

IC BUS<sup>®</sup> ELECTRIC CE SERIES SCHOOL BUS







# **CHARGING TO THE** HEAD OF THE CLASS

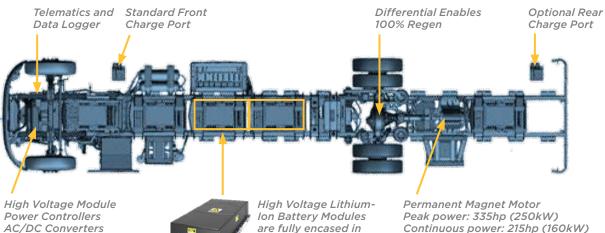
THE TIME HAS FINALLY ARRIVED - THE ELECTRIC SCHOOL BUS IS HERE. QUIET, SMOOTH, RELIABLE, LOW MAINTENANCE, ZERO **OPERATING EMISSIONS - WHEN IT COMES TO THE TRANSPORTATION** OF OUR STUDENTS, THIS SOLUTION IS AN EASY A.

Perhaps no transportation mode is more suited to electric propulsion than the school bus. With predictable, consistent routes and central parking and maintenance depots, school districts are the perfect candidates for electric buses. Plus, with no tailpipe emissions, quiet operation and turnkey reliability, electric propulsion is quickly becoming a preferred option. As the market leader, IC Bus is charging ahead with an electrified version of our flagship CE model school bus.





The Electric CE Series doesn't just tiptoe into the electric bus segment - it represents a thoroughly thought-out solution based on the tried-and-true CE platform. In fact, the Electric CE Series includes all the functionality and safety features that school bus drivers everywhere know and love - it just happens to include industry-leading electric propulsion technology.



vehicle frame rails

AC/DC Converters DC/DC Converter Charging Controllers

## ELECTRIC CE SERIES PERFORMANCE



## **QUIETLY MAKING A GRAND ENTRANCE**

Peak torque: 11.579 ft-lbs. (15.700Nm)

Max RPM: 2,700

## INDUSTRY-LEADING STANDARD FEATURES

ELECTRIFYING PERFORMANCE

The myth of slow and plodding electric vehicles has long been disproved. It's now common knowledge that EVs offer an incredible amount of instant torgue for guick, off-the-line acceleration and unbeatable hill-climbing ability. And thanks to recent improvements in battery technology, range can be equal to that of diesel as well.

Available best-in-class 200+ mile range Smooth consistent acceleration and power delivery

Peak power 335hp, continuous power 215hp

## **ONLY PAY FOR** WHAT YOU NEED

We understand that not all routes are the same; some are longer, some are shorter. So why would you pay for a longrange battery you don't need? By offering three battery sizes, the Electric CE Series provides options that can help you to meet your budget.



## **3 LEVELS OF REGENERATIVE** BRAKING

One reason why the Electric CE Series can achieve such impressive range is due to its regenerative braking technology. Instead of using friction from the brake rotors (which is wasted energy), under moderate braking, the Electric CE Series uses its own electric motor to slow down.

However, the Electric CE Series takes it a step further by employing three levels of driver-selectable regenerative braking:

Level 1 provides a similar level of slowing as the automatic transmission in a diesel bus, and is recommended for long trips on flat interstate-style roads

Level 2 provides a moderate amount of regenerative braking.

Level 3 is the most aggressive, and allows for "one pedal" style driving. Level 3 will slow the vehicle down to a few miles per hour with the driver using the service brake to bring the vehicle to a complete stop.





# **CHARGING BASICS**

## **DIFFERENT CHARGING**

## LEVEL ONE

Provides charging through a 120V AC plug and does not require installation of additional charging equipment.

- Residential / Auto Charger
- Typically 1.9 kW
- > 2-5 Miles / Hour of Charge

## LEVEL TWO

Provides charging through a 240V (for residential) or 208V (for commercial) plug and requires installation of additional charging equipment.

- Multiple Power Options
  3 kW 19.2 kW
- Typically 19.2 kW for commercial
- ▶ 10-20 Miles / Hour of Charge

## DC FAST CHARGE

Provides charging through a 208 - 600V AC input and requires specialized equipment to be installed at your vehicle location.

- Commercial Charger
- Multiple Power Options 25 kW - 350 kW
- Full Charge in < an Hour</p>

## CHARGING TIMES DC FAST - ASSUMING A 300 kW BATTERY SYSTEM

- T24 is an 8-hour charge
- ▶ T54HV is a 4-hour charge
- > T94 is a 2.5 hour charge
- T124 is a 90 minute charge
- ▶ T184 is a 70 minute charge



## FLEET MANAGEMENT



## CHARGING SYSTEM EVALUATION PROCESS -EVERY SITE IS DIFFERENT

## **1. GATHER SITE INFORMATION**

- Utility Bills
- 🕨 Site Plan
- One-Line Electrical Drawing

## 2. IN-CHARGE PERFORMS SITE WALK

- Understand existing site parking/layout
- Verify property limits/utility rights of way
- Begin prelim layout
- Web-based remote survey Tool

## **3. OVERALL EVALUATION**

- ▶ Routes/Distance, etc.
- Determine current power usage
- Determine current power capacity for EV fueling
- Calculate costs based on existing rate tariffs
- Develop future capacity needs analysis short term/long term
- Develop Energy Management control plan
- Determine any/all utility rebate, incentives and grants
- 4. IN-CHARGE DEVELOPS PRELIM PLAN
- 5. REVIEW OF PRELIM PLAN WITH CLIENT
- 6. DEVELOPMENT AND PRESENTATION OF FINAL PLAN/ESTIMATES
- 7. IDENTIFY FINANCIAL SOLUTIONS TO MEET CLIENT'S NEEDS



## **FEWER PARTS = FEWER REPAIRS**

It's no secret electric vehicles require less maintenance. With substantially fewer parts, an electric motor simply does not have the maintenance or service requirements of an internal combustion engine. Plus, thanks to regenerative braking, the standard brakes last much longer between service intervals.

## TAKE THESE OFF YOUR SERVICE PLATE

- No engine oil maintenance
- No transmission maintenance
- No fuel filters
- No turbos, no EGR, no Injectors
- No engine air filters, no MAF, no O2
- No aftertreatment

## **A TURN-KEY SOLUTION**

Making the switch to electric can seem daunting at first. That's why we created NEXT eMobility Solutions, an electric commercial vehicle consulting group assigned to walk you through the entire process - from C to C. With NEXT by your side, you can be well on your way to adding an electric option to your fleet.



## THE FIVE C'S

NEXT eMobility Solutions will support you through the entire process.

We're here to

starting at your

utility provider

for proper

infrastructure,

selecting the right

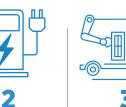
and even providing

service plans



## CONSULTING

We're here to guide you with route simulations, charging options, electrical infrastructure, operational plans, grant applications and much more



### CHARGING CONSTRUCTING

We construct assist with various the Electric CE employing the charging decisions same processes and quality systems used to produce our other IC Bus products charger option(s),



## CONNECTING

Our connected solutions use the powerful foundation of today's OCC product, and are enhanced for electric vehicles

## CONSERVING

We can provide environmentally friendly options at the battery's end of life in the vehicle. Batteries are useful beyond the vehicle

## CHARGING INFRASTRUCTURE

Implementing your charging infrastructure depends on many factors: individual bus requirements, route length, operating environment, time between charging, and the future of the fleet transformation, among others. For most fleets with centralized operations, a charging depot will be the perfect charging solution.

Depending on how frequently the vehicles need to charge, AC, DC or a combination of methods will supply your fleet of buses with all the electricity they need. We recommend either a 19.2 AC charger or a 24kW DC charger per bus. Depot chargers can charge at rates from 25 kW for overnight charging and up to 150 kW for DC fast charging.

What's more, the Electric CE Series is vehicle-togrid (V2G) ready, meaning that when paired with the appropriate equipment, the Electric CE Series can supply power BACK to the grid; or, if a school if experiencing an extended power outage, the Electric CE Series can supply power back to the school.

## **RECOMMENDED APPROACH**

- One 19.2 AC charger or one 24kW DC charger per bus
- Allows easy overnight charging for each bus
- Provides 0 to 100% charge in about 7 hours
- One 120/180kW DC fast charger per 8 buses
- Allows quick (less than an hour) for full charge on bus
- Typically used for buses that need additional charge for after-school activities

Routes that require mid-day replenishment





**3. Left Hand Switch Panel:** Switch panel is located in front of the driver and allows the driver to maintain a forward-facing position ensuring safe operation





## **DESIGNED WITH DRIVERS IN MIND**

1. Driver Seat Options: IC Bus offers a full range of driver seat options, from base to premium

2. Accessible Storage: Easy-to-reach storage compartment next to driver's seat helps the

- 4. Standard Backlit Steering Wheel Controls: Allows driver to keep their eyes on the road and hands on the wheel
- 5. Optimum Ergonomics: Cockpit accounts for the measurements of over 1,500 real school bus drivers to ensure optimal ergonomics and reduced driver fatigue
- 6. No Windshield Center Post: No center post to obstruct forward visibility

- 7. Widest Door in the Industry: The CE Series door is the largest among three major competitors for ease of loading and unloading
- 8. Three Piece Windshield: Absence of A-pillar provides a clear view of the side mirrors
- 9. Ingress/Egress: Steps are consistently spaced and better aligned with the driver's field-of-view enhancing safety



# **SAFETY BEYOND** REPROACH

IC Bus takes a comprehensive approach to the safety of our products. This approach has led us to develop innovative features that protect children, like the integrated front bumper crossing control gate, standard Leave No Student Behind<sup>®</sup> system, steering wheel-mounted door switches and the widest stepwell in the industry. In fact, the stepwell is positioned to be better aligned with the driver's field of view versus the competitors, which reduces neck strain and fatigue.

## **CE SERIES SAFETY FEATURES**

- Best-in-class 36" stepwell is better aligned with the driver's field of view versus the competitors and does not taper toward the top, allowing for easier and safer loading and unloading
- Long grab handles extend close to the ground and are reachable by even the smallest passengers
- Integrated front bumper crossing control gate helps to ensure that students do not cross in front of the bus



- Standard Leave No Student Behind<sup>®</sup> feature ensures drivers disable alarm at rear of bus before exiting, ensuring no student is overlooked
- Automatic traction control (standard with ESC) helps the driver maintain control on slick roads
- Bendix<sup>®</sup> ESP<sup>®</sup> stability system may help mitigate rollovers and loss of control on a wide variety of road conditions. Full stability systems like this one deliver more performance than roll-only systems, thanks to additional sensors and braking capability
- The Electric CE Series features class-leading standard air disc brakes for robust stopping power during emergency braking events
- The Electric CE Series high voltage batteries are located between the frame rails for enhanced protection in the event of an impact
- To ensure that pedestrians are alerted to the proximity of the bus, the Electric CE Series includes a standard exterior noise maker



With the widest stepwell in the industry, this best-in-class design has a 35" opening and features long grab handles which extend close to the ground

## IC BUS FULL VIEW CAMERA TECHNOLOGY BY ROSCO

IC Bus is proud to offer the industry's first camera system designed specifically for school buses. Combined with the side mirrors, this advanced system will allow bus drivers to have a "full view" around the bus so they can concentrate on driving and keeping kids safe.

- school bus application

- Provides accurate visibility to the areas that matter most around the bus

**APPROACH** 



## **FULL VIEW CAMERA FEATURES**

- Co-developed with Rosco, IC Bus designed the industry's first purpose-built camera for a
- Provides drivers views based on the situation at hand, such as backing up, opening the door or a view to the side or front of the bus
- This purpose-built camera technology is designed to not overload the driver with too much information, but instead provide them with the right information at the right time
- Gives the driver a greater feeling of security and peace-of-mind with the combination of the full view camera technology and driver mirrors

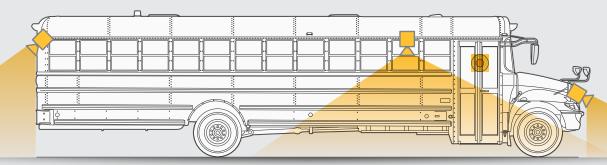


The Full View Camera System displays the most appropriate view based on the situation at hand. including backing up, opening the door, or the view of the front, side or rear of the bus.

## AUGMENTS EXISTING SAFETY FEATURES

## **AVOIDS INFORMATION OVERLOAD WITH A** FOCUSED INTUITIVE

## **CAMERA SYSTEM LOCATIONS**





## THE ONLY OEM **TO MAKE ESC STANDARD**

## BENEFITS OF ELECTRONIC STABILITY CONTROL

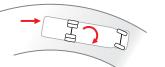
- Provides more control on slick surfaces
- ESC will automatically apply the appropriate brakes when loss of traction is detected
- Acts in ways the driver cannot replicate using selective wheel brake control
- May act before the driver realizes a situation exists
- Actively helps the driver avoid or recover from rollover and/or loss of control conditions
- ESC will help correct the vehicle orientation by reducing speed and/or applying brake pressure to the appropriate wheels
- More control
- The system helps mitigate vehicle slides, skids and loss of control through advanced monitoring of a variety of vehicle parameters and automatic and selective application of vehicle brakes

## **ELECTRONIC STABILITY CONTROL (ESC)**

Using sensors combined with the anti-lock braking system (ABS), ESC helps the driver maintain control during over-steer and under-steer situations on both wet and dry road surfaces, reducing the chance of a roll-over. When the stability threshold reaches a critical level, the system can selectively apply vehicle brakes and even reduce motor speed.

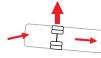
## **DRIVING SCENARIO:**

The vehicle's speed around a curve has exceeded the ability of the tires to hold the vehicle orientation, causing the vehicle to slide and over-steer.



## **DRIVING SCENARIO:**

A vehicle enters a curve too fast on high friction pavement. The wheels and the pavement create a "hinge" effect, allowing the forces at the center of gravity to push the vehicle over.

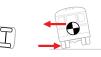




## THE IMPORTANCE OF FULL STABILITY

## SYSTEM RESPONSE:

ESC helps to correct the vehicle orientation by reducing speed and, if required, the system quickly applies braking pressure to the appropriate wheels.



## SYSTEM RESPONSE:

ESC applies pressure to all brakes and reduces motor speed to quickly decrease vehicle speed and help reduce the chance of a rollover.



### The table below identifies the key features and components of the Electronic Stability Control system:

	FEATURE	WHY IT MATTERS
Sensor Technology	Wheel Speed Sensors	Allows the system to determine vehicle speed and monitor wheel lock-up to optimize braking
	Lateral Acceleration Sensor	Side or lateral forces are used to detect a roll situation
	Steering Angle Sensor	An early indicator of a potential critical maneuver. Helps the system to respond faster and more accurately
	Brake Pressure Sensors	Allows the system to accurately supplement the driver throughout the maneuver
	Yaw Rate Sensor	Allows the system to monitor the true orientation of the vehicle and compare it to the driver's intention
Performance Enhancement	Multi-level Sensing	Improves the reaction time and accuracy of the intervention
	Tuning	Improves the ability of the stability system to match the intervention of the situation
	All Axle Braking	Provides the best opportunity to reduce vehicle speed in the shortest time
	Individual Corner Braking	Provides the capability to control under- and over-steer situations



# **TAKE COMMAND**

## THE MOST IMPORTANT FACTOR IN EVERY SAFE JOURNEY IS A TRAINED BUS DRIVER. DRIVING AS MANY AS 72 CHILDREN TO AND FROM SCHOOL TAKES A DEFT TOUCH AND A LOT OF CONCENTRATION.

The driver's cockpit of the CE Series has been carefully designed using the measurements of over 1,500 actual bus drivers to ensure maximum comfort and reducing driver fatigue.

## EASY-REACH DESIGN

- Electrically activated entrance door to increase driver control during loading and unloading, with standard vandal lock on electric door
- Eight lamp and entrance door switches placed on the steering wheel allow the driver to keep his/her hands on the wheel during loading/unloading situations



The Electric CE Series features a state-of-the-art digital gauge cluster for easy readability, and coaching for efficient driving.



**CAREFULLY CONSIDERED DESIGN USING** ACTUAL DRIVER MEASUREMENTS

## **OVER 1,500** DRIVEPS

## UNLIKE SOME COMPETITIVE DESIGNS, THE CE SERIES DOES NOT HAVE AN A PILLAR THAT MAY INTERFERE WITH THE **DRIVER'S VIEW OF THE MIRRORS**

Maintaining a high level of visibility of the road and pedestrians is one of the most important factors in bus design. The CE Series includes many features designed to enhance visibility and put the driver in a position to succeed.



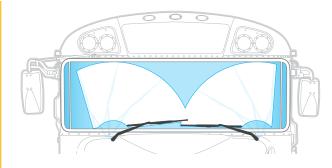


## **VISIBILITY - A NO COMPROMISE APPROACH**

Flat glass ensures no distortion in the corners Overlapping wiper pattern to ensure right hand mirror remains visible through cleared portion of windshield; a greater percentage of the windshield is cleared than main competitors

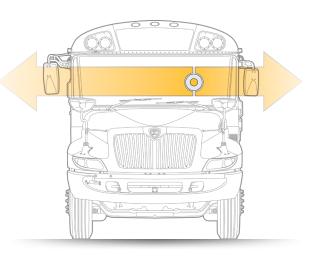
Unlike some competitive designs, the CE Series does not have an A-pillar that may interfere with the driver's view of the mirrors

The CE Series features a 3-piece windshield with individually replaceable sections to help avoid replacing an entire windshield in the event of damage. The windshield is also larger than the Blue Bird, but not unnecessarily large like the Thomas design where much of the glass area extends above and out of the driver's line of sight.



## **CE SERIES VISIBILITY**

Windshield Design	3-piece
Windshield Area (sq. in.)	2,458.0
Wiper Coverage (sq. in.)	1,369.0
Wiper Efficiency (%)	56%
Side Glass (sq. in.)	1,144
Rear Glass (sq. in.)	696.0
Total Glass (sq. in.)	22,087.5







# **INDUSTRY LEADING** CONNECTED **TECHNOLOGY**

## IC BUS IS A PROVEN LEADER IN EMBRACING THE MOST INNOVATIVE TECHNOLOGIES FOR THE BUS INDUSTRY.

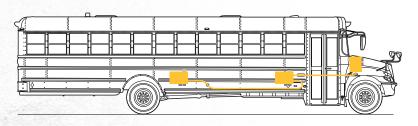
Diamond Logic<sup>®</sup> includes numerous programmable features that help promote safe and responsible operation of an Electric CE Series School Bus, including the Leave No Student Behind<sup>®</sup> feature and pre-trip inspection tools. With a a complete suite of service solutions to help you schedule regular service appointments, track maintenance history and find and order the parts you need. OnCommand®Connection transforms vehicle data into critical insights to help drive greater uptime and reliability for your entire vehicle fleet. The result is a lower total cost of vehicle ownership and increased lifecycle value.

## DIAMOND LOGIC

- Includes the ability to program available body integration and driver efficiency features, plus the ability to further customize to address specific application needs
- Service has easy access inside & out for ease of installing incremental features
- Common uses include: Leave No Student Behind; exterior light check for pre-trip inspections; lights on with windshield wipers

## IC Bus pioneered the best-in-class Diamond Logic electrical system. It includes numerous programmable features

which are available factory-installed.



Connection

## HELPING KEEP YOUR FLEET ON TIME, ALL THE TIME

As a manager of bus fleets, we know your biggest challenges. Ensuring passenger safety. Staying on schedule. Reducing operational costs and increasing efficiency. We're here to help. OnCommand<sup>®</sup> Connection is the first and only all-makes diagnostics system that connects your entire fleet and provides you with the information you need to get your job done.

## **OnCommand Connection lets you:**

- Be more proactive in identifying maintenance issues and addressing them before a breakdown occurs
- Provide a single view of your whole fleet all makes and models, including diesel, propane, gasoline and electric vehicles
- Integrate with leading bus solution providers to deliver seamless workflow management

## MISSION:

## HELPS:

- Merge inspection report data with vehicle fault codes into one easy-to-read report
- Be more proactive in identifying maintenance issues and addressing them before a breakdown occurs
- Make informed choices to manage your fleet for maximum productivity

## **ON COMMAND CONNECTION'S**

Improve vehicle reliability for your entire fleet Ensure the safety of your driver and passengers Increase the efficiency of your operation Reduce your costs and increase your value

## ONCOMMAND CONNECTION

Automate driver vehicle Inspection reports to make them faster and more accurate



## **ALL THE TOOLS** YOU NEED AT YOUR **FINGERTIPS**

OnCommand Connection is designed to keep your fleet on time, and your passengers safe through powerful features such as engineerdesigned fault code action plans, critical battery alerts and other powerful tools and bus solutions integrations.

## **REMOTE DIAGNOSTICS FOR ALL MAKES OF VEHICLES**



**MERGE** vehicle fault code data reports for a complete view o vehicle health

Full back office visibility into charge status o everv connected



Evaluate driver behavior with and traffic stop



Alerts back office | Provides vehicle if an en route bus is in danger of not being able to finish route based severity ratings on battery charge



through fault code action plans with parts and service



# **ELECTRIC CE SERIES SPECIFICATIONS**

CHOOL RUS

## AT IC BUS, WE KNOW WHAT IT TAKES TO DRIVE FORWARD, WE ARE FOCUSED ON MAKING PRODUCTS THAT ARE BETTER AND DIFFERENT, INVESTING IN QUALITY AND BUILDING A SCHOOL BUS THAT DRIVERS LOVE TO DRIVE.

The CE Series was engineered from the tires up to withstand the rigors of daily use and arrive at every destination on time. every time.

Additionally, IC Bus provides the tools and resources to enable you to operate as efficiently as possible. Numerous product features that allow mechanics to more easily maintain and repair buses. After all, the safe delivery of our children is a team effort, and no one understands this more than IC Bus.

## **KEY HIGHLIGHTS**

- Three battery options offer the longest single-charge range available in the industry
- Level II AC and DCFC charging ready
- Three levels of regenerative braking
- Standard Leave No Student Behind<sup>®</sup> feature ensures drivers disable alarm at rear of bus before exiting
- Entry steps are consistently spaced for predictable footing, and are the widest in the industry
- Standard 16-gauge steel body and all-steel rub rail construction provide increased strength
- 3-piece flat roped-in windshield and roped-in stationary glass for easier and more cost-effective glass replacement
- Electrically activated passenger door with standard electric vandal lock on entrance door
- Interchangeable BTI Seating features precision die-formed seat base and seat back available on certain models

## **CAPACITY:** 29-72 PASSENGERS

## ELECTRIC CE SERIES SPECIFICATIONS

### GVWR

31,000 or 33,000 lbs.

### CAPACITY

29 – 72 passengers

### Wheelbase Options

217" or 276"

### Single Rear Axle (4x2)

### Front Axle

Meritor: 10.000 lbs.

## **Front Suspension**

## **Rear Suspension**

## **Electrical System**

- Battery System

### Brakes

Air disc brakes with ESC and ABS

## Motor

▶ 650 volt, 3-phase permanent magnet motor

## **Fuel Tank**

### Exterior

Standard Crossing Control Gate



- Dana Spicer: 21.000 or 23.000 lbs.
- Parabolic taper leaf: 10,000 lbs.
- International<sup>®</sup> Ride-Optimized Suspension (IROS Air): 21,000 or 23,000 lbs
- Enersys Odyssey: 12 Volt 2300 CCA

Optional 15 gallon tank - left side, outside frame rail for fuel-fired heater

## Interior

- > 78" interior headroom
- Lighted steering-wheel mounted door control and eight-way light switches
- Available cruise control
- Optional factory-installed IC Air
- Entrance door stepwell 14 ga steel, formed treads. Naviflex<sup>™</sup> finish-standard
- Standard Leave No Student Behind<sup>®</sup>

## Rear Axle Ratio

5.57 or 6.83

### **Powertrain Batteries**

105. 210 or 315 kWh

## Luggage Compartments

Right rear side. 79" x 20" x 18"

## **Rated Horsepower**

Approx. 335 hp

## **Camera System**

> Optional IC Bus<sup>®</sup> Full View Camera Technology™ by Rosco

## Lights

LED interior and exterior

## Floor Covering

Koroseal; body length

## Tires

Hankook 11 R22.5 front and rear



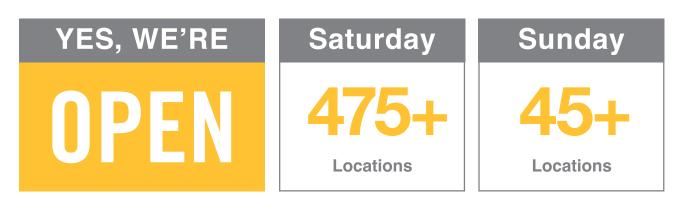








Your IC Bus<sup>®</sup> dealer is one of the best in the business, and a strong link in the industry's broadest, most capable parts distribution and dealer network.





NAVISTAR<sup>®</sup> CAPITAL a BMO Financial Group program

Navistar Capital is an industry leader in commercial vehicle financing with over 40 years of experience. We provide customized leases and secured loans with flexible structuring for International® heavy and medium duty commercial vehicles. Contact your local International<sup>™</sup> Truck dealer for more information.



For more than 40 years, Fleetrite® Parts have provided quality parts for all truck and bus makes sold exclusively at your International Truck dealer. Every part is Navistar quality approved and is covered under a 1-year parts and labor warranty. Parts you can trust and affordability you can bank on.



### DIAMOND EDGE<sup>SM</sup> CERTIFIED IC Bus Dealers

This select network of International dealer service departments has passed rigorous parts and service certification guidelines to provide you with faster turnarounds, immediate parts availability and a higher level of servicing expertise. Their ongoing pledge is to maximize your uptime and deliver a best-in-class customer experience.



## WE HAVE YOUR BACK SO YOU CAN **KEEP MOVING FORWARD**

7.600+ TECHNICIANS

SERVICE BAYS





### www.ICBus.com

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