Safe-T-Net
STN405

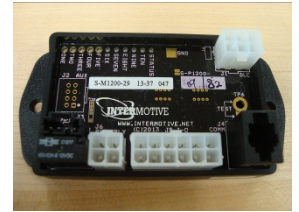**(For use with GTWY505/506, GTWY605, HL510/550/610 and PRPC)**
2009-2018 Ford E-Series
2009-2018 Ford F250 - F550
2009-2016 Ford F150
2008-2016 Chevy Express, GM Savana
2014-2016 Ford Transit

Introduction

The STN405 was designed to minimize compatibility problems when multiple third party devices are connected to a vehicles OBDII connector. It can completely eliminate bandwidth robbing active network requests from the OEM network. It does this by passively acquiring proprietary OEM data from the vehicles network, and then makes this data available to 3rd party devices on a secondary CAN network. This allows 3rd party devices to coexist without causing safety concerns for Intermotive wheel chair lift interlock products.

Eliminating/minimizing active device requests on the vehicle network eliminates vehicle operational concerns that can result from too much CAN traffic on the network. In most cases, no change is required to 3rd party devices. They make their J1979 diagnostic request to the STN, which responds just like the PCM would respond.

The STN405 is completely compatible with all Intermotive products. This In addition, the STN405 provides a number of proprietary data parameters to third party devices that may not be available in other cases. The STN405 assumes there is a GTWY505/506 or HL510/550/610 wheelchair lift interlock module also installed in the vehicle and provides a harness compatible with this application. See STN401 for applications with GTWY401 or HL201, and STN430 for standalone non-Gateway applications.

WARNING
Disconnect the battery to prevent setting a check engine light.

It is the installer's responsibility to route and secure all wiring harnesses where they cannot be damaged by sharp objects, mechanical moving parts and high heat sources. Failure to do so could result in damage to the system or vehicle and create possible safety concerns for the operator and passengers.
It is important to avoid placing the module where it could encounter strong magnetic fields from high current cabling connected to motors, solenoids, etc. Also avoid radio frequency energy from antenna's or inverters next to the module. Finally, avoid high voltage spikes in vehicle wiring by always using diode clamped relays when installing upfitter circuits.

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Installation Instructions

Disconnect the vehicle battery before proceeding with installation.

The STN is available as either an STN405-B or STN405-C. The only difference between the two is the harness. If the module is going to be installed close to the OEM OBDII connector, the STN405-C would be used. If the installation requires the module to be located away from the OEM OBDII connector, (e.g. the passenger side of the vehicle) the STN405-B should be used.
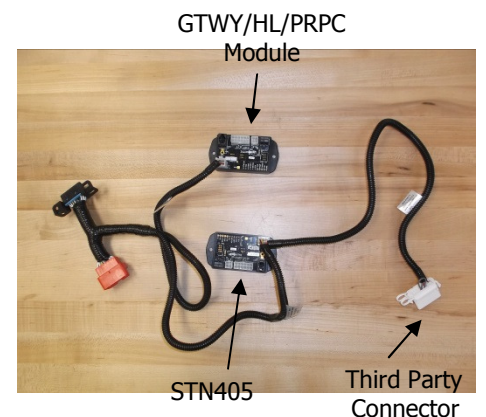
STN405-B

1. Locate the module in an area away from any heat sources. High temperatures can typically be caused by engine heat or hot air from heater ducts. Do not actually mount the module until all wire harnesses are routed and secure (last step of the installation is to mount the module).
2. Plug the male 6-pin connector (note red tape) into the mating 6-pin connector on the GTWY/HL/PRPC module.
3. Plug the female 6-pin connector into the existing OBD harness.
4. Locate the 6-pin male connector on the opposite side of the STN405 harness.
5. Plug this 6-pin connector into the 6-pin connector on the STN405 module.
6. Plug the third party connector into the third party product.

Existing OBD Harness

Third Party Connector

GTWY/HL/PRPC Module

Former Connection Tapped into Existing OBD Harness
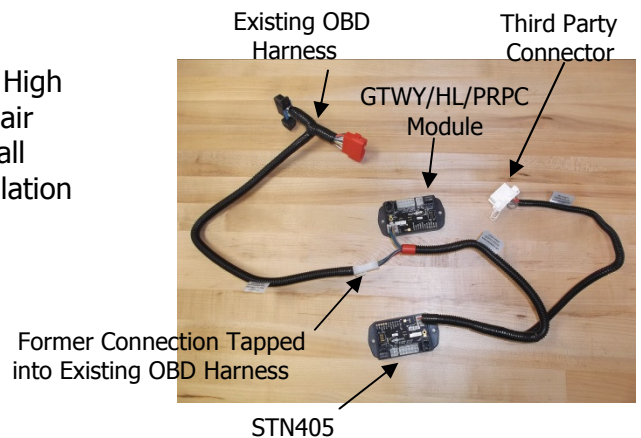
STN405

STN405-C

1. Locate the module in an area away from any heat sources. High temperatures can typically be caused by engine heat or hot air from heater ducts. Do not actually mount the module until all wire harnesses are routed and secure (last step of the installation is to mount the module).
2. Plug the male 6-pin connector (labeled "GTWY/PRPC") into the mating 6-pin connector on the GTWY/HL/PRPC module.
3. Plug the male 6-pin connector (labeled "STN405") into the mating 6-pin STN405 module.
4. Plug the third party connector into the third party product.
5. Plug the OBDII connector into the vehicle's OEM OBDII connector.

GTWY/HL/PRPC Module

STN405

Third Party Connector

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STN405 Translator Connection Output

Operation:

• **Active Mode**: By default the STN405 is passive, which means that it does not transmit on the vehicle network via the OBDII interface. However, unique data that is not available passively may be required by some third party devices. In these cases, the STN405 must be put into active mode. Active mode is entered by cutting the "Active Messaging Jumper" **Orange** wire installed on the 12-pin connector. **Tape or heat shrink both sides of the cut wire.** See the attached harness drawing for more jumper details. While in active mode, the STN405 will pass through certain requests to the vehicle network. See Table 4 for a description of data available in active and passive modes.
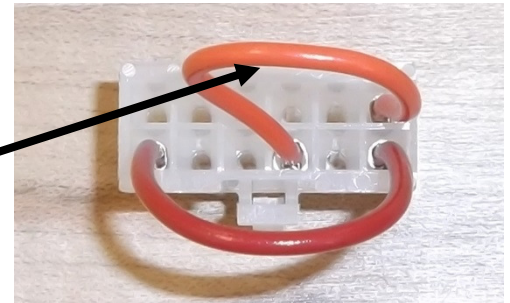
Active Mode Limitations

The STN405 is intended to be compatible with all Intermotive products. To accomplish this, it limits both the type and frequency of active messages transmitted on the vehicle network. This means that while in active mode not all messages will pass through to the vehicle network, and the rate at which they're passed through is limited. **The maximum rate at which active messages are transmitted on the vehicle network is 40ms. Note that the STN405 will reply immediately to any active request if it has available data, but the data parameters will not update faster than 40ms. See list of supported services in active mode.**

For more information please call our customer support. (530)-823-1048

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Inputs

The STN405 provides two general purpose, active high inputs. These inputs are read by the STN405 and their status is transmitted over the CAN network upon request. Pin 3 on the STN's 12 pin connector is transmitted as IN1, and pin 4 as IN2 within PID 0xE1 in Table 4.   See wiring diagram.

Outputs

The STN405 provides one active high output when the vehicle is out of PARK. Pin 1 is intended to be used for 3rd party devices that only need to be active when out of PARK. The output is rated at 1 amp. The output floats when in PARK.

Optional Third Party Device Harness (S-H31NX)

This harness can be used if a third party device will be installed. It will disable the third party device when the vehicle is in Park. This will prevent the device from interfering with the operation of the Intermotive product. See wiring diagram for installation instructions.
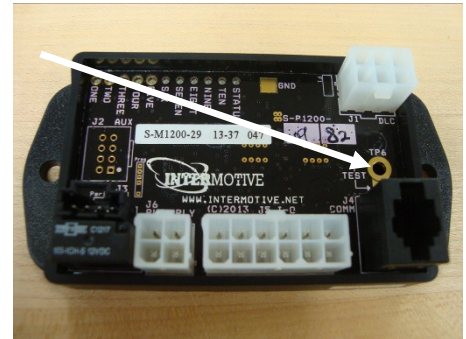
Diagnostics

During VIN acquisition: Scrolling LED's indicate an error occurred while acquiring the VIN.

- LEDs scrolling in ascending order (LED1, LED2, LED3...) indicate an **invalid VIN** was captured. Verify that the chassis is supported by this product. If work was recently performed on this chassis, the VIN may have been cleared in the PCM.

- LEDs scrolling in descending order (LED10, LED9, LED8...) indicate **no VIN** was captured. Verify that the ignition is On, the Data Link Harness is not damaged, and that no other devices are installed on the OBDII port that might interfere with the STN405.

Diagnostic Mode: During normal operation, momentarily shorting the pads labeled "Test" puts the module into diagnostic mode. Momentarily grounding the pad again exits diagnostic mode. While in diagnostic mode, the LEDs illuminate in the following manner:

- LED1: Passive vehicle data received
- LED2: Active response received from vehicle
- LED3: Active request sent to vehicle
- LED4: Request received from third party device
- LED5: Message sent to third party device
- LED6: Reserved
- LED7: Reserved
- LED8: Active Mode status
- LED9: Input 1 status
- LED10: Input 2 status
- Status: Heartbeat

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J1979 Service $01 - Request Current Powertrain Diagnostic Data

The description below refers to constructs used in the SAEJ1979 FEB2012 standard. Refer to this standard for further details. Service $01 allows a third party device to request vehicle data. Table 4 lists the PID's available in Passive Mode. All other service $01 PID's are available only in Active Mode. A number of PID's unique to the STN405 are available via service $01. These are listed in Table 4.

The STN405 only allows one PID per service $01 request.

Table 1 - Message Format

Size (Bits)	11	8	8	8	8	8	8	8	8
Field	ID	Data #0	Data #1	Data #2	Data #3	Data #4	Data #5	Data #6	Data #7

Table 2 - Service $01 Request Format

Data Byte	Parameter Name	Hex Value
#1	Request Powertrain Data Request Service ID	01
#2	PID (See table below, and/or J1979DA)	XX
PID value should be supported by this chassis.		

Table 3 - Service $01 Request Response Format

Data Byte	Parameter Name	Hex Value
#1	Request Powertrain Data Response Service ID	41
	Data Record of PID:	
#2	PID	XX
#3	Data A	XX
#4	Data B	XX
#5	Data C	XX
#6	Data D	XX
Data B-D depend on selected PID value.		

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Table 4 - Service $01 PID's available in Passive Mode

PID	Description	Conversion
0x05	Engine Coolant Temperature (ECT)	A-40, Degrees C
0x0C	Engine Speed (RPM)	((A*256)+B)/4
0x0D	Vehicle Speed (VSS)	1 bit = 1 kph
0x11	Throttle Position (TP)	A*100/255, %
0x2F	Fuel Level (FLI)	A*100/255, %
0xE1	Park Brake (PB), Service Brake (SB), A/C (AC), ABS Event (ABS), Engine Oil Pressure Lamp (EOP), Malfunction Indicator Lamp (MIL), General Purpose Inputs (IN1/IN2)	**Data A:** PB - On=$1x, Off=$0x, Unknown=$3x SB - On=$x1, Off=$x0, Unknown=$x3 **Data B:** AC - On=$1x, Off=$0x, Unknown=$3x ABS - On=$x1, Off=$x0, Unknown=$x3 **Data C:** MIL - On=$1x, Off=$0x, Unknown=$3x EOP - On=$x1, Off=$x0, Unknown=$x3 **Data D:** IN1 - Active=$1x, Inactive=$0x, Unknown=$3x IN2 - Active=$x1, Inactive=$x0, Unknown=$x3
0xE2	Transmission Range (TR), Key Position (KEY), Headlights (LIGHTS)	**Data A:** TR - 0=Park, 1=Reverse, 2=Neutral, 3=Drive, 7=Unknown **Data B:** KEY - 0 = Off, 1=Accessory, 2=On, 3=Crank, 7=Unknown **Data C:** LIGHTS - DRL On=$1x, DRL Off=$0x, DRL Unknown=$3x Park Lamps On=$x1, Park Lamps Off=$x0, Park Lamps Unknown=$x3 **Data D:** LIGHTS - Low Beams On=$1x, Low Beams Off=$0x, Low Beams Unknown=$3x High Beams On=$x1, Hi Beams Off=$x0, High Beams Unknown=$x3
0xE3	Transmission Fluid Temperature (TFT)	A-40, Degrees C; $FF = Unknown
0xE4	Ambient Air Temperature (AAT)	A-40, Degrees C; $FF = Unknown

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Table 4 - Service $01 PID's available in Passive Mode (Continued)

0xE5	Door Switch Status (DOORS), Door Lock Status (LOCKS), Turn Signal Status (TSIG)	**Data A:** DOORS - Front Driver Open=$1x, Front Driver Closed=$0x, Front Driver Unknown=$3x Front Passenger Open=$x1, Front Passenger Closed=$x0, Front Passenger Unknown=$x3 **Data B:** DOORS - Rear Driver Open=$1x, Rear Driver Closed=$0x, Rear Driver Unknown=$3x Rear Passenger Open=$x4, Rear Passenger Open=$x0, Rear Passenger Unknown=$xC Rear Open=$x1,Rear Closed=$x0, Rear Unknown=$x3 **Data C:** LOCKS - All Locked=$x1, All Unlocked=$x2, Driver Unlocked=$x4, Unknown=$x7 **Data D:** TSIG - Left On=$1x, Left Off=$0x, Left Unknown=$3x Right On=$4x, Right Off=$0x, Right Unknown=$Cx Hazards On=$x1, Hazards Off=$x0, Hazards Unknown=$x3
0xE6	Seat Switch Status (SEATS), Seat Belt Status (BELTS), Audio Mute Status (MUTE)	**Data A:** SEAT - Driver Occupied=$1x, Driver Unoccupied=$0x, Driver Unknown=$3x Passenger Occupied=$x1, Passenger Unoccupied=$x0, Passenger Unknown=$x3 **Data B:** BELT - Driver Buckled=$1x, Driver Unbuckled=$0x, Driver Unknown=$3x Passenger Buckled=$x1, Passenger Unbuckled=$x0, Passenger Unknown=$x3 **Data C:** MUTE - Mute On=$x1, Mute Off=$x0, Mute Unknown=$x3
0xE7	Odometer (ODO)*	1 km per bit. 32-Bit value, A is MSB, D is LSB

* Only available in Passive mode in some applications.

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J1979 Service $03 - Request Emission-Related Diagnostic Trouble Codes

The description below refers to constructs used in the SAEJ1979 FEB2012 Standard. Refer to this standard for further details. Service $03 allows a third party device to request Diagnostic Trouble Codes from all modules on a vehicle. **This service is only available in Active Messaging Mode**.

When the STN405 receives a Service $03 request, it passes it through to the vehicle network. Any responses from vehicle modules are passed back through to the third party device as they are received.

The third party device should use the message described in Table 5 to request trouble codes.

Table 5 - Service $03 Request Trouble Codes (refer to Table 1 for message format)

Data Byte	Parameter Name	Hex Value
#1	Request Powertrain Data Request Service ID	03

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J1979 Service $09 - Request Vehicle Information

The description below refers to constructs used in the SAE J1979 FEB2012 and ISO 15765 standards. Refer to these for further details. Service $09 allows a third party device to request vehicle-specific vehicle information. **The SNT405 only supports a VIN request, described below. This works in both Passive and Active Modes.** The VIN request using service $09 makes use of multiple frame communication, as described in ISO 15765. The message flow is outlined below, but refer to ISO 15765 for further details regarding multiple frame communications

Table 6 - Service $09 Request VIN

Data Byte	Parameter Name	Hex Value
#1	Request Vehicle Information Request Service ID	09
#2	Info Type - VIN	02

Table 7 - Service $09 Response 1 from STN405

Data Byte	Parameter Name	Hex Value
#0	Multiple Message Communication: First Frame	10
#1	Data Length	14
#2	Request Vehicle Information Response Service ID	49
#3	Info Type - VIN	02
#4	Number of Data Items	01
#5	VIN Character 1	XX
#6	VIN Character 2	XX
#7	VIN Character 3	XX

Table 8 - Service $09 Response 2 from STN405

Data Byte	Parameter Name	Hex Value
#0	Consecutive Frame: Sequence Number 1	21
#1	VIN Character 4	XX
#2	VIN Character 5	XX
#3	VIN Character 6	XX
#4	VIN Character 7	XX
#5	VIN Character 8	XX
#6	VIN Character 9	XX
#7	VIN Character 10	XX

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Table 9 - Service $09 Response 3 from STN405

Data Byte	Parameter Name	Hex Value
#0	Consecutive Frame: Sequence Number 2	22
#1	VIN Character 11	XX
#2	VIN Character 12	XX
#3	VIN Character 13	XX
#4	VIN Character 14	XX
#5	VIN Character 15	XX
#6	VIN Character 16	XX
#7	VIN Character 17	XX

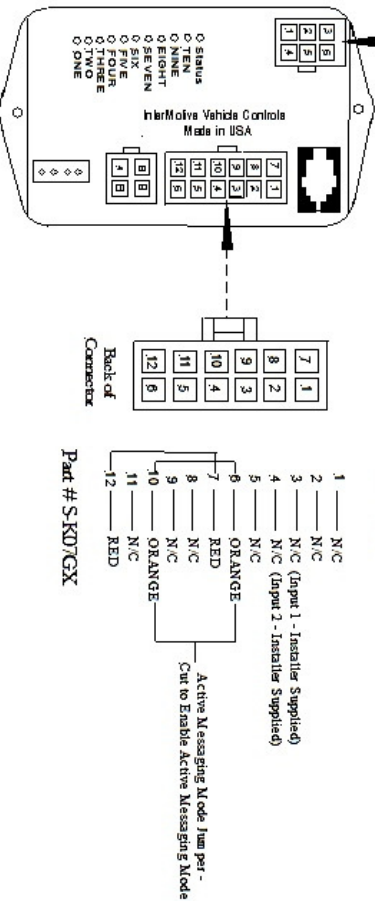## Proprietary Service $22 - Read Parameter by identifier

Some vehicles support service $22, which is used to request proprietary vehicle data. **This service is only available in Active Messaging Mode.**

When the STN405 receives a service $22 request addressed to a module ID greater than $700, it passes it through to the vehicle network. Any responses from vehicle modules are passed back through to the third party device as they are received.

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STN405-B

STN405
S-M1200-29

PRPC, Gateway 505/506/605, or HL 510/550/610

InterMotive Vehicle Controls
Made in USA

Status
TEN
NINE
EIGHT
SEVEN
SIX
FIVE
FOUR
THREE
TWO
ONE

InterMotive Vehicle Controls
Made in USA

Status
TEN
NINE
EIGHT
SEVEN
SIX
FIVE
FOUR
THREE
TWO
ONE

1 — RED
2 — YELLOW
3 — PINK
4 — GRAY
5 — BROWN
6 — ORANGE

Back of Connector

1 — RED
2 — YELLOW
3 — GREEN
4 — GRAY
5 — BROWN
6 — BLUE

Back of Connector

Part# S-HB1HX

PRC/GTWY/HL Supplied Harness

Attach To OEM OBDII Connector

Plug and Play Data Link Harness

Pass Through OBDII Connector

Pin
6
16
14
4

Front of Connector

Back of Connector

1 — N/C
2 — N/C
3 — N/C (Input 1 - Installer Supplied)
4 — N/C (Input 2 - Installer Supplied)
5 — N/C
6 — ORANGE
7 — RED
8 — N/C
9 — N/C
10 — ORANGE
11 — N/C
-12 — RED

Part # S-K07GX

Active Messaging Mode Jumper -
Cut to Enable Active Messaging Mode

If the STN405 fails any step in the Post Installation Test, review the installation instructions and check all connections.
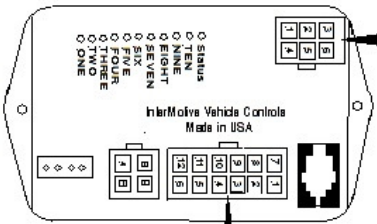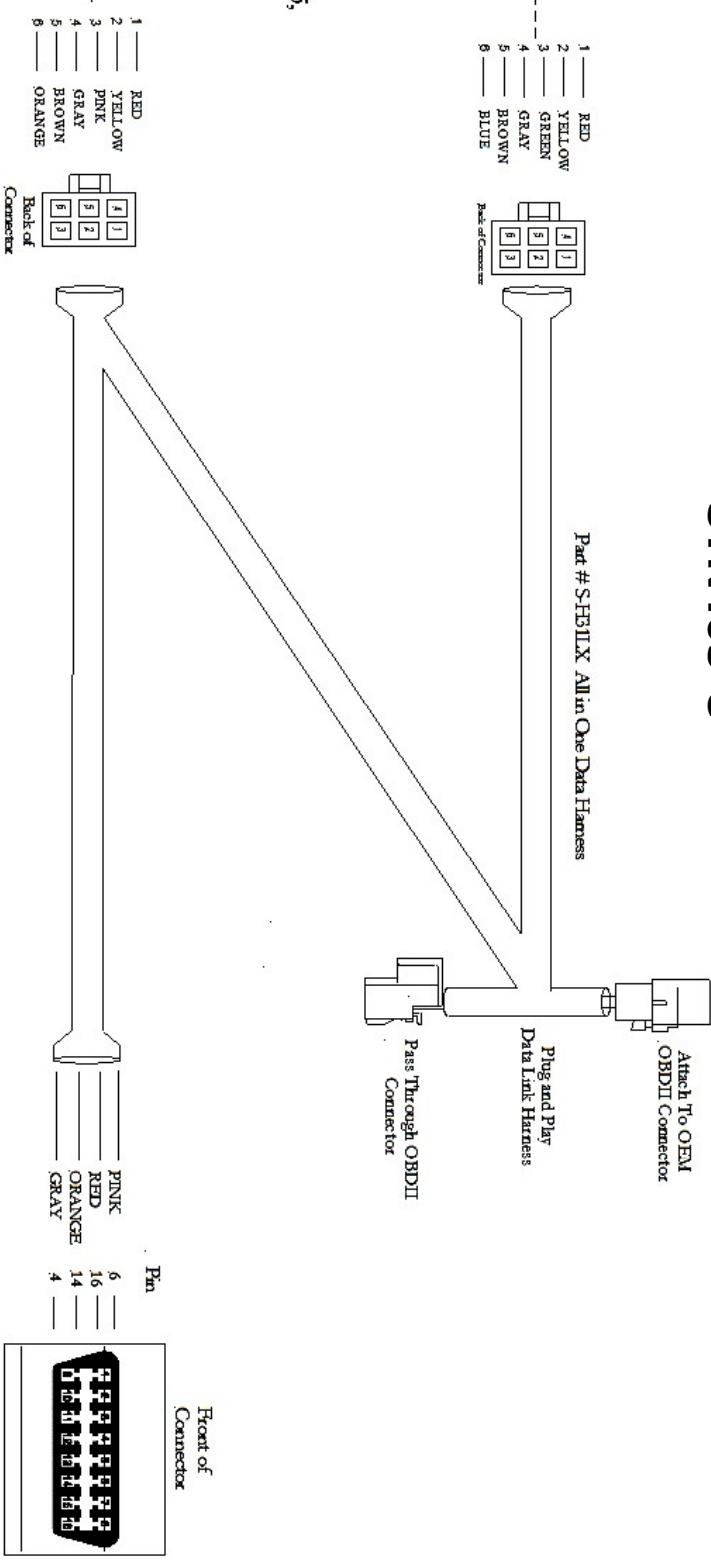If necessary, call

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STN405-092818-CAD

STN405-C
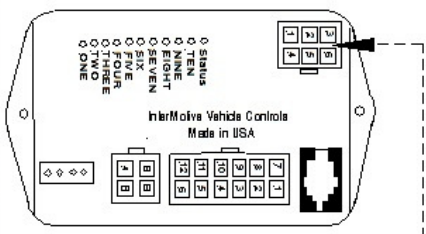
PRPC, Gateway 505/506/605, or HL 510/550/610

STN405
S-M1200-29

InterMotive Vehicle Controls
Made in USA

Status
TEN
NINE
EIGHT
SEVEN
SIX
FIVE
FOUR
THREE
TWO
ONE

Status
TEN
NINE
EIGHT
SEVEN
SIX
FIVE
FOUR
THREE
TWO
ONE

InterMotive Vehicle Controls
Made in USA

Part # S-HBILX All in One Data Harness

Back of Connector

1 — RED
2 — YELLOW
3 — GREEN
4 — GRAY
5 — BROWN
6 — BLUE

1 — RED
2 — YELLOW
3 — PINK
4 — GRAY
5 — BROWN
6 — ORANGE

Back of Connector

Part # S-K07GX

Back of Connector

1 — N/C
2 — N/C
3 — N/C (Input 1 - Installer Supplied)
4 — N/C (Input 2 - Installer Supplied)
5 — N/C
6 — ORANGE
7 — RED
8 — N/C
9 — N/C
10 — ORANGE
11 — N/C
12 — RED

Active Messaging Mode Jumper -
Cut to Enable Active Messaging Mode

Attach To OEM
OBDII Connector

Plug and Play
Data Link Harness

Pass Through OBDII
Connector

PINK — 6
RED — 16
ORANGE — 14
GRAY — 4

Pin

Front of Connector

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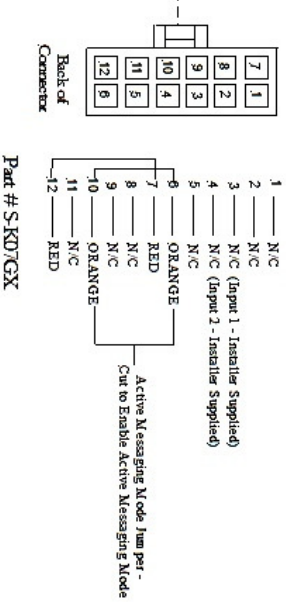
STN405-092818-CAD