CITY AND COUNTY OF SAN FRANCISCO
San Francisco Municipal Transportation Agency
Request for Proposals
THE PROCUREMENT OF
30-Foot, 40-FOOT AND 60-FOOT LOW FLOOR
DIESEL HYBRID COACHES

Proposal Section	Title	Bid Submission Requirements
13	Technical Specification Exceptions	Items 13A through 13E as indicated below in Section 13

Please refer to the attached clarifications and exceptions.

NEW FLYER

THE PROCUREMENT OF
30-Foot, 40-FOOT AND 60-FOOT LOW FLOOR
DIESEL HYBRID COACHES

New Flyer is compliant to the procurement specifications for 30-foot, 40-foot and 60-foot buses with the exception of the following deviations and clarifications

Exception/Clarification #	Page	Section	Title	Specification Reference	Exceptions
1	5	Addendum #1/13-1	Proffered Delivery Schedule	6) Approval of Prototype Coach (estimated) --165--	New Flyer is submitting a delivery schedule that is as compliant as possible with the preferred delivery. Please note that we have accounted for 20 weeks from Notice of Award to line entry of the prototype bus. All milestones after the pilot bus line entry are linked to the prototype evaluation requirements of the RFP and production rates are equal to current capacity at SFMTA. New Flyer believes that the evaluation of the prototype bus can be drastically reduced due to the fact that we have an XDE40 bus operation in SFMTA and we would have also have the same articulated model in a Trolley configuration reducing the risk of evaluating a new bus model. New Flyer is willing to discussed the proposed delivery schedule for possible enhancements that would have buses deliver to SFMTA in advanced of the preferred delivery. Please refer to Section 6-B of our proposal for the proposed delivery schedule.
2	6	Progress Payments.	Progress Payments.	Payment	New Flyer's proposal is based on eliminating completion of training as a deliverable linked to full payment of the 10% hold back. This is due to the fact that Training can take near 700 days for completion based on current SFMTA's capacity to order the specified training.
3	32	67 (Volume 1)	Deliveries	If the coaches are towed, the rear axle shafts shall be removed during the towing and re-coupled by the Contractor after arrival at the point of delivery. Contractor shall deliver each coach with a full tank of fuel and fully cleaned (exterior, interior, underside, and topside) prior to presentation for inspection. Also, if the coaches are towed from the Contractor's facility to SFMTA, highway-type tires shall be installed. Upon arrival at a SFMTA maintenance facility or within the City/County of San Francisco, Contractor, at its expense, shall install city-type tires.	New Flyer clarifies that we would not remove the axle as we would not deliver buses by towing; however, towing procedures do not required the removal of axles.
4	9.6	9.2 Publications	Supply of Engineernig Drawings	The Contractor shall provide all electronic copies of the vehicle drawings, frame structure of the vehicle, major electrical system and other subcomponent system in AutoCAD and PDF formats.	New Flyer does not provide copies of these engineering drawings. The are considered as proprietary information. If information is required due to major accident, New Flyer Technical Services will assist SFMTA with the required info.
5	9.6	9.2 Publications	Technical Manual Updates - Table 1	Maintain up-to-date after the date of acceptance of the coaches Maintenance Manual 12 years Parts Manual 12 years Operator's Manuals 12 years	New Flyer supplies updates to New Flyer published bus manuals only, not OEM component supplier published manuals. New Flyer supplies updates to Bus Parts Manuals for a period of 12 years, all other Bus Manuals are maintained for a period of 6 years.

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6	9.6	9.2 Publications	Manual Types - Digital Format	The supplied manuals shall provide complete, concise and clear documentation for all equipment ordered on the vehicle and shall not include superfluous documentation for equipment that was not provided with the vehicle. As well as the printed copies of the manuals specified above, all maintenance operations and illustrated parts manuals shall be provided in digital format. All such electronic documentation shall be viewable using modern, basic office and multimedia software such as Microsoft Office and Windows Media Player. In addition, all materials will be provided in a format that allows their use in the latest SPEAR Technologies software Image Manager and/or Document Manager modules. SFMTA reserves the rights to electronic reproduction of all such information mentioned herein for its own internal uses, where such electronic reproduction is not already specifically provided for by the Contractor as part of this contract....etc	All New Flyer Bus Manuals will be supplied in Adobe PDF digital format. OEM component supplier manuals will be supplied as made available by each OEM component supplier. In most cases this will be Adobe PDF file format. It is important to note that all files supplied are copyright protected. New Flyer Published Bus Manuals can be supplied without security after SFMTA signs a limited copyright agreement form. OEM component supplier manuals are not available in an "unsecured" file format.
7	9.7	9.2 Publications	Manual Format	All maintenance documents in electronic form shall be generated for best readability on a current computer monitor. The default page setup for all printed maintenance and parts manuals shall be standard U.S. letter size (8.5" by 11") in portrait mode with a gutter suitable for use in a standard 3-ring binder...etc	New Flyer Bus Manual format follows these specification closely however, OEM component supplier manual formats (Engine, Transmission, HVAC etc) are not customizable and can only be purchased and supplied as made available.
8	9.7, 9.8	9.2.1 Maintenance Manuals	Manual Format	Maintenance manuals shall be integrated so that all subsystems of the coach are contained in a logically indexed, contiguous series of chapters and/or volumes. Manual organization shall be approved by SFMTA before work begins on the manuals. All standard and specialized maintenance or overhaul procedures which involve potential health and safety issues for the repair technician shall be clearly noted in the documentation with the international safety warning symbol appropriate to the level of potential danger involved. Procedures where the proper performance of the task is critical to the safe operation of the vehicle shall also be clearly marked for emphasis. Maintenance manuals shall contain the complete data required for routine and periodic maintenance of all parts of the coach, including as a minimum the following:	New Flyer Bus Manual format follows these specification closely however, OEM component supplier manual formats (Engine, Transmission, HVAC etc) are not customizable and can only be purchased and supplied as made available. Bus Electrical, Air, Hydraulic, PLC, HVAC, Cooling system schematics and diagrams are all output in a convenient 11x17 format and included in a separate sturdy 3 hole plastic binder and not within the Bus Service Manuals.

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9	9.8	9.2.2 Preventive Maintenance Manuals	PM Manual	Contractor shall provide a separate Preventive Maintenance (PM) Manual specifying the recommended preventive maintenance procedures and the scheduling of those procedures.	New Flyer supplies all PM information within a dedicated section of the Bus Service manual and not a separately bound manual. This is done to eliminate repetitive information instances and at the same time ensure detailed info is readily available when reviewing PM activity tasks.
10	9.8, 9.9	9.2.3 Illustrated Parts Manuals	Manual Content	The parts list shall include the following data: 3) OEM's part number (from the supplied manufacturer)	New Flyer Bus Parts Manuals do not contain OEM component supplier part number information. New Flyer will supply Bus Manuals in the same format and content as supplied with past builds.
11	9.9	9.2.4 Parts Tables in Electronic Format	Parts Table Content	In conjunction with the IPM, there shall be provided hierarchal tables in electronic format (such as Microsoft Excel) that identify all systems and their subsystems, all sub systems and their assemblies, all assemblies and their sub-assemblies and all sub-assemblies and their components, down to unique chips and transistors that may be assembled on Printed Circuit Boards. The purpose of these tables shall be to provide system and component parts data that is readily suitable for loading into the SFMTA SHOPS (or equivalent) data processing system. The tables should include all information that is presented in the IPC. Additionally, the tables should provide tracking information such as serial numbers and locations of all serialized components found in this fleet. At the highest level, the tables should make it possible to identify, by their serial numbers all of the major assemblies installed on each individual coach and thereafter all major sub-assemblies that are installed in each major assembly down to the lowest serialized sub assembly.	New Flyer cannot supply data in this format. We can provide an MS Excel complete listing of all parts as they appear in the Parts Manual (logical Section - System - Assembly - Sub-assembly) Keep in mind that not all child level parts are available such as is the case in circuit boards, only serviceable parts will be identified.
12	9.9	9.2.5 Operator's Manuals	Operator's Manual Content	The operator's manual shall also document any vehicle-related operator and passenger health and safety concerns, including but not limited to recommended practices for the avoidance of operator on-the-job injuries such as Repetitive Strain.	New Flyer will supply Bus Operators Guides in the same format and content as supplied with past builds.
13	9-10	9.2.6 Electronic Systems Documentation	Electronic Systems Documentation	Where an electronic system is an intrinsic part of the vehicle, and where the contract for a vehicle specifies that an electronic system is field- or shop-repairable, the Contractor shall at a minimum provide circuit descriptions, schematic diagrams, voltage, waveform and/or data diagrams, troubleshooting trees and parts lists for the system as part of the maintenance/overhaul manuals in keeping with the requirements of Section 9.2.1, Maintenance Manuals. etc..	New Flyer will supply available OEM documentation on these systems as supplied with past builds.

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14	9-10	9.2.7 Surveillance Camera System Manuals	Surveillance Camera System Manuals	The Contractor shall provide 20 manuals, which include wiring diagrams clearly showing the interfacing vehicle wiring for the system as well as 20 sets of individual maintenance manuals for each piece of supplied equipment. These manuals shall include schematic diagrams, parts lists and maintenance procedures including but not limited to operation, preventive maintenance, troubleshooting and repair to the defective component(s) on printed circuit boards. In addition to paper copies of this documentation, all technical graphics must be provided in electronic formats per requirement in Section 9.2 PUBLICATIONS: MAINTENANCE MANUALS, ILLUSTRATED PARTS MANUALS, OPERATOR'S MANUALS, & VEHICLE RECORD BOOKS.	New Flyer will supply available OEM documentation on these systems as supplied with past builds.
15	9-11	9.2.9 Computerized Maintenance, Preventive Maintenance, and Illustrated Parts Manual System	Computerized Maintenance, Preventive Maintenance, and Illustrated Parts Manual System	Maintenance, Preventive Maintenance work functions and Illustrated Parts shall include two and three dimensional and exploded view graphics. In addition to providing hard copies and CDs of these manuals as specified in Section 9.2, PUBLICATIONS: MAINTENANCE MANUALS, ILLUSTRATED PARTS MANUALS, OPERATOR'S MANUALS, & VEHICLE RECORD BOOKS. Contractor shall provide required technical services to integrate these items into the latest SPEAR Technologies maintenance and materials management system. SPEAR Technologies software includes the following applications to support this integration:	New Flyer will supply Bus Manuals in electronic format as supplied with past builds.
16	10-9, 10-10, 10-11	10.3.3.2 Illustrated Parts Catalog Master File	Illustrated Parts Catalog Master File	The Contractor shall provide SFMTA with the following database information on MPC-compliant latest technology electronic media for the Illustrated Parts Manual: The parts catalog data must be provided in Microsoft Excel rows and columns. Columns with data will consist of the following: Section, Graphic Title, Figure #, Item # (item 1, 2, 3 etc. on the graphic), Manufacturer Part Number, Part Description, QTY, Unit of Measure. For example see below.	New Flyer will supply Bus Manuals in electronic format as supplied with past builds.
17	10-10	10.3.3.3 Publications Software	Publications Software	The Contractor shall provide the following on CD-ROM or latest technology electronic data storage media AutoCAD Drawings (only for the drawings contained in the Manuals), including all pertinent software and licenses. 1) Maintenance Manuals 2) Parts Manuals 3) Training Manuals 4) Wiring and Air Diagrams	New Flyer will supply Bus Manuals in electronic format as supplied with past builds.

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18	10.2	10.1.2	Voiding of Warranty	FIGURE 10-1 HYBRID SUBSYSTEM AND COMPONENT WARRANTY Engine and all items supplied by its manufacturer - 5 years/300,000 miles Suspension - 5 years/300,000 miles Basic Body Structure - 5 years/300,000 miles	New Flyer's proposal is based on providing the following whichever occurs first warranties: Engine and all items supplied by its manufacturer - New Flyer will provide the standard Engine warranty of 2-years/unlimited miles with a limited extended warranty of three (3) years or 300,000 miles (whichever occurs first) for a total of 5 years/300,000 miles. The extended warranty will be provided at a cost and covers components only as specified by the manufactures warranty document. Please refer to the attached Cummins supplier warranty documents for warranty coverage and exclusions. Suspension - 2 years/100,000 miles Basic Body Structure - 3 years/150,000 miles
19	10.3	10.1.5	Fleet Defects	A fleet defect is defined as cumulative failures of any kind in the same components in the same or similar application where such items are covered by the warranty and such failures occur within the warranty period in at least twenty (20) percent of the vehicles delivered under this contract, once half of those vehicles delivered have been accepted and placed in revenue service. SFMTA shall have final approval of corrections or changes under these conditions.	In line with the current contract SFMTA-2013-08 between New Flyer and SFMTA, a fleet defect is defined as cumulative failures of any kind in the same components in the same or similar application where such items are covered by the 2 year/100,000 mile base bus warranty period and such failures occur within the 2 year/100,000 mile base bus warranty period in at least 20 percent of all Buses delivered under this contract; provided, however, that components manufactured by the following companies shall not be subject to the fleet defect provisions unless a manufacturer agrees to honor the fleet defect provisions: Allison, Cummins, BAE, Thermo King. SFMTA shall have final approval of corrections or changes under these conditions.
20	10.3	10.1.5.1	Correction of Fleet Defects	If (a) Contractor does not provide a plan for correction within the time specified above (or as extended by SFMTA); or (b) a specific declared fleet defect is not fully corrected within the time specified in the plan; or (c) the remainder of the coaches are not corrected in accordance with the Contractor's work program; SFMTA will assess liquidated damages in accordance with Section 19, Part V, Agreement, Volume 1.	New Flyer's proposal is based on that we will repair fleet defects in an efficient and timely manner and will make every attempt to meet the "aged to" timeframes however, due to the possible degrees of fleet defect complexity, we cannot guarantee this or agree to pay liquidated damages on fleet defects.

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21	10.3 / 10.6	10.1.5.1 & 10.2.3 (Addendum # 1)	Correction of Fleet Defects / Warranty After Replacement Or Repairs	The warranty on parts, components or sub-systems replaced as a result of a fleet defect shall have the unexpired warranty period of the original subsystem, effective on the replacement date. Extended warranties shall begin on the date of the repair or replacement of the parts, components, or sub-systems. The warranty on parts, components or sub-systems replaced as a result of a standard warranty repair shall have the unexpired warranty period of the original subsystem, effective the replacement date. Extended warranties shall begin on the date of the repair or replacement of the parts, components, or sub-systems.	New Flyer's proposal is based on that if any component, unit or subsystem is repaired, rebuilt or replaced as a result of a fleet defect/warranty repair by New Flyer or by SFMTA personnel with the concurrence of New Flyer, the subsystem shall have the unexpired warranty period of the original subsystem. New Flyer would like to clarify that no extended warranty on the component will be given from the time of failure to the time it takes to do the repair. This is an industry standard.
22	10.4	10.1.6 (Addendum #1)	Contractor's Representative	The Contractor shall be responsible for having a suitable service center for its representatives, located within the San Francisco Bay Area. The facility should have office space with functional communication equipment (telephone, fax and computer capabilities), a parts storage area, and working space for a minimum of two coaches. The service center should be secured in a manner to protect SFMTA property from theft, vandalism and natural disaster, to the extent possible.	New Flyer's proposal is based on that we will provide the parts and tools required to complete warranty repairs, but when possible, we kindly ask that SFMTA provide shop space to so we can complete the repairs. This allows us to work with the property in order to return the bus to revenue service as quickly as possible. If shop space is unavailable, New Flyer will utilize contractors with their own service facilities in the SFMTA area to perform the repairs and get the buses back into revenue service as soon as possible. New Flyer will provide this in lieu of a service center. PLEASE NOTE: Major component repairs for the Engine, Transmission, and HVAC must be performed at the authorized warranty repairs centers of these components as mandated by these suppliers warranty terms & conditions. Please see attached major component service locations document for the nearest authorized service centers located to SFMTA.

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23	10.4	10.2	Repair Procedures	The Contractor shall be responsible for all warranty-covered repair work. The Contractor or its designated representative shall secure parts and perform all affected warranty repair work. At its discretion, SFMTA may perform such work if it determines it needs to do so based on transit service or other requirements. The Contractor shall be responsible, and shall reimburse SFMTA, for all costs for warranty work performed by SFMTA personnel or by any contractor(s) hired by SFMTA to perform warranty work, as described in Section 10.2.2, Repairs by SFMTA.	New Flyer's proposal is based on that we will work with the SFMTA on warranty-covered repairs when possible but we kindly ask that the SFMTA perform the majority of warranty repairs with reimbursement from New Flyer. However, in saying this, please be advised the following major component equipment suppliers (engine, transmission, HVAC and destination sign suppliers) mandate that all warranty repairs be performed by an authorized dealer of their components (and not the New Flyer or SFMTA). If the SFMTA elects to perform these repairs without the written permission of the original equipment manufacturer, the remaining warranty coverage may be voided. Please note: New Flyer will be available to work with SFMTA on major equipment repairs to ensure service quality expectations are met and work is conducted in an acceptable timeframe.
24	10.5	10.2.2.2 (Addendum # 1)	Contractor-Supplied Parts	Contractor shall furnish parts for all warranty work, whether the warranty labor is performed by the Contractor or by SFMTA. Contractor shall deliver, prepaid, warranty parts for repairs within forty eight (48) hours of notification from SFMTA."	New Flyer's proposal is based on that we will utilize our own parts warehouses throughout the United States including warehouses located in Fresno (only 3 hours away from SFMTA) to ship parts quickly as possible to support it's warranty obligations. New Flyer will endeavour to send all warranty coach down parts pre-paid to SFMTA via overnight priority whenever possible and all other warranty parts will be expedited and direct shipped when required, as long as parts are ordered under New Flyer's warranty process. Please refer to the attached iWarranty and warranty claim policy documents under Section 5-D.

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25	10.5	10.2.2.4 (Addendum # 1)	Reimbursement for Labor	Contractor shall reimburse SFMTA for all warranty labor incurred by SFMTA according to the Contractor supplied Standard Repair Time Manual. The amount shall be determined by multiplying the number of man-hours required to correct the defect by the current top mechanic's hourly wage rate plus fringe benefits and overhead. Additionally, Contractor will be responsible for the cost of towing the coach if such action was necessary and if the coach was in the normal service area. The wage rate, and therefore, the warranty labor rate, is subject to adjustment each year. The warranty labor rate shall be based on current SFMTA's 4M mechanic, 7381, Automotive Mechanic, hourly rate plus fringe benefits and overhead.	New Flyer's proposal is based on that the warranty labor amount shall be determined by multiplying the number of man-hours required to correct the defect and have been corrected by a qualified mechanic. The warranty labor rate charged to New Flyer will be the day shift hourly wage rate of a Mechanic and shall not include troubleshooting/diagnostic time. In addition, New Flyer will agree to cover reasonable towing costs for two (2) years or 100,000 miles, whichever occurs first. However, it should be noted that some limitations and exclusions may apply (e.g. New Flyer does not cover towing as a result of a Major Component failure). New Flyer kindly asks that the labor rate be agreed to, in writing, at the beginning of coach acceptance, and fixed for a period of one year and that the warranty labor adjustment for each year not exceed the Producer Price Index (1413 Truck and Bus Bodies) for that year.
26	10.6	10.2.2.4 / 10.2.2.5	Reimbursement for Labor / Reimbursement for Parts;Towing	In the event SFMTA deems it necessary to contract out for warranty repairs, the Contractor shall reimburse SFMTA for the actual cost of the repair, including charges for any warrantable parts, consequential parts or damages, labor, and towing or transportation. A 15% handling fee will be included on all outside invoices for warranty related services submitted to the Contractor. The warranty will include the cost of towing the coach or a coach change if either was necessary because of the failure of a warranted part. Towing costs consist of SFMTA's established contracted tow truck charge including applicable taxes, any parts utilized in the transfer of the coach, any SFMTA labor expended, plus a 15% handling fee. The cost of a coach change will consist of the actual time spent at the established warranty labor rate.	New Flyer will agree to cover reasonable towing costs for two (2) years or 100,000 miles, whichever occurs first. However, it should be noted New Flyer cannot reimburse for transportation charges, coach changes, SFMTA labor expended or accept a 15% handling fee added to all outside invoices for warranty related services submitted to the Contractor. New Flyer will cover parts only that are utilized in the transfer of the coach that are directly related to the warrantable failure.

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27	10.6	10.3.1	Warranty And Computer Program	SFMTA's preference is to use the latest SPEAR Technologies Warranty Conditions, Claims and Payments modules for all tracking and submission of Warranty repairs and/or claims. Contractor shall accept the latest SPEAR Technologies generated Warranty Claim forms. All systems modifications, parts retrofits, and factory recalls must be documented for integration into warranty software. If an alternative Warranty technology is proposed, it shall be made available to the appropriate SFMTA staff without any restrictions.	New Flyer's proposal is based on providing the SFMTA easy to use iWarranty system. With New Flyer's easy to use warranty system, SFMTA can submit warranty claims on-line. When required, SFMTA can process 'coach down' parts through iWarranty and coordinate shipments of parts to the requested location. New Flyer will reimburse SFMTA for parts and labour within 60 (sixty) days of receipt of an approved warranty claim. Other additional benefits of New Flyer's iWarranty system include: • Instant access to an electronic copy of your warranty; • Self-service reporting capabilities, run standard reports or build your own custom reports; • Tracking of warranty claims on a bus-by-bus basis; • Visibility into the date your claims were paid along with the check number; • Status updates on parts requests; • Online maintenance of your warranty account information Please refer to the attached iWarranty brochure under Section 5-D for additional information.
28	1-7	1.2	DIMENSIONS	Length,, excluding bumpers 30' +/- 1'	New Flyer's proposal is based on submitting a proposal for that includes bus dimensions as followed dimensions in lieu of the specified 30' length bus: Length Excluding Bumpers: 35.4' New Flyer can accommodate a 35' bus for evaluation purposes in routes where SFMTA is planning to operate the buses. Please refer to the attached dimensional drawing under Section 3-A.
29	1-7	1.3	PROPULSION SYSTEM PERFORMANCE	Table 1.3.1	New Flyer's proposal is based in providing performance capabilities as shown in the attached performance scans by BAE and Allison. New Flyer advises that for the BAE proposed buses New Flyer advises that per the BAE performance Scan the following areas are slightly off the specified requirement: Max speed requirements 63 MPH. BAE performs at 62 MPH 2% grade max speed requirement 55 MPH. BAE performs at 52 MPH 16 % grade to reach 8mph in 7 seconds. BAE will reach in 8 seconds All other areas are met. Please refer to Section 3-D For the Allison performance capabilities please refer to the attached Scan under section 3-D.

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30	1-9/2-11	1.5.1/2.7.2	Interior Noise/Sound Insulation	Maximum Allowable At Any Seat Location in Passenger Area 75 dBA Maximum Allowable at Operator Seat 70 dBA	New Flyer's proposal is based on providing buses with noise levels equal or lower than the current fleet of Xcelsior's at SFMTA. Noise levels are as follows: 75 dBA with A/C off and 78 dBA with A/C On at the driver's area and 80 dBA at all passenger seat location following test guidelines specified in the White Book as following: "The bus shall accelerate at full throttle from a standstill to 35 mph on level commercial asphalt or concrete pavement in an area free of large reflecting surfaces within 50 feet of the bus path."
31	1-9	1.5.2	Exterior Noise	Curb idle test 65dBA	External: New Flyer can provide the following: Idle Sound Levels @ 5,500 rpm (max EMP fan speeds): Curbside = 68 dB Streetside = 83 dB New Flyer's proposal is based on providing exterior noise levels that are equal or lower than the current fleet of Xcelsiors operating in SFMTA. Noise levels are as follows: Pull-away sound levels @ 5,500 rpm (max EMP fan speeds): Curbside = 72 dB Streetside = 84 dB All values above are measured values.
32	1-10	1.8	SHOCK HAZARDS	Interlocks shall be provided on doors and covers for inverters, converters and other energy storing devices to quickly de-energize primary power from these circuits when these doors and covers are opened	New Flyer together with BAE/Allison have established all safety precautions in the design of the Xcelsior bus and there are specific procedures that would need to be follow to avoid any situation with shock hazards. New Flyer proposal is based on providing buses that must follow the safety precautions as stated in our service manuals. Please refer to the attached information.
33	1-15	1.17	FIRE SAFETY	An independently powered system of active thermal detection in the battery compartment that alerts the driver and/or personnel when the temperature is greater than 180°F shall be installed.	New Flyer's proposal is based on providing an independent system powered off of coach batteries for best reliability.
34	2-1/2.8	2.1 / 2.3.3	BODY STRUCTURE / Headling	Fiberglass, plastic, or ABS type material shall not be used on the sidewalls, passenger doors, and equipment access doors unless approved by SFMTA. Side body panels shall be stainless steel or aluminum from the window down.	New Flyer's proposal is based on proving materials in the construction of the interior and exterior of the bus as current SR1794. Fiberglass, Melamine and ABS materials are used in the interior of the coach meeting and exceeding APTA procurement guidelines. These materials are standard in the transit industry. External side panels are fiberglass for greater corrosion prevention.
35	2-4	2.2.1	Strength and Installation	Exterior panels below 3 feet shall be divided into sections that are repairable (excluding painting) or replaceable by a 4M mechanic in less than 30 minutes for a section up to five (5) feet long.	New Flyer proposal is based on providing exterior body panels that are bonded into place and replacement time would take more than 30 minutes; however, actual replacement of the panels would only take place in a very severe accident with structural framing damage.

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36	2-4	2.2.5	Articulation Cover	The contractor shall provide a Hubner, or approved equal articulation joint for an articulated 60-foot bus.	New Flyer's proposal is based on providing articulated joints manufactured by ATG. Please refer to the attached information.
37	2-4	2.2.6	Finish and Color	Exterior shall be finished with lead-free Dupont Imron 6000 3.5 VOC basecoat/clearcoat system, PPG Delta DBHS 3.5 VOC or approved equal in accordance with the paint manufacturers recommendations. All paint used shall be lead free	New Flyer requests approval to provide DuPont Imron® Elite™ Single Stage low VOC paint. Please refer to the attached documentation under Section 3-E.
38	2-4	2.2.6	Finish and Color	Paint shall be coated with an anti-graffiti mask or shield from the rear doors around the back to the parallel location on the street side.	New Flyer proposal is based on providing paint systems as provided in current SR1794. We have negative results with anti-graffiti coatings with complex production procedures and minimal end user benefits but adding additional cost.
39	2-5	2.2.9	Windshield Wipers and Washers	No part of the windshield or wiper mechanism shall be damaged by manual manipulation of the arms.	New Flyer's proposal is based on providing electric wiper. Any electric motors will sustain damage to gears or linkage if the wiper arms are manually manipulated.
40	2-6	2.2.10.2	Engine Compartment	SFMTA prefers that an access door be installed which allows easy maintenance access to engine exhaust after-treatment devices. The access door should be designed to minimize labor time related to periodic servicing of the after-treatment device.	New Flyer advises that access to the after treatment equipment is provided; however, this is not a door but a removable panels as current SR1794.
41	2-6/7-6	2.2.10.3/7.10.2.1	Low Voltage Battery Compartment / Battery Tray	The low voltage or auxiliary battery compartment shall be constructed of 304 stainless. The battery shall be located under the floor on the street side of the coach, vented and self-drained, and prevent accumulation of debris on top of the batteries. Batteries shall be mounted in trays that are constructed of 304 stainless to resist corrosion	New Flyer's proposal is based on providing a heavy duty 3/16" polyethylene plastic enclosure with a battery tray constructed of polyethylene plastic mounted on a stainless steel sub-frame for support. The tray easily slides out on stainless steel rollers. This is as provided in current SR1794. Please refer to the attached information.
42	2-6/3-25	2.2.10.4/3.15.2.1	Radio Compartment / Radio Compartment and MDT	The radio compartment box (minimum 14 in. high, 26 in wide & 21 in deep) shall be lockable, waterproof, dustproof, and accessible through an unlocked skirt panel door, and shall be split with vertical hinges on either side of the radio box. These doors will fold out of the way for ease of access to the interior of the radio box. Contractor shall submit drawings to SFMTA for approval.	New Flyer proposal is based on providing our standard SDS box as currently provided in SR1794. This unit is accessible form the interior of the coach and accommodates all communications systems as specified by SFMTA. Please refer to the attached information under Section 3-E.
43	2-8	2.3.1	Divider and Side Trim Panel	Divider panels shall extend no higher than the lower daylight opening of the passenger windows, and that forward of transverse seats shall extend to within 1-1/4 inches ± 1/4 inch of the floor.	New Flyer request approval to provide modesty panels which are extended about 6 inches higher than the daylight opening of the side windows as current SR1794. This design provides greater passenger protection.
44	2-8	2.3.1	Divider and Side Trim Panel	The bottom 12 inches of each side of each divider panel shall be stainless steel.	New Flyer's proposal is based on providing modesty panels as current SR1794. These panels do not required Stainless Steel in the bottom 12 inches.
45	2-9	2.3.6	Access Doors	Access doors shall be hinged with props, as necessary, to hold the doors out of the mechanic's way.	New Flyer's proposal is based on providing access doors with lockable struts in lieu of props. This is as currently provided on SR1794.

Exception/Clarification #	Page	Section	Title	Specification Reference	Exceptions
46	2-9	2.3.6	Access Doors	Access doors for the destination sign compartment shall be secured with thumbscrews; access doors for the door actuator compartments shall be secured with latches and shall prevent entry of mechanism lubricant into the coach interior.	New Flyer's proposal is based on providing access to the specified door with square key locks. This is as provided in SR1794
47	2-9	2.4	FLOOR	The floor shall be attached with either properly installed, hardened self-tapping bolts of adequate size or carriage bolts that are serviceable from the underside of the coach.	New Flyer requests approval to provide a composite floor mainly retained by adhesives (Sika) with limited use of 410 stainless steel fasteners compatible with our ergonomically friendly stand up drill/screw gun. The joints are filled with 7700 series adhesive and rough surface areas are faired with Sika-force 7780 and sanded smooth where required.
48	2-9	2.4	FLOOR	Plywood is not considered acceptable flooring for this procurement. The flooring shall be composite material flooring, Coosa or approved equal.	New Flyer's proposal is based on providing Spaceage composite flooring as currently provided on SR1794. New Flyer is studying the possibility of an alternate supplier and is committing to avoid any duplication of the issues with floor bubbling as experience on SR1794.
49	2-10	2.4.3	Floor Covering	However, the artic trailer shall have rubber ribbed flooring.	New Flyer's proposal is based on providing full metal jacket anti skid coating for the articulated joint area matching colors of flooring of the coach.
50	2-10	2.4.3	Floor Covering	The outer edge of the step, just below the step nosing, at the rear door shall be covered with a stainless steel strip.	New Flyer's proposal is based on providing a composite step precluding the need of a stainless steel step.
51	3-2	3.1.3.4	Emergency Exits	Each emergency exit window location shall be labeled with a metal instruction plate that is riveted in place (preferably close to the latch).	New Flyer's proposal is based on providing the labels for emergency in windows made of heavy duty plastic lasting in the operating profile of a heavy duty transit bus.
52	3-2	3.2.2	Dimensions	Door openings shall be no less than 84.5 inches high.	New Flyer's proposal is based on providing a door opening of 82" as currently providing on SR1794.
53	3-2	3.2.3	Door Glazing	The lower section of the front door shall be glazed for no less than 45 percent of the door opening area of the section.	New Flyer's proposal is based on providing the front door glazing as a one piece on each panel at full length. This is as provided on SR1794.
54	3-4	3.3.1	Exterior Lighting & Back-up Alarm	Two (2) amber lights shall be mounted above each wheel opening and one (1) midway between each wheel opening.	New Flyer's proposal is based on providing one (1) exterior side signal lights per wheelwell matching current SR1794 and SR1849.
55	3-4	3.3.1.1	LED Lights	LED lights shall be Truck Lite, or approved equal.	New Flyer's proposal is based on providing LED lights manufactured by dialight meeting the warranty requirements and as provided on SR1794.
56	3-4	3.3.1.1	LED Lights	The wheelchair ramp light shall be amber and the kneeling indicator light shall be red.	New Flyer's proposal is based on providing a single light acting as kneeling a wheelchair deployment light.
57	3-4	3.3.1.2	Courtesy Lights	Lamps mounted on each side of the front, and rear doors shall comply with ADA requirements and shall be activated only when the doors open and shall illuminate the street surface to a level of no less than one (1) foot-candle for a distance of three (3) feet outward from the step tread edge using LED lighting.	New Flyer's proposal is based on providing an ADA compliant door header light, 1.0" X 18.5" LED strip light at both entrance door and exit door which precludes the need for the installation of exterior curb lights. The LED lights will illuminate the door opening to the ground. The proposed strip light provides 1.37 ft-candle for a distance of 36 inches from the front step edge

Exception/Clarification #	Page	Section	Title	Specification Reference	Exceptions
58	3-5	3.3.2	Interior Lighting	The LED passenger interior lighting system shall be DINEX or approved equal.	New Flyer's proposal is based on providing New Flyer (TCB) interior lights as currently provided on SR1794. The covers are an aesthetically pleasing with one continuous piece of polycarbonate without gaps. Based on the designed life of the LED lights and a 12 year warranty on the lighting system, there is no requirement for servicing. Please refer to the attached information under Section 3-F.
59	3-5	3.3.2	Interior Lighting	Photo sensor detects and adjusts light level automatically relative to ambient light for passenger comfort. The lighting system shall interface with vehicle multiplex control systems supplied by various vendors through J1939 gateway with serial data input or discrete inputs to automatically adjust the brightness of each individual light fixture to improve driver's visibility when the windshield wiper motor is set at high speed. High	New Flyer's proposal is based on providing the TCB LED light system with adjustable dimmer feature that can be programmed for each individual bank of lights without the use of any specialized tools. This matches SR1794.
60	3-7	3.6.1	Wheel Chair Ramp	The wheelchair ramp shall be a Lift-U, or approved equal, flip-out type design, self-contained, electrically-powered, which fully complies with ADA and FTA requirements and shall be provided at the front door of the coach.	New Flyer's proposal is based on providing New Flyer's patented self contained, modular Flip Type ramp that is stored in a stainless steel box mounted into the floor of the bus. The non-skid, 3/16 inch thick aluminum ramp platform has a clear width of 32.25 inches, a length of 47.6 inches and is rated at 660 lbs. with a deployment angle ratio of 1:7. The ramp exceeds ADA requirements and is a provided in current SR1794. Please refer to the attached documentation under Section 3-F.
61	3-27	3.17	**CLIPPER**	Each coach shall be delivered with a fully programmed, fully functioning Clipper system	Due to several issues encounter with the unique system New Flyer's proposal is based on providing provisions for this system as provided on SR1794. New Flyer would like to discuss alternatives that would assure product readiness for SFMTA.
62	3-28	3.18.2	System Enclosure	The APC system shall be housed in its own sturdy vandal-resistant enclosure that includes a tamper and pick-resistant lock.	New Flyer's proposal is based on providing the APC system mounted in the SDS box as currently provided on SR1794.
63	4-2	4.1.2	Instruments	The speedometer, certain indicator lights, and air pressure gauge(s) with two needles and a minimum of 2-1/2 inches in diameter, shall be located on the front cowl immediately ahead of the steering wheel.	New Flyer's proposal is based on providing Air pressure gauges with single needles for each pressure gauge as currently provided on SR1794.
64	4-3	4.1.3	Indicators	GFCI	New Flyer's proposal is based on providing the indicator cluster as provided in current SR1794.
65	4-5	4.1.4.3	interlock Override Switch	An interlock override switch, enclosed in the front destination sign compartment and accessible only through a horizontally-located adequately-sized finger hole beyond the reach of the seated	New Flyer's proposal is based on providing and interlock override switch accessible through the destination sign door as currently provided on SR1794.

Exception/Clarification #	Page	Section	Title	Specification Reference	Exceptions
66	4-6	4.1.5	Steering Wheel and Horn Button	The steering wheel shall be Vehicle Improvement Products, BKBL2024D47V, or approved equal and the horn assembly shall be Vehicle Improvement Products, HB9T, or approved equal.	New Flyer's proposal is based on providing a steering wheel with the following part number matching SR1794: BkBL1824D4V
67	4-6	4.1.7	Master Run Switch	OFF / RUN / CL/ID	New Flyer's proposal is based on providing a master run switch that is labelled, "Stop Engine, Day Run, Night Run, and Night Park". With exception of the hazard light, radio, and farebox, all other systems are powered off by the PLC control; ½ hour after the master run switch is placed in the "OFF" position. This is as provided on current SR1794.
68	4-9	4.4.2	Side Window	The side window shall be equipped with a solar screen and shall be USSC machine cassette or approved equal.	New Flyer's proposal is based on providing screens manufactured by Automotion Shade per SR1794.
69	4-10	4.5.1	Exterior	Both mirrors shall be mounted no less than 80 inches above the street surface.	New Flyer's proposal is based in providing mirrors that are 10x10 in order to meet the 80" requirement.
70	4-10	4.5.2	Interior	Interior observation shall be accomplished by a swivel-mounted convex rear view mirror of 4 inches by 10 inches attached above and to the right of the operator's head. The locations	New Flyer's proposal is based on providing an interior mirror measuring 8x15. This is as provided in SR1794.
71	4-11	4.11	SUN VISOR AND SUN SHADES	A scissor-type pull down shades shall be provided for operator's side of the windshield, approximately half of the entire windshield, and on the operator's side window. Scissor-	New Flyer's proposal is based on providing sun visor in lieu of pull down shades in order to meet California State Regulations (CHP)
72	5-1	5.1.2	Axles	The front axle suspension system shall be independent type, reverse Elliott Standard MAN, Rockwell, Meritor, or approved equal that incorporates Rockwell components from the steering knuckle through the entire brake assembly or approved equal.	New Flyer's proposal is based on providing the M.A.N. VOK-07F, a front axle and the HY-1336-F rear axle with disk brakes. The front axle is a cast iron, dropped beam with hollow section; steered, non-driven type axle. The maximum axle load is 15,873 on the front axle. The rear axle is a rigid, driven, non-steerable axle made of high-quality spherical center castings, utilizing a single-stage power reduction gear train. The maximum axle load is 28,660 lbs for the rear axle. 5 years or 300,000 miles warranty is provided at no extra charge.
73	5-2	5.1.7	Kneeling	The coach must kneel evenly on both sides. The operator-actuated kneeling device shall lower the step at the front door to a height of no more than 10 inches, measured at the longitudinal centerline of the front door to the ground. Brake	New Flyer's proposal is based on providing a coach, which can raise from a front right side kneel to a height permitting coach operation within 5 seconds with the air pressure at 135 psi, and both axles at 100% load (GVWR) and shall rise to the correct operating height within 7 seconds regardless of load to GVWR.

Exception/Clarification #	Page	Section	Title	Specification Reference	Exceptions
74	5-2	5.1.8	Lubrication	These fittings shall be located for ease of inspection, and shall be accessible with a standard grease gun without flexible hose ends, from a pit or with the coach on a hoist.	New Flyer's proposal is based on providing New Flyer's grease fittings are not all accessible to allow a rigid tube end grease gun to be used. A flexible hose end will be required.
75	5-6	5.5.2	Air Lines and Fittings		New Flyer requests approval to provide an additional color coding. Blue: Suspension
76	5-6	5.5.3	Air Reservoirs	The primary reservoir shall be equipped with an S.A.B. Auto Drain valve without heater, as well as a manual valve.	New Flyer's proposal is based on providing air tanks that are located near the ceiling on the interior of the bus with drain lines leading to remote drain valves. The tanks are not fitted with clean out plugs. New Flyer can supply four (4) drain valves conveniently located approximately at the lower edge of the vehicle.
77	5-7	5.6.1	Fuel Tank	he fuel tank shall be constructed of stainless steel.	New Flyer's proposal is based on providing a fuel tank constructed of cross-linked polyethylene which still contains the necessary baffles required to control the moving of the liquid inside the tank. Please refer to the attached documentation.
78	5-8	5.6.2	Fuel Filler	It shall be provided approximately 18 feet behind the front edge of the front bumper on the curbside of the coach.	New Flyer's proposal is based on providing the following dimensions from the front edge of the bumper to the fuel filler area: 60 FOOT BUS: 47' 40 FOOT BUS: 27.3' 35 FOOT BUS: 22.3'
79	5-8	5.7.1/5.8	Hydraulic Lines/Fluid Lines	Necessary flexible hydraulic lines shall be Aeroquip 2807 except where the radii of the lines exceed the performance of the Aeroquip 2807 line. In those instances, Aeroquip FC 350 with replaceable ends will be permitted.	New Flyer's proposal is based on providing the following flexible synthetic rubber lines with standard crimped end fittings manufactured by Manuli Rubber Industries and Aeroquip. Equator 1 (EQ1) / Equator 2 (EQ2) / 2807 PTFE / GH100, to accommodate the different ratings as required. Please refer to the attached documentation.
80	5-9	5.11	FIRE DETECTION / SUPPRESSION	The system shall have a 30 pounds dry chemical agent or a 22 pounds purple "K" storage tank and an external expellant gas tank. Up	New Flyer's proposal is based on providing a storage tank of 25 pounds as provided by Amerex.
81	5-9	5.11	FIRE DETECTION / SUPPRESSION	• Sufficient dry chemical agent to extinguish fire within the articulated joint section	New Flyer's proposal is based on deleting the requirement for nozzles in the articulating joint area as there is no risk of fires in this area.

Exception/Clarification #	Page	Section	Title	Specification Reference	Exceptions
82	6-4	6.4.6	Engine Override Button	SFMTA prefers that the vehicle be capable of returning (without passengers) to a coach maintenance division without the use of an engine. The ability for the vehicle to operate in engine-off mode shall be appropriately optimized and subject to SFMTA approval.	The BAE Systems HybriDrive® System SCU provides an emergency override feature. The emergency override switch is a momentary switch that must be held in the "ON" position for as long as the override function is required. This function overrides all thermal and electrical fold backs that normally limit or shutdown traction power. As long as the emergency override switch is held the system will provide traction power if at all possible regardless of any damage that may occur to the system. This function is primarily for emergency situations such as moving a disabled vehicle to the side of the road or over a railroad crossing.
83	7-2	7.7	WIRING, TERMINALS	All lamp sockets shall be of two-wire design with Cannon-Shearson or equal disconnects to eliminate corrosion or ground problems.	New Flyer's proposal is based on providing Weather-Pak and Deutch connectors matching SR1794.
84	7-3	7.9	MULTIPLEX WIRING SYSTEM	The electrical system shall be controlled by "MULTIPLEX" programmable logic controller, which shall be Dinex or approved equal and shall be located in a sealed compartment.	New Flyer's proposal is based on providing Parker Vansco Electronics VMM Multiplex System as specified in the attached documentation and as provided on SR1794.
85	7-3	7.9	MULTIPLEX WIRING SYSTEM	SFMTA shall be provided with the ability to make configuration changes to the software such as adding, deleting, or re-characterizing devices on the multiplex system, without having to go back to the supplier for software changes. Any associated devices required for reprogramming the coach should be identified with special	New Flyer strongly discourages providing full access to multiplexing system programming. Preference if for New Flyer engineering to assume liability in the event that program changes cause issue with vehicles. Full access would require waivers from customer to absolve New Flyer of any responsibility in the event that program changes initiated by KCM resulted in injury to persons or property.
86	N/A	N/A	N/A	Carb	Please refer to Section 4-A for status of Carb Certification.
87	12-5	12.2.1.3.2	Testing	Testing	New Flyer's proposal is based on eliminating tests on components that have already been installed on Xcelsior buses on previous contract. New Flyer can provide test documentation in lieu of performing duplicate testing on an SFMTA bus.
88	N/A	N/A	N/A	Electrical Accessories	New Flyer advises that Alectrical accessories are providided in the BAE proposal for 35', 40' and 60' buses; however, the Allison proposals for 35', 40', and 60' buses do not include electrical accessories as this still in development by New Flyer and Allison.
89	N/A	N/A	N/A	weight	New Flyer's proposal is based on providing bus weights as stated under Section 3-C of both 35/40 and 60 foot sections.

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CITY AND COUNTY OF SAN FRANCISCO
San Francisco Municipal Transportation Agency
Request for Proposals
THE PROCUREMENT OF
30-Foot, 40-FOOT AND 60-FOOT LOW FLOOR
DIESEL HYBRID COACHES

Exception # 18

Cummins Extended Coverage Plan

Coverage

Cummins Extended Coverage Plan (Plan) is available to be purchased for all eligible Cummins Engines used in automotive applications marketed for use anywhere in the world under the trademark "Cummins" or "Cummins ReCon®". This Plan covers any failure of the Engine, under normal use and service, which results from a defect in material or factory workmanship (Covered Failure).

This Plan begins on the expiration of the Cummins Base Engine Warranty applicable to the Engine. Coverage ends at the time, miles (kilometers) or hours specified on the accompanying Certificate, whichever occurs first, **AS MEASURED FROM THE CUMMINS BASE ENGINE WARRANTY START DATE**.

Cummins Responsibilities

Cummins will pay for all parts and labor needed to repair the damage to the Engine resulting from a Covered Failure.

Cummins will pay for the lubricating oil, antifreeze, diesel exhaust fluid, filter elements and other maintenance items that are not reusable due to a Covered Failure.

Cummins will pay reasonable labor costs for Engine removal and reinstallation when necessary to repair a Covered Failure.

Owner Responsibilities

Owner is responsible for operation and maintenance of the Engine as specified in the applicable Cummins Operation and Maintenance Manual. Owner is also responsible for providing proof that all recommended maintenance has been performed.

Before the expiration of this Coverage, Owner must notify a Cummins distributor, authorized dealer or other repair location approved by Cummins of any Covered Failure and make the Engine available for repair by such facility. Owner is also responsible for delivering the Engine to the repair facility. Service locations are listed on the Cummins Worldwide Service Locator at cummins.com.

Owner is responsible for all towing and/or travel expenses incurred as a result of a Covered Failure.

Owner is responsible for the cost of lubricating oil, antifreeze, filter elements, belts, hoses and other maintenance items provided during covered repairs unless such items are not reusable due to the Covered Failure.

Owner is responsible for communication expenses, meals, lodging and similar costs incurred as a result of a Covered Failure.

Owner is responsible for non-Engine repairs, "downtime" expenses, cargo damage, fines, all applicable taxes, all business costs and other losses resulting from a Covered Failure.

Owner is responsible for the cost to investigate complaints, unless the failure is caused by a defect in Cummins material or factory workmanship.

Limitations

Engines with an emissions certification listed below must be operated using only diesel fuel having no more than the corresponding maximum sulfur content. Failure to use the specified fuel (see also Cummins Fuel Bulletin #3379001) can damage the Engine and aftertreatment system within a short period of time. This damage could cause the Engine to become inoperable and failures attributable to the use of incorrect fuels will be denied Warranty Coverage.

Maximum sulfur levels by emissions certification level as listed on the Engine's dataplate are:

EPA 2007/2010/2013	max. 15 parts per million
EPA Tier 4 Interim / Final	max. 15 parts per million
EU Stage IIIB 2011	max. 15 parts per million
Euro 4/5	max. 50 parts per million
Euro 6	max. 15 parts per million

Cummins is not responsible for failures or damage resulting from what Cummins determines to be abuse or neglect, including, but not limited to: operation without adequate coolants or lubricants; overfueling; overspeeding; lack of maintenance of lubricating, cooling or intake systems; improper storage, starting, warm-up, run-in or shutdown practices; unauthorized modifications of the Engine. Cummins is also not responsible for failures caused by incorrect oil or fuel, or by water, diesel exhaust fluid, dirt or other contaminants in the fuel, oil or diesel exhaust fluid.

Aftertreatment components are not covered by this Plan.

This Plan does not apply to accessories supplied by Cummins which bear the name of another company. Such non-warranted accessories include, but are not limited to: alternators, starters, fans, air conditioning compressors, clutches, filters, transmissions, torque converters, steering pumps, non-Cummins fan drives, Engine compression brakes and air compressors.

Cummins branded alternators and starters are not covered by this Plan.

This Plan does not apply to maintenance components, including, but not limited to: fuel injectors, fuel pump, STC hydraulic tappets, STC oil control valve, fuel control valve, low pressure fuel regulator, throttle plate actuator, spark plugs, spark plug boots, ignition coils, ignition control module, turbocharger, air compressor, fan clutch, water pump, fan hub, fan idler pulley assembly, vibration damper, belts, hoses, belt tensioner and thermostat.

Failures resulting in excessive oil consumption are not covered by this Plan.

Parts used to repair a Covered Failure may be new Cummins parts, Cummins approved rebuilt parts or repaired parts. Cummins is not responsible for failures resulting from the use of parts not approved by Cummins.

A new Cummins or Cummins approved rebuilt part used to repair a Covered Failure under this Plan assumes the identity of the part it replaced and is entitled to the remaining Coverage hereunder.

This Plan is transferable to subsequent Owners of the Engine by notifying a Cummins Distributor within 90 days of the transfer of ownership.

This Plan does not duplicate other Coverage applicable to the Engine.

Fees paid for this Plan are not refundable.

CUMMINS DOES NOT COVER WEAR OR WEAROUT OF COVERED PARTS.

CUMMINS IS NOT RESPONSIBLE FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES.

EXCEPT FOR THE PUBLISHED CUMMINS ENGINE WARRANTY APPLICABLE TO THE ENGINE, THERE ARE NO OTHER WARRANTIES, EXPRESS OR IMPLIED, OR OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.

Coverage I.D.: NEC

Coverage I.D.: RNE

Coverage I.D.: CWB

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CITY AND COUNTY OF SAN FRANCISCO
San Francisco Municipal Transportation Agency
Request for Proposals
THE PROCUREMENT OF
30-Foot, 40-FOOT AND 60-FOOT LOW FLOOR
DIESEL HYBRID COACHES

Exception # 32

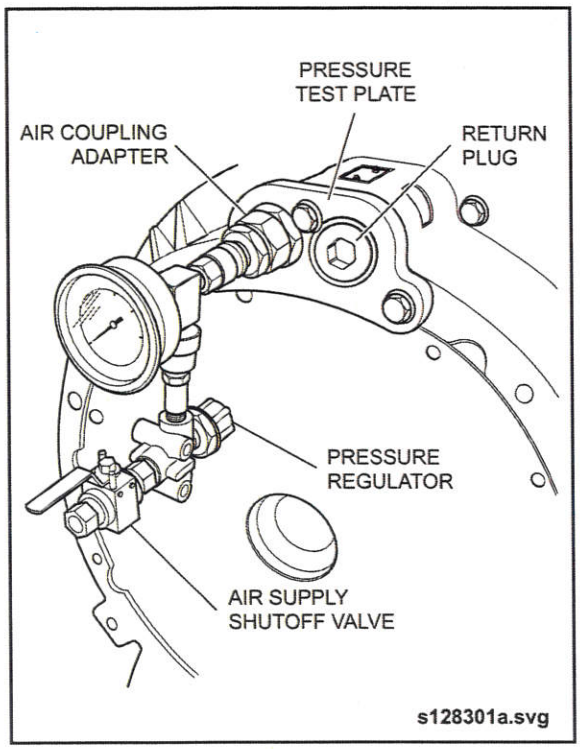

Fig. 55: ISG Pressure Test

2.5. Energy Storage System (ESS)

2.5.1. Description

The roof-mounted ESS consists of 16 battery modules, each containing 96 individual lithium-ion cells. The roof-mounted enclosure uses two fans to draw cooling air through the battery modules.

2.5.2. ESS Specifications

Nominal Voltage.....630 VDC

Power Capability
..... ±200 KW peak, ±50 KW continuous

Reserve .....11.2 KW/hr

Operating Temperature .....52°C (125°F)

Height..... 11.7 inches (297 mm

Width .....41 inches (1041 mm)

Length .....84 inches (2135 mm)

Weight .....800 lb (365 kg) 740 lb (336 kg)

Cooling .....Forced ambient air (environments up to 125°F (52°C)

2.5.3. Operation

The ESS provides energy during vehicle acceleration and peak power demands and recaptures energy during deceleration. The charge and discharge power are controlled by the Propulsion Control System (PCS) which communicates with other components in the hybrid drive system via the J1939 Data Link. The ESS uses one positive and one negative contactor to disconnect from the hybrid drive propulsion system when either the engine is shut down or when a Stop System fault is detected.

The ESS utilizes a self-contained Battery Management System (BMS) which monitors each battery module individually, provides continuous cell voltage equalization, and monitors ESS temperature.

2.5.4. Maintenance

Refer the Preventive Maintenance Section of this manual for scheduled maintenance activities and intervals. Refer to 4. "VENDOR SERVICE INFORMATION" on page 26 in this section for comprehensive troubleshooting, servicing, and testing information.

2.5.5. Removal

DANGER

Refer to 1.1. "High Voltage Safety" on page 1 **in this section and familiarize yourself with the safety requirements before performing any maintenance or repair on the system.** Refer to 4. "VENDOR SERVICE INFORMATION" on page 26 **in this section for BAE High Voltage safety requirements.**

1. Park vehicle on level surface with parking brake applied and wheels chocked.
2. Set Battery Disconnect switch to the OFF position and lock-out or tag-out the switch.

DANGER

DO NOT perform maintenance unless you have been properly trained on high voltage safety and are familiar with the safety requirements and procedures detailed in the BAE VPMS System Manual. Adhere to the procedures described in the vendor manual.

DANGER

Use work platforms or scaffolding whenever working on roof-mounted components. Ensure maintenance personnel use an approved safety harness.

3. Disconnect the ESS electrical cables. Refer to 4. "VENDOR SERVICE INFORMATION" on page 26 in this section for electrical disconnect procedures.
4. Remove 12 mounting bolts, washers, and spacers that secure the ESS to the vehicle roof structure.
5. Attach lifting equipment to the ESS, ensuring that all six lifting brackets are utilized and the load is evenly distributed and balanced.
6. Remove ESS from the vehicle.

2.5.6. Installation

1. Use appropriate lifting equipment and position the ESS on the vehicle rooftop rack.
2. Secure the ESS to the rack structure using 12 bolts, washers, and spacers. Torque bolts to 38 to 45 ft-lb. (51 to 61 Nm).
3. Connect the ESS electrical cables. Refer to 4. "VENDOR SERVICE INFORMATION" on page 26 in this section for electrical connection procedures.
4. Set Battery Disconnect switch to the ON position.
5. Start engine and verify system operation.

2.6. System Control Unit (SCU)

2.6.1. Description

The SCU, in conjunction with the Propulsion Control System, directs the energy flow in the hybrid-electric system using data from the driver interfaces and system components. The SCU is mounted behind a lighting panel on the interior streetside of the vehicle.

2.6.2. SCU Specifications

Operating Temperature
..... External ambient: -40° C to 75° C

Height ..... 3.9 in (99 mm)

Width..... 8.7 in (221 mm)

Length..... 15 in (385 mm)

Weight..... 10 lb (4.5 kg)

Cooling.....
Free convection air cooled on all exterior surfaces

2.6.3. Operation

The SCU and the Propulsion Control System (PCS) control the diesel engine speed, generator power, and traction motor torque. The SCU accepts commands from the primary driver interfaces (accelerator, brake, gear selection, Master Run switch etc.), Energy Storage System (ESS), Propulsion Control System (PCS), and other vehicle systems. It uses this information to control the engine load and RPM, provide optimal power, torque, and speed commands to the PCS and manage the ESS state of charge. The SCU is also used to monitor the overall hybrid drive system and provide diagnostic information.

2.6.4. Removal & Installation

1. Set the Battery Disconnect switch to the OFF position.
2. Remove the streetside lighting panel located above the third and fourth windows.
3. Unplug electrical connectors.
4. Disconnect dedicated ground wire.
5. Remove fasteners that attach SCU module to mounting plate.
6. Installation is the reverse of removal.

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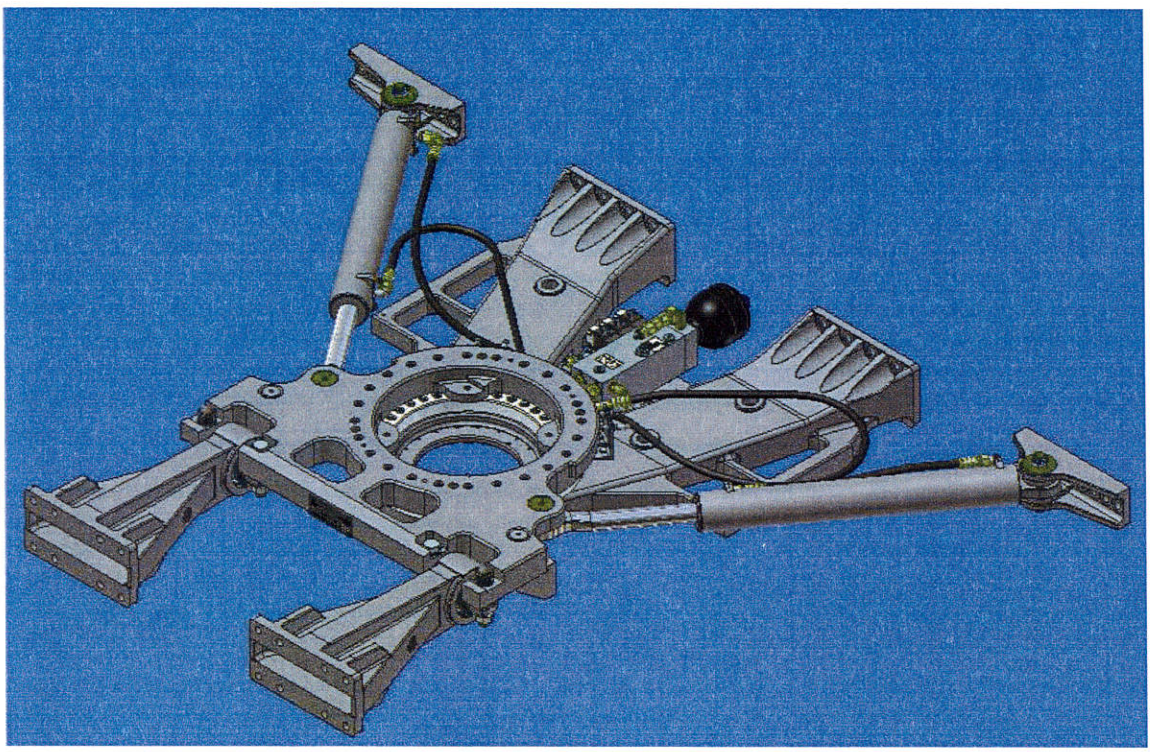
DIESEL HYBRID COACHES

Exception # 36

ARTIC - O - MAT LIMBO

TECHNICAL DESCRIPTION



LOW FLOOR ARTICULATION

Contents

INTRODUCTION

The ARTIC-O-MAT range of turntables has been in production since 1984.
There are three versions of the ARTIC-O-MAT :-

The standard	for high floor buses
The Compact	for low floor buses with two steps in the rear.
The Limbo	for ultra low floor buses.

The major hydraulic and electric / electronic components are common to all three versions. There are over 3 300 ARTIC-O-MAT turntables in service world wide, over half of these in the United States of America.
See Reference list.

LIMBO II 350

The ARTIC-O-MAT LIMBO was designed for low floor articulated buses. It's height, measuring a total 210 mm from the top of the aluminium deck plates to the bottom of the support structure caters for floor heights as low as 445 mm over the turntable. It allows horizontal rotational angles of up to 52° combined with vertical angles up to 10°.

The modular design allows this turntable to be used in a ' puller ' configuration by simply eliminating the electronically controlled hydraulic systems.

The aluminium cover plates have been designed with easy to open-flaps. These access flaps can be opened without removing the seats that are mounted on the articulation.
This makes it easy to access the the joint for lubrication,checking and maintenance.

General description

The Artic-O-Mat plays a very important role in the safety and stability of the bus. The anti-jacknife device is located in the articulation between the two vehicle sections. The pivot angle between the front and rear vehicle sections is electrically monitored. Unintended changes in the pivot angle are prevented by two double acting cylinders.

Depending on the driving conditions, the articulated joint is either free, damped (throttled) or locked in such a way as to prevent further pivoting in a clockwise or alternatively counter-clockwise direction.

When the maximum pivot angle is reached while reversing, the vehicle brakes are activated as well as the relevant lock up valve.

Information for the bus driver.

The pivot angle between the front and rear vehicle sections is electrically monitored. Two double acting hydraulic cylinders control the rotational movement of the turntable.

There are three tell tale lights located in the drivers compartment.

The max angle alarm.
This is activated at maximum angle (49°). If a pivot angle of 49 degrees is reached when reversing the vehicle parking brakes are activated. To release the brakes put the gear box into drive and move forward until the pivot angle is less than 49 degrees.

Pressure loss alarm.
This tell tale lights up when there is a leak in the system and the pressure has dropped to below 10 bar.

Joint fail alarm
This is activated if
a. there is no power getting to the control system
b. there is a fault in the speed signal
c. there is an internal fault in the controller or the connected sensors

The controller can be programmed to limit the vehicle speed or to shut down the engine within 60 seconds of a safety related feature , should the driver ignore the warning lights.

Buzzer (optional)
A buzzer can activated if the pivot angle increases above 39 degrees to warn the driver that he is approaching the maximum angle. It can also be activated to warn the driver of a safety related failure and of speed limitation or imminent engine shutdown.

TECHNICAL DESCRIPTION

The ARTIC-O-MAT turntable can be divided up into two main sections.

- The mechanical components
- The control system

The mechanical components.

The articulation is built up on a cast steel support structure.
This cast frame is bolted to the bus chassis at the front of the rear car body.
A large diameter bearing (slewing ring) is bolted on top of this frame.
This bearing allows the horizontal rotation between the front and rear body cars.
The maximum angle is limited to 52°.
Mechanical bump stops prevent larger rotational angles.
A steel "yoke" plate is bolted to the top of the bearing. This plate is connected to the front car body via two "wrist – joint" bearings. These metal elastic bearings can rotate through a 30 ° vertical angle. The turntable structures are designed to allow a maximum vertical angle of +/- 10°.

Maximum angles.

The maximum required horizontal turntable angle is defined by the front wheel base , the distance between the centre axle and the turntable, and the front axle steering angle. This angle is identified by a position switch and can be set at any angle up to 52°. At 52° the hydraulic cylinders have not reached their maximum extension / compression. Mechanical bump stops prevent a larger angle than 52° thus protecting the hydraulic cylinders. The control system can provide a signal to warn the bus driver when he is approaching maximum angle when reversing.

The maximum required vertical angle is defined by the approach angle and the break away angle between the centre axle and the hinge point at the turntable when driving forwards and the breakaway angle at the rear of the bus when reversing. On a low floor Artic these angles are usually between 6° and 8° and the resulting maximum vertical angle at the turntable is 9°.
As it is not possible under normal driving conditions to manoeuvre the bus so that a larger angle can occur, we do not have a vertical angle sensor.

The Turntable variations.

The ARTIC-O-MAT Limbo can be supplied in different configurations depending on the bus builder's requirements for seating on the turntable and how he wants to guide the hoses through the articulation.

The hoses can be guided

- through the articulation under the floor (preferred solution)
- between the bellows and a false ceiling
- above the bellows on the roof of the bus.

If it is necessary to mount seats on the turntable we recommend using a conventional centre hoop cross beam with the aluminium cover plates connected via hinges. The hoop is steered by the joint to half the articulation angle. The aluminium cover plates thus move at half the speed of the joint and half the distance. The symmetrical movement allows the seats to be mounted in the centre of the articulation.
The cover plates have access hatches which allow maintenance work to be carried out on the turntable without removing the seats.

Version 1 061-01.007-P.00
This version has a conventional centre hoop carrier beam and cover plates.
Seats can be bolted to the turntable.
The hoses are guided through the turntable above a false ceiling in the bellows.
The centre hoop is equipped with spring struts which half the vertical angle.

Version 5 061-01.011-P.00
This version has a conventional centre hoop carrier beam and cover plates.
Seats can be bolted to the turntable.
The hoses are guided through the centre hoop cross beam below the cover plates.
The centre hoop is suspended from the roof and steered from below the hose guiding frame.

The center hoop and aluminum cover plates.

The ARTIC-O-MAT LIMBO is equipped with a conventional center hoop.
This consists of a cross member that rides on top of the joint.
The center hoop which supports the folding bellows in the center of the articulation is connected to this cross member via two metal elastic bearings.
The complete assembly is steered to half the articulation angle by gear wheels located inside the main bearing.

The steering mechanism is held together by a retaining pin that can be removed to allow the assembly to rotate during maintenance work. The hoop must be pushed aside to torque the bearing bolts it conceals. The retaining pin is designed to shear if overloaded. This can happen if the center hoop is hit by another vehicle when driving or if an obstacle in the bus restricts its movement.

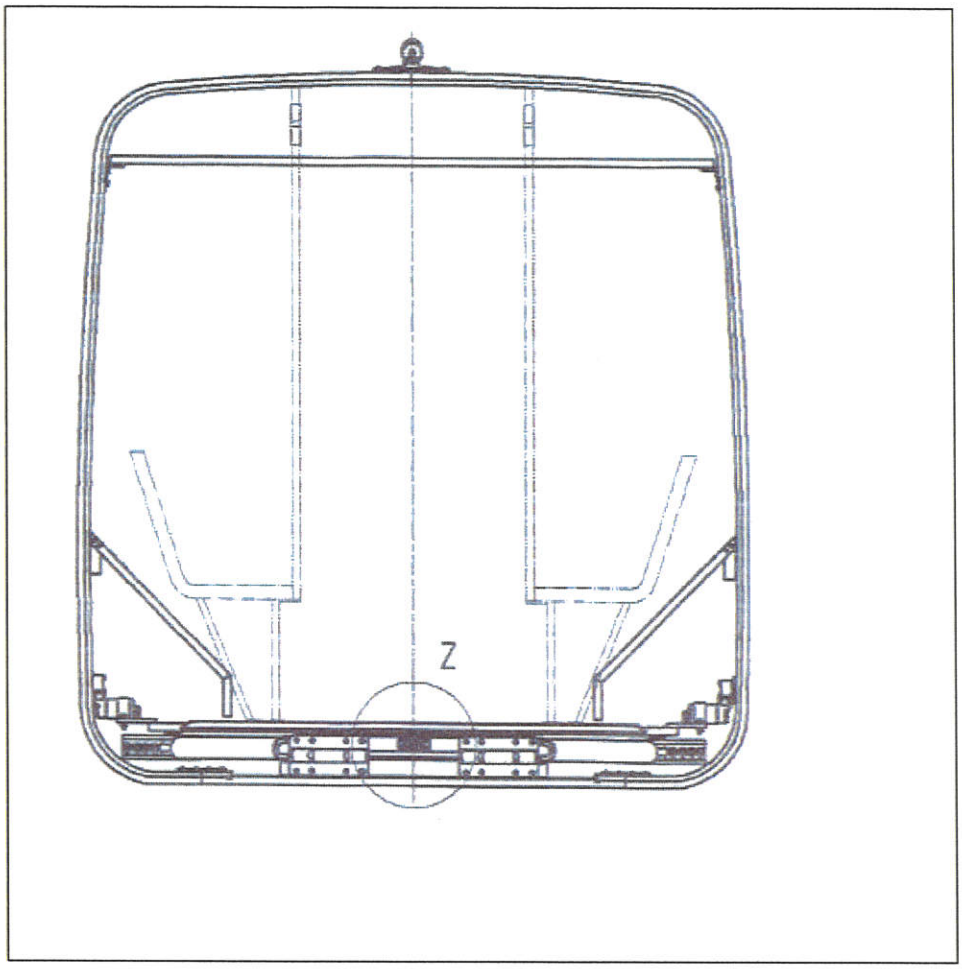
The design of the steel center hoop cross member allows seats to be mounted directly to it.

Two semi circular aluminum cover plates with a protective rubber outside lip are hinged to the center hoop cross member. Each cover plate has an access flap which can be opened without removing the seats.

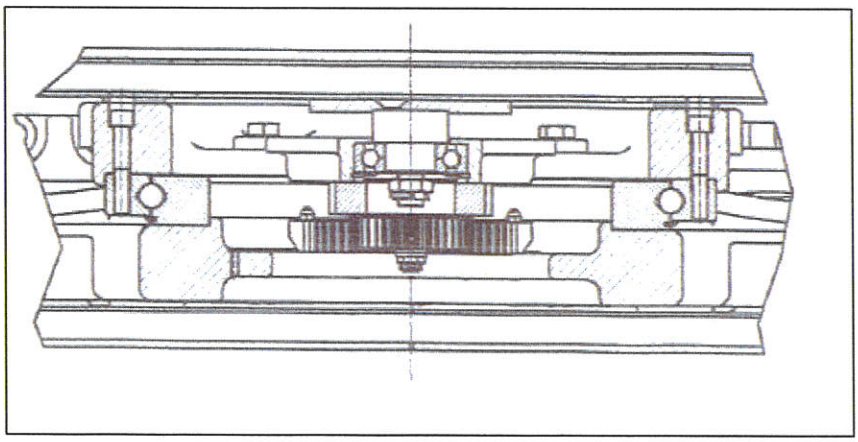
The access flaps are large enough to allow the joint to be lubricated and the joint electrics to be checked easily.

A T G Autotechnik GmbH	ARTIC-O-MAT LIMBO Centre hoop	

CENTRE HOOP WITH SEATS



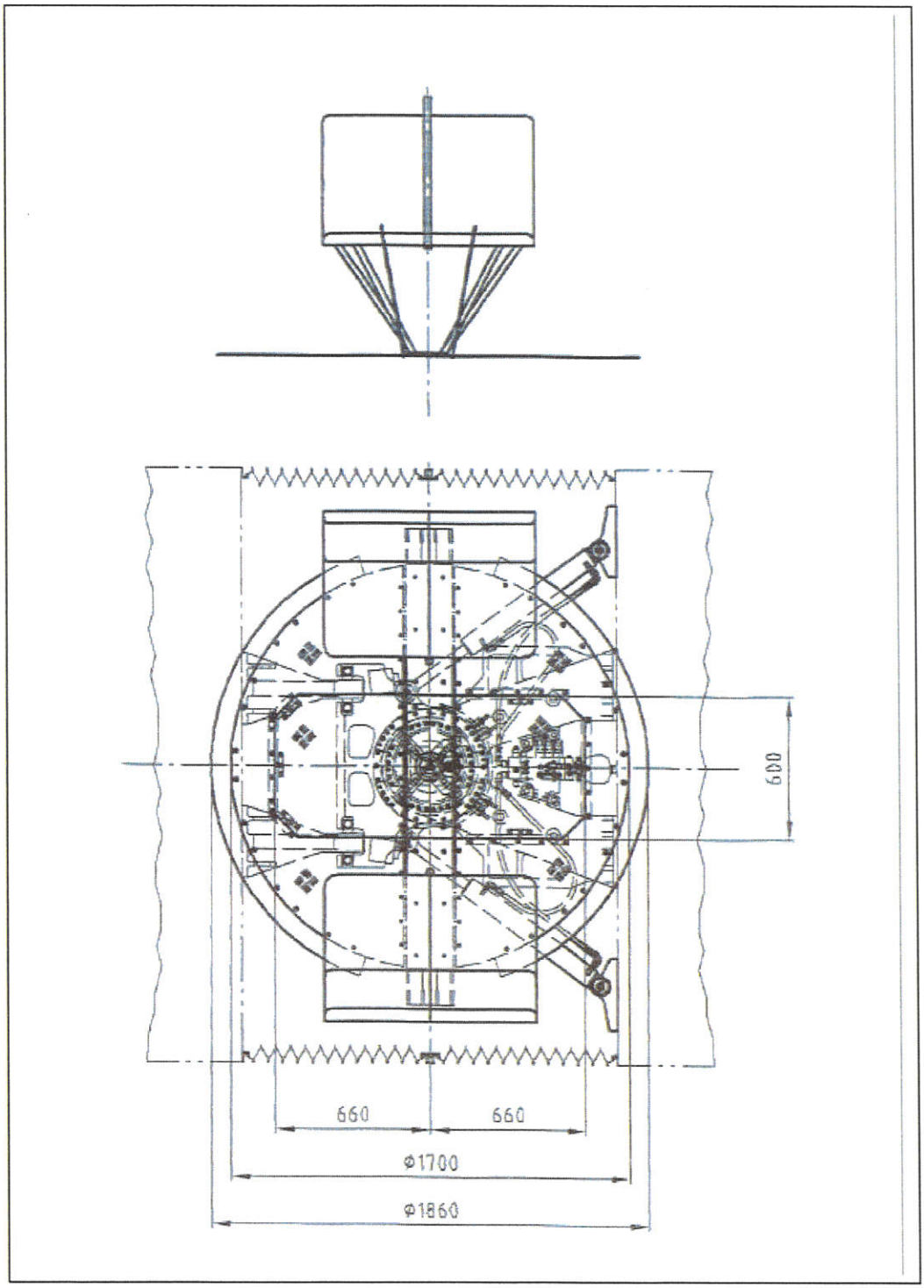
CENTRE HOOP BEARING



Erstellt am 30.05.05	Version 30.05.05	www.articulated-bus.com
von	von	
Name : Browne	Name	

A T G Autotechnik GmbH	ARTIC-O-MAT LIMBO COVER PLATES	

Cover plates with seats and open accesss Hatches



Erstellt am 30.05.05	Version 30.05.053)	www.articulated-bus.com
von	von	
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THE CONTROL SYSTEM

The control system can be divided into three subgroups.

1. **The Sensors**.

   Speed signal
   Speed switch / Transmission
   2 pressure switches (25 bar).
   2 damping switches (39° left and 39° right)
   2 end switches (49° left and 49° right)
   1 pressure loss switch (pressure below 10 bar)

2. **The Control System**

   The programmable logic controller.
   The telltale lights and buzzer on the driver's dashboard.

3. **The Controlled System**

   Four solenoid valves located on the hydraulic control block :-
   The damping valves, lock valve left and lock valve right.
   The parking brake.
   The engine management control system
   ASR / traction control system if installed

How the control system works.

Two double acting hydraulic cylinders are installed in the turntable. Four hoses connect these cylinders to the hydraulic control block.
When the turntable rotates, hydraulic oil is forced out of two cylinder chambers through the control block and into the remaining chambers, i.e. oil must flow through the control block if the turntable is to turn.
By controlling the flow through the hydraulic block one can influence the handling of the bus.

The pressure switches (25 bar) mounted on the hydraulic control block monitor the pressures which arise when the turntable rotates.

When the bus drives through a right hand corner, the hydraulic oil in the left hand ring chamber (marked V**3**, on diagram 050.03.I) and in the right hand cylinder chamber (marked V**4**, on diagram 050.03.I) is forced from the hydraulic cylinders through the hoses and through the hydraulic control block into the left hand cylinder chamber (marked V**I**, on diagram 050.03.I) and the right hand ring chamber (marked V**2**, on diagram 050.03.I). When this happens the right pressure switch is tripped.
When driving through a left hand corner the oil flow is reversed and the left pressure switch is tripped.

The larger the pivot angle at the turntable the greater the danger that the centre axle may be pushed off course which can result in jack-knifing.

This tendency to jack-knife or push the centre axle off course is held in check by two safety features :-

1. The application of hydraulic damping at turntable angles above 39°.

2. Limiting the torque output from the engine at turntable angles above 39°.

Hydraulic damping occurs when the damping solenoid switches a small nozzle into the path of fluid flow through the hydraulic control block. This action makes it more difficult for the turntable to rotate. By applying the damping (or throttle) valve at angles above 39° the speed of pivot angle change is effectively restricted and uncontrolled jack-knifing prevented.

It is nevertheless possible for the rear vehicle to push the front vehicle off course without jack-knifing if both axles on the front vehicle have low adhesion (e.g. on icy roads) and the rear drive axle has good traction. In order to reduce the risk of this happening the maximum torque available to the rear axle is limited at angles above 39°. The bus normally straightens up much faster when coming out of a corner than it bends when driving into the corner. For this reason the hydraulic damping and engine torque restriction are only activated when the turntable angle is increasing i.e. only when the bus is turning into the corner.

The control system can identify in which direction the turntable is turning based on the information available from the pressure switches.
The damping (39°) angle is defined by two inductive proximity switches , one for 39° left and another for 39° right.

The hydraulic damping solenoid and the engine torque limitation are only activated when the pivot angle is increasing. When the bus begins to straighten out of a turn the damping and the accelerator interface must be switched off.
The input from the two pressure switches (PL and PR)and the two 39° switches allows the control system to identify seven different conditions :-

PL	PR	39°L	39°R	Condition	Action
0	0	0	0	Driving straight	none
X	0	0	0	turning left ,angle below 39°	none
0	X	0	0	turning right, angle below 39°	none
X	0	X	0	turning left, angle above 39°L	Damping on
0	X	X	0	straightening, angle above 39°L	Damping off
0	X	0	X	turning right, angle above 39°R	Damping on
X	0	0	X	straightening, angle above 39°R	Damping off

The turntable is equipped with bump stops which physically limit the turntable angle. Before these stops are reached two end switches, one for maximum angle right and one for maximum angle left activate the relevant lock valve solenoid on the hydraulic control block. These lock valves only work in one direction i.e. it is possible to straighten out of maximum angle left when the lock valve left is activated.

When the maximum turntable angle is reached when reversing the parking brakes are activated. This stops the vehicle and prevents damage to the sub-frame around the turntable. An interlock override can be installed to allow the driver to release the brakes if necessary

The damping valve solenoids on the hydraulic control block are activated depending on the vehicle speed.
This stabilises the bus and limits swaying of the rear section of the bus when exposed to cross winds, overtaking another vehicle and when driving on uneven surfaces.

The programmable logic controller

The control unit is a general-purpose programmable logic controller (PLC), model VMM 1210 manufactured by Vansco Electronics of Canada.

This unit offers the following features: -

1. Module uses industry standard J1939 communication.
2. Interfacing to other vehicle electronics such and engine, transmission and anti-lock brakes can be easily accomplished with J1939 messaging.
3. Vansco VMM 1210 has LED's for each input and output circuit for easy system diagnostics. All LED's incorporate blink codes to indicate faults.
4. Vansco VMM 1210 has LED for network activity to indicate communication with other vehicle electronics.
5. Vansco VMM 1210 has LED for Power to indicate system is functioning correctly.
6. Module has ability to store information on errors and faults.
7. Module has ability to store information on events or occurrences (Log files) for system monitoring and advanced diagnostics.

Safety features / diagnostics

The input and output LED's allow quick and accurate failure diagnostics of the control system.

The following safety features are programmed into the logic.

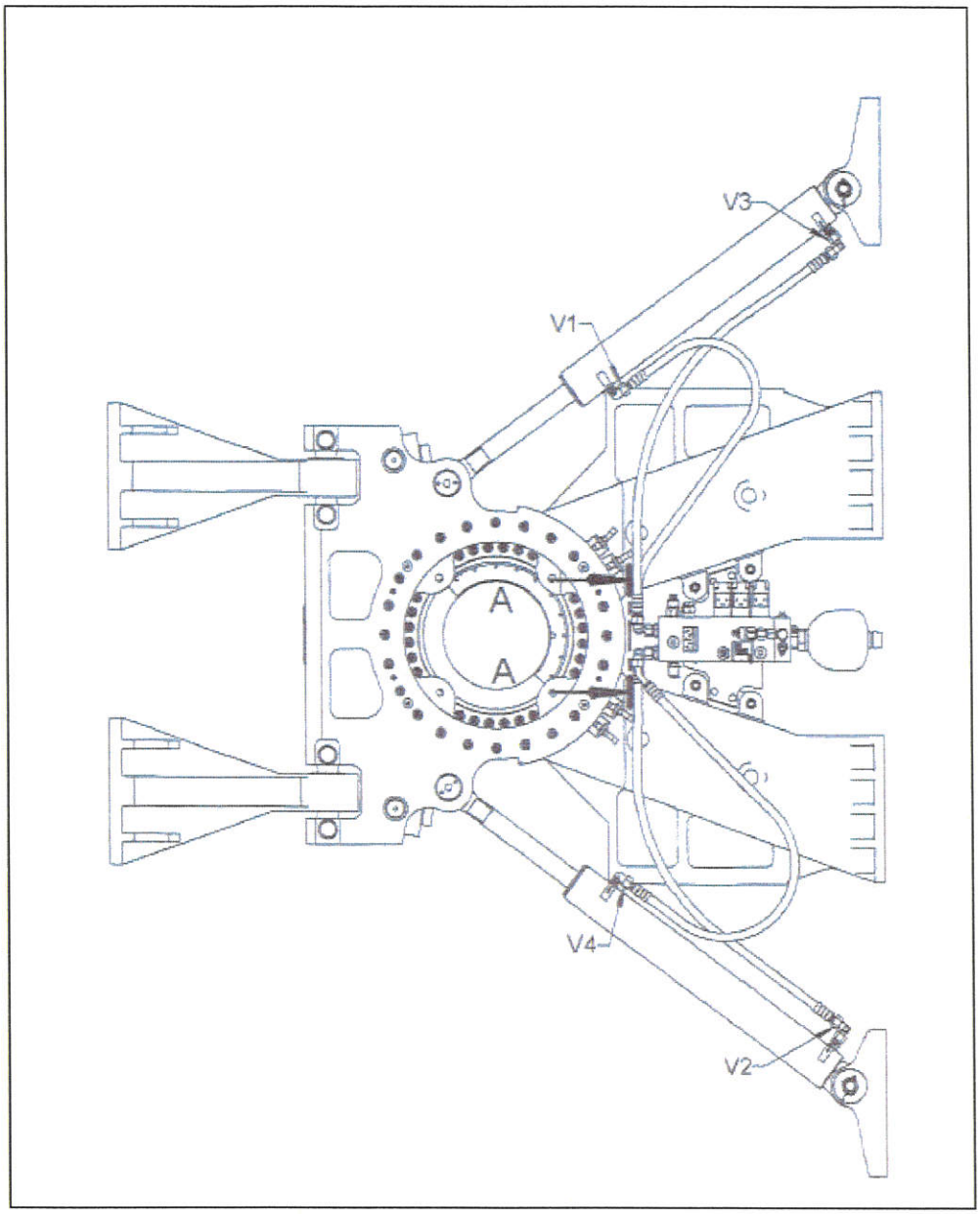
- Engine torque limitation at angles above 39°.

- ARS / traction control interface.
  The joint damping can be switched on when the traction control is active to limit the tendency to fish tail when a rear wheel is spinning.

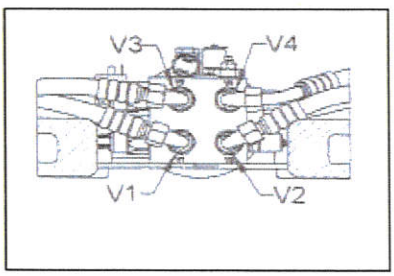
- Speed signal control.
  The most important safety feature of the articulation is speed dependent damping. It is important that the control system can identify the difference between waiting at a bus stop or stoplight and traveling without a speed signal. The controller compares the speed signal with a speed switch in the transmission. When the bus is moving at speeds above 5 mph both signals should arrive at the controller. If only one signal arrives both the joint fail light and first step damping is activated.
  The controller can be programmed to limit engine rpm or shut down completely if the bus is not stopped within a fixed time interval after the alarm has sounded.

ATG Autotechnik GmbH	ARTIC-O-MAT LIMBO HOSES	

HOSE CONNECTIONS ON HYDRAULIC CYLINDERS



CONNECTIONS TO HYDRAULIC BLOCK



Erstellt am 25.05.05	Version 31.05.05 (5)	
von	von	
Name : Browne	Name	

THE HYDRAULIC BLOCK

The hydraulic control block can be divided into two main sections. The high-pressure section consists of two lock up valves, two throttle or damping valves, two pressure limiting valves and four non-return valves. The low-pressure section has a pressure limiting valve and a screw lock valve which allows the different sections to be separated.

Each hydraulic cylinder has a ring chamber at the yoke end and a cylinder chamber at the frame end. The right hand cylinder chamber and the left hand ring chamber are connected to the left hand cylinder chamber and the right hand ring chamber via the hydraulic control block

By controlling the flow through the block, it is possible to control the pivoting of the turntable. The solenoid valves are activated by the electrical relay box depending upon the driving conditions, the flow through the block is either free, damped or locked in one direction. At vehicle speeds below 45 km/h the fluid flows without restriction through the block. At speeds between 45 and 80 km/h the fluid is forced through the nozzle of the damping valve DH
(nozzle diameter 1.0 mm). At speeds above 80 km/h the fluid is forced through the nozzles of DH and DL (nozzle diameter 0.6 mm). The lock valves SPL (lock valve left) and SPR (lock valve right) are activated when the turntable reaches the maximum pivot angle. The damping valve DL is also activated when reversing the vehicle if the pivot angle exceeds 39 degrees and the pressure exceeds 25 bar. The pressure in the block is monitored by two 25 bar pressure switches ML and MR.
The low-pressure section of the control block consists of a pressure limiting valve ,a 10 bar pressure switch, and a test connection M1. The pressure limiting valve exhausts the fluid through connection T if the pressure in the low-pressure part of the system rises above 300 bar this could happen in the event of a fire.

By closing the screw lock between the high and low pressure sections it is possible to work on one part of the system without having to bleed both sections afterwards.

The rotational movement of the turntable depends on the flow through the hydraulic block. The flow through the hydraulic block can be controlled by activating the solenoid valves.

The hydraulic block allows 5 possibilities: -

1. No solenoid valves activated .	The flow through the block is unrestricted. Only the system pressure of 20 bar stabilises the turntable.
2. D H solenoid activated.	The fluid must flow through a 1.0 mm nozzle This has a throttling or damping effect on the rotational movement of the turntable.
3. L H solenoid activated.	The fluid must flow through a 0.6 mm nozzle This has a very high damping effect on the rotational movement of the turntable.
4. SPL solenoid activated.	The flow through the block is locked in one direction, the turntable can not rotate to the left but it can rotate to the right.
5. SPR solenoid activated.	The flow through the block is locked in one direction , the turntable can not rotate to the right but it can rotate to the left.

The solenoid valves are activated by the controller depending upon the following parameters :-

Vehicle speed
Turntable angle
Vehicle in "Drive" or "Reverse" and the pressure in the hydraulic system.
ASR / Traction control interface

VEHICLE SPEED

At speeds below 45 km/h when driving forwards the turntable is stabilised by the charge pressure of 20 bar in the system, no solenoid valves are activated.
At speeds between 45 km/h and 80 km/h the solenoid valve DH is activated ,the fluid must flow through a 1.0 mm nozzle the system pressure can rise to 150 bar this damping pressure stabilises the vehicle.
At speeds above 80 km/h both solenoids D H and D L are activated , the fluid must flow through a 1.0 mm nozzle and then through a 0.6 mm nozzle, the system pressure can rise to 200 bar . This very high damping pressure prevents the rear vehicle from swaying during high speed overtaking.

Turntable angle

The lock valve solenoid is activated when the maximum pivot angle of 49 degrees, is reached. At 49 degrees right, a position switch ESR (end switch right) activates the SPR (lock valve right) solenoid. At 49 degrees left, ESL (end switch left) activates SPL (lock valve left).

Vehicle in drive or reverse

When the vehicle is reversing a buzzer is activated on the drivers dash board if the pivot angle increases above 39 degrees. The angle is identified by two position switches DSR (damping switch right = 39 degrees right) and DSL (damping switch left = 39 degrees left). If the system pressure exceeds 25 bar when reversing the damping valve D H is also activated. The pressure is monitored by two 25 bar pressure switches mounted on the hydraulic block. At 49 degrees in reverse the vehicle brakes are activated in addition to the hydraulic lock valves.

ATG Autotechnik GmbH	ARTIC-O-MAT LIMBO	CONTROL MATRIX

	Speeds between 0 and 45 km/h			Speeds between 45 and 80 Km/h	Speeds above 80 km/h
	Pivot angles below 39°	Pivot angles above 39°	At max. angle 49°		
Driving forwards	Charge damping 20 bar	Charge damping 20 bar	Hydraulic lock-up max angle alarm	High hydraulic damping independent of pivot angle	High and very high hydraulic damping
Reverse or neutral	Charge damping 20 bar	Very high hydraulic damping	Hydraulic lock-up + Vehicle brakes activated + max angler alarm		
ASR or traction - control	High hydraulic damping				
Joint fail pressure loss	problem with controller hydraulic system fail				

Erstellt am 25.05.05	Version 25.05.05	www.articulated-bus.com
von	von	
Name : Browne	Name	

A T G Autotechnik GmbH	ARTIC-O-MAT REFERENCE LISTE	

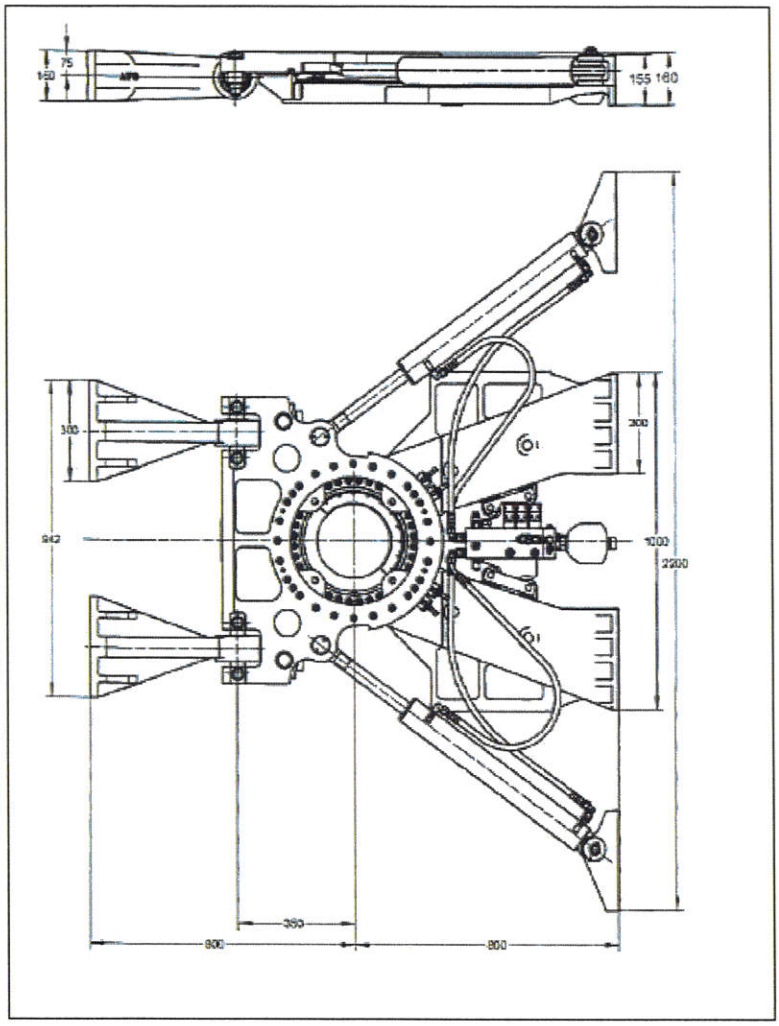
Bus Manufacturer	Transit authority	No in service
New Flyer		**1 400**
Canada+USA	AC Transit , California	30
	SAM Trans , California	40
	Las Vagas	18
	Minneapolis, St Paul	105
	B.C. Transit, British Colombia	21
	MUNI , San Francisco	24
	St. Alberta , Canada	6
	MUNI; Trolly buses, San Francisco	60
	Mississauga Transit , Toronto	21
	San Diego Transit , California	50
	New York Transit	630
	Clark County Transit, Oakland	36
	Seattle Transit	274
	Community Transit, Everit Washington	29
	Des Moines, Iowa	7
RENAULT		**1100**
France	RATP, Paris	
	Euro Disney , Paris	
	Orleans	
	Bordeaux	
VIBERTI IVECO		
Italy	Padova	86
	Milan / trolly bus	
	Turin	
MASA		
Mexico	Servicios y Transportes Electricos	190
DAF		
Holland	Puller Artics	39
	Pusher Artics	42
DAB		
Denmark	Puller Artics	32
MCI		
Canada		18
	Metro Transit Authority, Nova Scotia	
	Halifax Transit / Quebec City	
NEOPLAN		
USA + Germany		116
	Rhode Island Transit	
	San Mateo Transit, California	
	Dallas Transit, Texas	
	Community Transit, Everett, Washington	

Erstellt am 23.01.05	Version 23.01.05	www.articulated-bus.com
Name : Browne	Name	

Total 3000

A T G Autotechnik GmbH	ARTIC-O-MAT LIMBO DATA SHEET	LIMBO II PUSHER 350

LIMBO II PUSHER 350



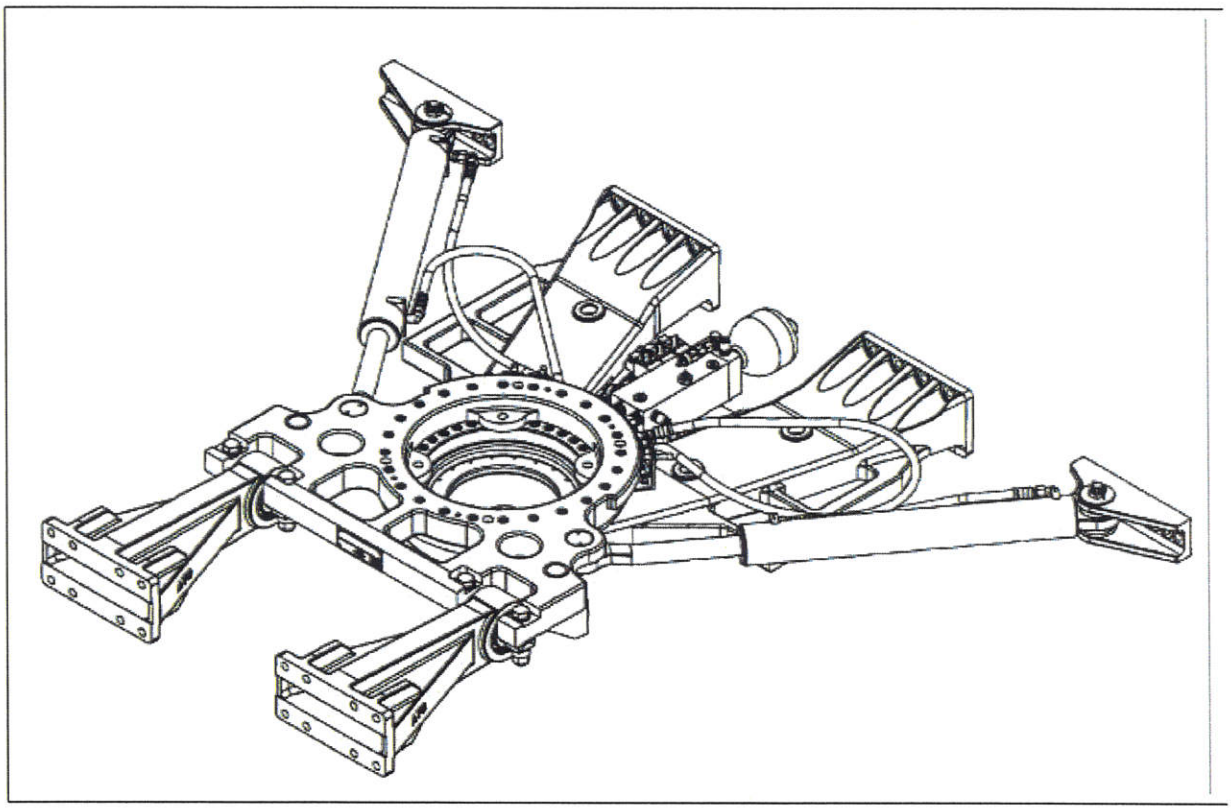
Height	Bottom of frame to top of yoke plate	:- 160
	Including Centre hoop, Bellows + cover plates	:- 235
Length	Total length	:- 1600
	between horizontal and vertical axis	:- 450
	between horizontal axis and front flanges	:- 350
	and rear flange	:- 800
Horizontal angles		:- +/- 52 °
Vertical angles		:- +/- 10 °

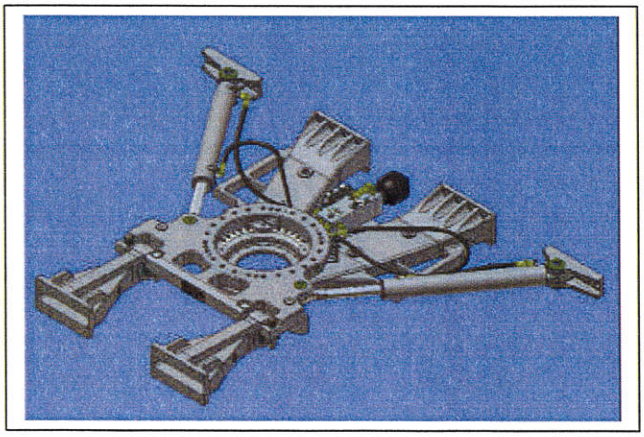
Erstellt am 20.11.02	Version 31.05.04	
von	von	
Name : Browne	Name	

A T G Autotechnik GmbH	LIMBO II 350	Basic Pusher articulation

061-01.002.0.04

- Mechanical and Hydraulic parts
- Wrist joints
- Articulation height **160 mm**
  (bottom of frame to bottom of cover plate)
- Articulation weight **470 Kg**



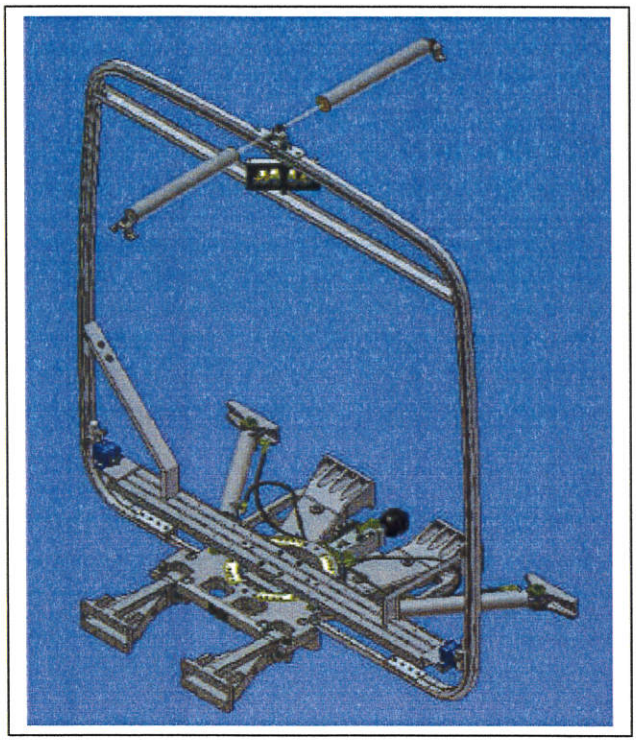


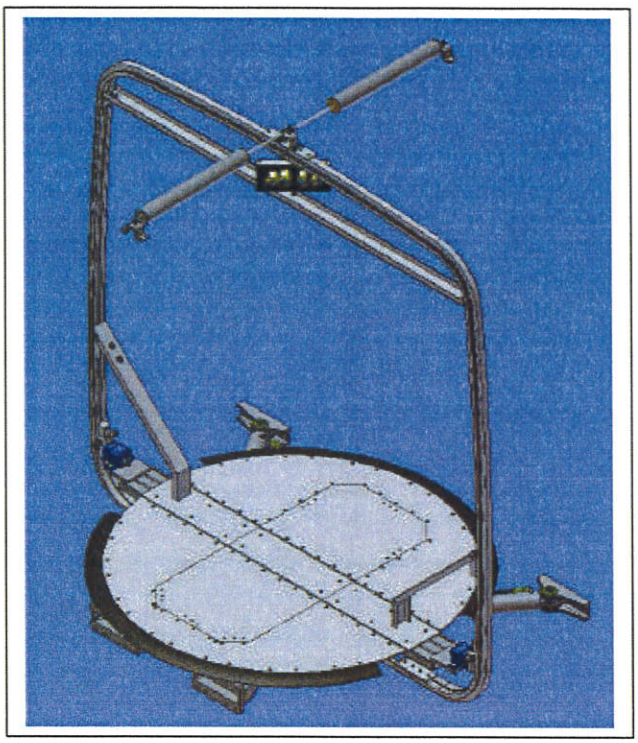
Erstellt am		Geprüft und freigegeben am 09.05.05	01
von	M. August	von	
Name		Name	

A T G Autotechnik GmbH	ARTIC-O-MAT LIMBO II 350	Roof hoses + Seats

061-01.007-P.00

- Hoses through falce ceiling (S).
- Roof struts
- Seats on centre hoop
- Conventional cover plates
- Turntable height 235 mm
  (bottom of bellows to top of coverplate)

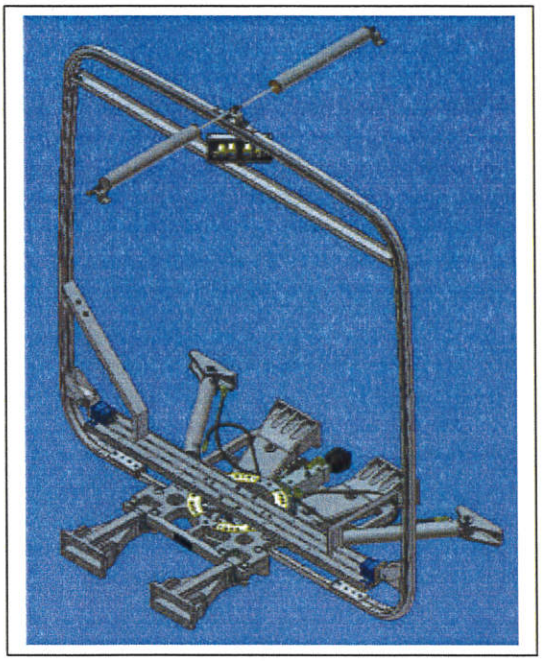


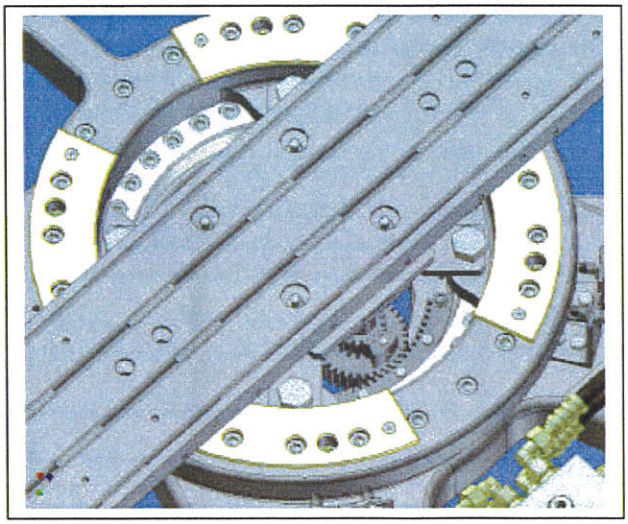


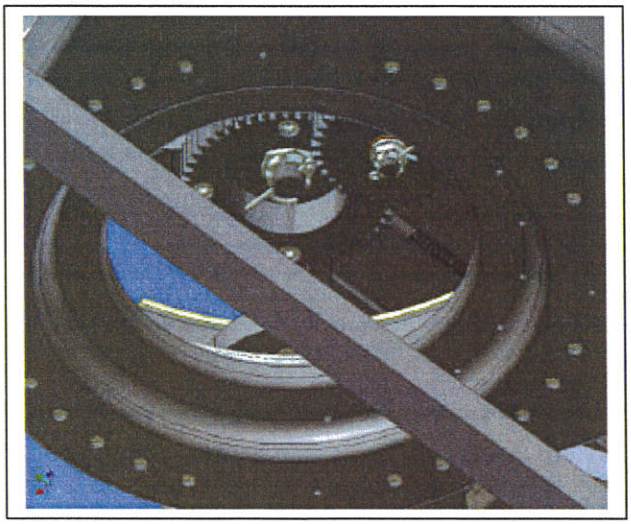
Erstellt am 13.05.04	Version 09.05.2005	
von	von	
Name : Browne	Name	

ATG Autotechnik GmbH	LIMBO II 350	Centre hoop control w hoop beam

Centre Hoop control to be used with ATG hoop with hoses through roof.





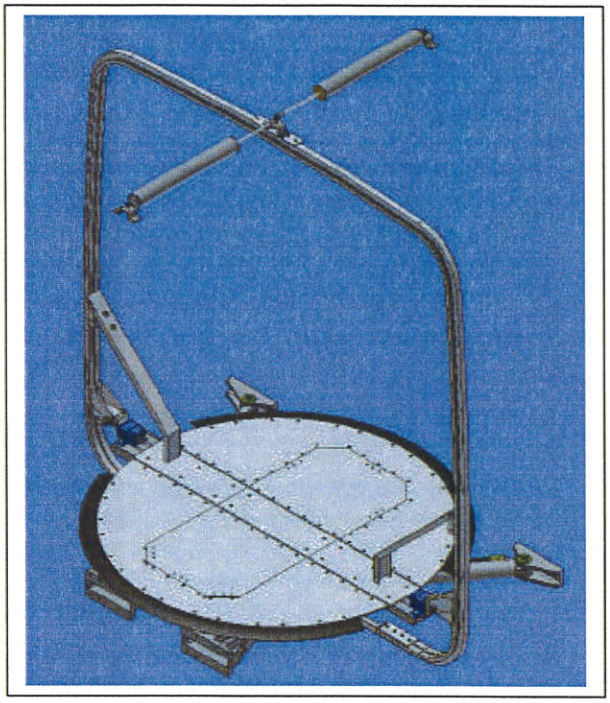


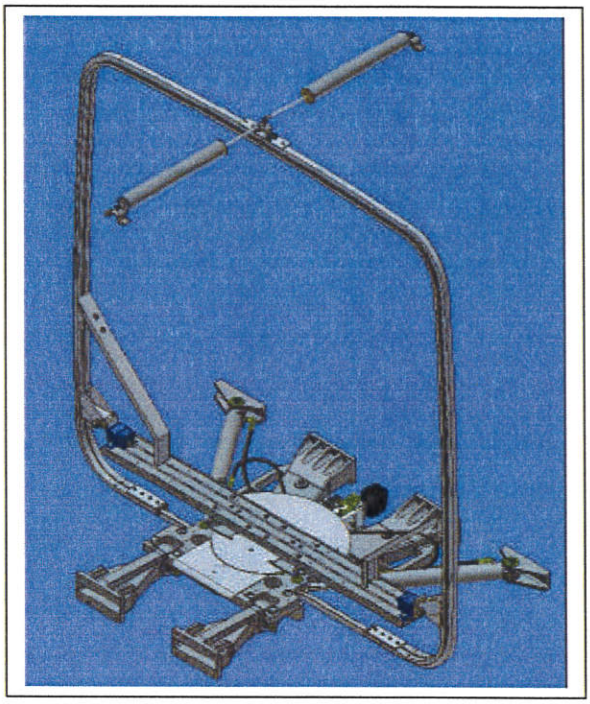
Erstellt am		Geprüft und freigegeben am 17.05.04	03
von	M. August	von	
Name		Name	

A T G Autotechnik GmbH	LIMBO II 350	Hoses in hoop beam

061-01.010-P.00 **Version 5**

-- Hoses through hoop beam under cover plates
– Roof struts
– Seats on centre hoop
_ Conventional cover plates
– Turntable height **288 mm**
(bottom of bellows to top of cover plate)





Erstellt am		Geprüft und freigegeben am 17.05.04	
von	M. August	von	
Name		Name	

CITY AND COUNTY OF SAN FRANCISCO
San Francisco Municipal Transportation Agency
Request for Proposals
THE PROCUREMENT OF
30-Foot, 40-FOOT AND 60-FOOT LOW FLOOR
DIESEL HYBRID COACHES

Exception # 41

NEW FLYER

#Option 260 I Model: Xcelsior I Length: 40-FT, 35-FT, 60-FT I Type: Low Floor I Propulsion: ALL

Battery System

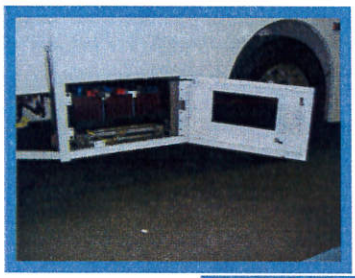
The battery system consists of the vehicle batteries and tray, the voltage equalizer, and the battery disconnect switch.

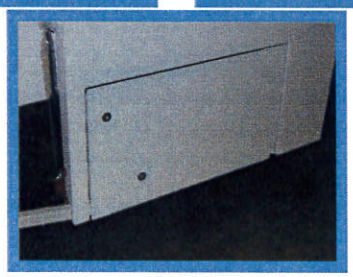
Battery Tray

The battery tray is located at the rear curbside of the vehicle behind an access door. The battery enclosure and tray are constructed of heavy duty 3/16" polyethylene plastic. The battery tray is mounted on a stainless steel sub-frame for support. The tray easily slides out on stainless steel bearings. The plastic between the batteries and the sub-frame acts as an isolator pad on the surface of the tray which reduces vibration to the batteries.

Battery Cable

The battery cable is a #4/0 gauge cable connected to the positive terminal of the battery to the battery disconnect switch. Ends of the cable are marked with red heat shrink to identify cable as being 24V Positive, blue heat shrink for 12V Positive and black for Negative.

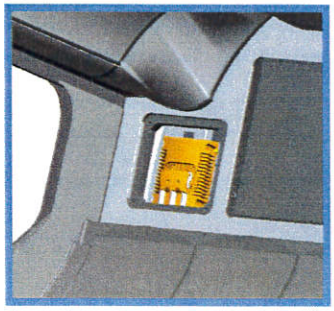




Voltage Equalizer

A voltage equalizer is installed on above the rear shelf and can be accessed from the interior bulkhead access panel.

- It's a power management system used to obtain a 12 VDC power source from a 24 VDC electrical system which allow to function batteries as if they are in series and parallel at the same time
- It ensures that battery voltages remain equal
- It is connected to the battery system at the 12 VDC, 24 VDC, and ground points
- It maintains voltage balance between the batteries and therefore the charge acceptance rate of each battery to within 0.05 volts at light load and 0.1 volts at full rated load
- Designed to extract 12 volts DC service from a multiple battery 24 volt DC system while electronically maintaining battery voltage balance which prevents overcharging and boiling of batteries
- Continuously monitor battery condition with or without the engine running



NEW FLYER

Battery Disconnect Switch:

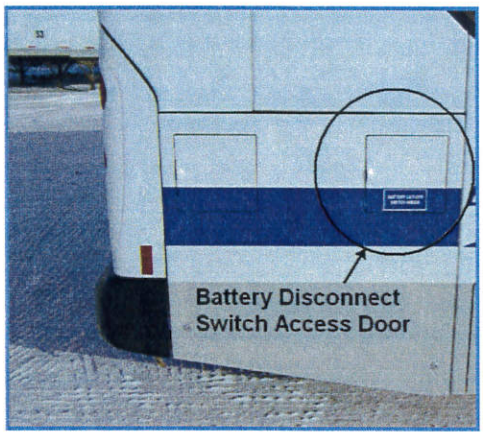
The battery disconnect switch is located on the fuse box, curb side of the engine compartment. This switch isolates the batteries from the vehicle electrical system. A separate disconnect switch access door is provided to allow disconnection of electrical power without having to open the curbside engine access door.

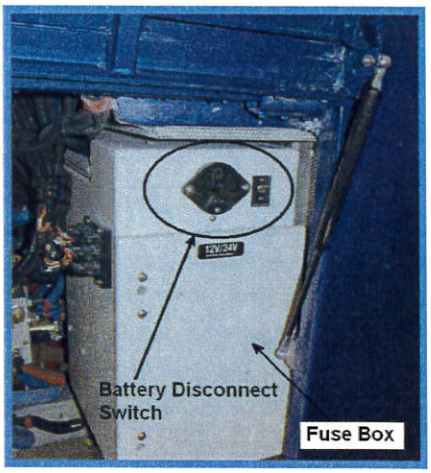
- This rotary switch serves to disconnect the batteries from the vehicle 12/24V electrical systems
- To disconnect the batteries from the electrical system, rotate the battery disconnect switch to the OFF position
- Always rotate this switch to the OFF position before disconnecting any battery cables
- **OPTION** - It can incorporate a limit switch that will detect when the switch is in the ON or OFF position which disable engine ignition and shutdown the engine if the Battery Disconnect switch is set to the OFF position

Fuse Box Assembly

The vehicle fuses are located in the fuse box located on curbside of the engine. It is made of Aluminum treated with white primer.

- The fuse box assembly includes the battery disconnect switch, voltage regulator, fuse panel, circuit breaker panel, and compartment light switch
- It also houses the air system brake interlock components including the pressure regulator, interlock mag valve, and Schrader pressure test valve





NEW FLYER

XCELSIOR
BETTER BY DESIGN

CITY AND COUNTY OF SAN FRANCISCO
San Francisco Municipal Transportation Agency
Request for Proposals
THE PROCUREMENT OF
30-Foot, 40-FOOT AND 60-FOOT LOW FLOOR
DIESEL HYBRID COACHES

Exception # 77

NEW FLYER

NEW FLYER Xcelsior®

SALES INFORMATION BULLETIN

#241-003 | **Model:** Xcelsior® | **Lengths:** 35', 40' and 60' | **Propulsions:** Diesel, Diesel-Electric

Polyethylene Diesel Fuel Tank

Product Features

The fuel system includes:

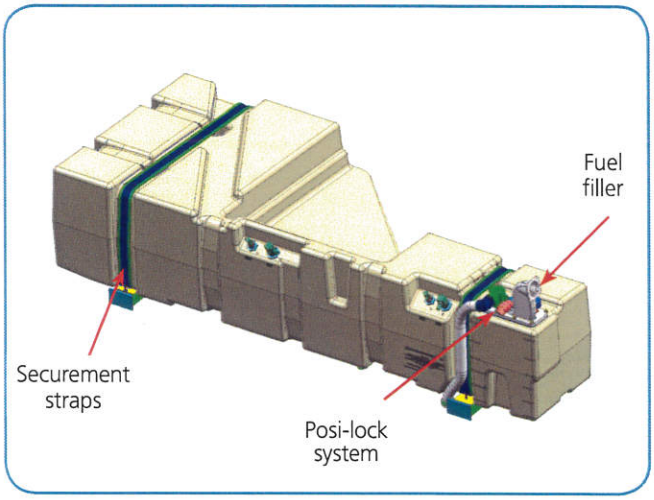
- Single cross-linked polyethylene fuel tank
- Fuel lines and check valve
- Fuel filters
- Fuel pump
- Fuel filler

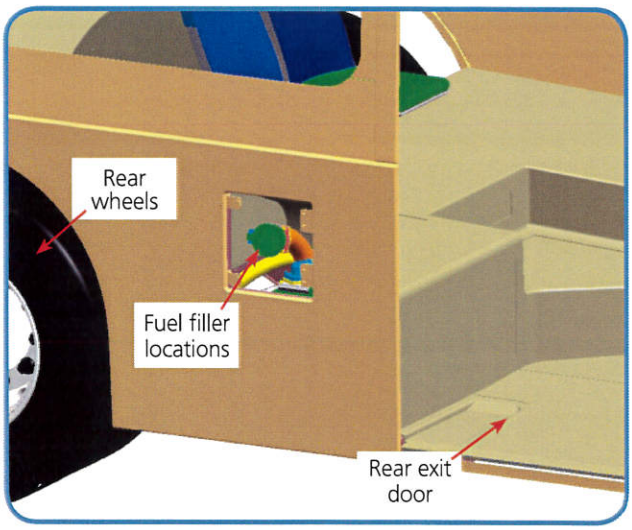
Fuel Tank

A single fuel tank is mounted transversely in the vehicle chassis, forward of the rear axle. A fuel filler neck assembly is bolted to the tank and provides mounting locations for the fuel-filler adapter, pressure relief valve, and fuel-level control valve. Fuel tank fill access is provided through a hinged door on the curbside of the vehicle. Supply and return fuel hoses connect the fuel tank with the engine.

The tank is constructed of cross-linked polyethylene with a nominal thickness of 0.300". The tank is internally baffled to prevent fuel sloshing regardless of fill level.

- All lengths of diesel buses come standard with a 125 useable US Gal (473 L)-size tank and holds up to 144 US gallons (545 L).
- Non-artic diesel-hybrid buses come standard with a 100 useable US Gal (378 L)-size tank and holds up to 144 US gallons (545 L).
- Artic diesel-hybrid buses come standard with a 125 useable US Gal (473 L)-size tank and holds up to 144 US gallons (545 L).





The fuel tank assembly is securely mounted to the bus with two support channels on both sides and a tubular structure in the center. The fuel tank is mounted to the support channels by means of straps to prevent movement. The lightweight design of the tank and the design of the tank supports make the tank easy to remove for maintenance.

Fuel Lines

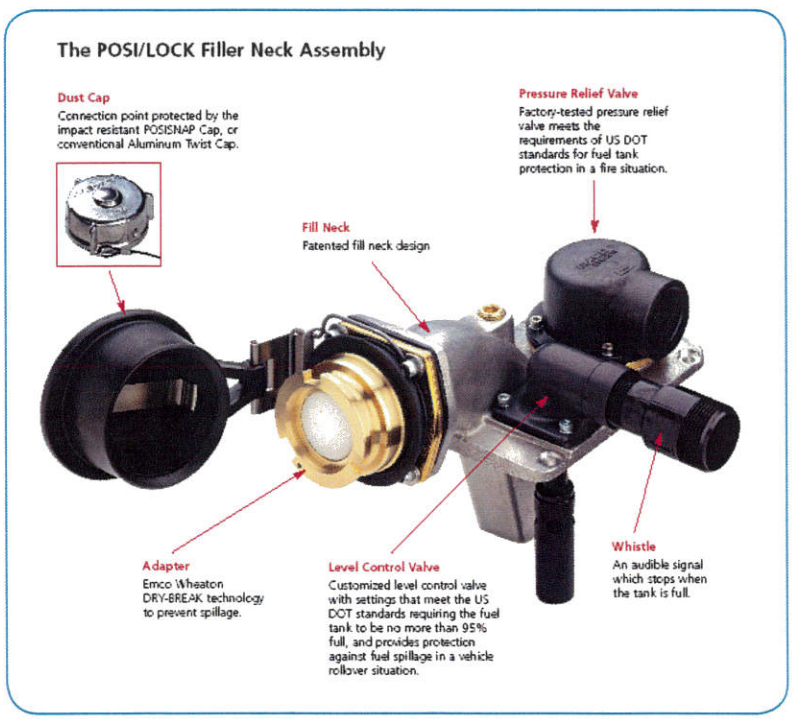
The Xcelsior® bus comes standard with a biofuel-compliant fuel system. The fuel lines from the fuel tank to the bulkhead are nylon fuel-grade tubing and orange in color in both 3/4" and 1/2" outer diameters. Fuel lines in the engine compartment are Eaton GH100 diesel and biodiesel compatible hoses. No copper hard lines are used, only stainless steel.

Fuel Filters

The primary fuel filter is bracket-mounted on the curbside of the engine compartment. The filter assembly consists of a filter head and a replaceable spin-on filter element, with a Water-in-fuel sensor and water drain valve. The secondary fuel filter is bracket-mounted on the curbside of the engine compartment. The filter assembly consists of a filter head and a replaceable spin-on filter element with a Water-in-fuel sensor and water drain valve.

Fuel Filler

By default, Xcelsior® is offered with an Emco POSI/LOCK 105 automatic dry-break fueling filler system although customers can request a non-pressure fill-type system as an option. The dry-break fuel filler is located behind the rear door on the curbside of the bus. The filler cap is recessed into the bus body behind a hinged access door. The filler accommodates a 1½" diameter nozzle and a fill rate of 40 US gallons (151 L) per minute of foam-free fuel without spitting back or causing the nozzle to shut off before the tank is full. An audible signal indicates when the tank is essentially full.



Operations/Procedures

On engine start-up, the lift pump draws fuel from the fuel tank through a primary fuel filter. The low pressure side of the fuel pump discharges fuel through the fuel manifold, the secondary fuel filter and to the inlet of the high pressure fuel pump. High pressure fuel is delivered through a common fuel rail to the fuel injectors. Surplus fuel returns to the fuel tank through a return line.

Service/Maintenance

Replacement of the primary and secondary fuel filter is recommended every 6,000 miles (9,600 km), six months, or 500 operating hours, whichever comes first. Opening of the drain at the bottom of the fuel tank to drain off water and/or sediment is required every 30,000 miles (48,000 km). Every 60,000 miles (96,000 km) or twelve months, whichever comes first, all fuel tank mountings and brackets should be tightened. At the same time, the fuel tank cap seal, the breather hole in the cap, and the condition of the flexible fuel lines should be checked. A thorough inspection of all fuel hoses is required annually for cover damage and for damaged, worn, twisted, crimped, brittle, cracked or leaking lines. Replacement of all hoses in or out of machinery every five years or during major overhaul is recommended.

Examples of detailed maintanance and repair instructions from existing bus service manuals can be supplied upon request.

Warranty

Fuel system componenets are covered by a 1 year, 50,000 mile warranty

Compliance

The Xcelsior® fuel system is compliant to APTA Whitebook guidelines. The fuel pickup location ensures continuous full power operation on a six percent upgrade for more than 15 minutes starting with no more than 25 US gallons (95 L) of fuel over the unusable amount in the tank for the 40' bus. The bus will operate at idle on a six percent downgrade for more than 30 minutes starting with no more than 10 US gallons (38 L) of fuel over the unusable amount in the tank. [1]

[1] Report TR09-35 Xcelsior® Fuel Tank 6% grade Test

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DIESEL HYBRID COACHES

Exception # 79

NEW FLYER

HYDRAULIC HOSES

Hydraulic hoses are used to provide a flexible, pressure-resistant, and leakproof connection between various hydraulic components such as pumps, motors, controls, actuators, coolers, and reservoirs.

HOSE SPECIFICATION				
Hose Type	Specification	Construction	Tem. Range	End Fitting
Manuli Equator 1 (EQ1)	Meets or Exceeds SAE J 517 100R2AT Type S, ISO 1436-1 Type 2SN	Tube: Oil-resistant synthetic rubber Reinforcement: Single high-tensile steel braid Cover: Black synthetic rubber with high ozone, weather and heat resistance cover	-67 to 300°F (-55 to 150°C)	Crimped
Manuli Equator 2 (EQ2)	Meets or Exceeds SAE J 517 100R2AT Type S, ISO 1436-1 Type 2SN	Tube: Oil-resistant synthetic rubber Reinforcement: Two high-tensile steel braids Cover: Black synthetic rubber with high ozone, weather and heat resistance cover	-67 to 300°F (-55 to 150°C)	Crimped
2807 PTFE	SAE 100R14A	Extruded PTFE tube with stainless steel single wire braid	-100 to 500°F (-73 to 260°C)	-
Aeroquip GH100	Tested with ASTM D6751 Fuel Temp. Range -40°C to +150°C	Polyester braided cover, Extremely abrasion resistant	-40 to 300°F (-40 to 150°C)	Crimped

Engine compartment hose assembly applications are as follow:

1) Coolant vent line - Manuli EQ1
2) Fuel lines - GH100
3) Air line - Manuli EQ1
    - Airline high temp. - 2807 PTFE
4) Engine and Trans oil - Manuli EQ1
5) Hydraulic and PS lines
    - Suction line - Manuli EQ1
    - Medium pressure and bypass line - Manuli EQ2
    - High pressure - Manuli EQ2

MANULI EQUATOR 1

MANULI EQUATOR 2


Aeroquip 2807 PTFE

Aeroquip GH100