

Echo

WASHINGTON METROPOLITAN AREA TRANSIT AUTHORITY

ANREW REHABILITATION GUIDE

XCELSIOR CNG 40 FT. TRANSIT BUS

Model: SR1947

Fleet 55 Buses 2830-2993

BUS ENGINEERING (BENG)

OFFICE OF BUS MAINTENANCE (BMNT)





WASHINGTON METROPOLITAN AREA TRANSIT AUTHORITY
OFFICE OF BUS MAINTENANCE
ENGINEERING MODIFICATION INSTRUCTIONS – APPROVAL SHEET



EMI NO. 22-BB-02-00

DATE: 3/4/2022

SUBJECT: Rehabilitation New Flyer Buses 2830-2993 SR1947

PRIORITY: Emergency Urgent Routine

CLASSIFICATION:

- Class I change: A change that affects safety or interchangeability.
 Class II change: A change to any element not covered under Class I that affects form, fit, function, reliability, or maintainability, as well as, changes made by the OEM.
 Class III change: A change that affects documentation only.

IMPACT ON: Safety Reliability Maintainability Performance

Is this modification to be accomplished in conjunction with other EMI(s)? No Yes

If yes, list EMI NUMBERS: EMI- 22-AS-01-00 NF Xcelsior Haldex Air Dryer Retrofit

Desired/required completion date: 12/31/2022

Victor Guillot

Victor Guillot (Mar 7, 2022 10:54 EST)

REQUESTER

DATE

N/A

RELIABILITY AND ANALYSIS (BENG)

DATE

M. R. Glaeser

M. R. Glaeser (Mar 7, 2022 13:48 EST)

BUS MAINTENANCE TRAINING (BMTR)

DATE

David Hahn

David Hahn (Mar 9, 2022 10:09 EST)

BUS SAFETY - (SAFE)

DATE

N/A

METRO TRANSIT POLICE (MTPD)

DATE

Frances Jallu

Frances Jallu (Mar 7, 2022 11:07 EST)

BCCB CHAIRPERSON (BENG)

DATE

Gerald Crumlin

RECEIVED: Gerald Crumlin (Mar 10, 2022 12:45 EST)

BUS MAINTENANCE PLANNING/SCHEDULING DATE

BUS CHANGE CONTROL BOARD ACTION:

- APPROVED
 DISAPPROVED
 REWORK

Jerry Guaracino
APPROVED: Jerry Guaracino (Mar 7, 2022 13:59 EST)

CHIEF ENGINEER BENG DATE

Dave Michels

APPROVED: Dave Michels (Mar 10, 2022 07:11 EST)

VICE PRESIDENT (BMNT) DATE

Robert O. Potts

APPROVED: Robert O. Potts (Mar 10, 2022 08:16 EST)

SENIOR VICE PRESIDENT (BUSV) DATE

Job plan # 8844 CAMPAIGN # 16838539
Asset list # 6197



**WASHINGTON METROPOLITAN AREA TRANSIT AUTHORITY
OFFICE OF BUS MAINTENANCE
ENGINEERING MODIFICATION INSTRUCTIONS – APPROVAL SHEET**



1. FUNDING

Funding over multiple fiscal years: Yes No FY 22 FY 23 FY _____

Funding Source: Operating Capital

GL account string number: CIP0005

2. MATERIALS COSTS

Estimated materials costs per unit: \$ 136,783.33 Total materials cost: \$ 22,432,466.22

Quantity required 164

Are all materials available from WMATA in Maximo and in stock in respective storerooms? Yes No

Estimate date of 100% material availability: _____

If non-stock materials purchased above are to become stock items in the future, please indicate whether new WMATA stock numbers are assigned. Yes No

PAF Number	WMATA Stock Number

If existing stock materials will be replaced due to this EMI and will no longer be needed, please list the potentially obsolete items.

WMATA STOCK NO	QTY ON HAND	EST \$ VALUE	OBSOLETE PAF NO	EST. OBSOLETE DATE

3. LABOR COST

Labor rate per hours: \$ 65.00

Estimate labor cost per unit: \$ 66,170.00 Total labor cost: \$ 10,851,880.00

4. EMI COST

Estimated material + labor costs per unit: \$ 202,953.33 Total cost materials + labor: \$ 33,284,292.00

Special skills/tools/facilities required? Yes No

Preferred work location(s): Andrew Heavy Overhaul Shop, CTF.

Responsible department: BMNT/BENG

Work group/crew: HOMT



WASHINGTON METROPOLITAN AREA TRANSIT AUTHORITY
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ENGINEERING MODIFICATION INSTRUCTIONS – APPROVAL SHEET



5. DOCUMENT / PROCEDURES UPDATES:

Documentation Type	Revision Needed?		Specify
	Yes	No	
Standard Operating Procedures	<input type="checkbox"/>	<input type="checkbox"/>	
Service Bulletins	<input type="checkbox"/>	<input type="checkbox"/>	
Preventive/Corrective maintenance plans	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Haldex Air Dryer Service
Job plan updated	<input type="checkbox"/>	<input type="checkbox"/>	
Technical specifications	<input type="checkbox"/>	<input type="checkbox"/>	
Schematic(s)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Haldex Air Dryer
Training aids / videos	<input type="checkbox"/>	<input type="checkbox"/>	
Special equipment needed	<input type="checkbox"/>	<input type="checkbox"/>	
Other	<input type="checkbox"/>	<input type="checkbox"/>	

6. INSTALLATION SCHEDULING:

Estimated date of 1st Installation: _____ Estimated date of completion: _____



WASHINGTON METROPOLITAN AREA TRANSIT AUTHORITY
OFFICE OF BUS MAINTENANCE
ENGINEERING MODIFICATION INSTRUCTIONS - BUS



Rehabilitation: 2830-2993 SR1947

WMATA BUS ENGINEERING (BENG)
EMI No.: 22-BB-02-00
Page 1 of 3

NEW FLYER 2015 XCELSIOR CNG 40FT.
Model (SR1947) FLEET 55
Buses 2830-2993

Revision History				
Revision No.	Revision Date	Reviser Author	Document Section No. (if applicable) or N/A	Description of Changes
00	03/04/22	Victor Guillot		Initial Release



WASHINGTON METROPOLITAN AREA TRANSIT AUTHORITY
OFFICE OF BUS MAINTENANCE
ENGINEERING MODIFICATION INSTRUCTIONS - BUS



Rehabilitation: 2830-2993 SR1947

WMATA BUS ENGINEERING (BENG)
EMI No.: 22-BB-02-00
Page 2 of 3

TABLE OF CONTENTS

<u>SECTION</u>	<u>TITLE</u>	<u>PAGE</u>
1.0	PURPOSE	3
2.0	BACKGROUND	3
3.0	APPLICABLE BUSES	3
4.0	JOB PLAN / ASSET LIST	3
5.0	MATERIAL REQUIRED	3
6.0	TOOLS REQUIRED	3
7.0	INSTALLATION PROCEDURE	3
8.0	TEST PROCEDURE	3
9.0	PERIODIC INSPECTION AND MAINTENANCE	3



WASHINGTON METROPOLITAN AREA TRANSIT AUTHORITY
OFFICE OF BUS MAINTENANCE
ENGINEERING MODIFICATION INSTRUCTIONS - BUS



Rehabilitation: 2830-2993 SR1947

WMATA BUS ENGINEERING (BENG)
EMI No.: 22-BB-02-00
Page 3 of 3

1.0 PURPOSE

This rehabilitation is being performed to update and improve the reliability to this series of buses.

2.0 BACKGROUND

3.0 APPLICABLE BUSES

2015 New Flyer 2830-2993

4.0 Job Plan: _____ Asset List: _____

5.0 MATERIAL REQUIRED

6.0 TOOLS REQUIRED

General Mechanic Tools and Equipment

CAUTION: ALL WORK MUST BE CONDUCTED IN A SAFE MANNER AND IN ACCORDANCE WITH THE METROBUS SAFETY RULES AND PROCEDURES. ALL WORK SHOULD BE PERFORMED IN SUCH A WAY THAT IT WOULD NOT INVOLVE ANY DANGER TO PERSONNEL OR DAMAGE TO PROPERTY.

7.0 INSTALLATION PROCEDURE

Follow the step-by-step procedure as outlined in the attached 2022 New Flyer Rehabilitation Guide and all relevant attached EMI's.

8.0 TEST PROCEDURES

Road test the bus as applicable in the last section of the attached procedures

9.0 PERIODIC INSPECTION AND MAINTENANCE

All PM schedules remain the same.

WASHINGTON METROPOLITAN AREA TRANSIT AUTHORITY

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XCELSIOR CNG 40 FT. TRANSIT BUS

Model: SR1947

Fleet 55 Buses 2830-2993

BUS ENGINEERING (BENG)

OFFICE OF BUS MAINTENANCE (BMNT)



Bus No. _____
Work Order No. _____

SAFETY PROVISIONS

ALL WORK MUST BE CONDUCTED IN A SAFE MANNER AND IN ACCORDANCE WITH ALL BMNT SAFETY RULES AND STANDARD OPERATING PROCEDURES.

ALL WORK SHALL BE PERFORMED IN SUCH A WAY AS TO PRECLUDE ANY DANGER TO PERSONNEL, OR DAMAGE TO WMATA PROPERTY.



required for all service personnel involved in the maintenance of this system. Maintenance involving welding, flame cutting, torching or the production of sparks or hot particles is not permitted around or in the immediate vicinity of the CNG storage facilities or the vehicle CNG system. Purge all traces of natural gas from any components of the CNG system requiring maintenance before performing any procedures

Purge all traces of natural gas from any components of the CNG system requiring maintenance before performing any procedures involving:

- open flame
- excessive heat
- production of sparks
- production of hot particles

Minimum safety requirements for these procedures should include the following personal protection equipment (PPE):

• Hearing Protection	• Eye Protection
• Fall Protection	• Gloves (Class 0 isolation)
• Proper Footwear	• Bump Cap

Note: Many items may need only to be repaired, and not replaced with a new or remanufactured part. It is the Supervisor's decision and responsibility to ensure that all mechanics are aware of what is to be repaired, and what is to be replaced. Supervisors are to inspect the bus prior to assigning work to a mechanic.

Refer to the OEM Service manual for safety precautions, replacement procedures, torque specifications, and lubrication application and lubricating specifications

Attachments

<u>Engineering Modifications Instruction</u>		<u>Page</u>
EMI # 50L23	Bendix PP-1, Valve Button Inspection and Replacement	28
EMI # 22-AS-1-0	Haldex Air Dryer Retrofit	32
EMI # B55L12	Zafety Lug Locks	54
EMI # 21-ENG-00-02	Low Coolant Indicator	60
EMI # B00L27	Throttle over J1939	74
EMI # B00L26	Recaro Seat Belt Replacement	89

<u>Supporting Document / Service Bulletins' / Standard Practice Bulletins</u>		<u>Page</u>
SOP 1.14/0 (02/16/21)	Wheel and Tire Maintenance	100
High Pressure Leak Tester	HPT 500 Operation Manual	117
02/02/2021	PMI Fluid / Lubrication	133
New Flyer Manual	Front Axle Spec	136
New Flyer Manual	Rear Axle Spec	137
New Flyer Manual	Suspension Ride Height	138
New Flyer Manual	Motor Mount Spec	139
ITS 3453	ITS 3453: Exhaust Flex Tube	140
18-P-001	Vibrant Power Inc. V Band Exhaust Clamp	150
16-03-003	Hose Clamp Torque Specifications	151
18-E-003	Dedicated Micro Backup Battery Mounting	152
16-B-002	Xcelisior Drivers Barrier, Lower Hinge Bolts	155
16-E-002	AGM Odyssey 31 -Battery Cleaning	156

Supporting Document / Service Bulletins' / Standard Practice Bulletins		Page
13-E-003	Battery and Charging Systems	158
20-E-001	Transmission Bulkhead Connector	160
17-P-001	Stoneridge Low Coolant Sensor	162
20-P-001	Engine Mounts, Front	164
18-E-001	Kidde Fire Systems	165
19-A-001	Xcelsior High Temperature Air Governor	167
17-E-001	Xcelsior Instrument Cluster	168
20-E-002	LED Headlight Assembly Replacement	168
22-PT-02-00	Surge Tank Cooling Hoses Supersession	171
19-P-001	Transmission Cooler Line Replacement	172

⚠️ WARNING

The following are basic guidelines that apply to all shop practices and procedures.

- To prevent eye injury, always wear eye protection - safety glasses or face shields when performing vehicle maintenance, service or body repair.
- Always wear a face shield with appropriate light filters when welding. Prolonged unprotected exposure to the intense light generated by arc welding can cause severe and permanent retinal damage. Welding area should be sectioned off with filtered panels to prevent inadvertent damage.
- Always wear a face shield when grinding or performing work beneath the vehicle.
- Always wear appropriate ear protection; plugs or headgear.
- Always secure or remove jewelry, watches, loose clothing and/or hair when operating power tools or repairing components with moving parts.
- Always wear an appropriate respirator, cartridge mask or HEPA type filter mask when sanding by hand or with power tools.
- Avoid ingesting the dust spray or fumes of cured/uncured substances.
- Always wear a 100 % air mask hood positive-pressure supplied respirator (NIOSH/MSHA TC-19C), eye protection, gloves and protective clothing when mixing chemicals during application of paint and topcoats, and until all vapor and mist are exhausted.
- Never attempt to operate a piece of equipment or power tool if you are unsure how to use it safely. Consult your supervisor.
- Wear protective clothing.
- Always refer to the Safety Data Sheets and/or product documentation provided with the products for safety information. Always be aware of the potential hazards when working with any chemical substances. Improper handling of some products can cause severe illness and personal injury and/or death.
- Always ensure that a portable fire extinguisher is within reach, in the event of an emergency and ensure that is in operating condition.
- Dispose of hazard waste in proper containers in compliance with standards, through the services of a qualified waste treatment company.

Bus Engineering/Bus Maintenance

New Flyer Rehabilitation Guide

Chassis Line (CL)



Station # 1

CL-1) CNG Safety /1 hrs.

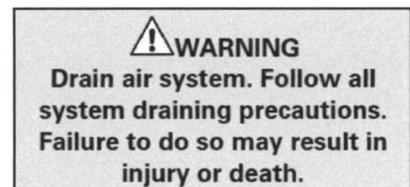
- Turn the main shut-off valve handle in the fuel filler compartment to the OFF position. The handle is in the OFF position when it is perpendicular to the main fuel line.
- Start the engine and run the vehicle until the engine stalls. This will use up the CNG which remains in the fuel line between the fill box and the engine.
- Set the Battery Disconnect switch in the street side battery compartment to the OFF position.

Employee Signature _____ Badge # _____

Supervisor/Designee Signature _____ Date _____

CL-2) Engine and Transmission Assembly Removal / 24 Hours

- Disable and disconnect the Fire Suppression System
- Remove License Plates turn into the lead-man
- Remove engine access door
- Drain Coolant
- Drain all air tanks
- Drain engine oil
- Drain fluids from transmission
- Drain hydraulic tank
- Disconnect all electrical wiring harnesses
- Remove drive shaft
- Disconnect exhaust piping, air filter housing piping, coolant lines and ground strap
- Remove belt guard
- Supported rear bumper to remove, remove 4 retaining bolts remove bumper
- Remove HVAC Belt
- Have AC system evacuated
- Remove engine and transmission assembly
- Deliver engine and transmission assembly to steam clean room
- Secure engine and Transmission assembly for delivery to CTF
- Remove wiring harnesses
- Remove coolant pipes, lines, fittings, and brackets
- Remove charge air piping
- Remove air filter housing and piping
- Remove surge tank assembly
- Remove Radiator/Charge Air Cooler assembly
- Remove circulation pump
- Remove spinner oil filter assembly
- Move bus to steam room and steam clean bulkhead place bus back to lift



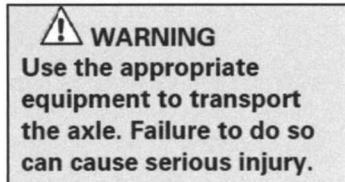
Employee Signature _____ Badge # _____

Employee Signature _____ Badge # _____

Supervisor/Designee Signature _____ Date _____

CL-3) Front Axle Removal / 8 Hours DO NOT TORCH, CUT OR GRIND TO REMOVE AXLES

- Inspect the R.H. Sheppard power steering box remove and replace as needed
- Exhaust air from air supply
- Remove front wheels, send to steam room for cleaning
- Disconnect drag link from pitman arm
- Disconnect front radius rods
- Disconnect front lateral rods
- Disconnect shock absorbers
- Disconnect air spring assemblies
- Disconnect steering stabilizer
- Disconnect the leveling valve control rod from bracket
- Disconnect ABS sensor
- Disconnect e-stroke cables from brake chambers
- Disconnect hoses from brake chambers
- Secure front axle assembly for delivery to CTF



Employee Signature _____ Badge # _____

Supervisor/Designee Signature _____ Date _____

CL-4) Install Rebuilt Front Axle / 16 Hours

Torque all front axle components to OEM Specification

- Install front axle per service manual
- Connect the brake hoses to air supply
- Plug-in ABS sensors
- Mount the leveling valve control rod to mounting bracket
- Mount the air bag assemblies to the air bag plate.
- Connect the airline to fitting
- Install steering stabilizer
- Install new shock absorbers with bushings, torque upper and lower mount lock nuts to **56 ft-lb.**
- Connect upper front radius rods to axle **Never-Seez bolt torque to 105 ft-lb.**
- Connect lower front radius rods to axle **Never-Seez bolt torque to 230 ft-lb.**
- Connect upper radius rod to frame **Never-Seez bolt torque to 105 ft-lb.**
- Connect lower radius rod to frame **Never-Seez bolt torque to 230 ft-lb.**
- Connect drag link to the upper steering arm and torque nut to **95-115 ft-lb.** Install cotter pins
- Adjust front brakes per service manual
- Set ride height – by the front axle measuring from top of axle beam to low chassis beam to **4"**
- Lubricate upper and lower steering shafts (2) U-joints
- Install all wheels with tires follow SOP 1.14 Wheel and Tire Maintenance Program

Employee Signature _____ Badge # _____

Supervisor/Designee Signature _____ Date _____

CL-5) Rear Axle Removal / 6 Hours **DO NOT TORCH, CUT OR GRIND TO REMOVE AXLES**

- Remove rear wheels, send to steam room for cleaning
- Disconnect the leveling valve control rods from bracket
- Disconnect shock absorbers from walking beam
- Remove air bag assemblies from the suspension beam
- Unplug the ABS sensor
- Disconnect and label e-stroke cables L/S and R/S to avoid confusion during Installation of the new brake chambers
- Disconnect hoses from brake chambers
- Disconnect upper radius rods from vehicle frame save all alignment shims and spacers
- Disconnect lower radius rods from vehicle frame save all alignment shim and spacers
- Remove axle assembly from suspension beam

WARNING

From this point on, make sure the axle is securely restrained to the lift cradles to prevent rolling or rotating when free from the frame mounting point

Employee Signature _____ Badge # _____

Supervisor/Designee Signature _____ Date _____

CL-6) Install Rebuilt Rear Axle / 16 Hours

Torque all rear axle components to OEM Specification

- Install rebuild axle on to suspension beams, align axle with suspension beam pads
- Insert U bolts per side hand tighten and torque initially torque to 100 ft-lb. Work in a circular pattern from outer to inner U-bolts on each side of the axle, torque in increment of 100 ft-lb final torque to 380 ft-lb.
- Install upper and lower radius rods from axle and frame torque to 300 ft-lb.
- Install lower radius rods to axle housing torque to 230 ft-lb.
- Install suspension beam to the vehicle frame and install shock absorbers with bushings, spacers and nuts onto Suspension beam.
- Torque shock absorber locking nuts torque to 56 ft-lb.
- Install air bags to suspension beam with bolt and washer torque to 20 ft-lb.
- Connect new brake hose
- Connect ABS cable sensors
- Connect e-stroke cables as mark L/S and R/S during removal of the brake
- Connect leveling valve rods to suspension beam
- Connect shop air check components for leaks, brake hoses, leveling valves and air spring.
- Check differential fluid
- Set ride height – by the rear axle measuring from top of axle beam to low chassis beam to 3 7/8"
- Adjust brakes per service manual
- Install all wheels with tires, follow SOP 1.14 Wheel and Tire Maintenance Program

Employee Signature _____ Badge # _____

Supervisor/Designee Signature _____ Date _____

CL-7) Install Engine and Transmission Assembly / Hours 50

Inspect all lines on bulkhead to ensure they have been repaired or replaced

- Remove and replace the (SCR) Selective Catalytic Reduction assembly
- Install Radiator / Charge Air Cooler Assembly with EMP
- Replace CNG primary fuel filter
- Replace CNG secondary fuel filter
- Install wiring harness
- Install new trans cooler and bracket assembly
- Install air filter housing and piping
- Install charge air piping
- Install surge tank assembly
- Install new/rebuilt spinner oil filter assembly
- Replace hydraulic tank filter
- Install rebuilt engine with transmission assembly
- Torque the two 3/4" x 5 1/2" with nut rear side mount bolts torque to **250 ft-lb**
- Torque the two 5/8"x 4 9/16" bolts with nuts on the front engine mounts torque to **160 ft-lb.**
- Drive Shaft
 - Torque cap bolts to **38 to 41 ft.lb.** bend taps on lock plate.
 - Transmission side Install bearing straps torque to **115 to 135 ft-lb.**
 - Align drive shaft flange to the axle and torque bolts to **81± 3 ft.lb** apply torque witness marks.
- Install OEM approved coolant hoses, lines, constant tension clamps and brackets
- Attach electrical connectors to transmission
- Install transmission dipstick tube
- Connect fuel lines
- Install exhaust piping
- Have A/C system serviced
- Install new circulation pump
- Install rear bumper assembly torque 3/4" retaining bolts torque to **250 ft-lb.**
- Installed belt guard
- Fill all fluids, engine, transmission, hydraulics and coolant per manufactures specifications
- Start engine and check all components for proper operation
- Check for coolant leaks, exhaust leaks, belts and tensioner.
- Check for exhaust leaks with the **Bosch HPT 500 High -Pressure Leak Detector, Operating manual attached**
- Pressure check engine cooling system
- Reinstall the engine access door
- Move bus to designated inspection lift

Employee Signature _____ Badge #_____

Supervisor/Designee Signature _____ Date _____

CL-8) Wheel Alignment / 4 Hours

- Align Front Axle per Computerized Alignment Procedure
- The steering wheel spoke should be at the 6 o' clock position
- If the steering wheel is removed reset the spoke to 6 o' clock **and torque the steering nut to 60 ± 5 ft-lb**
- Ensure that the horn is working by verifying its activation at all tilt and telescoping angles and positions.
- Setback & Thrust Angle $0.0 \pm 1^\circ$
- Camber Angle 1.0°
- Toe-in- Total 0.0 to $0.08"$,
- LH-RH Max. Wheel Cut $0.38"$
- Caster – front axle $3^\circ \pm 0.2^\circ$ positive
- Rear Axle Thrust Angle, $0.0 \pm 0.1^\circ$ max
- Front Axle set back $0.0 \pm 0.1^\circ$ max
- Ride height – by the front axle measuring from top of axle beam to low chassis beam to $4"$
- Ride height – by the rear axle measuring from top of axle beam to low chassis beam to $3.8"$
- Check tie-rod ends for proper alignment
- Check steering box travel (Check and adjust Stops)
- If adjustments are made to the lower radius rod for alignment torque bolts to 230 ft-lb.

Employee Signature _____ Badge # _____

Supervisor/Designee Signature _____ Date _____

Bus Engineering/Bus Maintenance

New Flyer Rehabilitation Guide

Pneumatics (P)

P-1) Pneumatics / 32 Hours

Replace the following Parts

- Leveling valves front (1) and rear (2)
- Single check valve
- Double check valve (DC-4)
- Pressure reducing valve (RV-3) 70 PSI
- Muffler tank safety valve 200 PSI
- Safety valves 200 psi
- Safety valve St -1 150 psi
- Front kneeling valve assembly
- E6 brake application valve
- BVA solenoid valve
- Parking brake valve (PP-1) **EMI # 50L23 Valve Button**
- Relay valve (R-14)
- Front brake circuit pressure switch. *4 psi.*
- Quick release valves (QR-1)
- Brake tank pressure sending unit
- Spring Brake control valve (SR-7)
- ABS modulator valves
- Air tank drain valves
- PR-1 Pressure protection valve 75 psi
- PR-2 Pressure reducing valve 70 psi
- PR-2 Pressure reducing valve 100 psi
- Air governor
- ATC valves
- Interlock pressure switch *4 psi.*
- Air Pressures switch *60 psi.*
- Air Pressure sender *150 Psi*
- Pressure Transducer 250 psi.
- Pressure Transducer 150 psi.
- Pressure transducer, E-Stroke (MGM)
- Pressure transducer, Brake Application
- Sender, air pressure
- Emergency stop light switch
- Emergency Release valve
- Stop Light Switch
- Front Kneel Valve Assembly
- Air dryer **EMI # 22-AS-1-0 Haldex Air Dryer Retrofit**

Perform the following:

- Check kneel operation
- Leaks (air) check entire Air System

 **WARNING**

Flying debris can cause serious eye injury. Wear safety glasses during vehicle maintenance to avoid personal injury.

Employee Signature _____ Badge # _____

Supervisor/Designee Signature _____ Date _____

Bus Engineering/Bus Maintenance

New Flyer Rehabilitation Guide

Electrical (E)

E-1) Bulkhead Electrical / 40 Hours

- Inspect all wiring; repair as needed
- Connect all Electrical Components
- Install new engine compartment lamps
- Inspect and repair all wiring in apparatus compartment
- Replace all bad connectors
- Replace battery switch
- Rebuild rear run switch box

Employee Signature _____ Badge #_____

Supervisor/Designee Signature _____ Date _____



Battery Safety Precautions

- Always wear proper eye, face and hand protection
- Keep all sparks, flames and cigarettes away from batteries
- Never try to open a battery with non-removable vents
- Make sure work area is well ventilated
- NEVER lean over battery while boosting, testing or charging
- Exercise caution when working with metallic tools or conductors to prevent short circuits and sparks.

E-2) Battery Compartment / 16 Hours

- Remove batteries
- Remove and inspect battery tray (repair/replace bushing as needed)
- Inspect battery tray roller bearings and replace as needed, grease bearing
- Install new batteries
- Install new battery cables as needed
- Check battery tray lock in, repair or replace if needed

Employee Signature _____ Badge #_____

Supervisor/Designee Signature _____ Date _____

E-3) Exterior Lighting Electrical repair / 16 Hours

- Markers
- Stop
- Back-up alarm
- License
- Aux.
- Turn signals
- Engine compartment

Employee Signature _____ Badge #_____

Supervisor/Designee Signature _____ Badge #_____

E-4) Interior Electrical / 16 Hours *Inspect, repair or replace as needed*

- E Stroke module
- EMI # B00L27 Throttle over J1939**
- Horn operation high / low pitch
- Headlights dash indicator, low beam and high beam lights
- Low indicator light/ buzzer warning at 70 psi.
- Brake & Accelerator interlock holds in all door position
- Dash lights, gauges, Dimmer switch
- Doors** Emergency override switch
- Defroster/heater operation
- Back-up alarm
- Turn signal switches
- Driver's booster blower switch
- ABS Diagnostic switch
- Passenger chime switch
- Check fire suppression button
- Silent alarm Indicator light
- Silent alarm button
- Hazard light
- LED warning lights / indicator panel
- Front step well heater switch
- Replace rear door sensitive edge switches
- Check class door sensors and replace as needed
- Check Clever Device system
- Check PA system microphone and speaker volume

WARNING

Flying debris can cause serious eye injury. Wear safety glasses during vehicle maintenance to avoid personal injury.

Employee Signature _____ Payroll # _____

Supervisor/Designee Signature _____ Date _____

E-5) Interior Electrical 24 hours *Inspect, repair or replace as needed*

- Entrance and exit door motors
- Door control valve switches
- Speedometer
- Clever Device panel
- Engine Diagnostic switch
- Climate Control blower switch
- Interior light switch
- Driver's light switch
- Transmission touch pad
- Master switch
- Engine emergency override switch
- Hazard light switch
- Engine start switch
- Wiper control switches
- Instrument Cluster, **Service Bulletins 17-E-001**
- Kneel system switch
- Wheelchair ramp switch and ramp alarm operation
- Front S/C Air pressure switches
- LED Dome lights
- Replace S/C panel decal
- Windshield wiper motor
- Front door dump valve
- Emergency brake valve
- PP1 park brake valve with new aluminum knob

WARNING

To avoid personal injury, do not wear rings, wrist watches, or loose-fitting clothing. Any of these items could catch on moving parts and cause serious injury

Employee Signature _____ Payroll # _____

Supervisor/Designee Signature _____ Date _____

Bus Engineering/Bus Maintenance

New Flyer Rehabilitation Guide

HVAC System (AC)

AC-1) A/C and Heating System / 40 Hours

- Turn the main shut-off valve handle in the fuel filler compartment to the OFF position. The handle is in the OFF position when it is perpendicular to the main fuel line.
- Start the engine and run the vehicle until the engine stalls. This will use up the CNG which remains in the fuel line between the fill box and the engine.
- Set the Battery Disconnect switch in the street side battery compartment to the OFF position.
- Compressor removal, evacuate the system recover the 407C refrigerant
- Compressor, Inspect replace as needed
- Install new or rebuilt align compressor to crankshaft, torque the 3/8" mounting bolts to 35 ft-lbs.
- Replace clutch pulley and armature, and grease with WMATA stock number 971-55-0006 grease.
- Replace compressor drive belt
- Lubricate HVAC compressor turn buckles
- Install new belt adjust turnbuckle to obtain 250 ft-lb.
- Torque 3/4" pivot bolt 304 ft.lb.
- Torque the 5/8" lock nuts to 172 ft-lb.
- Replace bottom snubber pulley
- Recharge the system, refer to Thermo King manual
- Replace TK coolant solenoid valve diaphragm
- Inspect defroster motor
- Replace defroster water control valve
- Check defroster control dash knobs/cables, replace as necessary
- Replace defroster filter with new
- Inspect driver's booster fan assembly
- Check operation of floor heaters, repair/replace as necessary, this is to include repairing of rusted floor blower housings
- Replace/clean floor heater filters
- Check evaporator and condenser fan motor operation and lubricate bearings. Replace bearings, as necessary
- Clean evaporator return air filter and wash louver access cover.
- Replace auxiliary heat head and 90° elbow

Employee Signature _____ Badge # _____

Supervisor/Designee Signature _____ Date _____

Bus Engineering/Bus Maintenance

New Flyer Rehabilitation Guide

Fare Box Shop (FB)

FB-1) Fare Box Removal / 1 Hours

- Turn Bus power off
- Remove fare box and keypad
- Remove the four (4) security mounting bolts
- Disconnect the main wire harness
- Remove mounting plate nuts and lift off fare box mounting plate
- Remove main wire harness connector, tape wire ends, pull loose ends under bus floor and secure

Employee Signature _____ Badge # _____

Supervisor/Designee Signature _____ Date _____

FB-4) Fare Box Installation / 1 Hours

- Insert and secure fare box mounting plate to bus floor
- Check wire harness for any signs of damage
- Insert wire harness through drilled hole in bus floor and install connector
- Return wheelchair lift to retracted position (See wheelchair lift mechanic to perform this task)
- Install cleaned, overhauled fare box
- Secure fare box keypad mount
- Connect main wire harness to the fare box base
- Test fare box for proper operation

Employee Signature _____ Badge # _____

Supervisor/Designee Signature _____ Date _____

FB-5) Destination Sign Checklist / 1 Hours

- Open access door above windshield
- Inspect all cables and wires for any damage
- Close and secure all access doors/panels
- Test all sign components for proper operation, to include "Call Police" circuit
- Repair as necessary

Employee Signature _____ Badge # _____

Supervisor / Designee Signature _____ Date _____

Bus Engineering/Bus Maintenance

New Flyer Rehabilitation Guide

Wheelchair Lift Shop (WC)

(WC-1) / 16 Hours

- Replace wheelchair ramp
- Inspect electrical harness for condition and security
- Replace Reservoir Pump Assembly
- Lubricate ramp mechanism assembly moving parts with light lithium grease.
- Remove build-up grease
- Ensure ramp pull-in strap is serviceable
- Replace wheelchair ramp cylinder as needed.
- Replace hydraulic hose assembly with OEM approved from kit.

Employee Signature _____ Badge #_____

Supervisor / Designee Signature _____ Date _____



Safety Tip

When disconnecting hydraulic hoses during maintenance procedures, always cap or plug open lines during maintenance procedures and clearly identify their original location and connection point. This will also prevent air from displacing hydraulic fluid. If pressurizing capped or plugged hoses, always restrain your hoses prior to re-starting machinery to prevent whipping. Removing the hose completely will also prevent whipping

Bus Engineering/Bus Maintenance

New Flyer Rehabilitation Guide

Body Shop (BS)

⚠️ WARNING

The following are basic guidelines that apply to all shop practices and procedures, and specific requirements required to perform body work, "prep" and painting procedures Safely.

- To prevent eye injury, always wear eye protection - safety glasses or face shields when performing vehicle maintenance, service, or body repair.
- Always wear a face shield with appropriate light filters when welding. Prolonged unprotected exposure to the intense light generated by arc welding can cause severe and permanent retinal damage. Welding area should be sectioned off with filtered panels to prevent inadvertent damage.
- Always wear a face shield when grinding or performing work beneath the vehicle.
- Always wear appropriate ear protection; plugs or headgear.
- Always secure or remove jewelry, watches, loose clothing and/or hair when operating power tools or repairing components with moving parts.
- Always wear an appropriate respirator, cartridge mask or HEPA type filter mask when sanding by hand or with power tools.
- Avoid ingesting the dust spray or fumes of cured/uncured substances.
- Always wear a 100 % air mask positive-pressure supplied respirator (NIOSH/MSHA TC-19C), eye protection, gloves and protective clothing when mixing chemicals during application of paint and topcoats, and until all vapor and mist are exhausted.
- Never attempt to operate a piece of equipment or power tool if you are unsure how to use it safely. Consult your supervisor.
- Wear protective clothing.
- Always refer to the Safety Data Sheets and/or product documentation provided with the products for safety information. Always be aware of the potential hazards when working with any chemical substances. Improper handling of some products can cause severe illness personal injury and/or death.
- Always ensure that a portable fire extinguisher is within reach, in the event of an emergency and ensure that it is in operating condition.
- Dispose of resins and containers in compliance with standards, through the services of a qualified waste treatment company.

Bus Engineering/Bus Maintenance

New Flyer Rehabilitation Guide I

Body Shop (BS)

Station # 2 120 hrs.

BS-1) Bus Interior Removal and Repair

Note: All items removed will be properly labeled with bus number and installation location. All defective repairable items removed will be repaired at designated work areas and stored in pre-arranged locations for reinstallation at Station 4. All other reusable items will be cleaned and stored in the above-mentioned location.

- Remove seat pans
- Repair defective items
- Rear interior engine access panel repair
- Check all areas of floor and step wells for corrosion, wear and fatigue
- Repair all damaged/defective areas

Any plywood replacement will be with $\frac{3}{4}$ " thick. Seven-ply fir AC grad pressure treated plywood and will be undercoated and sealed

WARNING

To avoid personal injury, do not wear rings, wrist watches, or loose-fitting clothing. Any of these items could catch on moving parts and cause serious injury.

- Repair or replace any damaged or defective panels in dash and driver's control area
- Remove all interior mirrors
- Send all repaired parts to paint on cart
- Perform a pre-audit inspection of the bus and make necessary corrections

Employee Signature _____ Badge # _____

Employee Signature _____ Badge # _____

Employee Signature _____ Badge # _____

Supervisor/Designee Signature _____ Date _____

BS-2) Bus Exterior Repairs

All exterior metal and fiberglass paneling, including the roof, shall be inspected. Areas in need of repair or replacement shall be identified. All other repair information will be noted on tags or tape and attached to the area in need of repair. These areas include, but are not limited to:

- Inspect and repair engine door
- All joint tape and caulking areas
- Remove clean/replace wheelchair restraints
- Hinges
- Locks
- Springs
- Door props
- Door-access, entrance, exits, etc.
- Glass windshield, drivers, destination sign, side, etc.
- Mirrors
- Lights
- Check window emergency release latch operation- Install missing window stops

**WARNING**

Always wear adequate foot protection - safety shoes or work boots when performing vehicle maintenance, service or body repair

All exterior metal and fiberglass paneling shall be repaired or replaced as identified. This also includes the A/C hood panel.

- Repair or replace all other identified areas and assure operation and functionality.

- Inspect bike racks and remove

All access doors, including, but not limited to:

- Surge tank
- Radiator door and with screen
- Battery
- Fuel
- Engine
- Entrance doors, exit doors, and all associated hardware
- Windshield glass, driver's glass, destination sign glass, (Retain original glass type, i.e., plastic or Glass)
- Glass retainer seals, hinges, and window felt – to include driver's window
- Windshield wiper arms and blades
- Rubber moldings, rub rails, fender rubbers, and grommets.
- Headlamps, tail lamps, turn signals, and marker lamps
- Emergency roof hatches
- Perform a pre-audit inspection of the bus and make necessary corrections

Employee Signature _____ Badge # _____

Employee Signature _____ Badge # _____

Employee Signature _____ Badge # _____

Bus Engineering/Bus Maintenance

New Flyer Rehabilitation Guide

Paint Shop (PS)

Station # 3 100 hrs.

PS- 1) Exterior Preparations

Do Not Paint over Stainless Steel or Aluminum. Clean Only

- Remove all exterior decals
- Clean complete exterior of bus with approved cleaner for removal of grease, road dirt, decal adhesive, etc.
- Protect engine compartment and A/C compartment from overspray
- Sand all rust and corrosion with .100 grit sandpaper
- Sand exterior painted area of the bus with .180 grit sandpaper
- Clean bus exterior
- Perform a final wash of the bus with approved cleaner to ensure all contaminants are removed
- Mask all unpainted surfaces
- Perform a pre-audit inspection of the bus and make necessary corrections

WARNING

Always select the proper treatment or cleaning solvent that is approved for the given material. Consult your supervisor if you are unsure.

Employee Signature _____ Badge # _____

Employee Signature _____ Badge # _____

Employee Signature _____ Badge # _____

Supervisor/Designee Signature _____ Date _____

PS-2) Exterior Refinishing

- Prime coat entire exterior of bus with approved epoxy primer/sealer
- Primer is to be hand sanded with .320 grit sandpaper
- Remove sanding dust with compressed air and wipe with rags
- Apply all striping decals over prime coat blue & silver stripes
- Apply black low VOC paint to the passenger entrance and exit door sides, between the side windows and on the front and rear bumpers. Then mask all black surfaces, prepare for color.
- Apply low VOC paints Red / Silver/ as designed to the exterior
- Remove all masking tape and paper
- Remove all 'over spray' with polishing compound
- Touch up paint around all panel joints and vent screens
- Apply remainder of exterior decals, logo and Bus Number
- Re-squeegee all decals to ensure good adhesion
- Perform a pre-audit inspection of the bus and make necessary corrections

Employee Signature _____ Badge # _____

Employee Signature _____ Badge # _____

Employee Signature _____ Badge # _____

Supervisor/Designee Signature _____ Date _____

PS-3) Interior Preparation

- Remove all interior decals with razor scraper
- Sand and prep all areas to be painted

These areas include, but not limited to:

- Interior passenger doors

Driver's area to include:

- Dash
- Complete front windshield area
- Driver console
- Destination sign door area
- Mask all the areas mentioned above

Employee Signature _____ Badge # _____

Employee Signature _____ Badge # _____

Supervisor/Designee Signature _____ Date _____

PS-4) Interior Refinishing

Do Not Paint over Stainless Steel or Aluminum. Clean Only

- Paint all prepared areas
- Remove all masking tape and paper
- Wash and paint all plastic trims
- Paint sign boxes
- Replace all interior decals
- Perform a pre-audit inspection of the bus and make necessary corrections

Employee Signature _____ Badge # _____

Employee Signature _____ Badge # _____

Employee Signature _____ Badge # _____

Supervisor/Designee Signature _____ Date _____

BS-3) Interior Installations Station # 4, 160 hrs.

Note: Any problems not repaired or corrected at Station 2 will be taken care of before calling for the Station 4 internal audit.

- Install new yellow ADA passenger chime cord and associated hardware
- Remove and replace flooring in driver's area.
- Remove and replace driver's seat, **EMI# B00L26 Recaro Seat Belt Replacement**
- Install new modesty panels with new glass
- Check the following items for proper operation and repair if defective
 - Emergency roof hatch
 - Install new passenger information center
 - Windshield washer
 - Check wheel chocks
- Replace fire extinguisher**
- Install new trash bag
- Install (as required) triangle reflector kit
- Install new seat cushions
- Perform emergency egress operation per New Flyer maintenance manual.
- Replace all door window, check for proper operation
- Remove all passenger chime cords
- Remove floor covering
- Inspect and replace as needed emergency equipment.
- Reinstall cleaned and repaired side windows. Check for proper operation
- Seal rub rails and rain gutters with silicone
- Perform a pre-audit inspection of the bus and make necessary corrections

Doors Operation

- Replace all front and rear door bearings, clevis pins and connecting rod ends and lubricate.
- Ensure that front and rear door mounting bolts are fully tightened.
- With front doors fully closed check that the top brush forms a tight seal with the top of the door.
- Manually push the rear doors to their fully open position. Verify that the doors open to 90° angle.
- Manually open and close the front and rear doors. Verify that the leading panel overlaps the trailing panel during closing.
- Apply torque putty to all jam nuts on rear door hardware.***
- Exhaust air to the front and rear door motor. With the front and rear doors in the close position, verify that the Leading door edge metal-to-metal distance is **4.12" +/- 0.12"** across the leading edges of the entire door length.
- Gap between door panel trailing edge and trim for both fore and aft panels should be approximately 3/4"
- The height of each **front or rear door panels** must be adjusted to allow light contact (maximum 0.030") between the top edge of each panel for the upper brush seal.
- Front door closing speed between 3 to 3.5 second @ 120 to 95 psi.
- Front door opening speed 2.5 to 3.0 second.
- Rear door closing speed 3 to 3.5 second @ 131 to 95 psi
- Rear door opening speed 2.5 to 3.0 second
- Check front and rear door cushioning during opening
- Ensure that front and rear doors are properly adjusted, and doors do not slam open or closed.
- Ensure that the interlock activates when front and rear doors are authorized.
- Ensure that the rear door sensitive edge rubber seal overlap each other and touches equally from top to bottom
- Ensure that the rear door sensitive edges are operational on # 3 door and # 4 door
- Check the front door emergency air release valve
- Check the rear door emergency air release valve
- If any of the above operations, checks are out of spec follow the **New Flyer manufacturer's specifications to adjust the front and rear doors.**

Employee Signature _____ Badge # _____

Employee Signature _____ Badge # _____

Supervisor/Designee Signature _____ Date _____

BS-4) Exterior Installations (After painting)

- Reinstall bike rack
- Silicone all necessary joint areas on bus body (Rub rail and gutters)
- Check all access doors; adjust as necessary
- Replace all reflectors
- Install door props
- Lubricate all latches
- Install new exterior mirrors. Inspect replace as needed.
- Install new windshield wiper arms and blades
- Check washer and wiper operation adjust washer spray and fill reservoir with washer cleaner
- Perform a pre-audit inspection of the bus and make necessary corrections
- Seal roof hatch, condenser compartment, antenna's mounts
- Repair driver's console cracks
- Install new windshield wiper arms and blades
- Check washer and wiper operation and adjust washer spray and fill reservoir with windshield washing fluid

Employee Signature _____ **Badge #** _____

Employee Signature _____ **Badge #** _____

Employee Signature _____ **Badge #** _____

Supervisor/Designee Signature _____ **Date** _____

Bus Engineering/Bus Maintenance

New Flyer Rehabilitation Guide

Final Inspection (FI)

New Flyer Rehabilitation Station Five (5)

Final Inspection

Final Inspection (Check-off Sheet) Lift Inspection / Road Test Bus Reliability

Bus# _____

Rehab# _____

Miles_____

Inspected By: _____

Name

Badge #

Work Order#

Tasks

Final Inspection: 32 hrs.

Final Inspection

Note: All inspection checks are to be found fully operational according to manufacturer's specifications and engineering modifications (form, fit, function) while paying full attention to safety and cleanliness.

Interior

- Chime cords, chime strips, and jump seat buttons
- Emergency equipment, fire extinguisher, three (3) safety triangles, Fire Suppression System, and wheel chocks
- Interior lighting, steps, domes, fare box, dash, dash signs, and drivers panel lamps
- Emergency hatches, seals, and springs
- Driver's seat, passenger seats, wheelchairs jump seats, wheelchair restraints, and seat belts
- Stanchion poles and grab rails
- Floorings and moldings
- Ceiling and sidewall panels
- Modesty panels and glass
- Mirrors and mounting brackets
- Windows, latches, slides, and emergency egress
- Decals
- Access compartment doors, hinges, props, and compartment lights
- Engine access panel (under rear seat cushion); should be sealed not to allow engine noise and exhaust
- Destination and dash signs
- Steering wheel, horn, telescopic and tilt
- Trash bags
- Registration and operators defect card holders
- Phone mounting
- PA system
- Driver side control panel (test all switches and knobs)

Exterior

- License tags
- DC Inspection sticker
- Windshield wipers and washer
- Decals and paint
- Drip moldings: check that they are sealed
- Bike rack
- Head lamps, (High/low) turn signal lights, marker lamps, stop lamps, flashers, exit door lamps, wheelchair lamps and reflectors; check that they are sealed
- Document mileage on inspection sheet
- Access doors, hinges, seals, props, locks, and catches

Wheelchair compartment

- Oil reservoir fill
- Ramp pull strap
- Hoses
- Wiring harnesses
- Cleanliness
- Free of debris
- Check dump valve modification

Ensure terminals are protected and lubricated with protective coating dielectric compound

Fuel tank access

- Door
- Filler Neck
- Inspect fuel tank

Engine access compartment

- Routing and clamping of hoses and harnesses
- Check Radiator Fan Operation

Surge tank compartment

- Surge tank fill
- Pressure test valve
- Pressure relief valve

Roadside and Curb side compartments

Battery compartment

- New cables
- New control switch (On/off)
- Battery tray rollers
- Compartment lamp

Blower Motor Compartment

- Cleanliness
- Properly sealed
- Compartment lamp
- Test motors
- All contacts are coated with Dielectric compound

Electrical compartment

- Compartment lamp
- Loose wiring
- Loose connectors and contacts
- Sealing of compartment

Rear Engine Compartment

- Compartment lamps and emergency flashers
- NOCO Niehoff alternator connections
- Check the alternator connections conform to OEM
- Check routing of electrical harnesses and chaffing
- Check installation of hoses, clamps, and chaffing
- Check mounting of transmission breather
- Check engine belt guard
- Check engine oil and transmission fluids
- Pressure check surge tank and check system for leaks
- Check fire suppression nozzles for obstruction and proper position

Start engine and while running, check the following:

Note: During, look and listen for any telltale signs of engine compartment problems

- Check rear emergency engine shut-off/start control switch
- Check idle speed
- Check Radiator fans
- Check charging system
- Check oil pressure (Diagnostic laptop)
- Check for any visual signs of fluid leakage on all engine components
- Shut engine off, raise bus and proceed with undercarriage inspection

Undercarriage Inspection

- Skid plates
- Front axle
- Mounting saddles
- Radius and lateral rods
- Shocks
- Bellows
- Drag link ends
- Tie rod and rod ends
- Steering box
- Steering U-joints
- Column and prop shaft
- Leveling valves
- Check all air valves and air line connections for leaks
- Open air tank valves to assure all are void of moisture
- Check undercarriage structure for any signs of fatigue, cracks, etc.
- Inspect fuel tank for any signs of leakage
- Inspect underside of all compartments
- Engine mounts
- Check for leaks, wire harnesses or hose lines chaffing, and all clamps are secure
- Brakes front and rear: brake chambers and air lines air leaks while brakes are being applied.
- Rear axle: shocks, air bags, drive shaft and safety bracket, and mounting flange bolts and nuts are marked with torque putty.
- Check mud flaps

CL-9) Road test pre-check

- DC Inspection if needed
- Wheel torque, **SOP 1.14/0 (02/16/21) Wheel and Tire Maintenance**
- Adjust all mirrors
- Parking brake/brakes
- Interlocks
- Transmission engagement, forward and reverse
- Back-up alarm
- Road Test
- Burnish brakes
- Record brake Rotor temperature
- Turning radius (Right- and Left-Hand U-turns)
- Operate entrance and exit doors
- Operate wheelchair Ramp
- Operate heat and A/C
- Operate windshield defroster
- Operate driver's heater
- Operate kneeling

Take bus up to highway speed and monitor:

- Steering play/vibration
- Transmission shifting
- Tracking
- Differential noise
- Check Retarder

Employee Signature _____ Badge # _____

Supervisor/Designee Signature _____ Date _____

CL-10) Clean and Release Bus / 8 hrs.

- Check for proper front and rear tags
- Final Inspection
- Check the following exhaust components for leaks and repair
 - V Clamps
 - Seal Clamps
 - Spherical Clamps
 - Particulate Filter Clamps
- Inspect and re-torque all wheel lug nuts after road test, **SOP 1.14/0 (02/16/21) Wheel and Tire Maintenance**
- Clean the interior and windows of the bus
- Check Fire Extinguisher ensure PM Inspection tag is attached.
- Release the bus to division
- Notify garage to satisfy / adjust PM requirements in Maximo and Bus Reliability

Employee Signature _____ Badge # _____

Supervisor/Designee Signature _____ Date _____

**BUS RELIABILITY
DEFECT SHEETS**

Bus# _____

Work order number _____

Date _____

Description of defects	Department	Repaired or Adjustment	Initials
1.			
2.			
3.			
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35.			

Chassis line Supervisor / Designee Signature _____ Date _____

Paint / Body Shop Supervisor / Designee Signature _____ Date _____

Index

CL Chassis Line

CS Chassis Line Support

P Pneumatics

E Electrical

AC HVAC System

WC Wheelchair Lift

BM Body Modifications

BS Body Shop

PS Paint Shop

FB Fare Box Shop

FI Final Inspection Protocol

WASHINGTON METROPOLITAN AREA TRANSIT
AUTHORITY

CTF Support Section
Bus Number _____

XCELSIOR CNG 40 FT. TRANSIT BUS

Model: SR1947

Fleet 55 Buses 2830-2993

BUS ENGINEERING (BENG)

OFFICE OF BUS MAINTENANCE (BMNT)





WARNING

The following are basic guidelines that apply to all shop practices and procedures.

- To prevent eye injury, always wear eye protection - safety glasses or face shields when performing vehicle maintenance, service, or body repair.
- Always wear a face shield with appropriate light filters when welding. Prolonged unprotected exposure to the intense light generated by arc welding can cause severe and permanent retinal damage. Welding area should be sectioned off with filtered panels to prevent inadvertent damage.
- Always wear a face shield when grinding or performing work beneath the vehicle.
- Always wear appropriate ear protection; plugs or headgear.
- Always secure or remove jewelry, watches, loose clothing and/or hair when operating power tools or repairing components with moving parts.
- Always wear an appropriate respirator, cartridge mask or HEPA type filter mask when sanding by hand or with power tools.
- Avoid ingesting the dust spray or fumes of cured/uncured substances.
- Always wear a 100 % air mask hood positive-pressure supplied respirator (NIOSH/MSHA TC- 19C), eye protection, gloves and protective clothing when mixing components, during application of paint and topcoats, and until all vapor and mist are exhausted.
- Never attempt to operate a piece of equipment or power tool if you are unsure how to use it safely. Consult your supervisor.
- Wear protective clothing.
- Always refer to your Safety Data Sheets and/or product documentation provided with the products for safety information. Always be aware of the potential hazards when working with any chemical substances. Improper handling of some products can cause severe illness, personal injury and/or death.
- Always ensure that a portable fire extinguisher is within reach, in the event of an emergency and ensure that it is in operating condition.
- Dispose off hazard waste in proper containers in compliance with standards, through the services of a qualified waste treatment company.

Bus No. _____
Work Order No. _____

SAFETY PROVISIONS

ALL WORK MUST BE CONDUCTED IN A SAFE MANNER AND IN ACCORDANCE WITH ALL BMNT SAFETY RULES AND STANDARD OPERATING PROCEDURES.

ALL WORK SHALL BE PERFORMED IN SUCH A WAY AS TO PRECLUDE ANY DANGER TO PERSONNEL, OR DAMAGE TO WMATA PROPERTY.

 **WARNING** This vehicle is equipped with a high pressure CNG fuel system. Special training is required for all service personnel involved in the maintenance of this system. Maintenance involving welding, flame cutting, torching or the production of sparks or hot particles is not permitted around or in the immediate vicinity of the CNG storage facilities or the vehicle CNG system. Purge all traces of natural gas from any components of the CNG system requiring maintenance before performing any procedures

Purge all traces of natural gas from any components of the CNG system requiring maintenance before performing any procedures involving:

- open flame
- excessive heat
- production of sparks
- production of hot particles

Minimum safety requirements for these procedures should include the following personal protection equipment (PPE):

- | | |
|----------------------|------------------------------|
| • Hearing Protection | • Eye Protection |
| • Fall Protection | • Gloves (Class 0 isolation) |
| • Proper Footwear | • Bump Cap |

Note: Many items may need only to be repaired, and not replaced with a new or remanufactured part. It is the **Supervisor's decision and responsibility** to ensure that all mechanics are aware of what is to be repaired, and what is to be replaced. Supervisors are to inspect the bus prior to assigning work to a mechanic.

Refer to the OEM Service manual for safety precautions, replacement procedures, torque specifications, and lubrication application and lubricating specifications

Attachments

Page

<u>Supporting Document / Service Bulletins'/ Standard Practice Bulletin's</u>		<u>Page</u>
New Flyer Manual	Front Axle Torque Spec	9
New Flyer Manual	Rear Axle Torque Spec	10
New Flyer Manual	Engine Mount Torque Spec	11
New Flyer Manual	Allison Transmission Flex-plates Instructions	12

**Bus Engineering/Bus MaintenanceNew
Flyer Rehabilitation Guide
CTF Engine Shop Support (ES)**

ES-1) CTF Engine Tear Down / 16 hrs.
Remove wiring harnesses

- Remove coolant pipes, lines, fittings and brackets
- Remove hydraulic pump
- Remove air compressor with brackets
- Remove alternator with bracket
- Remove starter
- Disassemble engine



WARNING

To prevent eye injury, always wear eye protection when performing vehicle maintenance or service.

Employee Signature _____ Badge# _____

Employee Signature _____ Badge# _____

ES-2) Engine Build-Up / 50 Hours

- Rebuild engine per manufacturer specification
- Install wiring harness
- Torque all fittings, torque coolant constant tensioner clamps, nuts, and bolts per manufacturer specifications and apply torque putty

Employee Signature _____ Badge# _____

Employee Signature _____ Badge# _____

ES-3) Engine & Transmission Build Up 12 Hrs.

- Install hub adapter
- Flex-plate assembly
- Plate (4), M10 bolts
- Flex plates
- Adapter assembly, ring gear
- Plate, wear
- Crankshaft Bolts, M6

Employee Signature _____ Badge# _____

Employee Signature _____ Badge# _____

Supervisor/Designee Signature _____ Date _____

**Bus Engineering/Bus Maintenance
New Flyer Rehabilitation Guide
CTF Small Unit Support (SU)**

 **WARNING**
To prevent eye injury, always
wear eye protection when
performing vehicle
maintenance or service.

SU-1) Surge Tank Tear Down and Build up 4 hrs.

- Replace coolant level sensor
- Replace Low coolant sensor
- Inspect, replace as needed coolant level gauge
- Pressure check tank

Employee Signature _____ Badge# _____

Supervisor/Designee Signature _____ Date _____

**Bus Engineering/Bus Maintenance
New Flyer Rehabilitation Guide
CTF Transmission Shop Support (TS)**

TS-1) CTF Transmission tear down / 12 hrs.

- Clean transmission (pressure washer)
- Mount transmission to Stand
- Tear down transmission
- Clean parts

Employee Signature _____ Badge# _____

Employee Signature _____ Badge# _____

TS-2) CTF Transmission rebuild/ 40 hrs.

- Assemble transmission per OEM specifications

Employee Signature _____ Badge# _____

TS-3 Dyno Test Transmission / 16 hrs

- Connect Transmission to the dynamometer
- Add fluids and check for leaks
- Allow Transmission to reach operating temperature and rechecking for leaks
- Check Transmission Main Pressure
- Check upshift and down shift points
- Drain all fluids and remove Transmission from Dyno
- Place Transmission on stand

Transmission Serial # _____

Employee Signature _____ Badge # _____

Supervisor Signature _____ Badge # _____

**Bus Engineering/Bus Maintenance
New Flyer Rehabilitation Guide
CTF Axle Shop Support (AS)**

AS-1) Front Axle Tear Down & Rebuild 40 Hours

- Replace king pin
- Replace brake chambers
- Replace foundation brake assembly
- Replace inner and outer wheel bearing
- Replace seals and gaskets
- Replace tie rod ends

Front Axle Serial # _____

Employee Signature _____ Badge # _____

Employee Signature _____ Badge # _____

AS-2) Rear Axle / Differential Tear Down & Rebuild 40 Hours

- Replace Brake chambers
- Replace foundation brake assembly
- Replace inner and outer wheel bearing
- Replace seals and gaskets
- Rebuild Differential Carrier Assembly per OEM specifications

Rear Axle Serial # _____

Employee Signature _____ Badge# _____

Employee Signature _____ Badge# _____

Supervisor/Designee Signature _____ Date _____

**Bus Engineering/Bus Maintenance
New Flyer Rehabilitation Guide
CTF Machine Shop Support (MS)**

MS-1) Machine Shop Inspection & Repairs / 10 Hours

- Crankshaft
- Block
- Camshaft
- Drive Unit - repair threads
- Manifold - repair threads
- Remove broken bolts
- Weld and repair

⚠ WARNING
To prevent eye injury, always wear eye protection when performing vehicle maintenance or service.

Employee Signature _____ Badge# _____

Employee Signature _____ Badge# _____

Supervisor/Designee Signature _____ Date

**Bus Engineering/Bus Maintenance
New Flyer Rehabilitation Guide
CTF Fare Box Shop Support (FS)**

FBS-1) Fare Box Tear Down / 2 Hours

- Bill validator
- Bill transport
- Coin validator
- Wiring harnesses
- Power supply
- Mother Board
- Logic board
- OCU
- Lock bar
- Electronic lock
- Passenger display

FBS-2) Fare Box Overhaul / 6 Hours

Clean, inspect, adjust and repair/replace as necessary the following parts:

- Bill validator
- Bill transport
- Coin validator
- Wiring Harness
- Power supply
- Mother Board
- Logic board
- OCU
- Smartrip reader
- Lock bar
- Electronic lock
- Cash box
- Passenger display top

Farebox Serial Numbers

Primary # (Base) _____

Fare Collector # _____

Employee Signature _____ Badge# _____

Supervisor/Designee Signature _____ Date _____

**Bus Engineering/Bus Maintenance
New Flyer Rehabilitation Guide
CTF Body & Paint Shop Support (BP)**

BP- 1) Paint / 2 Hrs.

- Paint engine

Employee Signature _____ Badge# _____

Supervisor/Designee Signature _____ Date _____

**Bus Engineering/Bus Maintenance
New Flyer Rehabilitation Guide
CTF Body & Paint Shop Support (GS)
Graphics**

GS- 1) Graphic / 20 Hrs.

Decals

Employee Signature _____ Badge # _____

Supervisor/Designee Signature _____ Date _____