



# MICRO-BIRD

## Owner's Manual



BLUE BIRD

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# INTRODUCTION

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Thank you for selecting the Blue Bird Micro-Bird. This body/chassis combination is the result of developments in mass transportation which have been ongoing since 1927. The design and construction of the Micro-Bird bus body reflects Blue Bird's concern for efficiency and—above all—safe operation.

This manual has been prepared to acquaint you with various aspects of service, maintenance, and operation. It explains the various features and controls which should be familiar to the operator before he or she attempts to drive the unit, and it will help keep your Blue Bird Micro-Bird in top operating condition and help extend its service life.

Your Blue Bird Micro-Bird may have some or all of the equipment described in this manual. Therefore, you may find maintenance data for equipment not installed on your bus. Please note that some sections of the manual are written for more than one product offered by Blue Bird, so some illustrations may differ slightly from what you find on your own bus. Text, illustrations, and specifications in this manual are based on information available at the time of printing. We reserve the right to make changes at any time without notice. You are encouraged to contact your Blue Bird distributor if additional maintenance information or assistance is needed. For chassis-related service and maintenance information, contact your local chassis distributor or representative.

The complete line of Blue Bird Service Parts is available from your Blue Bird distributor. The use of original Blue Bird replacement parts and components will help ensure that your Micro-Bird remains true to its original design, best preserving our high standards of performance, efficiency, and safety.

Proper operation, service, and maintenance are important to the safety and reliability of all motor vehicles. The information contained herein is provided as a reference for systems and components that require periodic service. The intervals given are manufacturer's recommendations and should be considered maximum intervals. Actual operating conditions must be considered and maintenance intervals adjusted accordingly. Any time a system does not perform satisfactorily, corrective service should be performed at once.

Familiarity with automobile operation and controls is not a prerequisite, but is assumed to be common knowledge to all who will be operating this coach. Basically, control and operation are the same for both, but the driver must recognize some distinct differences

before attempting to operate the coach.

**Note:** The Micro-Bird is larger than a typical automobile. Acceleration will likely be slower than that of a car or truck. The new operator may find that steering, brakes, and other systems feel different from what is familiar. This makes it very important, from a safety standpoint, for him or her to become completely familiar with bus operation through experience before attempting passenger transit. The operator will observe other differences, but after basic familiarization and some practical experience, he or she will find the operation quickly becomes quite natural, comfortable, and far from difficult.

**CAUTION: No one should attempt to operate this coach without: (1) thorough knowledge of all instruments and controls; (2) supervision, or actual driving experience in this or a similar vehicle under supervision; and (3) an appropriate license or permit to operate. Do not drive the coach until the space in front, on the sides, and in the rear is unobstructed. Most accidents occur because the operator did not ensure a clear path before driving.**

**The operator should read this manual, as well as the manual supplied by the chassis manufacturer, before attempting to drive the unit.**

This manual provides you with the most current maintenance and operation information available. We welcome your comments and suggestions regarding this manual. Please direct all correspondence to:

**Blue Bird Body Company  
Attn: TECHNICAL PUBLICATIONS  
P.O. Box 937  
Fort Valley, GA 31030**

# FOREWORD

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This Operator's Manual provides some general and specific information regarding safe operation and maintenance of your Blue Bird bus. It does not address all items or situations that may arise, and it is not a substitute for proper driver and mechanic training. Exercise of care, common sense, and good driving and working practices are required for safe operation.

If this manual does not adequately address your specific questions or concerns, please contact your Blue Bird distributor. The distributor will answer your questions or put you in contact with the proper factory personnel.

Throughout this guide you will find **CAUTIONS** and **WARNINGS**. **CAUTIONS** are given to prevent you from making an error which could damage the vehicle and possibly cause personal injury. **WARNINGS** remind you to be especially careful to avoid personal injury.

Blue Bird Corporation offers many items as standard and optional equipment to meet Federal, state, and local specifications and individual customer requirements. Properly selected equipment can help ensure reliable and safe transportation of passengers.

Examples of this safety equipment include: stop arms, crossing guards, warning lights, warning light monitors, mirrors, first aid kits, fire extinguishers, warning reflectors, fuses, directional and brake lights, warning buzzers, security locks, emergency exits, and seat belts.

It is the driver's responsibility to ensure that the safety items are in proper order. Equipment relating to safety should be checked for operation on a daily basis. Safety equipment may vary due to Federal and state specifications, and individual customer requirements.

In addition, the driver/operator must ensure that the loading area around the bus is clear of pedestrians before stopping, and that all unloaded passengers are a safe distance away from the bus before moving.

Blue Bird has mounted the bus body on the chassis you have received. You should also have received with your vehicle an operator's manual from the chassis manufacturer. If you failed to receive such a manual, contact the chassis manufacturer's closest dealership immediately to obtain one. **Please read this manual and the chassis manual carefully before operating or repairing your bus.**

# REPORTING SAFETY DEFECTS

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If you believe your vehicle has a safety defect which could cause a crash or could otherwise result in injury or death, you should immediately inform the National Highway Traffic Safety Administration (NHTSA) as well as Blue Bird Corporation.

If NHTSA receives similar complaints, it may open an investigation, and if it finds that a safety defect exists in a group of vehicles, it may order a recall and remedy campaign. However, NHTSA cannot become involved in individual problems between you, your dealer, and/or Blue Bird Corporation.

To report safety defects, or to obtain information about motor vehicle safety, you may call NHTSA's Auto Safety Hotline toll-free at (800) 424-9393, or (202) 366-0123 in the Washington, DC area. You may access their website at <http://www.nhtsa.dot.gov/> . Their mailing address is:

**NHTSA  
U.S. Department of Transportation  
Washington, DC 20590**

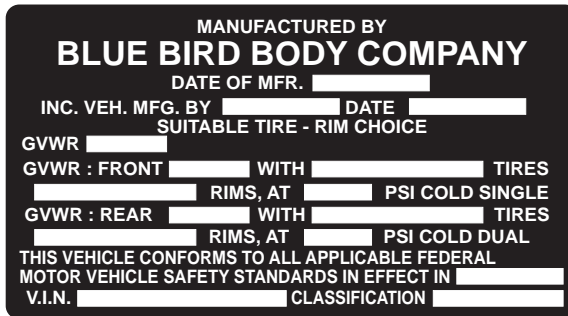
# BODY IDENTIFICATION

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The **Body Serial Number Plate** and **Body Service Number Plate** are located above the windshield on the right side of the unit. Refer to the data on these plates for registration purposes or for replacement part information.



The **Vehicle Certification Plate** certifies that the vehicle conforms to all applicable Federal Motor Vehicle Safety Standards in effect at the date of manufacture. Do not remove or deface this plate. This plate is located over the driver's window.



# INSPECTION

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## DAILY INSPECTION

To keep your bus in the best operating condition in terms of safety, convenience, service, and operating expense, follow these recommended inspection procedures on a daily basis, as well as all inspection procedures recommended by your chassis manufacturer. Any malfunctions or defects should be corrected before the next trip. Report needed services to responsible maintenance personnel.

### **Outside the bus:**

- Wipe clean the windshield, mirrors, front windows, headlights, taillights, directional lights, and stop lights.
- Is the tailpipe clear?
- Check tire pressure and treads. Are the lug nuts in place?
- Is the area under the bus all clear?
- How is the general outside appearance? Is it clean? Is there a clear view of identifying features (license plate, school/organization name, bus number, etc.)?
- Are the mirrors clean and adjusted?

### **Inside the bus:**

- Are the seats and floor clean? Are the steps and aisle clear?
- Verify that the emergency exits, rear door, and windows can all open and close.
- Check emergency equipment and first aid kit.
- Check pressure on fire extinguisher.
- Are the windshield and windows around the driver's area clean?
- Are the mirrors clean and adjusted?

### **Starting the engine:**

- Be sure parking brakes are on.
- Put in Neutral.
- With key on, check fuel gauge. Check brake warning buzzer or light, neutral safety switch.
- Start engine. Look and listen for trouble signs; check gauges.



**With the engine running, check (from driver's seat):**

- Mirrors, interior and stepwell lights, service door seal.
- Does the steering feel OK? Is there any unusual noise?
- Are the horn, defroster/heater blower, and windshield wipers working properly?
- Does brake pedal have right height and feel; is gauge reading OK? Parking brake release, reset.

**Outside checks required before driving away:**

- Check right- and left-turn signals in front and rear. Are they clean and flashing?
- Are flasher warning lights in front and rear clean and flashing?
- Is stop arm clean and working?
- Check hi-lo beams in headlights.
- Are stop lights and taillights clean and working?
- Is hazard flasher working?

**Final check while moving the bus:**

- Is seat belt fastened?
- Do brakes stop and hold?
- Does steering feel OK? Are there any unusual noises? Is bus under control... tracking straight?
- Brake to a stop. Are all gauges OK?

**Remember:** Safety on the road depends on you. Observe weather and road conditions and drive accordingly. Be physically and mentally alert. When backing up near pedestrians or in congested areas, use outside monitor or director. Look around before driving away from where you are parked and observe all traffic rules and regulations.

## QUARTERLY INSPECTION

- Inspect fire extinguisher to see if fully charged.
- Check first aid kits to see if fully equipped.
- Oil all hinges and window latches for ease of operation.
- Lubricate all window channels with silicone or graphite.
- There is one drain hole in each floor section under windows. Be sure hole is clear of debris so any water may escape.
- Clean all rubber door seal and lubricate with rubber lubricant.
- All rear and side emergency door latch slide bars to be lubricated with light grease to reduce friction.
- Tighten all body tie-down bolts to between 75 and 85 foot-pounds torque at 1,000 miles, and quarterly thereafter.
- Grease emergency door hinges.

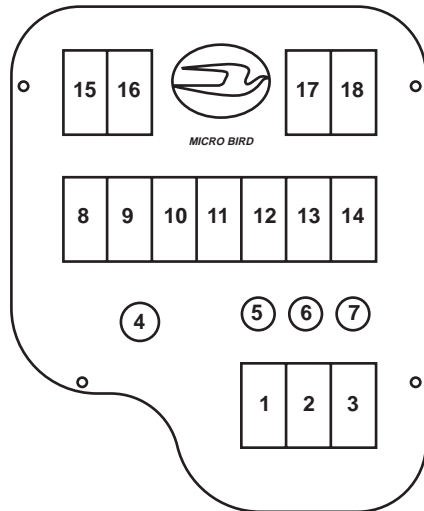
## YEARLY INSPECTION

- Complete Quarterly Inspection.
- Remove all seat cushions, thoroughly clean with upholstery cleaner, and reinstall on a rotating basis.
- Adjust door control rod and closing mechanism to entrance doors.
- Thoroughly clean all front heater cores.
- Bleed all air from heaters.
- Tighten all heater hose clamps.
- Wash underseat heater core filter(s).

**Note:** These checklists are suggested. They do not replace or supersede local or state required driver inspection procedure.

# SWITCH PANEL

1. Manual warning light switch.
2. Master warning light switch. Systems may vary on some units
3. Warning light switch emergency override
4. Emergency exit or lift pilot
5. Pilot—shows amber warning lights are flashing
6. Pilot—shows red warning lights are flashing
7. Pilot—warning light monitor
8. Clearance lamps
9. Dome lights
10. Underseat heater
11. Heater pump
12. Mirror defrost
13. Auxiliary fan
14. Strobe Light
15. Destination sign
16. Lift
17. Stop arm/crossing arm
18. Switch panel rheostat



**Note:** For Positions 8-18, the components are located in order of dominance. Depending on unit equipped features.

**Note:** Driver's compartment not indicated. Located above driver's side door, accessible by depressing release button latches.

# SEATS AND SEAT BELTS

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## DRIVER'S SEAT BELT OPERATION

For driver's seat belt operation refer to chassis manual. If you failed to receive such a manual, contact the chassis manufacturer's closest dealership immediately to obtain one.

## PASSENGER SEAT BELT OPERATION (IF SO EQUIPPED)

Individual lap belts for passengers are retractable or non-retractable depending on option ordered. Insert the catch into the buckle, test for assurance of latch fit, and pull loose end of strap until belt fits snugly across the lower hips. The buckle can be released by pushing the button in its center. The adjustable end can be moved outward on its strap by turning 90° to the strap and pulling.

## SEAT BELT INSPECTION AND MAINTENANCE

Inspect seat belts and their attachments on a weekly basis. Check seat belt buckles and adjustability to ensure proper operation. If necessary, lubricate buckle with a graphite lubricant. When buckle is found to be inoperable, replace immediately. If there are any defects in the webbing (i.e., torn or frayed), the seat belt must be replaced immediately to ensure passenger safety. Hand-wash webbing with warm water and mild soap. Rinse thoroughly and dry in the shade. Do not bleach or redye, because such processing may severely weaken the assembly.

**WARNING: Be sure the lap belt is fitted snugly across the hips, not the waist. Failure to do so may increase the chance of injury in the event of a collision.**

**WARNING: If seat cushions are removed for maintenance, they must be installed using the following instructions. Failure to comply with these instructions could result in injury from unattached seat cushions in the event of an accident.**

## SEAT CUSHION REMOVAL AND INSTALLATION—DOT SEATS

### *Removal*

1. Loosen the two front swivel type clamps at the front underside of the cushion with a Phillips-head screwdriver. **Caution—Do not remove clamps.**

2. Rotate the swivel clamps so as to clear the front retaining channel frame.
3. Lift the forward edge of the cushion two to three inches and pull cushion forward to remove.

### *Installation*

1. Place the rear edge of the cushion down on the base portion of the seat frame. Lifting the forward edge of the cushion two or three inches, slide the cushion to the rear to engage the positive type clamp into the rear retaining channel.
2. Lower the forward edge to the frame making sure the swivel clamps are inside the frame and the positive type clamps are secure on the rear retaining channel.
3. Rotate the swivel clamp to engage the forward retaining channel frame.
4. Tighten with Phillips-head screwdriver until clamps do not rotate.

## SEAT CUSHION REMOVAL AND INSTALLATION—DOT SEAT BELT SEATS

### *Removal*

1. Loosen the two front swivel type clamps at the front underside of the cushion with a Phillips-head screwdriver. **Caution—Do not remove clamps.**
2. Rotate the swivel clamp located at the rear underside of the seat cushion.
3. While lifting at the rear edge of the cushion, pull the cushion to the rear and remove.

### *Installation*

1. Place the forward edge of the cushion two inches to the rear of the front retaining clamps. Slide the cushion forward engaging the positive clamps onto the forward retaining channel.
2. Lower the rear edge of the frame and rotate the swivel clamps so they engage the square tube crossmember.
3. Tighten with Phillips-head screwdriver until clamps do not rotate.

# NORMAL CURRENT USAGE

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## STANDARD EQUIPMENT

### *Constant Load*

| <b>Item No.</b>              | <b>Items</b> | <b>Current (Amps)</b> |
|------------------------------|--------------|-----------------------|
| Cluster Lamps                | 6            | 4.14                  |
| Clearance Lamps              | 4            | 2.76                  |
| Intermediate Side Marker     | 2            | 1.38                  |
| Tail Lamp*                   | 2            | 1.18                  |
| Ignition                     | 1            | 2.50                  |
| Instrument Panel             |              | 1.00                  |
| Headlamps<br>(Dual Low Beam) | 2            | 8.40                  |
| Parking Lamps                | 2            | 1.18                  |
| 90-FC & MB Heater**          | 1            | 27.00                 |
| 90-Conv. Heater**            | 1            | 31.50                 |

### *Intermittent Load*

| <b>Item No.</b>   | <b>Items</b> | <b>Current (Amps)</b> |
|-------------------|--------------|-----------------------|
| Stepwell          | 1            | 0.44                  |
| Stop Lamp*        | 2            | 4.20                  |
| Dome Lamps (each) | Varies       | 0.58 ea.              |
| Back-up Lamps     | 2            | 4.20                  |
| Electric Wipers   | 2            | 8.00                  |

\* Combined Stop and Tail Lamp

\*\* Use Applicable Heater

## OPTIONAL EQUIPMENT

**NOTE: To figure current draw, add constant load and 35% of intermittent load.**

### *Policy*

1. Warning light options include lights, standard flasher, and pilot light. If optional flasher unit is desired, add current draw of that option.
2. Directional light options include lights and standard thermal flasher.

### *Constant Load*

| <b>Item</b>                    | <b>Option Number</b> | <b>Current (Amps)</b> |
|--------------------------------|----------------------|-----------------------|
| Auxiliary Fan                  | 0525                 | 3.00                  |
|                                | 0531                 | 6.00                  |
|                                | 0532, 0546           | 3.00                  |
| Exhaust Fan                    | 0552                 | 2.00                  |
| Heater                         | 1145                 | 31.5                  |
|                                | 1154                 | 9.00                  |
|                                | 1230                 | 2.50                  |
|                                | 1325, 1330           | 4.50                  |
|                                | 1336, 1342           | 9.00                  |
| Heater Pump                    | 1416                 | 6.75                  |
| Clearance                      | 1576                 | 2.16                  |
| Light                          | 1581                 | 1.08                  |
|                                | 1591                 | 0.54                  |
| Cluster Light                  | 1642                 | 1.62                  |
| Door Light                     | 1878-01              | 0.59                  |
|                                | 1878-02              | 1.18                  |
|                                | 1878-03              | 1.77                  |
| Destination Sign               | 3050, 3052, 3053     | 4.06                  |
| Destination Sign (Roll)        | 6165                 | 4.06                  |
| School Bus Sign                | 3064                 | 4.06                  |
| Front and Rear School Bus Sign | 3065                 | 8.12                  |

## *Intermittent Load*

| <b>Item</b>                       | <b>Option No.</b>                     | <b>Current (Amps)</b> |
|-----------------------------------|---------------------------------------|-----------------------|
| Directional Lights                | 1686,                                 |                       |
|                                   | 1697, 1701,                           |                       |
|                                   | 1719, 1723, 1727, 1731                | 2.10                  |
|                                   | 1740                                  | 0.27                  |
|                                   | 1790, 1788                            | 4.20                  |
|                                   | 1820                                  | 0.27                  |
| Dome Lights ( <i>**Per Lamp</i> ) | 1825, 1828, 1831**,<br>1832**, 1840   | 0.58                  |
| 7" Stop Lights                    | 6723                                  | 4.79                  |
|                                   | 1940, 6728                            | 4.20                  |
| Warning Lights                    | 1987, 1990, 1992,<br>2013, 2016, 2017 | 12.50                 |
|                                   |                                       |                       |
| Solenoid Switch                   | 2130, 2131                            | 0.75                  |
| Buzzer (Emergency Door)           | 3000                                  | 0.50                  |
| Dot Buzzer                        | 3002-01                               | 1.00                  |
|                                   | 3002-02                               | 1.50                  |
|                                   | 3002-03                               | 2.00                  |
| Buzzer (Emerg. Door)              | 3005                                  | 0.50                  |
| Emergency Door                    | 3020                                  | 0.94                  |
| Pilot Light & Buzzer              | 3025                                  | 0.94                  |
| Chime System                      | 3040                                  | 1.00                  |
| Stop Arm w/Lights                 | 3135, 3143, 3146,<br>3155, 3148, 3162 | 1.80                  |
|                                   |                                       |                       |
| Stop Arms Dual w/Lights           | 3159, 3149                            | 3.60                  |
| Pushout Windows w/Buzzer          | 3343                                  | 0.50                  |
| Sanders                           | 4015, 4475                            | 1.50                  |
| 56" Wheelchair Lift               | 0467                                  | 48.00                 |
| 35" Wheelchair Lift               | 0469                                  | 48.00                 |
| 42" Wheelchair Lift               | 0465, 0466                            | 90.00                 |



# LIGHT BULB DATA

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| Lamp Description | Trade Name | Trade No. | Color | Bulb No. |
|------------------|------------|-----------|-------|----------|
|------------------|------------|-----------|-------|----------|

## INTERIOR LIGHTS

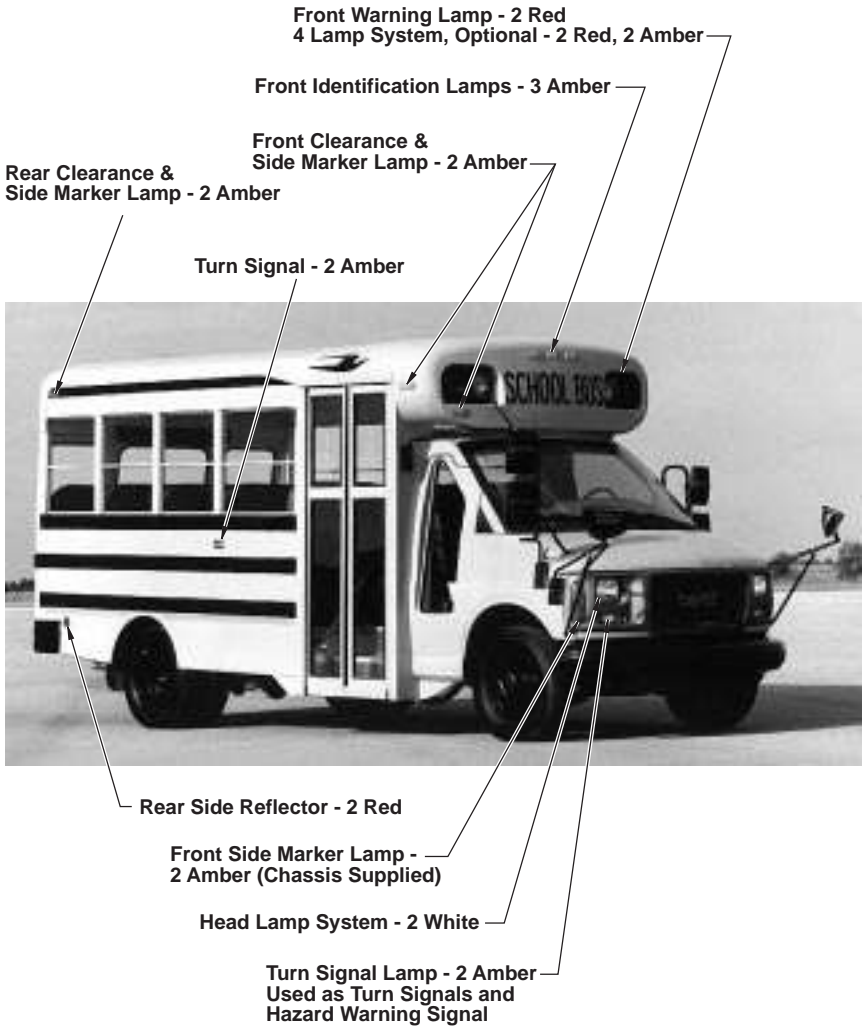
|                          |             |            |            |    |
|--------------------------|-------------|------------|------------|----|
| Dome                     | Weldon      | 8005       | (Standard) | 89 |
|                          | Weldon      | 8010       | (Deluxe)   | 93 |
| Stepwell                 | Arrow       | 35         |            | 67 |
| Emerg. Door Light        | Weldon      | 8025       |            | 67 |
| Switch Panel Pilots      | Cole Hersee | PL19       |            | 53 |
|                          | Dial        | 41204-1211 |            | 68 |
| Switch Panel Illuminator |             | 2007367    |            | 53 |

## EXTERIOR LIGHTS

|                                |             |               |                                 |      |
|--------------------------------|-------------|---------------|---------------------------------|------|
| Directional                    | KD          | 772-9105      |                                 | 1156 |
|                                | Weldon      | 1010 Series   | Red & Amber<br>Plain & w/ Arrow | 1156 |
| Warning Light Cluster & Marker | Signal Stat | 1604          |                                 | 1156 |
|                                | Weldon      | 1020 Series   | Red & Amber                     | 4636 |
| Side Directional               | Weldon      | 5050          | Amber & Red                     | 904  |
|                                | Peterson    | 122           | Amber & Red                     | 194  |
|                                | Peterson    | 122           |                                 | 194  |
| Stop/Tail/Tag                  | Arrow       | 059-9900021CP |                                 | 1073 |
|                                | Dominion    | 70-6128-71    |                                 | 1157 |
| Back-Up                        | Signal Stat | 2103          |                                 | 1157 |
|                                | KD          | 854-5301      |                                 | 1156 |
| Stop                           | Weldon      | 7-1010-1      |                                 | 1156 |
|                                | Weldon      | 1010          | Red                             | 1156 |
|                                | Arrow       | 438           |                                 | 1157 |
|                                | Signal Stat | 1605          |                                 | 1156 |
|                                | KD          | 772-9105      |                                 | 1156 |

# VISIBILITY EQUIPMENT REQUIRED BY FEDERAL MOTOR VEHICLE SAFETY STANDARDS (FMVSS)

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**Rear Warning Lamp - 2 Red**  
**4 Lamp System, Optional - 2 Red, 2 Amber**

**Rear Identification Lamps - 3 Amber**



**Rear Reflector - 2 Red**

**Rear Tail & Stop Lamp - 2 Red**  
**Rear License Plate Lamp - 1 White**  
**Combined with Tail Lamp**

**Rear Back-Up Lamp System -**  
**Operated by Chassis Furnished Switch**

**Stop Lamps - 2 Red**

**Rear Turn Signal Lamp - 2 Red or Amber**  
**Used as Turn Signals and Hazard Warning Signal**

# MIRRORS AND ADJUSTMENT

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**WARNING:** The vehicle's mirror system has been designed to comply with all field-of-view requirements, but it is the owner's responsibility to adjust the mirrors properly before placing the vehicle in service and to maintain the adjustment during the service life of the vehicle. Mirrors provide additional driver visibility on buses. To be used effectively, mirrors must be properly adjusted for each driver and the driver must be aware of the limitations on viewing area that exist even when mirrors *are* properly used. Mirrors are not a substitute for proper driver training and care that should be exercised when operating the vehicle and loading or unloading passengers. Do not move the bus until you have accounted for each passenger that has disembarked and have confirmed that all passengers are clear of the bus. Failure to follow these procedures could cause serious injury or death.

Left and right front fender mounted convex crossview and left and right front fender-mounted convex rearview mirrors are required equipment on all Micro-Bird (Type "A") and Mini-Bird (Type "B") buses.

## INTERIOR MIRRORS

Inside rearview mirrors can be adjusted by loosening the bolts and nuts in slotted holes. Adjust the mirror to give the operator a clear view of bus interior and roadway to the rear.

**WARNING:** Many school bus passengers are energetic children who are small and playful and do not understand the hazards of buses. After unloading, some children could be outside the field of vision of your mirrors or could dart out of view quickly. After unloading passengers, do not move the bus until you have confirmed the location of each disembarked passenger, and know that all are completely clear of the bus. Failure to follow this procedure could cause serious injury or death.

## EXTERIOR MIRRORS

Outside rearview mirrors are adjustable by turning from side to side, by sliding the adapter from side to side, and by sliding the adapter bracket on slots. Adjust mirror to provide view of roadway to rear of bus. Retighten all bolts after adjusting mirrors.

**CAUTION:** A convex mirror has a curved surface and is designed to

**provide a wide view with minimum distortion. However, persons or objects seen in a convex mirror will look smaller and appear farther away than when seen in a flat mirror or viewed directly. Therefore, use care when judging the size or distance of a person or object seen in a convex mirror. Wait until you can view the person or object directly or in a flat mirror to determine their size and distance.**

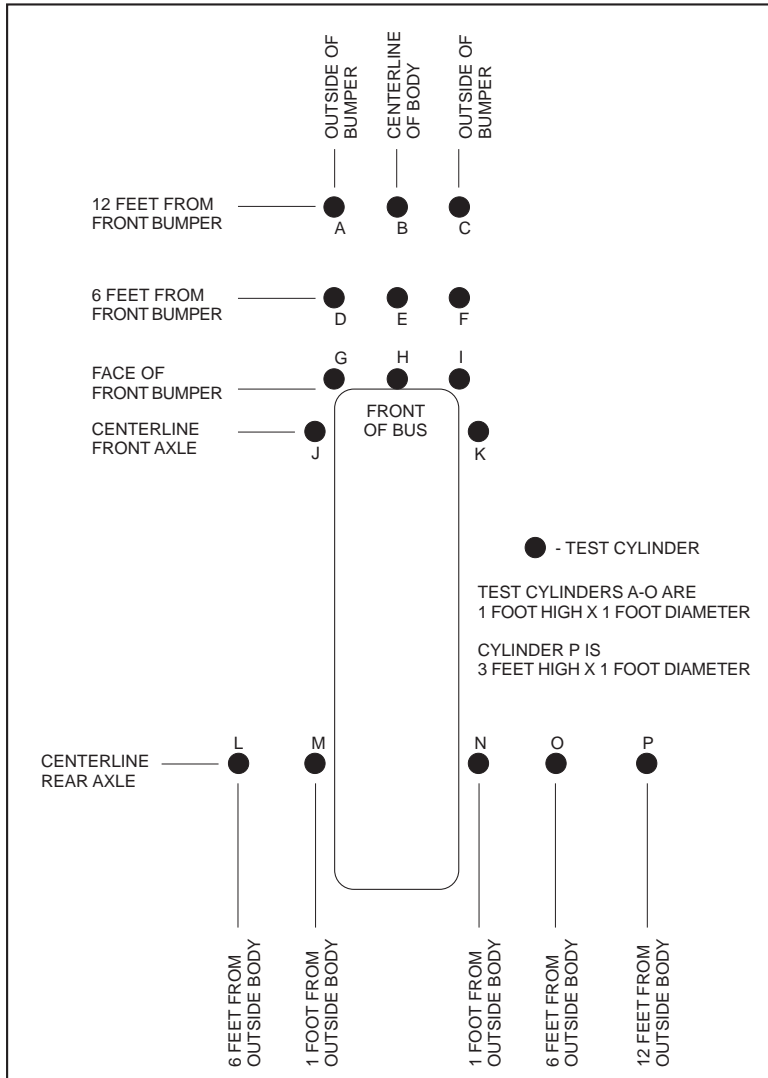
## **EXTERIOR REARVIEW**

Standard equipment on all school buses includes four outside rearview driving mirrors (two per side), and two elliptical crossview mirrors (one per side). The outside rearview driving mirrors include one flat and one convex on each side, both measuring 6.5 by 10 inches (10 by 10 inches in Canada). The outside rearview driving mirrors are designed to provide the seated driver a view of the roadway to the rear and to the sides of the bus. The elliptical crossview mirrors are designed to allow a seated driver to view all areas around the front of the bus not visible directly. The elliptical crossview mirrors are designed to be used to view pedestrians while bus is stopped. **DO NOT USE THE ELLIPTICAL CROSSVIEW MIRRORS TO VIEW TRAFFIC WHILE BUS IS MOVING. IMAGES IN SUCH MIRRORS DO NOT ACCURATELY SHOW ANOTHER VEHICLE'S LOCATION.**

Proper adjustment is necessary for any mirror system to perform as designed. The following adjustment sequence should be used to allow the driver to obtain the maximum viewing area with the mirror system.

1. Adjust the driver's seat to the desired position.
2. Adjust the right-side flat driving mirror so that the tops of the side windows are visible in the upper edge of the mirror, and so that the right side of the bus body is visible in the inside edge of the right-side flat mirror.
3. Adjust the right-side convex driving mirror so that the view in the top of the convex mirror overlaps the view provided by the right-side flat driving mirror, and so that the right side of the bus body is visible in the inside edge of the right-side convex mirror.
4. Adjust the left-side flat driving mirror and the left-side convex driving mirror following the same procedures described for the right-side mirrors. See Steps 2 and 3 above.
5. Adjust the elliptical crossview mirrors by positioning each mirror head so that the center of its field of view is pointed directly at the eyes of the seated driver.
6. Make a final adjustment to the mirror system so that the seated driver can view the areas required by Federal Motor Vehicle Safety Standard 111, including the entire top surface of cylinders M and N when

located as illustrated and rearward a minimum of 200 feet (measured from the mirror surface) using the outside rearview driving mirrors. The elliptical crossview mirrors should be adjusted to provide the seated driver a view of the entire surface of any cylinder A thru P (when located as illustrated) not visible by direct view of the driver. The view provided by the elliptical crossview mirrors must overlap the view provided by the outside rearview driving mirror system.



## MAINTENANCE

All mirrors should be cleaned once a week (or more if needed), preferably with an ammonia solution. Keep the mounting fasteners tight so that mirrors will not vibrate. Check weekly and retighten, if necessary.

# DOORS

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## CONTINUING MAINTENANCE REQUIREMENTS

1. Keep working parts of control tightened.
2. Lubricate all working parts periodically, including hinges and overhead controls (see Body Component Maintenance Chart).
3. Repair or replace worn seals.
4. Maintain proper door opening and closing adjustment (see Body Component Maintenance Chart).

## OUTWARD OPENING

Doors are mounted in a prefabricated framework which eliminates effect of body construction variations on door and seal operation. Doors are suspended completely on sealed ball bearings located at the top corners of the framework, inside the body. The interlink connection between the doors is a single assembly with oppositely threaded spherical bearing rod-end connectors on each end providing simple link length adjustment without disassembly. Simply loosen the lock nut, turn the tube, and retighten the nut when satisfactorily adjusted. The geometry of the mechanical link between the doors causes the rear door to close well ahead of the front door, so that the front nosing seal rubber always overlaps the rear. Oil-impregnated bronze bearings in the lower corners of the framework serve as pivots (not supports). All controls and mechanisms and the complete lower step tread are sealed inside the bus and out of the weather when the door is closed.

In the interest of safety through maximized driver visibility, the doors have been designed to have as much clear glass opening as possible. A four-inch-wide pad is mounted to the header cover over the opening.

The manual control is the Blue Bird over-center locking type with built-in Saf-Latch. The door's ease of operation allows use of a short handle arm.

# CIRCUIT BREAKERS

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Blue Bird uses circuit breakers and fuses. The circuit breakers are a quick resetting type and are located behind the driver's compartment above the driver's side door. The advantage of circuit breakers is that no replacement (as with fuses) is required. When the breaker opens a circuit, follow standard electrical troubleshooting procedures within the circuit to determine the cause of overload. Exposed wires and electrical shorts are the most common causes. To access circuit breakers and fuses, remove the rear panel of the driver's compartment.

# LUBRICATION—WINDOWS, HINGES, AND LOCKS

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1. Lubricate latches and sliding seal of top window with silicone every thirty days.
2. All exterior hinges should be lubricated every thirty days with a light weight oil.
3. Inside hinges and door control hardware should be lubricated quarterly with a light weight oil.
4. A heavy grease should be used on the upper door control quarterly.
5. Luggage compartment latches should be lubricated every thirty days with a silicone type grease.
6. Luggage compartment lock cylinders should be lubricated with a graphite lubricant every thirty days.
7. Lubricate the positive hold open hinge on the rear emergency door with the door closed using a low temp grease per ASTM 4950 GC-LB Grade 2 -60° to 350°F monthly. (If so equipped)
8. A heavy grease should be used on the emergency door hinges quarterly.

# FLOOR COVERING

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Good floor covering maintenance is essential for long service. The covering should be swept daily, if at all possible, to avoid dirt from being ground into the covering.

**Do not** use sweeping compounds as this may cause a deterioration of the covering.



**Do not** let such substances as road salt build up. Mop the floor frequently as you think it is needed. Use a mild detergent with water and rinse thoroughly.

**Do not** use solvent-type cleaners. Mop any excess water up as soon as possible, because this may cause the covering to separate from the sub-floor. If separation does occur and “bubbles” appear, cut the material to gain access to the underside. Clean the underside of the covering and sub-floor where separated and re-bond with a high-quality contact cement.

## DESTINATION SIGNS

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**Two Station Sign**—Rear lighted, sign material masonite with lettering on both sides. Lubricate interior door hinge.

## DRAIN HOLES

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There are two drain holes located in each floor section; one right hand side under window, and one left hand side under window. These holes should be cleared of all debris quarterly to allow for water drainage.

## JACKING INSTRUCTIONS

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See the manual provided by the chassis manufacturer for proper jacking instructions, procedures, and locations.

**WARNING: Do not lift the vehicle by the bumper. Bumpers are designed to protect the vehicle and occupants during a collision, not to support the vehicle’s weight.**

# STOP ARMS

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Stop arms are required on Blue Bird school buses per Federal Motor Vehicle Safety Standard 131. Stop arm assemblies are purchased as a kit; many different kits are available with blades to meet all state requirements. The stop arm is located on the left-hand side of the body under the driver's window. Stop arms are most commonly operated by a manual switch on the switch panel.

On electric stop arms, the manual switch activates the control relay of the stop arm. Optionally, the stop arm may be activated by the warning lamp system.

## MAINTENANCE

The following preventive maintenance procedures should be followed for the electric stop arm:

### *Monthly*

- Oil the dual-action breakaway hinge at its four pivot points with a high-performance, penetrating lubricant. Tri-Flow™ (DuPont) with Teflon is recommended.
- Check and make sure breakaway portion of hinge is free and movable.
- Check fasteners for tightness.

### *Quarterly*

- Remove front and rear covers of base and check internal fasteners for tightness.

The "STOP" sign must extend, and if equipped with lights, the lights must be operating any time the red lights of the warning light system are flashing. For those state-designed warning light/stop arm systems that allow the stop arm to withdraw while warning lights are operating, an audible alarm sounds to alert the driver of the condition.

## STOP SIGNS AND CROSSING ARM TROUBLESHOOTING

To troubleshoot electric stop signs or crossing arms, it is important first to understand how they are installed. This can be done one of two ways:

1. Dark blue to a switched 12 V terminal. Red to a constant 12 V terminal. Green to a proper ground. By this method, the blue wire activates and deactivates the stop sign.
2. Dark blue and red to a constant 12 V terminal. Green to a grounded switched terminal. This method uses the green wire or the ground to activate and deactivate the stop signs and crossing arms.

Note that for the electric stop signs and crossing arms, all the works are in the base. You can troubleshoot the electric stop sign by these steps:

1. Determine if the sign is wired correctly (see Steps 1 and 2 above) and that 12 V and ground are available where required.
2. Remove the rear cover of the base.
3. Remove the red wire from the relay (wires lead to terminal on motor).
4. Remove red wire from the limit switch.
5. Replace the red wire on the limit switch with the red wire from the motor.
6. With a battery charger (or any other 12 V source), ground the motor terminal (black wire) and attach the positive 12 V to the red wire terminal on the motor. The motor should activate and run continuously until the red wire is removed.
7. With a probe attached to the 12 V positive side of the battery charger, identify the black and light blue leads on the limit switch at the motor base and attach the 12 V positive probe to one of the two leads. Either the motor will begin running or it will not. If the motor runs, it should proceed until the CAM circles and deactivates the limit switch, causing the motor to stop. At that time, change terminals with the limit switch to the other of the two leads, and again the motor should begin to run until the CAM positions itself to deactivate the limit switch. If both these points can operate the motor, then the limit switch, CAM, and motor assembly are functioning. If the motor still fails to run, and you have verified that you have the proper wiring installation as identified above, then the problem is with the relay. Once the relay is replaced, the sign should be operational.

## *Stop Sign Blade Failure*

### **Problem:**

Lights do not function.

### **Areas to Check:**

1. Check that the light bulb is working.
2. Check that the ground strap is secure.
3. Check to see if 12 V is being supplied to the light bulb.

Please note the following improvements to the socket and pigtail:

- A. Screws are now used instead of rivets. This makes replacement easier.
- B. The braided wire ground strap, which failed on occasion, has been replaced with a two-wire socket and pigtail. This helps ensure an intact ground throughout the operation and life of the sign.
- C. Lower temperature protection has been added to ensure a broader temperature range in warmer and cooler climates.

### **Problem:**

Color fading of the blade surface.

### **Areas to Check:**

1. The red paint used on steel blades contains a pigment that tends to bleach over time. If a blade surface fades, it may be repainted or replaced. Specialty recommends replacement due to the labor savings and cost efficiency.
2. Improvements in technology now allow aluminum reflective signs to last much longer than in the past. Decals are available for engineering grade, and the high-intensity sign costs somewhat more than the steel blade. All stop arms are available with a high-intensity face.



# EMERGENCY EQUIPMENT

---

Each state or province has its own set of laws regarding emergency equipment. Your unit may have some or all of the items listed below. Because of variations in option packages, the placement of this equipment inside the bus may vary from one unit to another, but it is important for you to recognize and know the locations of all the emergency equipment on your bus. Furthermore, it is important for you to read all literature, labels, and any other written materials supplied by the equipment manufacturers. Be sure you familiarize yourself with all aspects of the emergency equipment before attempting to drive the bus.

## FIRE EXTINGUISHER

The fire extinguisher is located in the right front corner of the bus body near the floor. Your unit may be equipped with a 2.5, 5, or 6 pound extinguisher. Check quarterly to make sure it is fully charged.



## FIRST AID KIT

The first aid kit is mounted above the windshield on the right hand side of the bus body. Size and contents of first aid kits may vary because of different state specifications. The kit should be inspected quarterly or as required by local regulation to be sure that all contents comply with state specifications.

## BODY FLUID CLEANUP KIT

The body fluid cleanup kit is designed to contain accidental spillage of biological matter, minimizing risk of exposure to potential health hazards. The contents of the kit should be inspected every 30 days or as required by local regulation to be sure that all contents comply with state specifications.

## FIRE AXE/CROWBAR

Your bus may be equipped with fire axe and /or crowbar. Every 30 days, inspect installation mounting fasteners to make sure they are tight. Check fire axe and crowbar monthly to see that they are easily accessible and unobstructed.

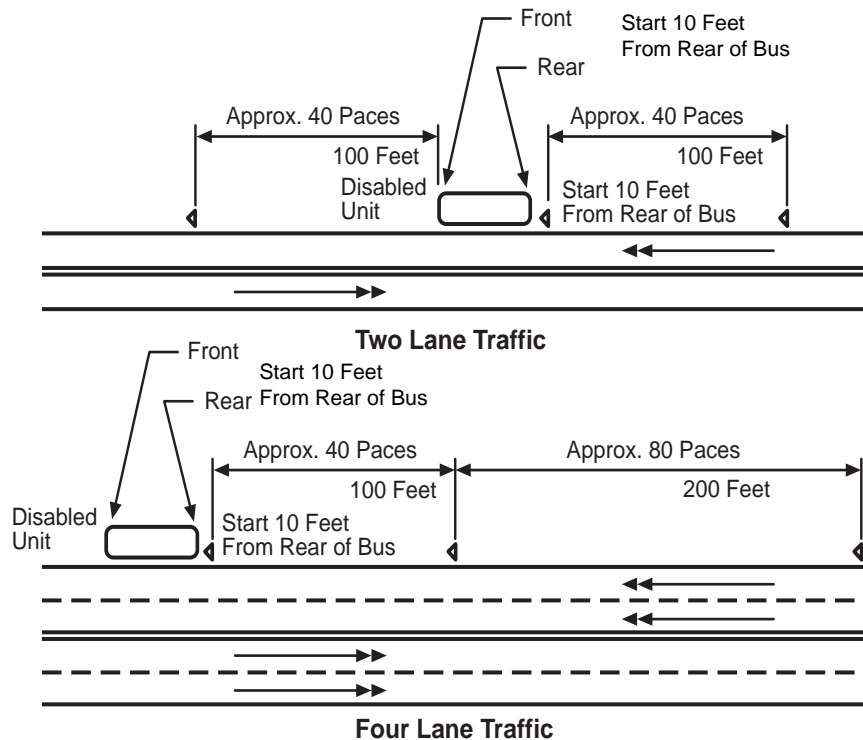
## FLARE KIT

If your bus is equipped with a flare kit, check to see that its contents are in place every 30 days or as required by local regulations. Inspect mounting fasteners for flare kit box every 30 days to ensure that they are tight.

## TRIANGULAR WARNING DEVICES

Your unit may be supplied with triangular warning devices. Inspect contents of the kit quarterly or as required by local code to ensure proper operation.

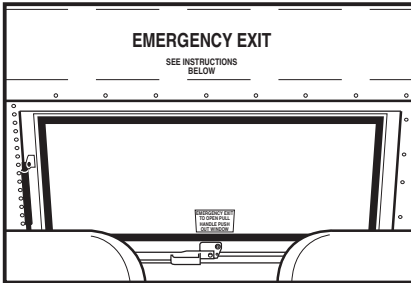
### *Recommended Warning Device Positioning*



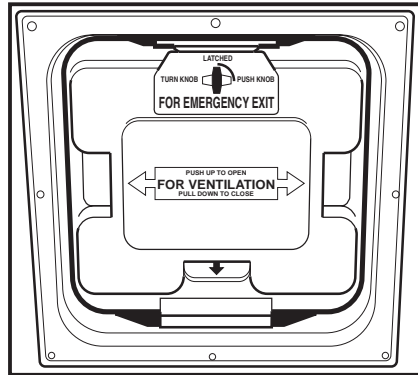
# EMERGENCY EXITS

Emergency exits are clearly identified by the words “Emergency Exit”. Operating instructions are written close to each exit. Some units are equipped with an audible alarm device signifying an emergency exit is open. If when turning the ignition switch on, a buzzer sounds, check emergency exits to see that they are completely closed. All emergency exits meet Federal Motor Vehicle Safety Standard 217 “Bus Window Retention and Release”. All emergency

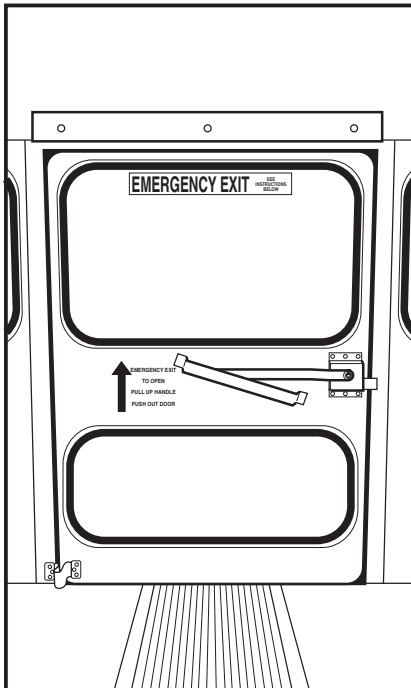
exits should be inspected and operated daily to ensure they are labeled and operate properly per the instructions provided.



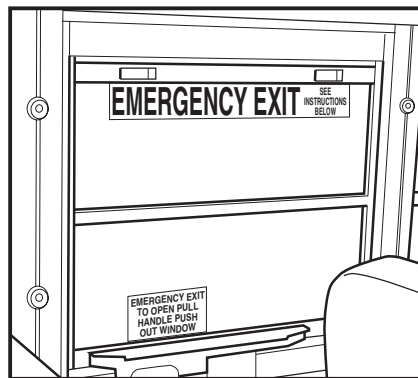
Rear Emergency Window



Roof Hatch



Rear Emergency Door



Split Sash Pushout Window

# HEATERS

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## GENERAL INFORMATION

Blue Bird heaters are hot-water type, which depend on engine-generated heat for their function. Heat from the engine is picked up by the engine coolant, which is pumped through the heaters inside the body and back into the engine. A typical heater inside the body is made of a heat exchanger coil and fans which move air across the coil. Air moving across the coil picks up heat from the engine coolant and transfers it into the body.

Satisfactory performance of the body heaters is mostly dependent upon:

1. Adequate engine (coolant) temperature—this can be altered by thermostat rating (which should never be higher than recommended by the engine manufacturer) and/or shutters.
2. Adequate coolant flow—this varies with engine speed and can be increased if necessary by the use of an auxiliary water pump. The heaters are rated at six gallons per minute.
3. Proper fan operation—all motors have multiple speeds, and can most easily be checked for function by operating the motor switches individually and listening for variations in speed.

Many other factors affect performance, but these three are most important.

## HEATER OPERATION

Be sure the engine radiator is full and all coolant flow valves are open. **For your own safety, do not leave the engine running while opening or closing valves.** Warm up the engine to operating temperature with the engine at fast idle if possible, and turn on the heater fans (and the auxiliary water pump if unit is equipped with one). Under extremely cold weather conditions, turning on the heater fans will cause the engine temperature to drop noticeably as heat from the engine is transferred into the body, but as air temperature inside the body rises, engine temperature also rises. The engine will also generate more heat as it does work in moving the vehicle. Once the engine is warm, heater fan motor speeds and subsequent air



volumes across heater coils can be controlled at the driver's discretion for best defrosting and ultimate passenger comfort. **NOTE:** See *Heater Bleeding Instructions* for completely filling cooling system.

## **DEFROSTING**

Windshield fogging and frosting is caused by warm, humid air coming into contact with a colder windshield, which causes the moisture in the air to condense and even freeze if the windshield is cold enough. The warmer the windshield, the less moisture will condense. During initial warm-up, the defroster blowers should be operated at maximum to heat the inside of the windshield glass as much as possible.

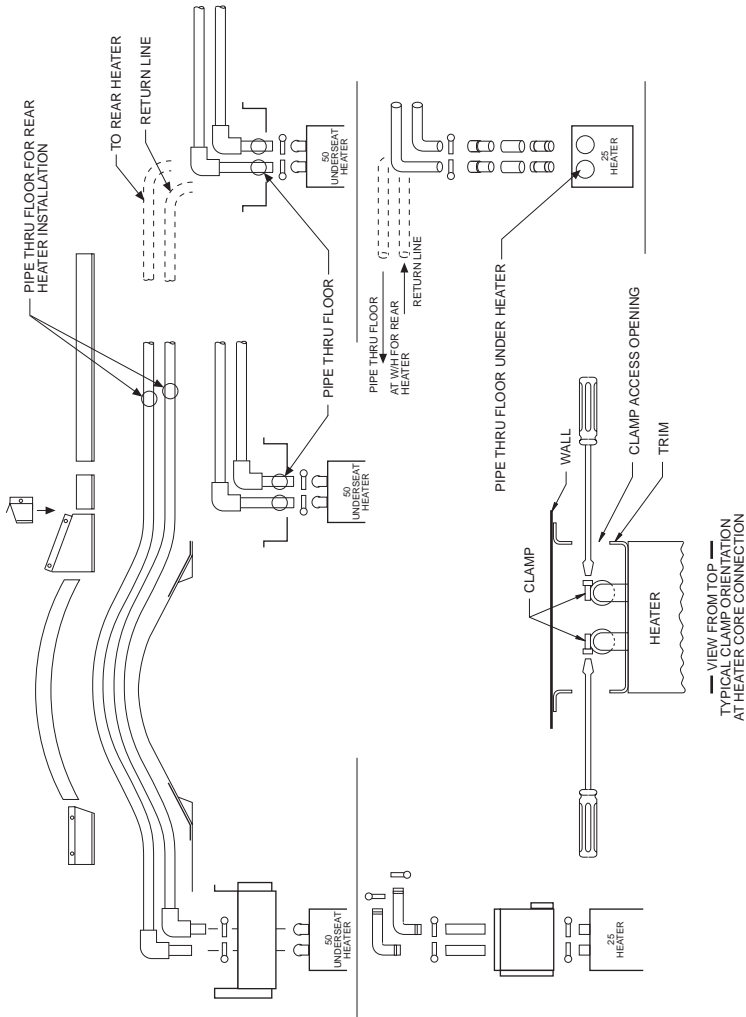
If the defrosters are not turned on until the after condensation starts, it is more difficult to heat the glass and drive moisture away. As passengers are loaded onto the bus, the moisture content of the air inside the bus increases. Conditions will be especially difficult when there are large passenger loads staying on board for extended periods of time, such as on a charter or over-the-road activity trip. Travelling at highway road speeds causes heat to dissipate through the windshield glass, and each passenger's breath continually adds to the air's moisture content. To reduce fogging, lower the driver's window slightly to let the moist air escape, and run all defroster blowers at high speed. If bus is equipped with adjustable static air vents in the roof, they should be kept open, and exhaust fans should be used, if present.

Auxiliary fans mounted on the dash or overhead may be helpful as an aid to defrosting. Direct them to blow with the air from the defroster outlets, rather than against it. Many different ways of positioning auxiliary fans have been found to work under various conditions, and their use on your unit can probably best be determined by experience.

## HEATER HOSE CLAMP SERVICE

Tighten heater hose clamps after first 1,000 miles and annually thereafter.

Heater hose clamps are located as indicated in diagram.



## **HEATER BLEEDING INSTRUCTIONS**

The following procedure must be followed to ensure adequate heater bleeding. During the bleeding process, it will be necessary to remove the radiator cap and refill cooling system several times to ensure adequate coolant is available to replace purged air and coolant lost when bleeding.

**WARNING: Use extreme care when removing radiator cap. As coolant becomes hot, pressure builds up in the cooling system. Rapid venting and/or removal of radiator cap will cause coolant to boil up and spray out, and can result in serious burns. Vent pressure off slowly before removing radiator cap.**

***Procedure***

1. With the engine off, shut engine heater return gate valve, located in the engine compartment.
2. Fill cooling system completely, including surge tank, with coolant and run engine for a few minutes to bleed air from cylinder block and heads.
3. Open the heater hose supply line gate valve located in engine compartment. Turn on heater water pump, if equipped.
4. Using a suitable container to catch the coolant, run the engine between 2,000 and 3,000 rpm. Loosen bleeder valve located in heater hose return line in engine compartment. Bleed air and coolant through bleeder valve until air is eliminated from heater system. Stop bleeding when continuous stream of coolant comes from bleeder valve.

**Note:** It will be necessary every few moments to refill the radiator or surge tank.

5. When all the air has been purged from the heater system, open gate valve in heater hose return line or unclamp return hose.
6. Run engine between 2,000 and 3,000 rpm until thermostats open. To assist in deaerating the entire cooling system, accelerate the engine a few times before and after the thermostats open.  
**Note:** Thermostats have opened when upper radiator tank and radiator hose becomes hot.
7. Refill cooling system including radiator and coolant surge tank.

**WARNING: Never idle engine in closed areas. Never sit in a parked vehicle for an extended period of time with the engine running. Exhaust gases, particularly carbon monoxide may build up. These gases are harmful and potentially lethal.**

**Carbon monoxide is colorless and odorless, but can be present with all other exhaust fumes. Therefore, if you ever smell exhaust fumes of any kind inside your vehicle, have it inspected immediately by your dealer and have the condition corrected. Do not drive with exhaust fumes present.**

# GLASS REPLACEMENT

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The glass used in Blue Bird buses meets Federal Motor Vehicle Safety Standards 205 and 217. Therefore, when a piece of glass is broken, it should be replaced with an identical piece.

The following instructions are for replacing glass in the side split sash window, rear and rear side vision, entrance door, and windshield.

**WARNING:** When replacing broken or damaged glass use extreme care at all times to prevent personal injury. This includes the use of proper replacement parts, tools, and personal protective equipment such as gloves and safety eyeglasses.

## SPLIT SASH

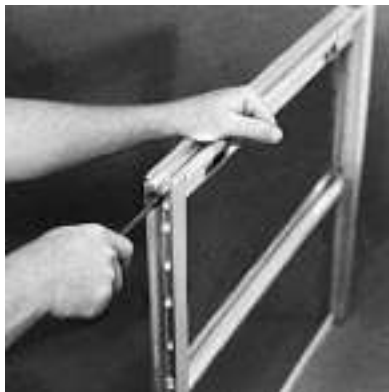
1. Remove four screws securing window frame to bow (Figure 1).
2. Pull window to inside of body and remove (Figure 2).
3. Remove six screws (three on each side of window) holding main assembly together (Figure 3).
4. On bottom part of window, simply pull aluminum channel off top and bottom of glass (Figure 4).
5. To remove glass from top part of the window, remove six screws holding frame around glass (Figure 5).
6. Reassemble window by reversing above procedure.
7. Apply weather seal caulking around window frame on outside of body, to prevent leaking.



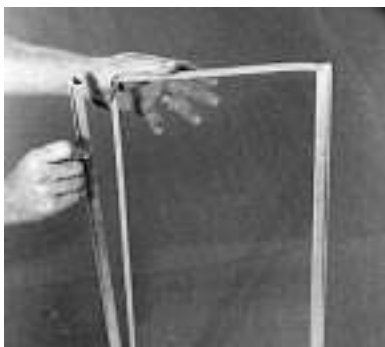
Figure 1



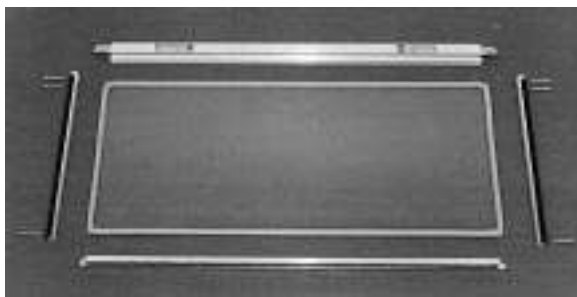
Figure 2



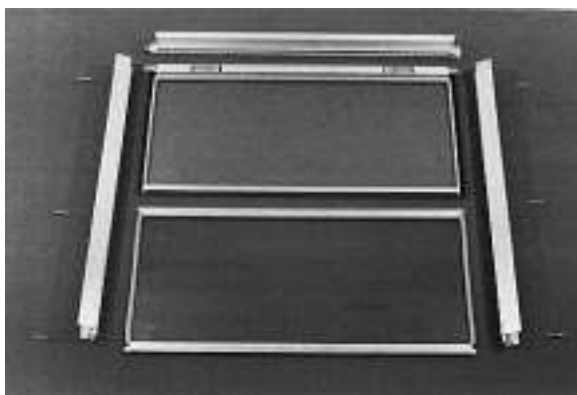
**Figure 3**



**Figure 4**



**Figure 5**



**Figure 6—Window shown  
with frame disassembled**

## REAR VISION

1. Remove filler strip from channel in glazing rubber.
2. Apply pressure against glass from the outside of the bus starting at a corner and push glass and glazing rubber off of metal flange.
3. Remove glazing rubber from around glass.
4. Replace glass and put glazing rubber on new glass.
5. Apply soapy solution to the flange on the bus body and to the filler strip channel on the glazing rubber. This acts as a lubricant for easier installation. Wrap a cord around the glazing rubber and rest glass on bottom window flange from the inside of bus body. Pull cord slowly and work glazing rubber onto the window flange (Figure 7).
6. Apply pressure from the inside of bus body to ensure glass is seated properly. Pull cord slowly and work glazing rubber onto the window flange.
7. Using filler strip tool, insert filler strip into channel on glazing rubber (Figure 8). Filler strip tool is available from your distributor.
8. Apply clear caulking around glass and window flange on the outside of bus body to ensure that no leaks occur.



Figure 7



Figure 8

## ENTRANCE DOOR

1. Apply pressure against glass from the outside of the bus, starting at a corner and push glass and glazing rubber off of metal flange.
2. Remove glazing rubber from around glass.
3. Replace glass and put glazing rubber on new glass.
4. Wrap a cord around the glazing rubber and rest glass on the bottom flange from the inside of bus.
5. Pull cord slowly and work glazing rubber onto metal flange.
6. Apply pressure to glass from inside of bus to assure proper seal.

# **KEEPING YOUR VEHICLE LOOKING NEW**

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## **WASHING YOUR VEHICLE**

The best way to preserve your vehicle's finish is to keep it clean by frequent washings. Wash the vehicle in lukewarm or cold water. Do not use hot water or wash in the direct rays of the sun. Do not use strong soap or chemical detergents. All cleaning agents should be promptly flushed from the surface and not allowed to dry on the finish.

**CAUTION: Pressure washing may cause damage to finish. Pre-test pressure washer on similar surface before applying pressure and chemicals to your vehicle. Pressure washers using recirculated water should filter the water to remove abrasive grit.**

## **POLISHING AND WAXING YOUR VEHICLE**

Polishing with non-abrasive wax is recommended to remove accumulated residue and eliminate any "weathered" appearance.

## **FOREIGN MATERIAL DEPOSITS**

Calcium chloride and other salts, ice-melting agents, road oil and tar, tree sap, bird droppings, chemicals from industrial chimneys, and other foreign matter may damage vehicle finishes if allowed to remain on painted surfaces. Prompt washing may not completely remove all of these deposits. Additional cleaners may be needed. When using chemical cleaners developed for this purpose, be certain they are safe for use on painted surfaces.

## **FINISH DAMAGE**

Any stone chips, fractures, or deep scratches in the finish should be repaired promptly. Exposed metal will corrode quickly and may develop into a major repair expense.

# PREVENTIVE MAINTENANCE CHECKLIST

| Page Ref. | Item  | First 1,000 and 2,000 Miles | Daily | Monthly | Quarterly | Annually |
|-----------|---|-----------------------------|-------|---------|-----------|----------|
| 29        | Check fire extinguisher   |                             |       |         | ●         |          |
| 29        | Check first aid kit   |                             |       |         | ●         |          |
| 24        | Lubricate window latches and seal                               |                             |       | ●       |           |          |
| 23        | Lubricate exterior hinges                                       |                             |       | ●       |           |          |
| 23        | Lubricate interior hinges                                       |                             |       | ●       |           |          |
| 23, 24    | Lubricate door control hardware                                 |                             |       |         | ●         |          |
| 23, 24    | Lubricate upper door control rod                                |                             |       |         | ●         |          |
| 24, 25    | Sweep floor covering  |                             | ●     |         |           |          |
| 25        | Clear drain holes   |                             |       |         | ●         |          |
| --        | Clean all rubber door seals and lubricate with rubber lubricant |                             |       |         | ●         |          |



| Page Ref. | Item  | First 1,000 and 2,000 Miles | Daily | Monthly | Quarterly | Annually |
|-----------|---|-----------------------------|-------|---------|-----------|----------|
| 34        | Tighten all heater hose clamps  | ●                           |       |         |           | ●        |
| 39        | Inspect outer surface for cleanliness and wash as needed  |                             | ●     |         |           |          |
| --        | Check under floor and underside structures for de-icing chemical buildup, keeping these areas free of chemical deposits |                             | ●     |         |           |          |
| 18-19     | Check all lights and signals  |                             | ●     |         |           |          |
| --        | Check for component part damage, loose screws, rivets, etc., and have corrected immediately                             |                             | ●     |         |           |          |
| 9         | Check brakes before each run  |                             | ●     |         |           |          |
| 31        | Check all emergency exits for operation and labels  |                             | ●     |         |           |          |
| 20-22     | Check all mirror adjustments  |                             | ●     |         |           |          |
| 31        | Lubricate all rear and side emergency door latch slide bars with light grease to reduce friction                        |                             |       |         | ●         |          |
| 23        | Adjust entrance door  |                             |       |         |           | ●        |

# METRIC CONVERSION

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## LENGTH

1 inch (in) = 2.54 centimeters (cm)

1 foot (ft) = 12 inches (in) = 30.5 centimeters (cm)

1 mile (mi) = 5,280 feet (ft) = 1.609 kilometers (km)

1 centimeter (cm) = 10 millimeters (mm) = 0.01 meter (m) = 0.394 inches (in)

1 meter (m) = 100 centimeters (cm) = 3.28 feet (ft)

1 kilometer (km) = 1,000 meters (m) = 0.62 mile (mi)

## WEIGHT/MASS

1 pound (lb) = 16 ounces (oz)

1 pound is equivalent to 0.45 kilogram (kg).

1 kilogram (kg) = 1,000 grams (g)

1 kilogram is equivalent to 2.2 pounds (lb).

## AREA

1 square foot (ft<sup>2</sup>) = 144 square inches (in<sup>2</sup>) = 0.0929 square meter (m<sup>2</sup>)

1 square meter (m<sup>2</sup>) = 10,000 square centimeters (cm<sup>2</sup>) = 10.76 square feet (ft<sup>2</sup>)

## VOLUME

1 quart (qt) = 2 pints (pt) = 0.25 gallon (G) = 0.946 liter (L)

1 liter (L) = 1,000 milliliters (mL) = 1,000 cubic centimeters (cm<sup>3</sup>, cc) =

1.057 quarts (qt)

**Note:** 1 liter of water has a mass of 1 kilogram, and a volume of 1,000 cubic centimeters.

## TORQUE

1 foot-pound (ft-lb) = 1.355 newton-meters (N·m)

1 newton meter (N·m) = 0.738 foot-pound (ft-lb)

## PRESSURE

1 pound per square inch (psi) = 6.895 kilopascals (kPa)

1 kilopascal (kPa) = 0.145 pound per square inch (psi)

## TEMPERATURE

To convert from degrees Fahrenheit (°F) to Celsius (°C), subtract 32, then multiply by 5/9.

To convert from Celsius to Fahrenheit, multiply by 9/5, then add 32.

Freezing point of water:            32°F    (0°C)

Boiling point of water:            212°F    (100°C)

Average room temperature:        68°F    (20°C)

## FRACTIONS/DECIMALS/MILLIMETERS

Conversion between fractions of an inch, their decimal equivalents, and millimeters.

| <b>Fraction<br/>of an inch</b> | <b>Decimal</b> | <b>Milli-<br/>meters</b> | <b>Fraction<br/>of an inch</b> | <b>Decimal</b> | <b>Milli-<br/>meters</b> |
|--------------------------------|----------------|--------------------------|--------------------------------|----------------|--------------------------|
| 1/64                           | 0.0156         | 0.396                    | 33/64                          | 0.5156         | 13.096                   |
| 1/32                           | 0.0312         | 0.793                    | 17/32                          | 0.5312         | 13.493                   |
| 3/64                           | 0.0468         | 1.190                    | 35/64                          | 0.5468         | 13.890                   |
| 1/16                           | 0.0625         | 1.587                    | 9/16                           | 0.5625         | 14.287                   |
| 5/64                           | 0.0781         | 1.984                    | 37/64                          | 0.5781         | 14.684                   |
| 3/32                           | 0.0937         | 2.381                    | 19/32                          | 0.5937         | 15.081                   |
| 7/64                           | 0.1093         | 2.778                    | 39/64                          | 0.6093         | 15.478                   |
| 1/8                            | 0.1250         | 3.175                    | 5/8                            | 0.6250         | 15.875                   |
| 9/64                           | 0.1406         | 3.571                    | 41/64                          | 0.6406         | 16.271                   |
| 5/32                           | 0.1562         | 3.968                    | 21/32                          | 0.6562         | 16.668                   |
| 11/64                          | 0.1718         | 4.365                    | 43/64                          | 0.6718         | 17.065                   |
| 3/16                           | 0.1875         | 4.762                    | 11/16                          | 0.6875         | 17.462                   |
| 13/64                          | 0.2031         | 5.159                    | 45/64                          | 0.7031         | 17.859                   |
| 7/32                           | 0.2187         | 5.556                    | 23/32                          | 0.7187         | 18.256                   |
| 15/64                          | 0.2343         | 5.953                    | 47/64                          | 0.7343         | 18.653                   |
| 1/4                            | 0.2500         | 6.350                    | 3/4                            | 0.7500         | 19.050                   |
| 17/64                          | 0.2656         | 6.746                    | 49/64                          | 0.7656         | 19.446                   |
| 9/32                           | 0.2812         | 7.143                    | 25/32                          | 0.7812         | 19.843                   |
| 19/64                          | 0.2968         | 7.540                    | 51/64                          | 0.7968         | 20.240                   |
| 5/16                           | 0.3125         | 7.937                    | 13/16                          | 0.8125         | 20.637                   |
| 21/64                          | 0.3281         | 8.334                    | 53/64                          | 0.8281         | 21.034                   |
| 11/32                          | 0.3437         | 8.731                    | 27/32                          | 0.8437         | 21.431                   |
| 23/64                          | 0.3593         | 9.128                    | 55/64                          | 0.8593         | 21.828                   |
| 3/8                            | 0.3750         | 9.525                    | 7/8                            | 0.8750         | 22.225                   |
| 25/64                          | 0.3906         | 9.921                    | 57/64                          | 0.8906         | 22.621                   |
| 13/32                          | 0.4062         | 10.318                   | 29/32                          | 0.9062         | 23.018                   |
| 27/64                          | 0.4218         | 10.715                   | 59/64                          | 0.9218         | 23.415                   |
| 7/16                           | 0.4375         | 11.112                   | 15/16                          | 0.9375         | 23.812                   |
| 29/64                          | 0.4531         | 11.509                   | 61/64                          | 0.9531         | 24.209                   |
| 15/32                          | 0.4687         | 11.906                   | 31/32                          | 0.9687         | 24.606                   |
| 31/64                          | 0.4843         | 12.303                   | 63/64                          | 0.9843         | 25.003                   |
| 1/2                            | 0.5000         | 12.700                   | 1                              | 1.0000         | 25.400                   |

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**Part Number: 0018378**  
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