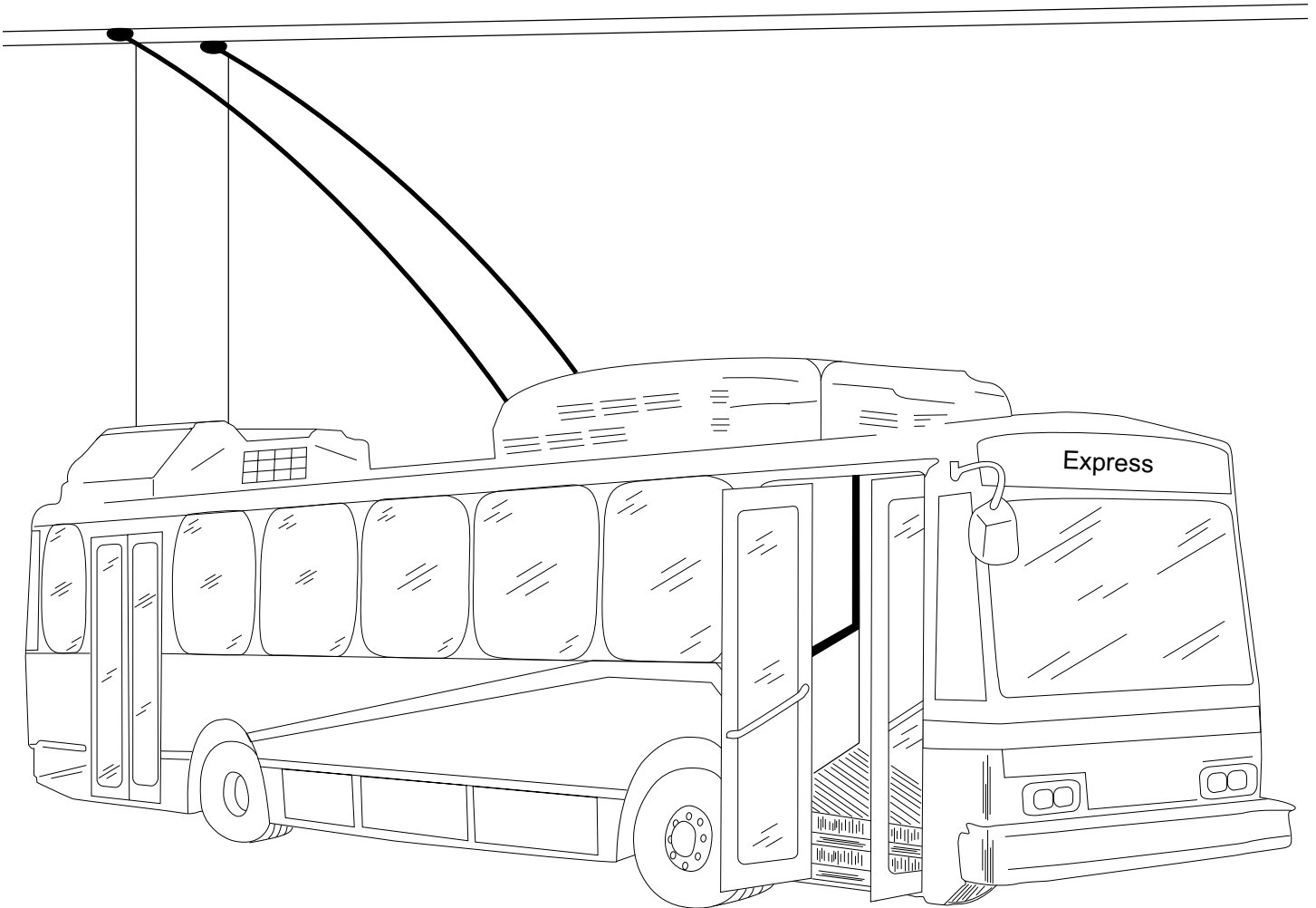


**Inductive Control System (ICS)**  
*Automated Vehicle to Wayside Control System  
For Electric Trolley Buses*



The **Inductive Control System (ICS)** uses modern electronic design to transmit three different inductive signals within an approximate range of two feet. These frequencies are too low to initiate transmission of an electromagnetic radio wave. Power output is kept below regulatory limits, therefore, licensing of the system is generally not required. The three inductive signals work automatically in conjunction with the vehicle's turn signals.

### Transmitting the Signal

Under normal conditions, operators approaching an area with overhead trolley frogs will simply use their turn signal switch to signal the appropriate turn. The turn signal switch then causes the transmitter unit to change the transmitting signal from straight to the corresponding turn direction signal. Without the turn signal switch on, the transmitter unit constantly transmits a straight signal. Placing the turn signal switch in the right or left turn position initiates the transmitting of the appropriate right or left signal.

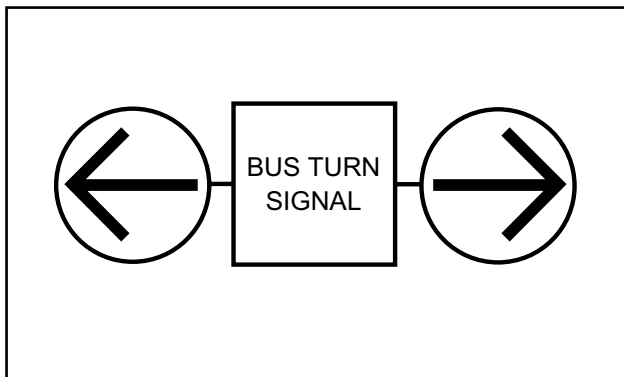
### Operating the Override Switch

A four-position selector switch (Override Switch) is provided on the dash to operate the trolley frogs independently of the turn signal during unusual traffic conditions. For example, a stalled vehicle just before an intersection may require the trolley bus operator to use their right of left turn signal for going around the vehicle, although the trolley bus route is straight ahead. In this situation the operator will place the Override Switch selector to straight, then give the right or left turn signal to maneuver around the vehicle or obstacle. The transmitter system will transit a straight signal regardless of the turn signal switch position until the override switch is placed back to normal.

### Receiving the Signal

The transmitted signal continues its path through an isolation transformer designed to protect the transmitter unit from possible feedback from the catenary system's power. The signal then travels to the transmitter coil which is mounted on the negative trolley pole. The transmitter coil emits into the air an inductive signal, which is collected by a receiving antenna mounted on the negative trolley wire. The signal is then sent from the receiving antenna to to wayside-mounted receiver control unit, where the signal is discriminated. Once discriminated, the appropriate control relay is activated, providing a momentary contact closure suitable for energizing the trolley frog coils, activating headway recorders, initiating traffic signal preemption or unmanned gate controls.

## System Diagram



## System Capabilities

### Economical and Reliable Transmission of Control Signals for Remote Actuation of:

- ◆ Trolley frogs (mainline or yard)
- ◆ Headway recorders
- ◆ Traffic signal pre-emption
- ◆ Unmanned gates (at storage or shop facilities)

## System Features

- ◆ No mechanical interaction between bus and wayside (mainline or yard)
- ◆ Secure - low transmission range
- ◆ Immune - chopper control/CB
- ◆ Integration - during installation
- ◆ Compatibility - retrofit or new vehicles
- ◆ Portable test equipment - (optional)

## System Benefits

- ◆ Replaces older method such as:
  - A. Power on/off
    - Subject to operator error
    - Dewirements/overhead damage
    - Impractical on hills/slopes
  - B. Selectric or turning angle
    - Difficult maneuvering in yards and unusual traffic conditions
    - Dewirements/overhead damage
    - Mechanical devices/maintenance expense
- ◆ Lower maintenance costs
- ◆ More efficient vehicle movements



**1) DASH MOUNTED  
OVERRIDE SWITCH**  
Operates equipment independently of the turn signal, if needed.

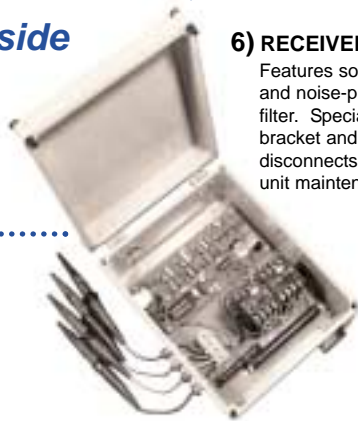
# ...e NC, INC.

## ...e Motion Power™

### Actuation Of:

- ◆ Trolley Frogs
- ◆ Headway Recorders
- ◆ Traffic Signal Pre-Emption
- ◆ Unmanned Gates

### Wayside

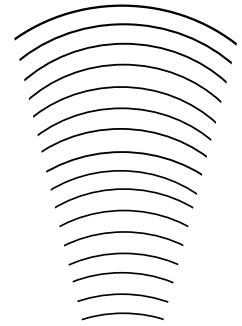


#### 6) RECEIVER

Features solid-state logic and noise-proof reception filter. Special mounting bracket and wire disconnects allow ease of unit maintenance.

#### 5) RECEIVER ANTENNA

Light-weight PVC waterproof design allows overhead mounting on negative trolley wire.



#### 4) TRANSMITTER COIL

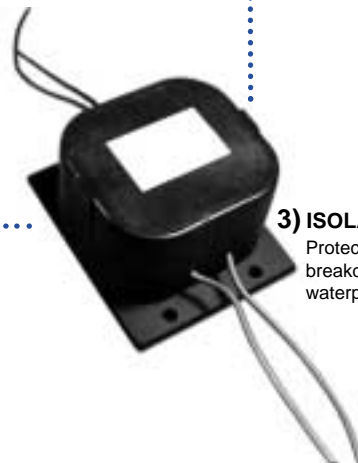
Waterproof, double-impregnated rugged coil mounts on the negative trolley pole.

### Onboard Trolley Bus



#### 2) TRANSMITTER

Low maintenance solid-state device easily mounts under dash.



#### 3) ISOLATION TRANSFORMER

Protects from high voltage breakdown. Completely waterproof. Units mounts on roof.

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## System Specifications

### Transmitter Components

Operates from vehicle battery voltage of 12 to 32 VDC @ .50 Amp max.

### Signal Frequencies

Straight	11.5 KHZ
Left	9.2 KHZ
Right	14.0 KHZ

### 1. Override Switch

Weight	.31 lbs.	.1406 kg
Dimensions	1 7/8" L	4.7625 cm
	1 7/8" W	4.7625 cm
	3 3/8" D	

### 2. Transmitter

Weight	1.5 lbs.	.4536 kg
Dimensions	10 1/2" L	26.67 cm
	6 1/2" W	16.51 cm
	3 3/4" D	9.525 cm

### 3. Isolation Transformer

Weight	1.0 lbs.	.4536 kg
Dimensions	4" L	10.16 cm
	3 1/4" W	8.255 cm
	2 1/8" D	5.2388 cm

### 4. Transmitter Coil w/Housing

Weight	1.25 lbs.	.567 kg
Dimensions	5" L	12.7 cm
	2 7/8" Dia	7.3025 cm

### Receiver Components

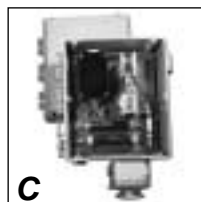
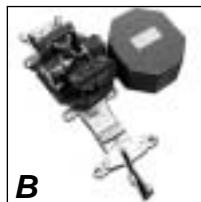
Operates from 24 - 1000 VDC or 12 - 600 VAC  
Power requirements: 250 MA @ 24 VDC  
Output duration: 0.5 seconds

### 5. Receiver Antenna

Weight	3.75 lbs.	1.701 kg
Dimensions	48" L	1.2192 m
	8 1/4" W	20.955 cm
	2" D	5.08 cm

### 6. Receiver

Weight	18.0 lbs.	8.1648 kg
Dimensions	14 1/2" L	36.83 cm
	14 1/2" W	26.83 cm
	8" D	20.32 cm



## Support Equipment (Optional)

IMPulse NC also offers portable transmitter and receiver test systems for shop or field testing of installations.

## Other IMPulse Products

Other IMPulse products include: (A) Frog Position Indicator; (B) Universal Trolley Frog Switch; (C) Push-button Remote Controls for a single pair of overhead frogs or lane controls for multiple (storage yard) frog sets. IMPulse also has a complete line of overhead hardware for ETB systems.

**IMPulse NC, INC.**  
"Innovative Motion Power"



A member of the Marmon Group of companies



IMPulse NC, INC.