future.

The Contractor shall submit to the Customer for approval a minimum of 60 days prior to completion of the first of the pilot cars a detailed outline of the training program, and a schedule for its presentation. This submittal shall include the hours of classroom and “hands-on” training projected per subset, final course content, the qualifications of the instructors, a listing of training aids to be used and a description of the scope of instruction, on an individual subset level, to fulfill the program requirements.

The Contractor may assume that maintenance personnel have the basic skills pertinent to their crafts. The manuals shall be used as the major element of the training program.

The Customer shall advise the Contractor as to how many individuals of each discipline are to be trained at each location.

The Contractor shall provide a program to train and educate personnel in all details of the equipment as required to enable the Customer to satisfactorily operate, service, and maintain the vehicles. The program shall include up to 300 Contractor hours of classroom training at each designated site, up to four sites; 160 of which shall be for operations and the remainder for maintenance. A primary objective of the program shall be to develop within the Customer the capability to perform similar training under its own training program subsequent to the Contractor’s involvement. The training shall be designed to be delivered by an instructor in the classroom and, when appropriate, in the field or shop when actual equipment is used. The Customer shall have the right to videotape any classroom training sessions. The Customer will retain ownership of the videotapes, following a final editing as mutually agreed with the Contractor and will have the right to use videotapes for future training sessions.

The Contractor’s program shall include formal and informal instruction, mockups, models, manuals, diagrams and component catalogs. All materials used in the programs, such as models, manuals, mock-ups, video cassettes and drawings, shall be of durable construction and shall become the property of the Customer. Training materials shall be updated as required during the course of instruction. The Contractor shall assume no knowledge of the features of the supplied equipment on the part of the Customer personnel. However, the Contractor may assume that maintenance personnel have the basic skills pertinent to their crafts.

The training programs shall take place at up to four maintenance locations as designated by the Customer. Field instruction may be provided in locations approved by the Customer using actual cars or mockups to provide hands-on instruction in the maintenance and operation of the rail cars.

Before delivery of the first pilot car of each type, the Contractor shall provide the Customer with a proposed training plan incorporating the following elements:

- Description of the training program, including program goals and objectives, sequence of activities, course outlines, evaluation methods, required resources and time required for each part of the program.

- Schedule of instruction, based on 300 hours of instruction at each location.
Training and Documentation

- State of the Contractor’s experience in organizing and delivering similar training programs and qualifications of the designated instructors.
- List of training materials to be provided by the Contractor to support the training program.
- Instruction guides for each course to be taught within each program.
- Student workbooks for each course, each workbook including a syllabus, objectives, schedule, outlines, figures, lesson summaries and any other appropriate instructional information.

All informative material, audio and video training aids and notes shall be supplied beyond that given in the instruction manuals to clearly explain all systems and subsystems that the work force will maintain. All instructional materials will become property of the Customer.

22.7.1 User Training

The Contractor shall provide a user training program, designed for Customer operating, maintenance and training personnel. This is to acquaint them with the equipment in order to provide sufficient working knowledge to safely operate, inspect, service and maintain it. The training program shall include formal classroom instruction, as well as practical demonstrations and activities on the actual new vehicles. The Contractor and/or suppliers shall provide appropriate training aid in the classes as required.

Class audience will be:
- Operating personnel
- Maintenance personnel
- Food service personnel
- Supervisors and management
- Training department personnel
- Customer representatives
- Others as required

22.7.2 Training Requirements

The courses listed below shall be accompanied with training manuals, guides, training aids, student and instructor workbooks, and operator and maintenance manuals. It is the desire of the Customer that the content and structure of the manuals be used as direct input into the training course materials where applicable.

22.7.2.1 System Operation Instruction Training Course (Course #1):

22.7.2.2 This course shall include:
- General vehicle familiarization;
- Location, function, and operation of pertinent controls, gauges, indicators, and switches;
- Subsystem inspection, setup, and shutdown procedures;
• Trouble symptoms diagnostic and troubleshooting procedures for isolating and correcting minor faults including, at a minimum, techniques for the following:
  • Release of brakes;
  • Door isolation and cut-out;
  • Breaker and/or fuse reset or replacement;
  • Head End Power (HEP) failure recovery;
  • Any other techniques that would assist operators in quickly bypassing non-critical safety subsystems, allowing trains to safely depart the main line to a convenient service location.
• Towing
• Emergency Procedures including, at a minimum, techniques to respond to fire on board or emergency evacuation.

This class shall be conducted four times (twice for operations personnel, twice for maintenance personnel). The first class shall be conducted at the time of the arrival of the first pilot car. Subsequent classes shall be scheduled as approved by the Customer. This class shall include at least 40 hours of training.

22.7.2.3 Repair and Maintenance Training Course (Course #2).

Course #2 shall include and expand on the information furnished in course #1, and shall include basic schematic and block diagrams to provide fault diagnosis information and training appropriate for in-service maintenance.

Course #2 shall provide the training needed for the following:
  • Troubleshooting in-service failures as described in course #1
  • Performing running maintenance including:
    • General servicing
    • Lubricating
    • Inspecting
    • Adjusting

The training shall include maintenance instructions on the use of the integrated wiring diagrams.

Participation shall include up to 20 electricians, mechanics and foremen. This class shall be conducted twice. The first class shall occur immediately following course #1 and be attended by maintenance personnel. The second class shall be scheduled as approved by the Customer. This class shall include a minimum of 80 hours.

22.7.2.4 Workshop Training (Course #3)

The workshop training course shall provide the training for in-shop repair and trouble diagnosis of each LLRU to the level of the lowest replaceable component. The training shall contain detailed explanation of flow charts, schematic drawing and detailed analyses related to each LLRU so that the Customer maintenance personnel will be able to effectively service,
inspect, maintain, adjust, troubleshoot, repair, replace and overhauled the LLRU. The flow charts, schematic drawings and detailed analyses shall be included in the training manuals.

The training shall include maintenance instructions on the use of the integrated wiring diagrams and shall include reference to the manuals.

The major sections of the workshop training course will address, at a minimum the following subsystems and products, as defined above:

- Friction brakes
- HVAC
- Carbody
- Auxiliary electrical
- Trucks
- Door controls and operators
- Coupler and draft gear
- Communicators
- Waste and water
- Cab controls
- Microprocessor-based products

This course shall also provide Customer maintenance and stores personnel instruction on the use of the illustrated parts manual.

Participation shall include, up to 25 electricians, foremen, and purchasing/storekeepers. This class will be conducted twice. It shall follow the first course #2; others shall be conducted at dates to be scheduled as approved by the Customer. Each class shall include a minimum of 120 hours.

22.7.2.5 Diagnostic Test Equipment (DTE) and Special Tools Course (Course #4)

This course shall provide instruction on the proper use of DTE and special tools during application, operation, usage, adjustment, inspection, maintenance, troubleshooting, repair and storage instructions.

It shall be conducted twice. It shall be conducted upon the delivery of the test equipment and special tools and as agreed upon by the Customer. It shall be a minimum of 20 hours.

Subjects addressed shall include:
- Introduction
- General description of the equipment
- Description of controls and indicators
- Operation of equipment
- Operation of safety and emergency equipment
- Troubleshooting
22.7.3 Training Materials

Draft copies of the training materials shall be provided for Customer review and approval, with sufficient time to allow review and Contractor revision. Open discussion is encouraged early in the development process between the Suppliers, Contractor and the Customer.

The Contractor shall provide materials to support each course in the training program, including; instructor guides, training aids, student workbooks, and operator and maintenance manuals. Instructor guides and student workbooks shall be submitted for Customer’s approval 60 days in advance of the start of the first class for each category of training. All training materials shall become the property of the Customer. The instructor guides and student workbooks shall be submitted as camera-ready copy in a form that allows easy reproduction; such as, loose-leaf bound, black ink on 8.5 in. by 11 in. white paper, printed on both sides and numbered sequentially within units of training. Any viewgraphs used in training will be supplied along with camera-ready, paper copy. Master copies of slides and other audiovisual materials shall also be provided to allow for reproduction as necessary.

22.7.3.1 Instructor Guides

The Contractor shall provide an instructor guide for each training course. The guides shall include course agendas; course objectives; procedures for managing training sessions; resources and facilities required; guidelines for preparing for training; detailed lesson plans, including scripted or outlined presentations and discussion guides; training aids and job aids; pre-tests and post-tests; criteria and methodology for measuring performance in the classroom and in the shop/field; instructions for using any audiovisual support, mockups, and scale models; and detailed instructions for managing any on-the-job training.

22.7.3.2 Training Aids

The Contractor shall provide training aids, such as mock-ups, scale models, overhead transparencies, videotaped demonstrations, diagnostic testing equipment and any special tools required. These training aids shall become the property of the Customer upon the completion of the training program.

22.7.3.3 Student Workbooks

The Contractor shall provide, for each course, a student workbook, which shall include course agenda, course objectives, a schedule of sessions, paper copies of overhead transparencies, lecture outlines, lesson summaries and any other information that will facilitate the learning process.

The training program shall be conducted prior to the start of the new equipment in revenue service. The Contractor shall develop a training action plan and schedule and submit it to the Customer within 90 days of Notice to Proceed (NTP), and shall update it periodically, to be submitted with program meeting minutes.
Paper and electronic (editable and PDF) copies of all training materials shall be provided at the completion of the training program, and shall become the property of the Customer for unrestricted use for future training purposes.

* End of Chapter 22 *