NEW FLYER

NEW FLYER Xcelsior®

SALES INFORMATION BULLETIN

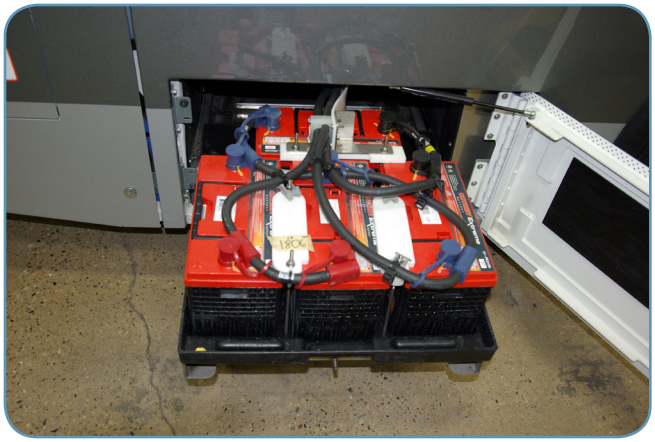
#260-001 | **Model:** Xcelsior® | **Lengths:** 35FT, 40FT, 60FT | **Type:** Low Floor | **Propulsions:** ALL

Battery System

Xcelsior® is designed with an easily-accessibly, rugged and simple-to-use battery system.

Battery Tray

The battery enclosure and tray are constructed from a combination of heavy-duty 3/16" polyethylene plastic and stainless steel. This design is proven to eliminate corrosion as well as dampen any mechanical vibrations. Furthermore, a slide-out tray system improves access to the batteries for maintenance purposes.



Battery Cable

Battery cables are #4/0 gauge. Red plastic over mold terminals are used to designate 24 VDC Positive, blue are used for 12 VDC positive and black for negative (ground). The battery disconnect switch is wired into the positive cables.

Voltage Equalizer

The voltage equalizer is a battery management system used to keep individual batteries in voltage equilibrium with each other. The main advantage of this system is it prevents overcharging and battery boiling scenarios which critically reduce the life of a battery. Access to the equalizer can be gained through the interior bulkhead access panel.

- Ensures battery voltages remain equal and that individual batteries are charged accordingly.
- Connected to the battery system at the 12 VDC, 24 VDC and Negative (ground) points.
- Maintains charge acceptance rate of each battery to within 0.05 volts at light load and 0.1 volts at full rated load
- OPTION - a monitored equalizer is available with an internal electronic monitoring designed to monitor several critical functions in the electrical system. This unit provides fault signals that can be wired to warning lights, buzzers or other control/warning devices.

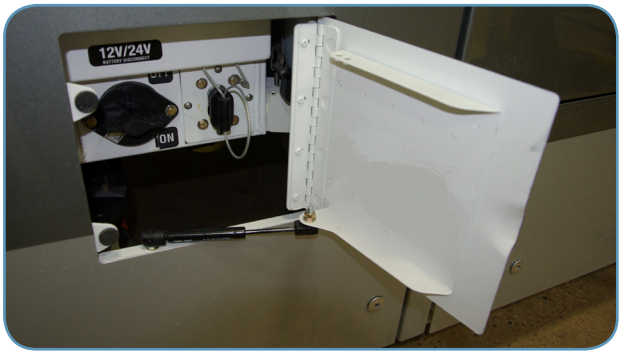
Battery Disconnect Switch

The battery disconnect switch is located on the fuse box, behind the curbside engine compartment access door. This switch isolates the batteries from the vehicle electrical system. A separate (smaller) access door is provided to allow disconnection of electrical power without having to open the curbside engine access door.

- Rotary two-position switch (on/off) functions to disconnect the batteries from the vehicle 12/24VDC electrical systems.
- OPTION - A limit switch can be incorporated to disable the engine ignition and shut down the engine if the battery disconnect switch is set to the off position.

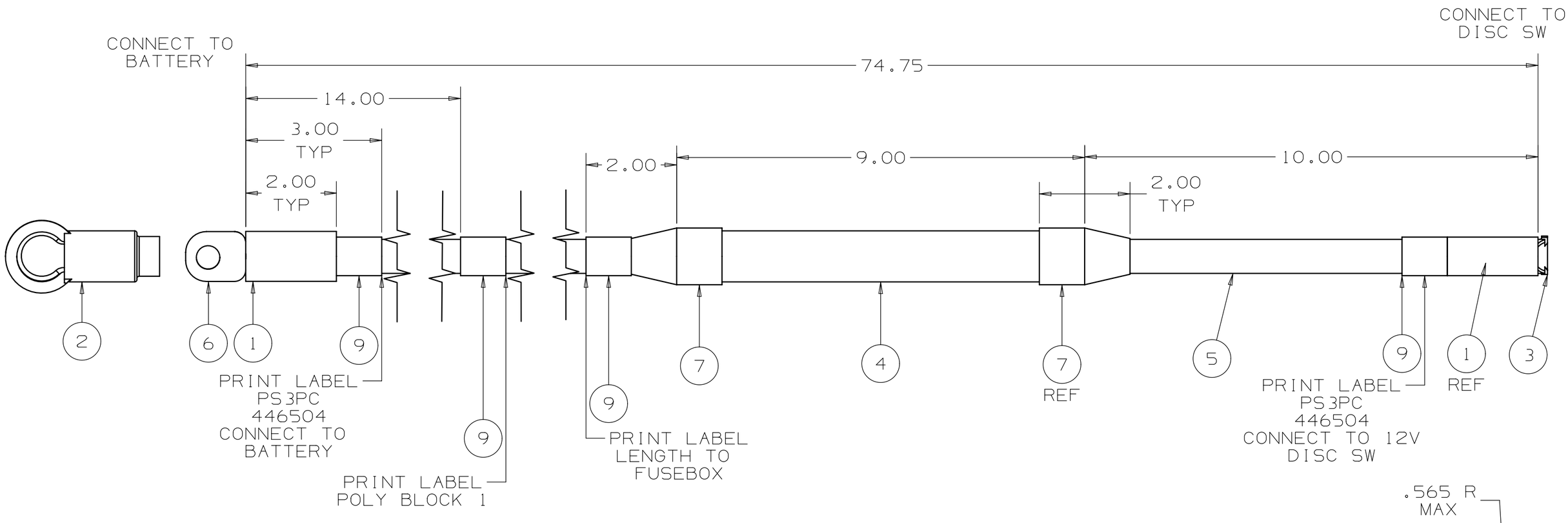
Fuse Box

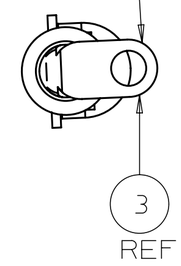
Fuse Box A fuse box located behind the curbside engine access door is used to house the vehicle fuse panel, circuit breaker panel, battery disconnect switch, voltage regulator and compartment light switch. The fuse box is constructed from aluminum and sealed from dirt and debris.



Note: Optional jump start shown in picture

NOTE: FOR INSTALLATION DRAWINGS PLEASE REFER TO ATTACHED MRP BOM SHEET FOR PARTS LISTING





NOTES: (8)

- LISTED ITEMS NOT SHOWN
- SOLDER ALL CONNECTIONS AFTER CRIMPING
- IF TERMINAL REQUIRE MODIFICATION, RE-TINNING IS REQUIRED

VENDOR: IMECO

QTY	U/M	ITEM	PART NO.	DESCRIPTION	WEIGHT
4	EA	9	8112067	MARKER-WRITE ON	-
0.010	LB	8	8111384	SOLDER 60/40	-
0.060	EA	7	5962260	TAPE-ELECTRICAL, .75 WIDE	-
1	EA	6	5944058	TERM-R 1/2 4/OAWG NIN	-
6.229	FT	5	284449	WIRE-4/O WELDING BK	-
0.750	FT	4	270433	TUBING-CONV SPLIT .875	-
1	EA	3	268163	TERM-R 1/2 4/O AWG 90	-
1	EA	2	140588	BOOT-BAT CABLE BLUE	-
0.400	FT	1	117203	TUBING-HEATSHRINK 1.OBL	-

STANDARD NOTES:

ALL CABLES MUST BE BUILT TO CONFORM WITH SPECIFICATION REQUIREMENTS OF SAE RECOMMENDED PRACTICE J1127, J1128, J1292. CRIMPED TERMINALS SHALL MEET THE PULL TEST REQUIREMENTS OF SAE J1742.

USE ELECTRICAL TAPE AT LOOM ENDS, MIN. TWO WRAPS. ENSURE STRIPPED PORTION OF CABLE IS INSERTED INTO FULL LENGTH OF TERMINAL.

ENSURE STRAIN RELIEF CONNECTORS ARE TIGHTENED IN POSITION AND TYRAP LOCKNUT AND BUSHING TO TERMINAL ENDS FOR INSTALLATION ONLINE.

REV	DESCRIPTION	ECO
B	1) ITEM 9, QTY WAS 2 2) PRINT LABELS ADDED (C3,C4) 3) PRINT LABELS UPDATED (C5,C1)	ECN-055156

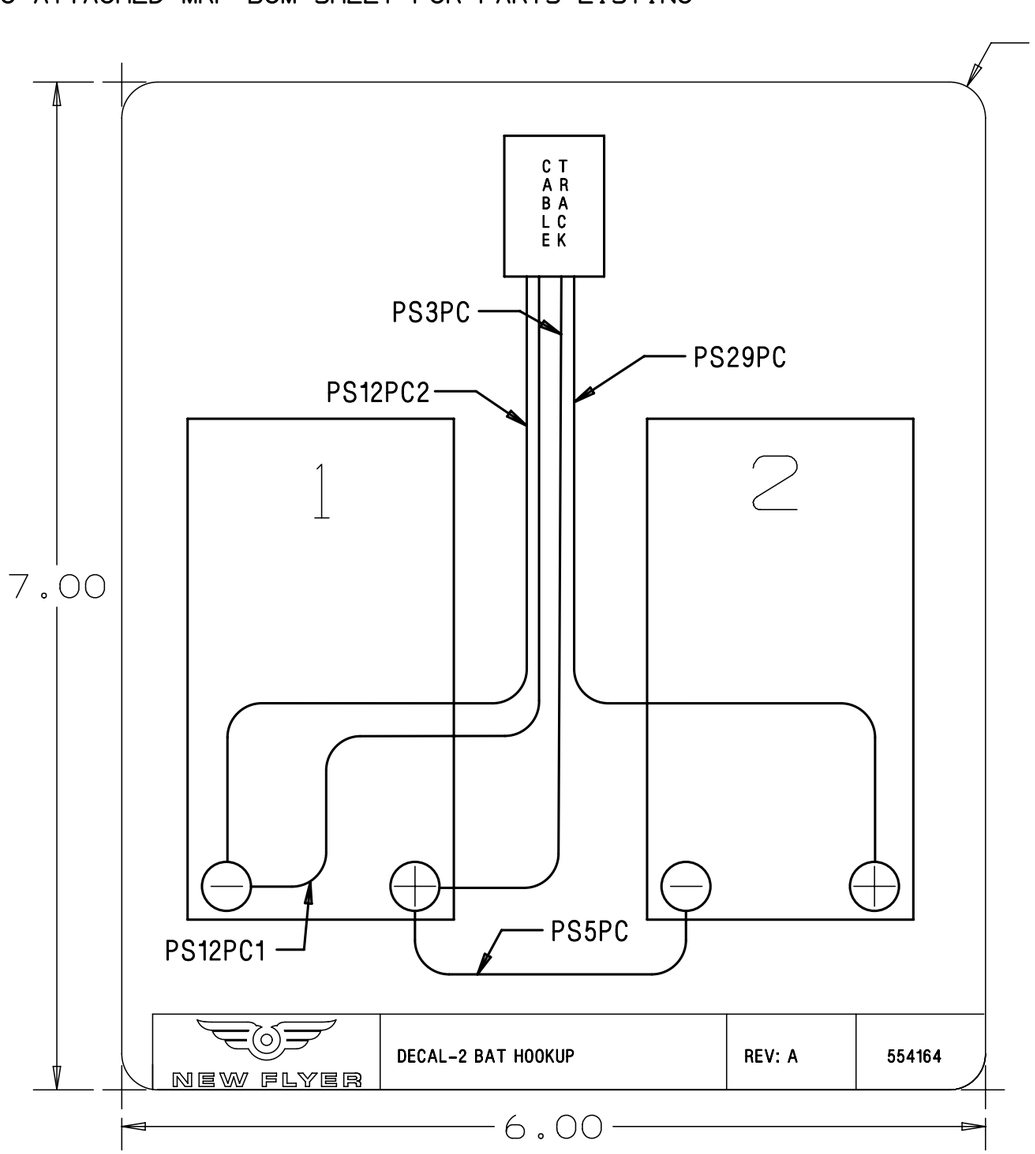
DO NOT SCALE DRAWING	
DIMENSIONS IN [ ] ARE IN m.m.	
THD ANGLE	
DRAWN BY	RAHUL RAJEEV
DATE (DD-MMM-YY)	10-SEP-15

MATERIAL N/A	UNSPEC'D TOLS.	DEC.IN.	TITLE: PS3PC-12V BAT TO DISC SW
WEIGHT N/A	.X .XX .XXX HOLE DIA. BEND RADII. ANGLE TOL.	±.12 ±.06 ±.03 ±.015 ±.03 ±1°	NEW FLYER
TREATMENT NOT REQUIRED	SIMILAR TO 439467		PART Nº 446504 (NX)
			SCALE NTS / C / SHEET 1 OF 1

REPORT ALL ERRORS TO ENG. DEPT.

NOTE: FOR INSTALLATION DRAWINGS PLEASE REFER TO ATTACHED MRP BOM SHEET FOR PARTS LISTING

REV	DESCRIPTION	ECO
A	RELEASED TO PRODUCTION	ECN-033467



NOTES:

1. LETTERS 1 AND 2 FOR THE BATTERIES TO BE HELVETICA CONDENSED BOLD 0.40 MAXIMUM HEIGHT UNLESS OTHERWISE NOTED.
2. LETTERS PS12PCXX, PS3PCXX, PS5PCXX AND PS29PCXX TO BE HELVETICA CONDENSED BOLD 0.15 MAXIMUM HEIGHT UNLESS OTHERWISE NOTED.
3. LETTERING FOR THE DECAL DESCRIPTION, REVISION LEVEL AND PART NUMBER TO BE HELVETICA CONDENSED THIN 0.09 MAXIMUM HEIGHT UNLESS OTHERWISE NOTED.
4. LETTERING TO BE BLACK ON WHITE BACKGROUND.
5. MATERIAL TO BE 3M 3650-10(ADHESIVE ON BACK SIDE)
6. OVERLAMINATE WITH 0.001" GLOSSY POLYESTER.
7. LETTERS CABLE TRACK TO BE HELVETICA CONDENSED BOLD 0.09 MAXIMUM HEIGHT UNLESS OTHERWISE NOTED.

DO NOT SCALE DRAWING	
DIMENSIONS IN [ ] ARE IN m.m.	
THD ANGLE	
DRAWN BY	
RAMEEZ MANSURI	
DATE (DD-MMM-YY)	
18-MAR-14	

MATERIAL - -	UNSPEC'D TOLS.	DEC. IN.
	.X	±.12
	.XX	±.06
	.XXX	±.03
	HOLE DIA.	±.015
	BEND RADII.	±.03
	ANGLE TOL.	±1°
WEIGHT 0.001 LBS		
TREATMENT NOT REQUIRED -	SIMILAR TO 425370	

TITLE

DECAL-2 BAT HOOKUP

NEW FLYER

PART Nº

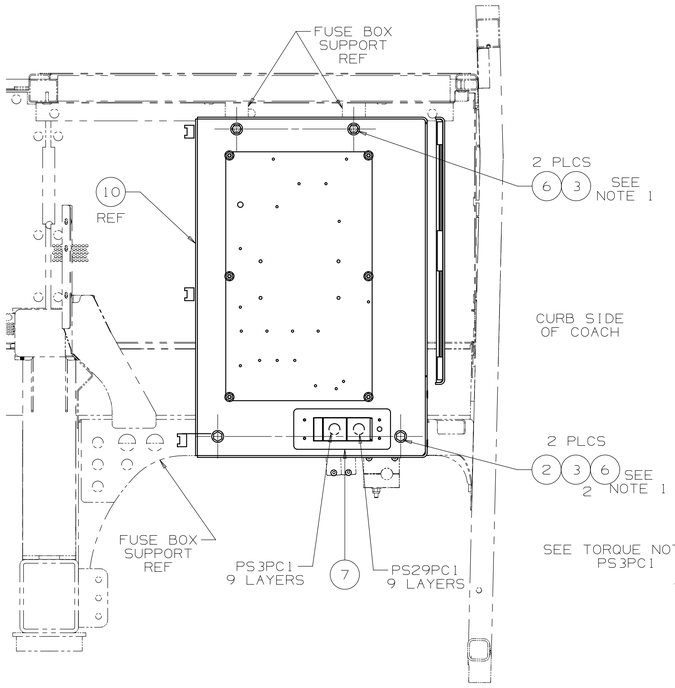
554164 (NX)

SCALE 1:1 | B | SHEET 1 OF 1

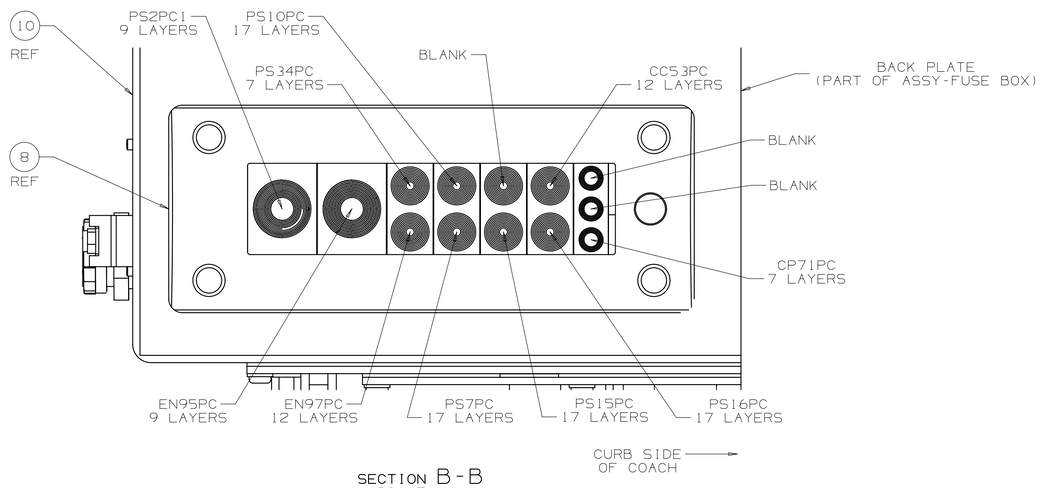
REPORT ALL ERRORS TO ENG. DEPT.

NOTE: FOR INSTALLATION DRAWINGS PLEASE REFER TO ATTACHED MRP BOM SHEET FOR PARTS LISTING

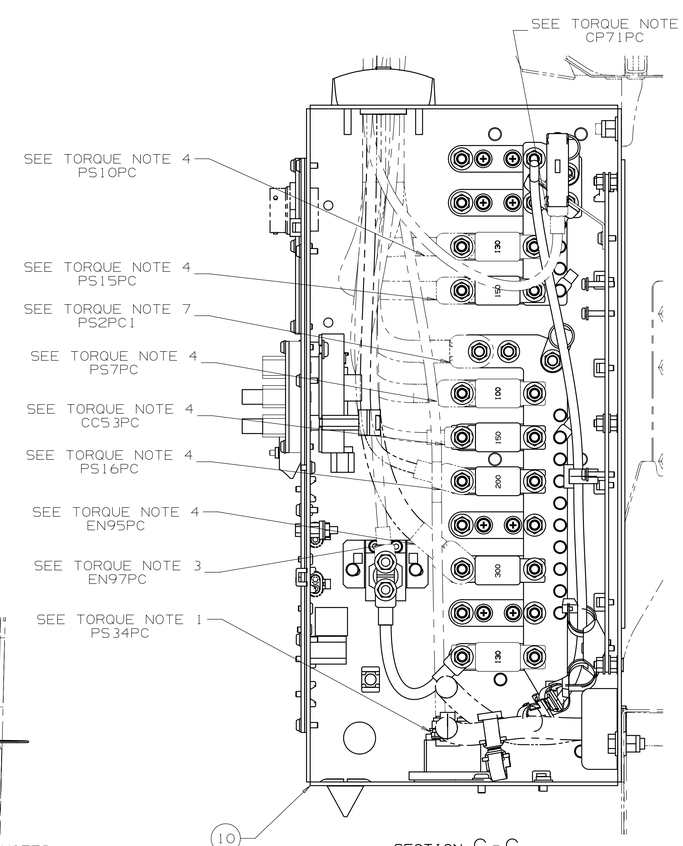
DRAWING Nº 566122



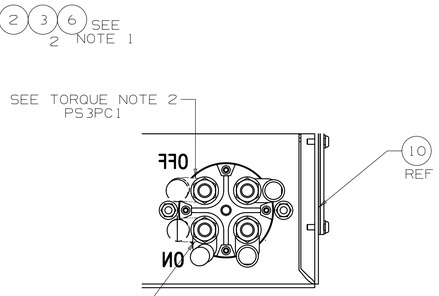
SECTION A-A



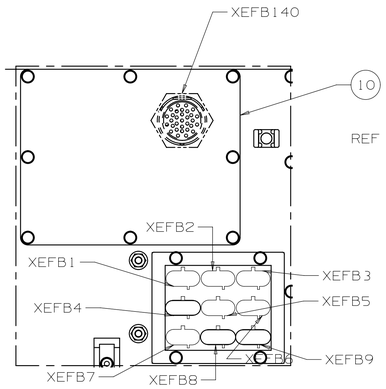
SECTION B-B
SCALE 1:1
SHOWING CABLE POSITIONS
SEE NOTE 2



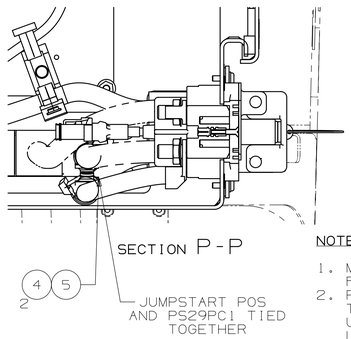
SECTION C-C
SCALE 1:2



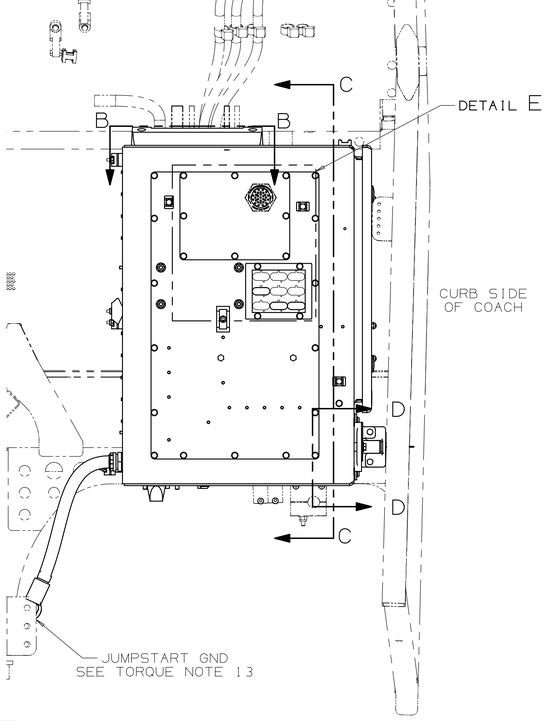
SECTION D-D
SCALE 1:2

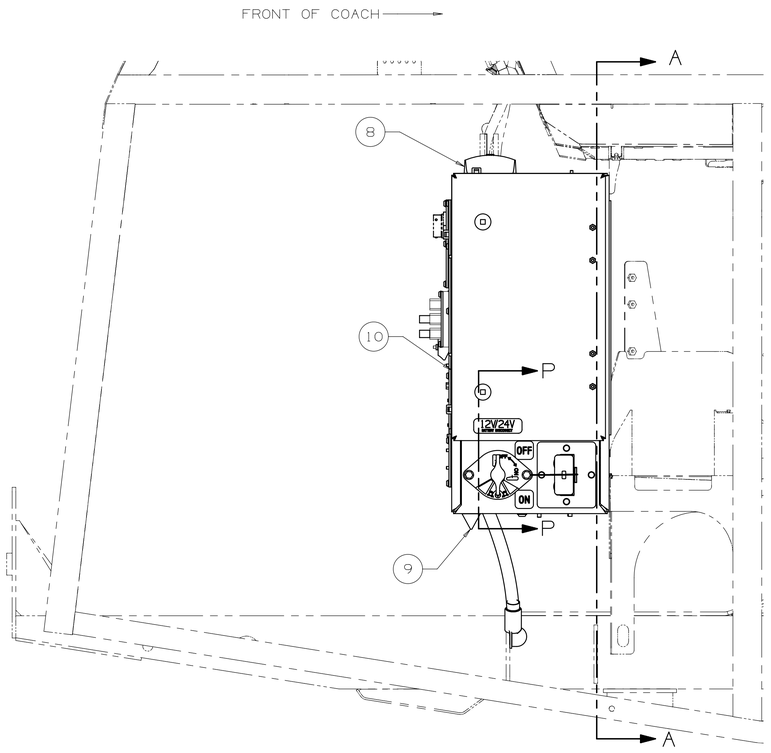


DETAIL E
SCALE 1:2



SECTION P-P





NOTES:

1. MOUNT FUSE BOX TO EXISTING UPPER AND LOWER FUSE BOX SUPPORT BRACKETS (INSTL 410-XXXXC, LINE ITEM 15).
2. ROUTE CABLES THRU ASSEMBLED FRAME. ADAPT MODULES (PART OF ROXTEC KIT) TO HOLD SPECIFIED CABLES BY PEELING LAYERS FROM EACH HALF UNTIL A GAP OF FROM .004-.04" IS ACHIEVED BETWEEN HALVES. LUBRICATE ALL MODULES THOROUGHLY ON BOTH INSIDE AND OUT. INSERT THE MODULES FROM THE OUTSIDE INTO THE FRAME. TIGHTEN THE COMPRESSION SCREW (PART OF ROXTEC KIT) WHEN ALL THE MODULES ARE IN PLACE ENSURING A TORQUE RANGE OF 3.7-5.2 FT-LBS.
3. FOR ROXTEC POWER CABLE ORIENTATION REFER TO WD-FUSE BOX 290-XXXXC/U, LINE ITEM 385.
4. FOR CONNECTION POINTS REFER TO WD-CONNECTION POINTS 290-XXXXC/U, LINE ITEM 400.
5. ADD DIELECTRIC GREASE TO ALL ELECTRICAL CONNECTIONS AFTER TORQUING.
6. IF SUPPLIER COMPONENTS ARE RECEIVED WITH HELICAL LOCK WASHERS FOR MOUNTING OR ELECTRICAL CONNECTIONS, THEY ARE TO BE DISCARDED
7. APPLY LOCTITE TO ALL THREADED FASTENERS WHERE LOCK NUTS NOT USED (EXCEPT FOR ELECTRICAL CONNECTIONS)
8. ENSURE THAT SPLIT NUTS ARE INSTALLED EITHER BY HAND OR A LOW RPM AIR TOOL TO PREVENT GALLING.

TORQUE SPECS:

1. TORQUE NUTS ON STARTER RELAY TO 12 FT-LBS.
2. TORQUE TERMINALS AT BATERY DISCONNECT SWITCH TO 14 FT-LBS.
3. TORQUE NUTS ON GRID HEATER RELAY TO 9-10 FT-LBS.
4. TORQUE NUTS ON FUSE LIMITERS TO 10 FT-LBS.
5. CONNECTIONS ON LOAD SIDE OF FUSE LIMITERS SHOULD BE HAND TIGHTENED.
6. TORQUE NUTS ON AIRPAX BREAKERS TO 2.5 FT-LBS.
7. TORQUE NUTS ON CARRIAGE BOLTS TO 13 FT-LBS
8. TORQUE SCREWS FOR WIRES ATTACHING TO BUSBAR AND GROUND BAR TO 30 IN-LBS (DRY).
9. TORQUE ALL WIRE CONNECTIONS ON SWITCH (ON/OFF) SCREW TERMINALS TO 7 IN-LBS (DRY).
10. TORQUE NUTS ON PRE-LUBE RELAY TO 4 FT-LBS.
11. TORQUE NUTS ON ISOLATED STUD TO 15 FT-LBS.
12. ALL GROUND POINTS TO BE CLEANED TO BARE METAL AND TORQUED TO 30-37 FT-LBS.
13. TORQUE NUTS ON GROUND BLOCK 1/4 BOLT TO 9 FT-LBS.
14. TORQUE NUTS ON GROUND BLOCK 5/16 BOLT TO 10 FT-LBS.
15. TORQUE TO BE APPLIED UNDER DRY CONDITIONS NOT LUBRICATED.
16. TORQUE BUSHING NUT ON SWITCH (ON/OFF) TO 25 IN-LBS (DRY).

(1)(11) ITEM NOT SHOWN

QTY	U/M	ITEM	PART NO.	DESCRIPTION	WEIGHT
0.010	EA	11	8111767	LUBRICANT NYK-77	-
1	EA	10	566123	ASSY-FUSE BOX	-
1	EA	9	426384	EJECTOR-DUST, WATER	-
1	EA	8	425896	KIT-ROXTEC EZ16/13	-
1	EA	7	417853	KIT-ROXTEC FB EZ10/5	-
4	EA	6	40N06000	NUT-3/8-16 LOCK	-
1	EA	5	351500	SPACER-DUAL SWIVEL SADDLE	-
2	EA	4	351161	CABLETIE-WIDE HEAVY-DUTY	-
6	EA	3	20W06000	WASHER-FLAT HARDENED 3/8	-
2	EA	2	10B06016	BOLT 3/8X1.00	-
0.010	EA	1	081034	LOCTITE-243 MEDIUM 10ML	-

MATERIAL N/A		UNSPEC'D TOLS.	DEC. IN.	TITLE	
		.X	±.12	INSTL-FUSE BOX	
WEIGHT TBD		.XX	±.06		
		.XXX	±.03		
		HOLE DIA.	±.015		
		BEND RADII	±.03		
		ANGLE TOL.	±1°		
TREATMENT NONE		SIMILAR TO 564620		PART Nº 566122	
				NEW FLYER	(NX)
				SCALE 1:4	E SHEET 1 OF 1

DO NOT SCALE DRAWING			
DIMENSIONS IN [ ] ARE IN m.m.			
THD ANGLE			
DRAWN BY			
RAHUL RAJEEV			
DATE (DD-MMM-YY)	A	RELEASED TO PRODUCTION	ECN-038785
24-JUL-14	REV	DESCRIPTION	ECO

REPORT ALL ERRORS TO ENG. DEPT.

ROXTEC VIEW (LOOKING UPWARDS FROM INTERIOR)

CURBSIDE

CC53PC · PS10PC · PS34PC

PS16PC · PS15PC · PS7PC · EN97PC · EN95PC · PS2PC1

*CP71PC

1:EN46EM
2:EN46CZ
3:
4:
5:
6:EN46CW
7:
8:EN46CY
9:EN46BT
10:EN48B
11:EN46DP
12:EN46BY
13:EN46DS
14:EN46AP
15:EN46AR
16:
17:EN46CX
18:

XEFB140

LEFT VIEW FROM INSIDE

XEFB3 A: B:PS32C C:
XEFB2 A: B: C:
XEFB1 A:CC17 B:CC17A C:PS34A
XEFB6 A: B: C:
XEFB5 A: B: C:
XEFB4 A:TR51A B: C:
XEFB9 A: B: C:
XEFB8 A: B: C:PS32A
XEFB7 A:PS12 B:PS22 C:LI93F

NOTES:
1) * HARD WIRED ONLINE, NOT PANEL COMPONENT
2) WIRES ARE STAMPED WITH A HARNESS CODE PREFIX. FOR DETAILS, REFER TO ES-GENERAL INFO G1.

BREAKER VIEW

EN46CJ	CC17A	PS32	EN46DM	EN46BW	PS22BB PS22	CC17	EN46EM	PS35PC	CP71PC1
15A RLY	15A	10A PWR	10A	10A MODULE	6A SW	6A	30A	50A RLY	30A PWR
F4EN LINE HTR	F1CC AUX HTR	F1PS VOLT REG	F9EN AFT TRTMT	F46EN SUPPLY	F5PS START SEL	F7CC AUX HTR	F2EN ENG ECM	F25PS STARTER	F2CP RADIO
EN46CH	CC17AB	PS32AA	EN46DN	EN46BX EN46BV	PS22AA	CC17AA	EN46AA	PS37PC	CP71PC *

FUSE BOX LP SW
2:LI93F
3:LI93H

PS12 · PS34B · PS32L · LI93J · EN46R · PS32B
GNDBEFB

BACK VIEW

12VBATFB · PS1PC

* PS10PC | 130A | F2PS EQUAL PWR
* PS15PC | 150A | F8PS RR PNL PWR

CP71PC1

24VBATFB · *PS2PC1 · PS2PC

* PS7PC | 100A | F3PS EQUAL PWR
* CC53PC | 150A | F3CC HVAC
* PS16PC | 200A | F4PS RR PNL PWR

PS37PC · EN46DN · PS22AA · PS32AA · CC17AB · CC17AA

* EN95PC | 300A | F6EN EMP RAD FAN

EN99PC | 130A | F45EN GRID HTR RLY

GRID HTR RLY 24V
EN46AR:2 · 1:EN46AP · 3:EN97PC * · 4:EN99PC

RIGHT VIEW FROM INSIDE

FUSE BOX SVCE LP
1:LI93H
2:LI93J

DELCO VR
1:PS32A
2:PS32
3:PS32B
4:PS32L
5:PS32C
6:PS32G

F50PS 2A VOLT REG PWR
A:PS32GA
B:PS32G

PRESS LINE HTR RLY
86:EN46CK
85:EN46CT
30:EN46CL
87:EN46CW
87a:

BACKFLOW LINE HTR RLY: 86:EN46CM · 85:EN46CU · 30:EN46CN · 87:EN46CX · 87a:
SUCTION LINE HTR RLY: 86:EN46CP · 85:EN46CV · 30:EN46CR · 87:EN46CY · 87a:
24V · 24V · 24V

PS3PC * · PS29PC *

FRONT VIEW FROM INSIDE

PS3PC * · (PC)12LB (PC)12LB PS1PC
2 MN PWR SW 1
12VBAT
4 24VBAT 3
(PC)12RD* PS29PC * (PC)10RD* (PC)12RD* (PC)12RD* (PC)12RD*
(PC)12RD (PC)12RD (PC)12RD (PC)12RD PS2PC

XBC12 A: B:

XBCENG1 A:EN46BW B:EN46CH C: D:
XBCENG2 EN46AA

XBC24 A:PS32GA B: C:TR51N D:

BOTTOM VIEW FROM INSIDE

STARTER RLY
*PS34PC:2 · 3:PS34A · PS34B:4 · 1:PS35PC

F4TR 10A TRAN ECU PWR
A:TR51N
B:TR51A

AFT TRTMNT RLY
86:EN46DP
85:EN46R
30:EN46DM
87:EN46DS
87a:

SUPPLY MODULE RLY
86:EN46BX
85:EN46BY
30:EN46BV
87:EN46BT
87a:
24V · 24V

XBBPS2 A: B: C: D:EN48B E:PS22BB F:

XBBEN14 A: B:EN46CZ C:EN46CT D:EN46CU E:EN46CV F:

XBBEN18 1:EN46CL 2:EN46CK 3: 4:EN46CJ 5:EN46CR 6:EN46CP 7:EN46CN 8:EN46CM

DECAL-FUSE BOX | REV: C | 473362

NOTES:
1. CONTACT NFIL ENG. DEPT. FOR ORIGINAL ARTWORK
2. SUPPLY HIGH QUALITY COPIES FOR LAMINATING PROCESS
3. PHOTOCOPY ONTO BOND PAPER
4. DECAL LAMINATED WITH ITEM #1
5. TRIM TO INDICATED FINISHED SIZE
6. DECAL DIMENSIONS 7.75 HEIGHT X 12.00 WIDTH
7. ENSURE ARTWORK IS NOT FOLDED

QTY	U/M	ITEM	PART NO.	DESCRIPTION	WEIGHT
0.002	EA	2	170937	PAPER-BOND 11" X 17"	-
0.040	EA	1	170936	LAMINATE-POUCH 11"X17"	-

REV	DESCRIPTION	ECO
C	UPDATED CORRESPONDING WIRE CODES AS PER LATEST WIRING DIAGRAM RELEASE	ECN-036627

DRAWN BY: RAMEEZ MANSURI
DATE (DD-MMM-YY): 06-JUN-14

REPORT ALL ERRORS TO ENG. DEPT.

TITLE: DECAL-FUSE BOX
SHEET NAME - | SHEET 1 OF 1 | SCALE 1:1 | B

NEW FLYER

PART N°: 473362 (NX)

NEW FLYER

XCELSIOR
BETTER BY DESIGN.

SALES INFORMATION BULLETIN

#284+286-001 | **Model:** Xcelsior | **Lengths:** All | **Propulsions:** All

Multiplexing System

New Flyer uses superior multiplexing power provided by Parker Vansco.

- Vansco has more than 25 years of experience in developing state-of-the-art electronic control systems and components; it was acquired by Parker Hannifin in 2008
- Parker Hannifin Corporation (NYSE: PH) is the world's leading diversified manufacturer of motion control technologies and systems, with annual sales exceeding $12 billion

Product Features

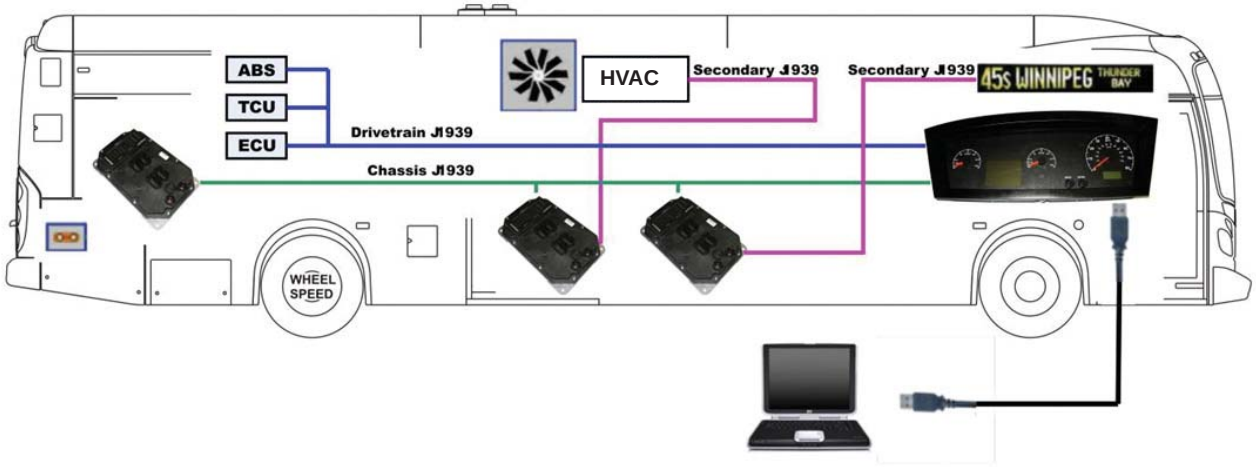
- Industry standard communications protocol and ladder logic software
- Single style auto-programming module controls all functions and reduces inventory (35' and 40' buses have six modules, a 60' bus has seven
- Easy-to-use diagnostics software runs directly on your laptop in Windows; free lifetime upgrades
- In service on more than 10,000 New Flyer buses in North America

Multiplexing Module (VMM) System, also called Programmable Logic Controller (PLC), is utilized to:

- reduce wiring complexity
- minimize wiring costs
- simplify troubleshooting
- provide unparalleled reliability

Benefits

- **Multiplexing system uses industry standard CAN J1939 communications protocol**
- **Certified to J1455 environmental standard rating**
  - Rugged Parker Vansco module meets or exceeds all test requirements for temperature, electrical transients, EMC, pressure wash, and immersion
  - All solid state construction (no internal fuses) to ensure reliable, low maintenance system
- Industry standard ladder logic software
  - Ladder logic view for input and output relationships, real time diagnostics
  - I/O view defines all inputs, outputs
- **User friendly software runs in Windows (32 bit operating systems)**



SALES INFORMATION BULLETIN

- **Easy-to-use diagnostics**
  - Ladder logic and documentation can be uploaded directly to an internet enabled PC, system supports remote diagnostics across a LAN or the Internet
  - Multiplexing module can be configured to log a cycle count or a cumulative duration count for any input, output, or communication signal without adding components to the system
  - Free lifetime software license and upgrades
  - Basic diagnostics achieved through LEDs on module with Input/Output LEDs, Net LEDs, Power LED, Address LEDs
- **One style module to control all systems**
  - Reduces required inventory
  - All modules work independently; in the event of a failed module, others will still operate
- **Auto programming (Plug & Play) feature**

  Upon connection to a VMM system, the Parker Vansco Multiplexing Module auto-programs itself from the other modules. No programming tools, special exchange software or PC connections are required to exchange a module; it is "Plug and Play."
- **The multi-master system**

  Allows multiplexing modules within a system to store and execute a common ladder logic program; the multi-master system architecture facilitates distribution of critical functions and minimizes the number of different modules within a system.
- **Internal gateway control**

  Ability to force gateway on or off through the software
- **Designed with familiar concepts to reduce training**
  - Same ladder logic
  - Same LED diagnostics
  - Features, such auto-programming and the multi-master system, reduce maintenance cost
- **Total system supplier**
  - New Flyer can supply a complete Parker Vansco system, comprising multiplexing modules and an instrument cluster (gauges, tell tales, and harnesses), or customers can select components that work with third party equipment
  - Custom electronic components (New Flyer, working with Parker Vansco, can design and manufacture custom components)
- **Superb service/warranty**
  - Parker Vansco has been installed on more than 10,000 New Flyer buses in North America
  - New Flyer's Service Organization coordinates warranty claims through iWarranty
  - New Flyer maintains extensive service networks and comprehensive in-house engineering resources
  - Three year/150,000 miles parts and labor warranty

Specifications

	Parker Vansco Module
CORE	
Micro Processor	Power PC
Flash	1 Mbyte up to 2 Mbyte
RAM	64 Kbyte up to 512 Kbyte
Eeprom	32 Kbyte
Bus Speed (Clock)	80 Mhz
COMMUNICATION CHANNELS	
CAN Buses	2
Wake on CAN	CAN Bus 1
COMMUNICATION PROTOCOL	
SAE J1939	Yes (2)
CAN	Yes (2)
Gateway Functionality	Yes
Router Functionality	No
RV-C Capable	No
GMLAN	No
J1708	No
RS232	No
Built in DLA capability	No
Diagnotic Messages (DM)	Yes
CAN Messages (User Definable)	Yes

	Parker Vansco Module
VISUAL DIAGNOSTICS	
Power LED	1
Network LED	2
Fault LED	-
Input LED	21
Output LED	15
SYSTEM ARCHITECTURE	
Master - Master	Yes
Single Part Solution	Yes
Mix and Match Controllers	Yes
SOFTWARE	
Software License Cost	No
Programming Modules	Program with PC for the first time, then if a unit is replaced, they Plug and Play each other.
Power Shedding	Yes
OTHER	
Module Addressing	5 dedicated inputs for addressing
Power Control	1 (AH)
Total Continuous Current per Controller	80 Amps
Total User Configurable Inputs	16
Total User Configurable Outputs	15

SALES INFORMATION BULLETIN

Parker Vansco VMM1615

- Total of 16 inputs
- Six switch (digital) inputs
  - One input with power control switched to high
  - Six programmable input switch high or low
- Eight analog / digital inputs
- One DC frequency input
- Total of 15 outputs
  - 6 outputs, 10 A max
  - 4 outputs, 5 A max
- 3 outputs, 2 x 2.5 A high side, 1 x 2.5A low side
  - 2 solid state outputs, 1 A max
  - Total Current 80 A max
  - 2 V or 24 V operation
  - Split power bus
  - 5V/8V Regulated Sensor Supply
- PWM outputs 1- 100%, 100 Hz
- Solid state switching and circuit protection
- Accurate current sense on selected outputs
- Internal power protection and conditioning
- 2 - CAN ports, 1 with wake on CAN, both J1939 communications protocol
- Built-in pocket gateway functionality

Parker Vansco Xcelsior Instrument Cluster

- Contemporary dash design with the industry's first standard electronic automotive-style instrument panel
- Integrated inputs, outputs, gauges, LCDs, tell tales, and user buttons in one drop-in package
- 2 CAN ports for built in pocket gateway functionality
- Bridges drivetrain J1939 to chassis J1939
- USB device port; uses a standard cable to communicate with a PC
- Total of 27 inputs
  - 3 Wake Ups Active High
  - 12 Digital Active Low
  - 6 Digital Active High
  - 5 Analogs (3 Position Switch Settings)
  - 1 Frequency Input
- Total of 3 outputs
  - 2 High Side Outputs 2 A max.
  - 1 Low Side Output 2.5 A max.
- User programmable routing table for passing or blocking of J1939 Messages
- User programmable inputs, outputs, gauges, tell tales, and LCDs
- Uses a standard off the shelf USB A-B cable to communicate with a PC
- Uploading, downloading and diagnostics are all done from two points on the vehicle (front & rear)
  - The instrument cluster serves as built-in service tool
- Advanced Diagnostics
  - Real time diagnostics
  - All documentation is stored in the VMMs
  - Monitor all inputs and outputs from one location
  - Monitor analog voltage
  - 'Force' inputs or outputs On or OFF
  - Upload logs and error codes

Xcelsior Electronic Instrument Cluster

Air Pressure Gauges

- Two gauges in 40’ bus
- Third gauge positioned above LCD screen in 60’bus

Speedometer

(MPH in US, KPH in CAN)

Tell Tales

- Up to 31 standard tell tales illuminate on dash
- Additional selected tell tales are programmed to display on LCD screen

LCD Screen

- Up to four LCD screens
- Each LCD screen displays between 1 to 4 gauges
- 2010 EPA regulation requires that an urea level gauge always be present and in the “1” position

User Buttons

Odometer

Examples of LCD Screen Configurations

SC — NODE 02 — VMM1615

ADDRESS	DESCRIPTION	PIN	CIRCUIT	TYPE
I-01	HZD_SW	J3-3	DS14	BAT
I-02	-	J3-7		-
I-03	DY_NGHT_SEL_SW	J4-10	EL50	BAT
I-04	NGHT_PRK_SEL_SW	J2-1	EL50B	BAT
I-05	-	J3-10		-
I-06	IL_BRK_PS	J3-11	DC50KA	GND
I-07	FRT_DR_CNTRLR_SW	J1-5	DC80B	GND
I-08	RR_DR_CNTRLR_SW	J1-6	DC80A	GND
I-09	BRK_APLY_SNDR	J2-2	DS31K	ANLG
I-10	-	J2-3		-
I-11	RET_SW	J2-4	TR57N	GND
I-12	HGT_SNDR	J2-5	LK54F	ANLG
I-13	CC_COOL_SW	J3-8	CC72B	GND
I-14	CC_HEAT_SW	J3-9	CC72C	GND
I-15	CC_VENT_LO_SW	J1-4	CC72A	GND
I-16	CC_VENT_HI_SW	J4-9	CC72D	GND
O-01	LH_HDLP_HI_BM	J1-1	EL10P	12V
O-02	RMP_STW_MV	J2-12	LK50T	24V
O-03	-	J3-6		-
O-04	RMP_DPLY_MV	J4-7	LK50R	24V
O-05	RH_HDLP_HI_BM	J3-2	EL10U	12V
O-06	-	J4-11		-
O-07	LH_TRN_PWR	J3-1	DS21	12V
O-08	HGT_SNSR_PWR	J4-12	LK54D	24V
O-09	-	J3-5		-
O-10	PWR_ON_SIG	J4-8	PN90	24V
O-11	WRN_ALM	J3-12	LK43P	12V
O-12	CC_WKUP_SIG	J4-1	CC66G	24V
O-13	-	J2-8		-
O-14A	-	J1-7		-
O-14B	-	J2-7		-
O-15A	AISL_LPS_DIM_SIG	J2-10	IL64P	24V
O-15B	AISL_LPS_DIM_SIG	J2-9	IL64PA	24V

ED — NODE 11 — VMM1615

ADDRESS	DESCRIPTION	PIN	CIRCUIT	TYPE
I-01	RR_DR_EMER_PS	J3-3	DC70E	BAT
I-02	FRT_DR_CLSD_LS	J3-7	DC71K	BAT
I-03	-	J4-10		-
I-04	RR_DR_SEN_EDG_PS	J2-1	DC70N	BAT
I-05	RR_DR_CLSD_LS	J3-10	DC70D	BAT
I-06	RR_DR_OPN_LS	J3-11	DC70G	BAT
I-07	FRT_DR_OPN_LS	J1-5	DC71J	BAT
I-08	WC_RMP_ENA_PS	J1-6	DC71N	BAT
I-09	-	J2-2		-
I-10	FUEL_LVL_SNDR	J2-3	EN25C	ANLG
I-11	-	J2-4		-
I-12	-	J2-5		-
I-13	-	J3-8		-
I-14	-	J3-9		-
I-15	-	J1-4		-
I-16	-	J4-9		-
O-01	RR_DR_MV	J1-1	DC70F	12V
O-02	-	J2-12		-
O-03	FRT_DR_MV	J3-6	DC71M	12V
O-04	FRT_DR_LPS	J4-7	LI20A	12V
O-05	RR_DR_LPS	J3-2	LI41A	12V
O-06	FRT_DR_DUMP_MV	J4-11	DC71P	12V
O-07	WRN_LP	J3-1	LK43M	12V
O-08	-	J4-12		-
O-09	FUEL_LVL_SNDR_PWR	J3-5	EN25	12V
O-10	-	J4-8		-
O-11	RR_DR_ENA_LP	J3-12	DC60T	12V
O-12	-	J4-1		-
O-13	-	J2-8		-
O-14A	-	J1-7		-
O-14B	-	J2-7		-
O-15A	-	J2-10		-
O-15B	-	J2-9		-

RR — NODE 14 — VMM1615

ADDRESS	DESCRIPTION	PIN	CIRCUIT	TYPE
I-01	-	J3-3		-
I-02	STOP_LPS_ST	J3-7	DS72AA	BAT
I-03	BKUP_LPS_ST	J4-10	DS62AB	BAT
I-04	TL_LPS_ST	J2-1	DS53AB	BAT
I-05	CLR_LPS_ST	J3-10	EL80SB	BAT
I-06	LO_CAB_CLNT_SNSR_ST	J3-11	CC39B	GND
I-07	-	J1-5		-
I-08	-	J1-6		-
I-09	-	J2-2		-
I-10	-	J2-3		-
I-11	-	J2-4		-
I-12	-	J2-5		-
I-13	-	J3-8		-
I-14	-	J3-9		-
I-15	ALT_CHRGNG_ST	J1-4	PS32E	ANLG
I-16	-	J4-9		-
O-01	SVCE_LPS	J1-1	LI93C	12V
O-02	AISL_3_LPS	J2-12	IL64V	24V
O-03	LO_CAB_CLNT_LP	J3-6	CC39D	12V
O-04	ZONE_1_HI_SPD_SIG	J4-7	CC31A	24V
O-05	-	J3-2		-
O-06	AISL_2_LPS	J4-11	IL64N	24V
O-07	LO_CAB_CLNT_SNSR_PWR	J3-1	CC39A	12V
O-08	AISL_1_LPS	J4-12	IL64	24V
O-09	STRTR_SIG	J3-5	PS34A	12V
O-10	AUX_HTR_ENA_SIG	J4-8	CC17D	24V
O-11	WAIT_TO_STRT_LP	J3-12	EN46A	12V
O-12	-	J4-1		-
O-13	-	J2-8		-
O-14A	-	J1-7		-
O-14B	-	J2-7		-
O-15A	-	J2-10		-
O-15B	-	J2-9		-

IP — IP CLUSTER — DPS

ADDRESS	DESCRIPTION	PIN	CIRCUIT	TYPE
A-01	-	J1-16	IP70J	TRI
A-02	KNL_SW	J1-17	LK40C	TRI
A-03	RMP_SW	J2-11	LK40E	TRI
A-04	-	J2-12	IP70K	TRI
A-05	-	J2-20	IP70L	TRI
F-01	IP_BCKLT	J1-18	IP21G	BAT
F-02	PRK_BRK_PS	J2-13	DS31D	BAT
I-01	IP_CLUSTER_ENA_SIG	J1-2	PN90FA	BAT
I-02	RH_TRN_IND	J1-1	DS20A	BAT
I-03	LH_TRN_IND	J1-11	DS21A	BAT
I-04	ABS_FAIL_ST	J1-12	AB16	GND
I-05	ATC_ST	J1-13	AB16C	GND
I-06	-	J1-14	IP70F	GND
I-07	-	J2-19	IP70G	BAT
I-08	LH_TRN_SW	J2-10	DS10B	GND
I-09	RH_TRN_SW	J2-9	DS10C	GND
I-10	DFRSTR_HT_SW	J2-8	CC12G	BAT
I-11	FRT_STOP_PS	J2-7	DS31C	BAT
I-12	-	J2-6	IP70S	BAT
I-13	-	J2-5	IP70H	GND
I-14	RH_HDLP_FLT_ST	J2-4	EL10L	GND
I-15	RH_TRN_SIG_FLT_ST	J2-3	EL10J	GND
I-16	LH_HDLP_FLT_ST	J2-2	EL10K	GND
I-17	LH_TRN_SIG_FLT_ST	J2-1	EL10H	GND
I-18	-	J2-16	IP70D	GND
I-19	-	J2-17	IP70E	GND
I-20	RMP_STWD_ST	J2-18	LK50V	BAT
LIN	-	J1-20	IP70M	-
O-01H	-	J1-19	IP70N	24V
O-01L	-	J2-14	IP70R	GND
O-02H	-	J2-15	IP70P	24V

SC — NODE 09 — VMM1615

ADDRESS	DESCRIPTION	PIN	CIRCUIT	TYPE
I-01	PLC_WKUP_ST	J3-3	PN90BB	BAT
I-02	RR_STRT_PB	J3-7	PS22K	BAT
I-03	FRT_STRT_PB	J4-10	PS22F	BAT
I-04	DR_MSTR_SW	J2-1	DC80C	BAT
I-05	-	J3-10		-
I-06	-	J3-11		-
I-07	-	J1-5		-
I-08	-	J1-6		-
I-09	FST_IDL_SW	J2-2	EN47K	GND
I-10	DIMMER_SW	J2-3	EL10A	GND
I-11	EXH_REGEN_NRML_SW	J2-4	EN50J	GND
I-12	EXH_REGEN_REQ_SW	J2-5	EN50H	GND
I-13	AUX_HTR_ENA_SW	J3-8	CC17JA	GND
I-14	-	J3-9		-
I-15	AISL_NRML_SW	J1-4	IL56A	GND
I-16	AISL_ON_SW	J4-9	IL56B	GND
O-01	-	J1-1		-
O-02	-	J2-12		-
O-03	SHFT_SEL_ENA_SIG	J3-6	TR87C	12V
O-04	-	J4-7		-
O-05	LOWR_KNL_MV	J3-2	LK56E	12V
O-06	RAISE_KNL_MV	J4-11	LK56C	12V
O-07	HLD_KNL_MV	J3-1	LK56	12V
O-08	RH_TRN_PWR	J4-12	DS20	12V
O-09	STOP_REQ_LP	J3-5	DC41CB	12V
O-10	IL_BRK_MV	J4-8	DC50Z	12V
O-11	HDLP_LO_BM	J3-12	EL10C	12V
O-12	FRT_CHM_SIG	J4-1	DC51	12V
O-13	-	J2-8		-
O-14A	-	J1-7		-
O-14B	-	J2-7		-
O-15A	-	J2-10		-
O-15B	-	J2-9		-

RR — NODE 13 — VMM1615

ADDRESS	DESCRIPTION	PIN	CIRCUIT	TYPE
I-01	-	J3-3		-
I-02	-	J3-7		-
I-03	-	J4-10		-
I-04	-	J2-1		-
I-05	CAB_CLNT_FILL_MD_SW	J3-10	CC39F	BAT
I-06	-	J3-11		-
I-07	-	J1-5		-
I-08	-	J1-6		-
I-09	FRT_AIR_PRESS_SNDR	J2-2	IP30A	ANLG
I-10	RR_AIR_PRESS_SNDR	J2-3	IP30E	ANLG
I-11	-	J2-4		-
I-12	-	J2-5		-
I-13	STOP_REQ_SW	J3-8	DC52	GND
I-14	WC_STOP_REQ_SW	J3-9	DC53	GND
I-15	-	J1-4		-
I-16	-	J4-9		-
O-01	ENG_IGN_SIG	J1-1	EN46AU	24V
O-02	TRAN_NAS_SIG	J2-12	TR51K	24V
O-03	-	J3-6		-
O-04	REG_ENA_SIG	J4-7	PS32A	24V
O-05	AIR_DRYR_PWR	J3-2	CC08E	24V
O-06	ACCSRS_24V_PWR	J4-11	DC70A	24V
O-07	ABS_ENA_SIG	J3-1	AB10	24V
O-08	AFT_TRTMT_RLY	J4-12	EN46DP	24V
O-09	ZONE_1_CLNT_MV	J3-5	CC31Y	24V
O-10	ZONE_1_LO_SPD_SIG	J4-8	CC31B	24V
O-11	ENG_RAD_FAN_SIG	J3-12	EN49	24V
O-12	TRAN_ENA_SIG	J4-1	TR51J	24V
O-13	-	J2-8		-
O-14A	-	J1-7		-
O-14B	-	J2-7		-
O-15A	-	J2-10		-
O-15B	-	J2-9		-

RR — NODE 15 — VMM1615

ADDRESS	DESCRIPTION	PIN	CIRCUIT	TYPE
I-01	RR_STRT_SEL_SW	J3-3	PS22E	BAT
I-02	FRT_STRT_SEL_SW	J3-7	PS22D	BAT
I-03	-	J4-10		-
I-04	AUX_HTR_PMP_ST	J2-1	CC17E	BAT
I-05	AUX_HTR_ST	J3-10	CC17CA	BAT
I-06	-	J3-11		-
I-07	-	J1-5		-
I-08	-	J1-6		-
I-09	-	J2-2		-
I-10	-	J2-3		-
I-11	-	J2-4		-
I-12	-	J2-5		-
I-13	-	J3-8		-
I-14	-	J3-9		-
I-15	-	J1-4		-
I-16	-	J4-9		-
O-01	-	J1-1		-
O-02	-	J2-12		-
O-03	BKUP_LPS	J3-6	DS62AA	12V
O-04	-	J4-7		-
O-05	TL_CLR_LPS	J3-2	EL80A	12V
O-06	STOP_LPS	J4-11	DS72AB	12V
O-07	-	J3-1		-
O-08	-	J4-12		-
O-09	-	J3-5		-
O-10	AIR_CONTAM_SEP_SOL	J4-8	CC09	12V
O-11	-	J3-12		-
O-12	-	J4-1		-
O-13	-	J2-8		-
O-14A	-	J1-7		-
O-14B	-	J2-7		-
O-15A	-	J2-10		-
O-15B	-	J2-9		-

REV	DESCRIPTION	ECO
V	SHEETS AFFECTED (1,2,3,4,5,6,7,8,9,10,11,12) SHEETS AFFECTED (14,15,27) NODE 14 O-12 DEF_TNK_SNSR_PWR (E4)-REMOVED NODE 14 I-06 'LO_CAB_CLNT_SNSR_ST'(G4)-ADDED NODE 14 O-01 'SVCE_LPS'(F5)-ADDED NODE 14 O-03 'LO_CAB_CLNT_LP'(F4)-ADDED NODE 14 O-07 'LO_CAB_CLNT_SNSR_PWR'(E4)-ADDED NODE 13 I-05 'CAB_CLNT_FILL_MD_SW' (D7)-CHANGED NODE 13 O-03 'AUX_HTR_BYPS_MV' (C7)-REMOVED	ECN-056280

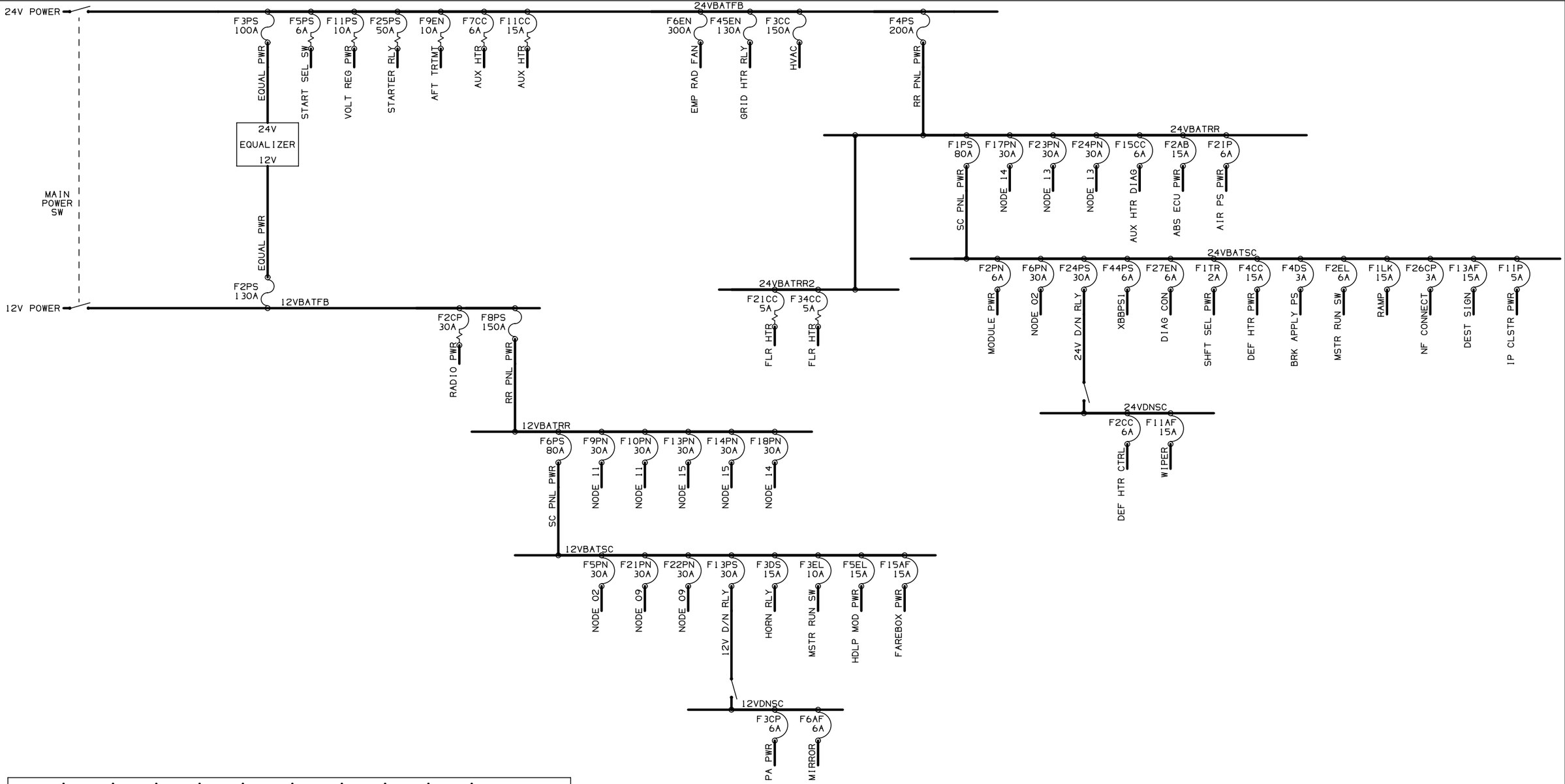
DRAWN BY: SCOTT KIM
DATE (DD-MMM-YY): 04-JAN-16

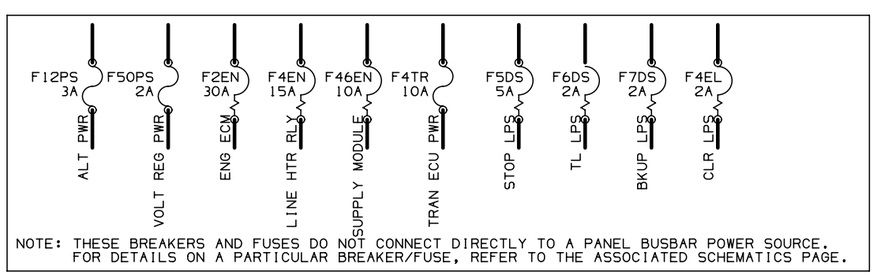
TITLE: ES-ELECTRICAL SCHEMATICS

REPORT ALL ERRORS TO ENG. DEPT. | SHEET NAME 10 | SHEET 01 OF 27 | SCALE NTS | B

NEW FLYER

PART N° 454970 (NX)





NOTE: THESE BREAKERS AND FUSES DO NOT CONNECT DIRECTLY TO A PANEL BUSBAR POWER SOURCE.
FOR DETAILS ON A PARTICULAR BREAKER/FUSE, REFER TO THE ASSOCIATED SCHEMATICS PAGE.

DRAWN BY			
SCOTT KIM			
DATE (DD-MMM-YY)	V	F27EN BREAKER ON 24VBATSC - ADDED (E3) F3LI BREAKER ON 12VBATRR - REMOVED (D5)	ECN-056280
04-JAN-16	REV	DESCRIPTION	ECO

REPORT ALL ERRORS TO ENG. DEPT.

TITLE
ES-ELECTRICAL SCHEMATICS

SHEET NAME PD | SHEET 02 OF 27 | SCALE NTS | B

NEW FLYER

PART N°
454970

(NX)

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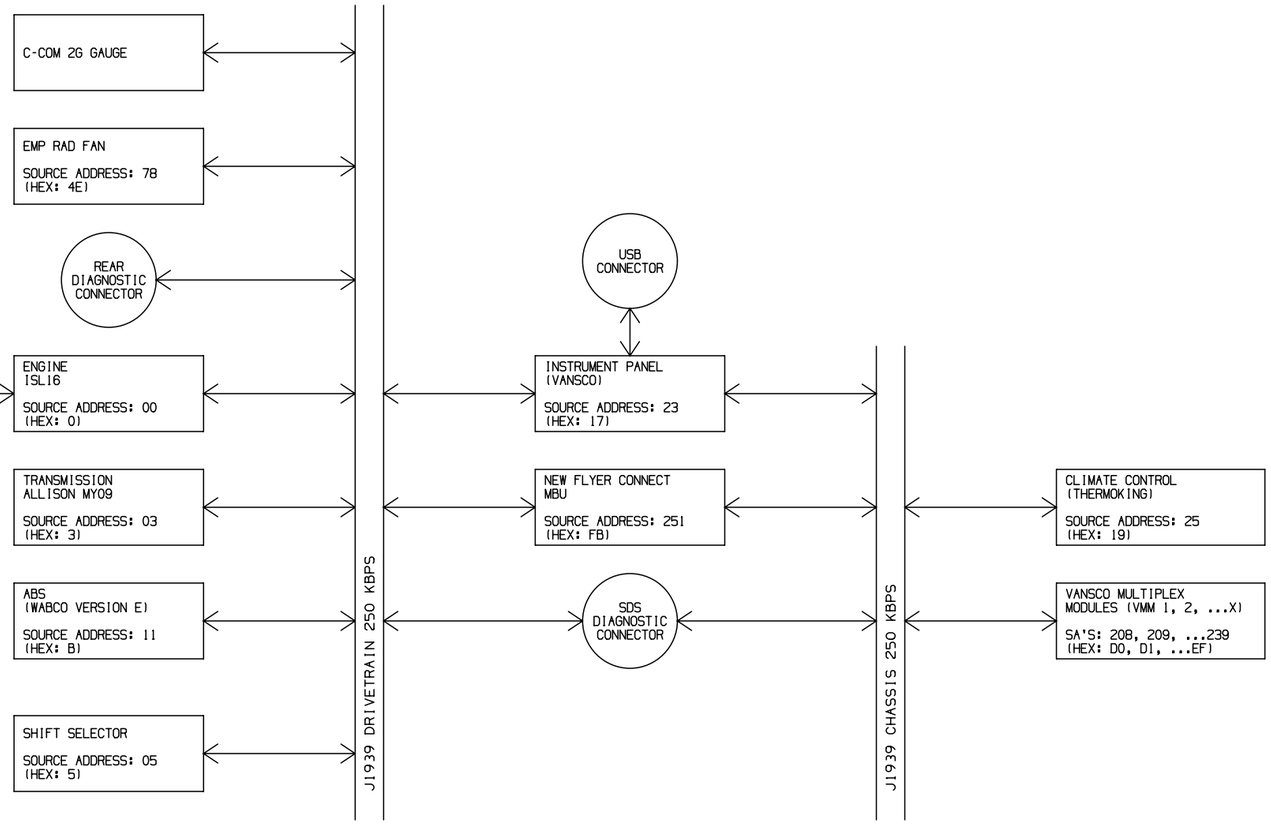
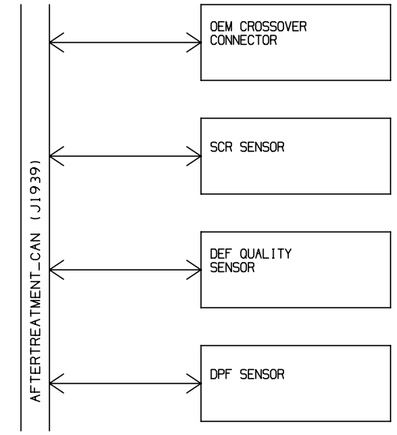




NOTES:
1) SOURCE ADDRESSES ARE DECIMAL, WITH HEXADECIMAL IN BRACKETS.
2) MESSAGE DETAILS ARE OUTLINED IN SEPARATE DOCUMENTS.
3) THE PARKER/VANSCO IP CLUSTER ONLY USES SA=33 WHEN PASSING INFORMATION TO THE J1939 POWERTRAIN NETWORK.

REV	DESCRIPTION	ECO
V	ENGINE ISL16 WAS ENGINE ISL13 (C8) J1939 DRIVETRAIN 500 KBPS - ADDED (C9) REAR J5,SDS J5,FRONT J5 DIAGNOSTIC CONN.-ADDED(C8) FRONT DIAGNOSTIC CONN. - REMOVED (B6) J1939 DRIVETRAIN 250 KBPS WAS J1939 DRIVETRAIN (B7) J1939 CHASSIS 250 KBPS WAS J1939 CHASSIS (B5) SOURCE ADDRESS FOR SHIFT SELECTOR - ADDED (B8)	ECN-056280

DRAWN BY	SCOTT KIM
DATE (DD-MMM-YY)	04-JAN-16

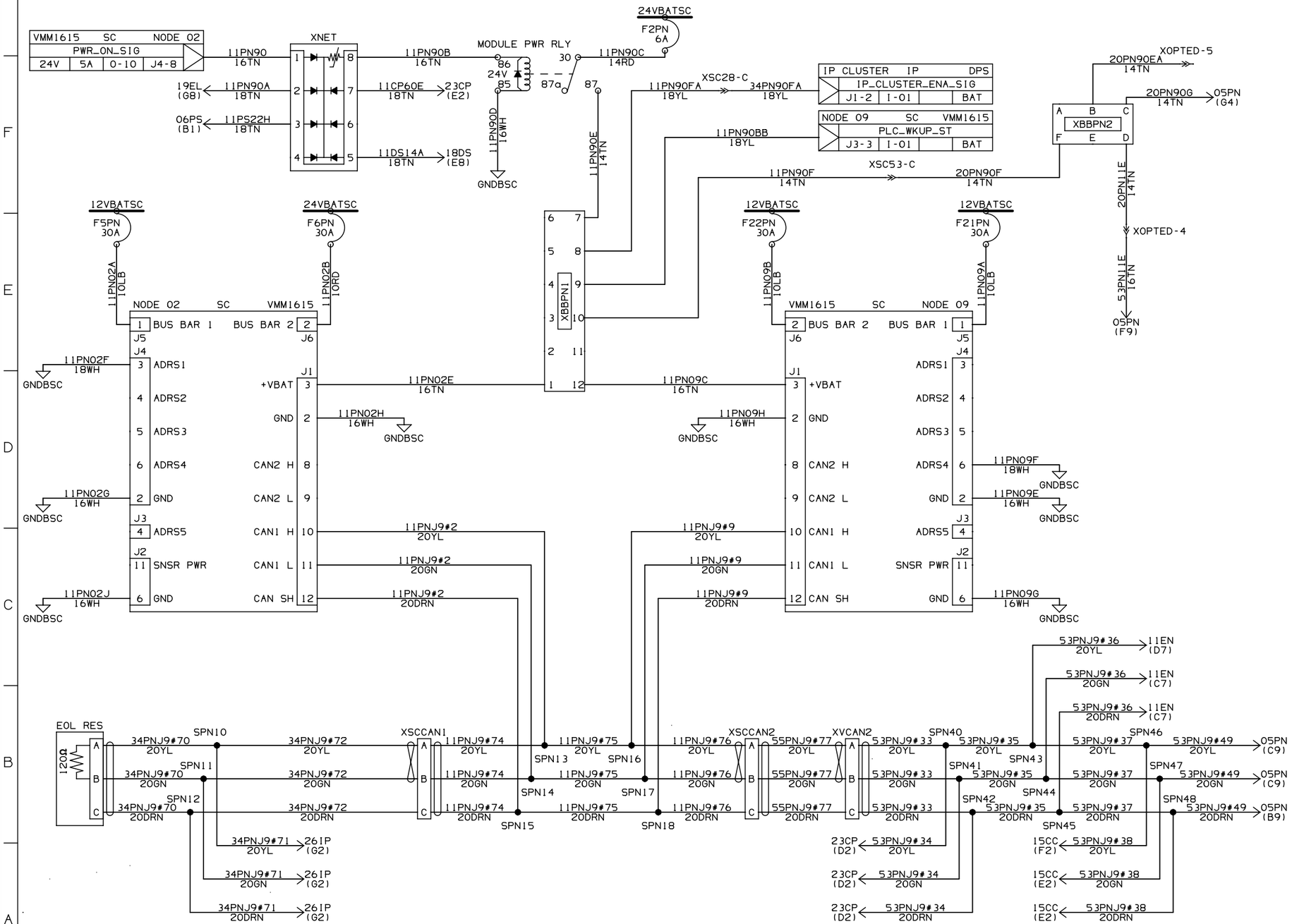
REPORT ALL ERRORS TO ENG. DEPT.

TITLE
ES-ELECTRICAL SCHEMATICS

SHEET NAME NT | SHEET 03 OF 27 | SCALE NTS | B

NEW FLYER

PART Nº
454970
(NX)



REV	DESCRIPTION	ECO
V	WIRE 34PNJ9#73 - REMOVED (C8) WIRE 34PNJ9#72 - REMOVED (B8) WIRE 34PNJ9#80 - REMOVED (B8) SPN37, SPN38 AND SPN39 - REMOVED (B8) WIRE 34PNJ9#72 - ADDED (B8)	ECN-056280

DRAWN BY: SCOTT KIM
DATE (DD-MMM-YY): 04-JAN-16

REPORT ALL ERRORS TO ENG. DEPT.

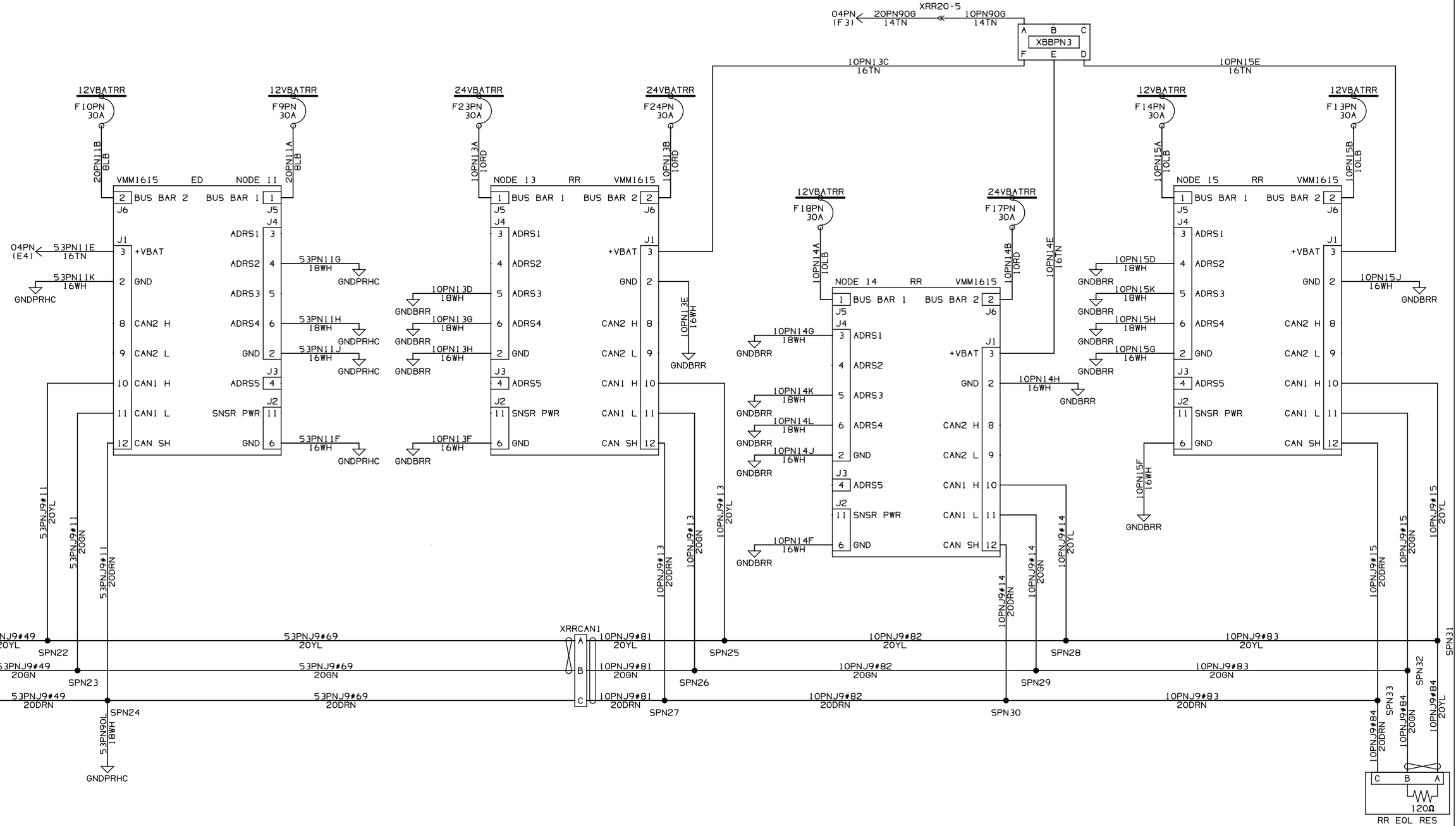
TITLE
ES-ELECTRICAL SCHEMATICS

SHEET NAME PN | SHEET 04 OF 27 | SCALE NTS | B

NEW FLYER

PART Nº
454970

(NX)



DRAWN BY			
SCOTT KIM			
DATE (DD-MMM-YY)	V	WIRE L193ZZ - REMOVED (G2)	ECN-056280
04-JAN-16	REV	DESCRIPTION	ECO

REPORT ALL ERRORS TO ENG. DEPT.

TITLE
ES-ELECTRICAL SCHEMATICS

SHEET NAME PN | SHEET 05 OF 27 | SCALE NTS | B

NEW FLYER

PART N°
454970
(NX)

9 8 7 6 5 4 3 2 1

24VBATFB 12VBATFB
F4PS 200A
F8PS 150A
24VBATRR
PS16PC 2/0BK
PS15PC 2/0BK
PS17PC 2BK
24VBATRR 12VBATRR 24VBATRR2
24VBATRR 12VBATRR
F1PS 80A
F6PS 80A
PS20PC 2BK
PS13PC 2BK
24VBATSC 12VBATSC

24VBATFB
14PS32AA 10RD
F11PS 10A
14PS32 16RD
VMM1615 RR NODE 13
REG_ENA_SIG
24V | 10A | 0-04 | J4-7
10PS32A 16TN
XRR20-8
20PS32A 16TN
DELCO VR
2 + IGN 1
6 S F 5
- 4
- 3
14PS32L 16WH
GNDBEFB
14PS32A 16TN
XEFB8-C
36PS32A 16TN
XBHR3-11
14PS32B 16WH
GNDBEFB
14PS32C 14RD
XEFB3-B
F50PS 25A
A B
14PS32G 16RD

XBAT24A
(PC)12RD 12RD A
(PC)12RD 12RD B
(PC)12RD 12RD C
(PC)12RD 12RD D
14PS32GA 16RD
14EN46BW 12RD → 08EN (E5)
14EN46CH 12RD → 08EN (F2)
XBAT24B
(PC)10RD 10RD
14EN46AA 10RD → 07EN (G8)

13TR (G3) ← 14TR51N 14RD
XBAT23
A (PC)12RD 12RD
B (PC)12RD 12RD

ALTERNATOR
F1 A
F2 EMP
AC A
A
PS2PC1 4/0BK
PS22PC 4/0BK
GNDPBAT
60PS32C 12RD
60PS32D 16YL
F12PS 3A
A B
60PS32E 16YL
XBHR4-30
53PS32E 16YL
XRR53-1
10PS32E 16YL
NODE 14 RR VMM1615
ALT_CHRGNG_ST
J1-4 | I-15 | | ANLG

VMM1615 RR NODE 14
STRTR_SIG
12V | 5A | 0-09 | J3-5
10PS34A 16TN
XRR53-17
53PS34A 16TN
XBHR4-25
60PS34A 16TN
XEFB1-C
14PS34A 16TN
14PS34B 16WH
GNDBEFB

24VBATFB
PS37PC 6BK
F25PS 50A
PS35PC 6BK
STARTER RLY
12V 4
24VBATFB
PS2PC2 4/0BK
STARTER
B
DELCO
G S
PS27PC 4/0BK
GNDPBAT
PS34PC 6BK

12EN (C1) ← 11EN48H 18RD
11EN (C7) ← 11EN48C 18RD
11PS80A 18RD
XSC4-6
24VBATSC
F44PS 6A
11PS80 18RD
PROTECTED PTC
XBBPS1
20IL (E8) ← 111L64PA 16RD
11DS40B 18RD → 18DS (D9)
11PS22G 18RD → 06PS (C5)
11DS14B 18RD → 18DS (E7)
11DS31A 18RD → 18DS (C7)
11DC80D 18RD → 16DC (A4)

24VBATFB
PS2PC 4/0BK
3 4
MAIN PWR SW
PS29PC 4/0BK
BATT2 12V
PS5PC 4/0BK
12VBATFB
PS1PC 4/0BK
1 2
PS3PC 4/0BK
BATT1 12V
PS12PC2 4/0BK
GNDPENG
PS12PC1 4/0BK
(PC)12WH 12WH → 13TR (G3)
(PC)12WH 12WH → XBC9-1
(PC)12WH 12WH → XBC3-1
(PC)12WH 12WH → XBC6-1
36PS12 12WH
XEFB7-A
14PS12 12WH
GNDPBAT
GNDBEFB

12VBATFB
F2PS 130A
24VBATFB
F3PS 100A
PS10PC 2/0BK
PS7PC 2/0BK
12V
24V
GND
PS6PC 2/0BK
GNDPBAT
EQUALIZER

PS25PC 6BK
GNDBSCBOX GNDPSCBOX
PS28PC 6BK
GNDBRR GNDPRR
PS24PC 6BK
GNDBSC GNDPSCBOX

2 5
3 4 6 7
FRT START PB
06PS (F1) ← 11PS22G 18RD
11PS22F 18YL
NODE 09 SC VMM1615
FRT_STRT_PB
J4-10 | I-03 | | BAT
24VBATFB
14PS22AA 18RD
F5PS 6A
A B
F XBBPS2 C
E D
14EN48P 18RD → 12EN (C8)
14EN48B 18RD → 10EN (B5)
14PS22BB 18RD
15CC (F4) ← 15CC39G 18RD
2
15PS22 18RD
XESB36-1
36PS22 18RD
XEFB7-B
14PS22 18RD
RR START PB
FRT/OFF/RR SW
15PS22B 18TN
3
15PS22D 18YL
XESB36-2
36PS22D 18YL
XBHR3-6
20PS22D 18YL
10PS22D 18YL
XRR20-23
OFF
15PS22E 18YL
XESB36-4
36PS22E 18YL
XBHR3-1
20PS22E 18YL
10PS22E 18YL
XRR20-24
NODE 15 RR VMM1615
FRT_STRT_SEL_SW
J3-7 | I-02 | | BAT
NODE 15 RR VMM1615
RR_STRT_SEL_SW
J3-3 | I-01 | | BAT
15PS22A 18YL
XESB36-3
36PS22A 18YL
XBHR3-2
20PS22A 18YL
11PS22A 18YL
XSC4-8
11PS22K 18YL
XSC50-A
NODE 09 SC VMM1615
RR_STRT_PB
J3-7 | I-02 | | BAT
11PS22H 18TN → 04PN (F9)

12VBATSC
F13PS 30A
11PS30D 10LB
12VDNSC
11PS30E 10TN
87
30
87a
12V D/N RLY
86
24V
85
19EL (E9) ← 11PS30C 18TN
11PS30J 18TN
XSC4-5
11PS30H 18TN
24V D/N RLY
11PS30F 18WH
GNDBSC GNDBSC
24VBATSC
F24PS 30A
11PS30 10RD
24VDNSC
11PS30A 10TN

DRAWN BY		WIRE 14EN48P - ADDED (C1) WIRE 15EN63E - REMOVED (C4) WIRE 15CC39G - ADDED (C4) WIRE 11EN48H WAS 11EN48G (G1)	
SCOTT KIM			
DATE (DD-MMM-YY)	V		ECN-056280
04-JAN-16	REV	DESCRIPTION	ECO

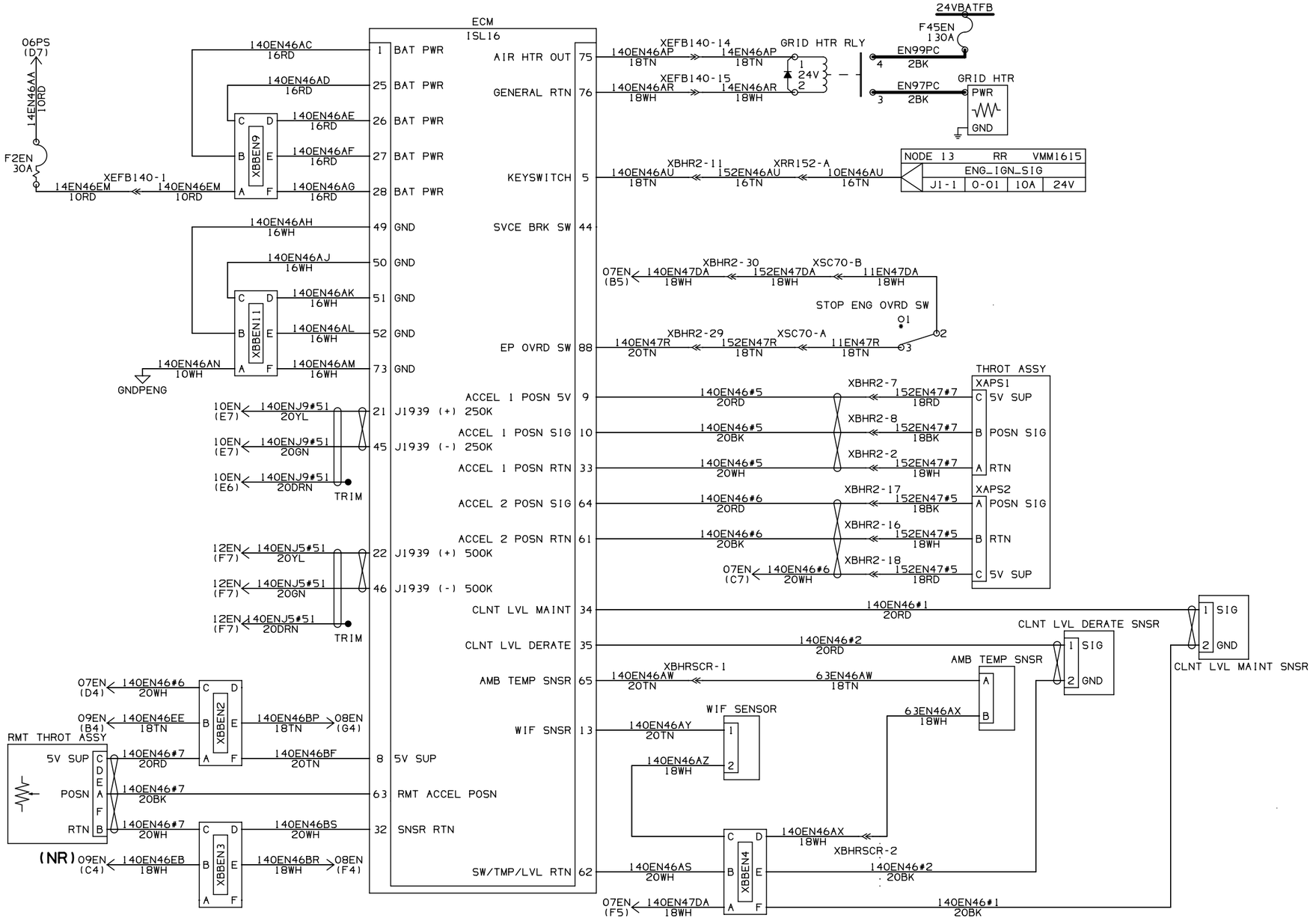
REPORT ALL ERRORS TO ENG. DEPT.

TITLE
ES-ELECTRICAL SCHEMATICS

SHEET NAME PS | SHEET 06 OF 27 | SCALE NTS | B

NEW FLYER

PART N°
454970
(NX)



DRAWN BY			
SCOTT KIM			
DATE (DD-MMM-YY)	V	ENGINE_TYPE WAS 'ISL15' (G6) WIRE 140ENJ9#51 WAS ON ECM PORT 22 AND 46 (E7) WIRE 140ENJ5#51 - ADDED (D7) XBBEN4 WAS 8CCT (B5) DEF TANK SNSR AND ASSOCIATING WIRES - REMOVED (B4) DEF_TNK_SNSR_PWR SYGNAL AND WIRES - REMOVED (A2) CLNT LVL DERATE SNSR LIBRARY - CHANGED (C2) CLNT LVL MAINT SNSR LIBRARY - CHANGED (C2)	ECN-056280
04-JAN-16	REV	DESCRIPTION	ECO

REPORT ALL ERRORS TO ENG. DEPT.

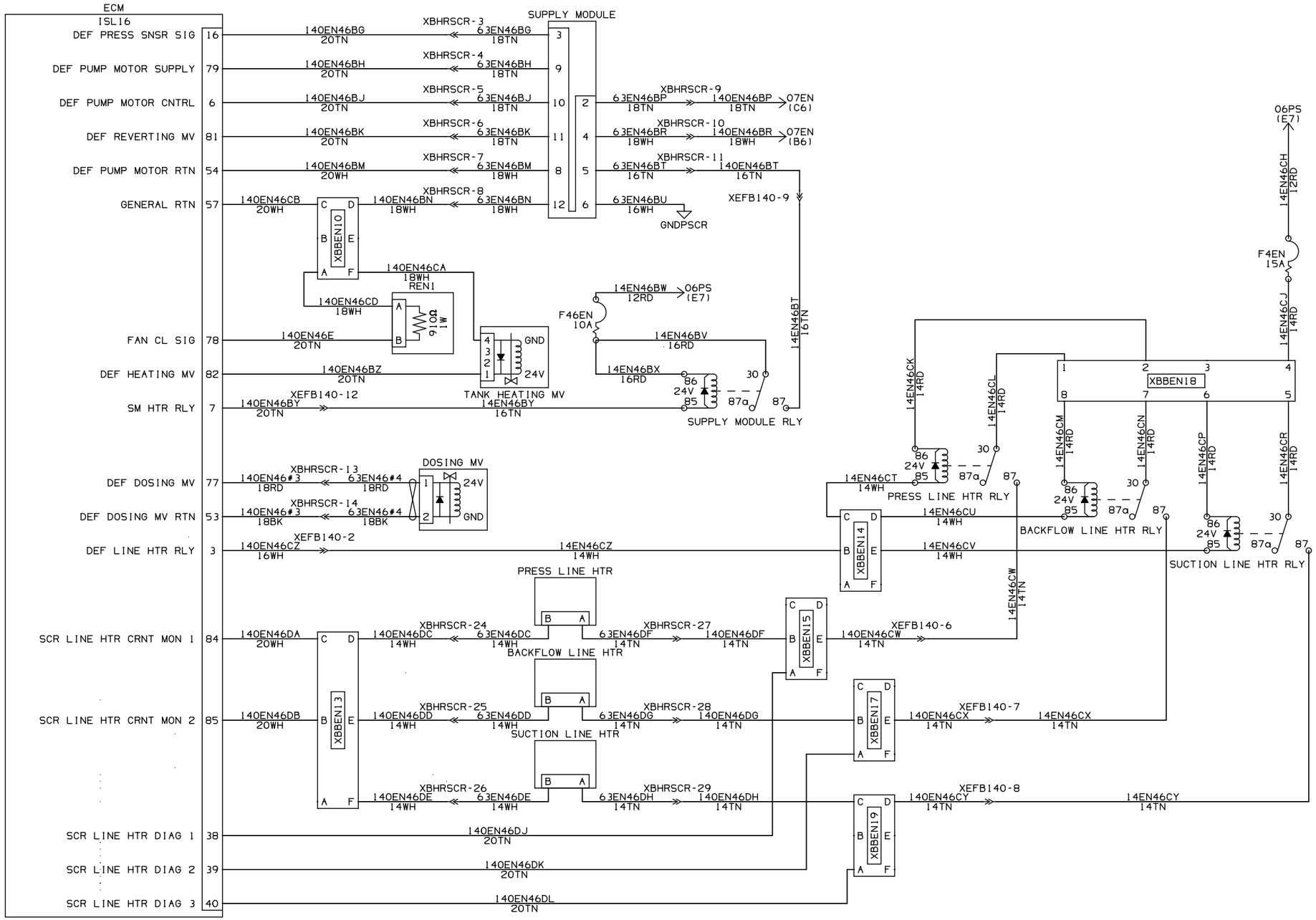
TITLE
ES-ELECTRICAL SCHEMATICS

SHEET NAME EN | SHEET 07 OF 27 | SCALE NTS | B

NEW FLYER

PART N°
454970

(NX)



DRAWN BY			
SCOTT KIM			
DATE (DD-MMM-YY)	V	ENGINE_TYPE WAS 'ISL15' (G6)	ECN-056280
04-JAN-16	REV	DESCRIPTION	ECO

REPORT ALL ERRORS TO ENG. DEPT.

TITLE
ES-ELECTRICAL SCHEMATICS

SHEET NAME EN | SHEET 08 OF 27 | SCALE NTS | B

NEW FLYER

PART N°
454970
(NX)

9 8 7 6 5 4 3 2 1

VMM1615 SC NODE 09 | EXH_REGEN_NRML_SW | GND | | I-11 | J2-4
11EN50J 18YL → XSC75-A → 55EN50J 18YL → XFD55-7 → 16EN50J 18YL
EXH FLTR SW: NORMAL 1, INHIBIT REGEN 2, 3
16EN50K 18WH → XFD55-8 → 55EN50K 18WH → GNDPLHC

VMM1615 SC NODE 09 | EXH_REGEN_REQ_SW | GND | | I-12 | J2-5
11EN50H 18YL → XSC75-B → 55EN50H 18YL → XFD55-6 → 16EN50H 18YL

FUEL SENDER: D, B, C, A
53EN25 16TN → NODE 11 ED VMM1615 | FUEL_LVL_SNDR_PWR | J3-5 | 0-09 | 5A | 12V
53EN25C 16YL → NODE 11 ED VMM1615 | FUEL_LVL_SNDR | J2-3 | I-10 | | ANLG
53EN25A 16WH → GNDPRHC

VMM1615 SC NODE 09 | FST_IDL_SW | GND | | I-09 | J2-2
11EN47K 18YL → FAST IDLE SW: 2, 3 → 11EN47KA 18WH → GNDBSC

24VBATFB
14EN46DN 10RD → F9EN 10A → 14EN46DM 16RD
AFT TRTMNT RLY: 30, 86, 24V, 85, 87, 87a
XEFB140-11 14EN46DP 16TN → XBHR2-20 140EN46DP 16TN → XRR152-K 152EN46DP 16TN → 10EN46DP 16TN → NODE 13 RR VMM1615 | AFT_TRTMT_RLY | J4-12 | 0-08 | 5A | 24V
14EN46R 16WH → GNDBEFB
14EN46DS 16TN → XEFB140-13 140EN46DS 16TN → XBBEN16 C, D, B, E, A, F
09EN (C4) ← 140EN46EA 16TN ; 140EN46DT 14TN → 09EN (C2)
140EN46DV 16TN

SCR SNSR: 10, 7, 8, 9, 11, 12
XBHRSCR-17 63EN46DW 18TN → 140EN46DW 16TN
XBHRSCR-15 140ENJ9#3 19YL
XBHRSCR-16 140ENJ9#3 19GN
SEN50 63ENJ9#4 19YL
SEN51 63ENJ9#6 19GN
SEN52 140ENJ9#1 19YL
SEN53 140ENJ9#1 19GN
63ENJ9#6 19YL
63ENJ9#7 19YL
63ENJ9#7 19GN
63EN46DX 18WH → GNDPSCR
140EN46DY 16WH → GNDPECRC

XJ1939SCR: A, B, C; 120Ω
63ENJ9#7 19YL
63ENJ9#7 19GN

ENG OEM CROSSOVER: 5 A/T PWR, 6 KEYSWITCH, 2 A/T DL (+), 9 A/T DL (-), 13 OEM RTN

DPF SNSR: 1, 2, 4, 5, 6, 7, 8, 3
63ENJ9#5 19YL
63ENJ9#5 19GN
XBHRSCR-19 09EN (E3) ← 140EN46EA 16TN ; 63EN46EA 18TN
XBHRSCR-20 07EN (B7) ← 140EN46EB 18WH ; 63EN46EB 18WH
XBHRSCR-21 140EN46EC 20TN ; 63EN46EC 18TN
XBHRSCR-22 140EN46ED 20TN ; 63EN46ED 18TN
XBHRSCR-23 07EN (C7) ← 140EN46EE 18TN ; 63EN46EE 18TN
63EN46EF 18WH → GNDPSCR

DEF QUALITY/LEVEL/TEMP SNSR: 4, 2, 1, 3
09EN (E2) ← 140EN46DT 14TN
140ENJ9#2 19YL
140ENJ9#2 19GN
140EN46DU 14WH → GNDPECR

ECM ISL16
DPF DIFF PRESS SIG 41
DPF OUTLET PRESS 42

VMM1615 RR NODE 14 | WAIT_TO_STRT_LP | 12V | 2.5A | 0-11 | J3-12
10EN46A 16TN → XRR53-13 → 53EN46A 16TN → XBHR4-22 → 60EN46A 16TN → XESB60-1 (EN)RD1 CABLE → WAIT TO START LP 12V
XESB60-2 (EN)BK1 CABLE → GND
60EN46AB 16WH → GNDPECR

REV	DESCRIPTION	ECO
V	ENGINE_TYPE WAS 'ISL13' (B4) DEF QUALITY SNSR - REMOVED (C1) DEF QUALITY/LEVEL/TEMP SNSR - ADDED (C1) CLNT FILL MODE SW AND THE CIRCUIT - REMOVED(F6)	ECN-056280

DRAWN BY: SCOTT KIM
DATE (DD-MMM-YY): 04-JAN-16

REPORT ALL ERRORS TO ENG. DEPT.

TITLE: ES-ELECTRICAL SCHEMATICS
SHEET NAME EN | SHEET 09 OF 27 | SCALE NTS | B

NEW FLYER

PART Nº 454970 (NX)

C COM 2G CAN COMMUNICATOR

21LI (D9) ← 15EN24A 16TN
XESB60-3
60EN24C 16WH ← 15EN24C 16WH
GNDPECR

1 PWR
2 GND
3 DIM
6 SW GND
4 CAN H
5 CAN L

140ENJ9#62 20YL — A — 15ENJ9#63 20YL
140ENJ9#62 20GN — B — 15ENJ9#63 20GN
140ENJ9#62 20DRN — C — 15ENJ9#63 20DRN
XJ1939ECSB
TRIM

07EN (E7) 140ENJ9#51 20YL
07EN (E7) 140ENJ9#51 20GN
07EN (D7) 140ENJ9#51 20DRN

XJ1939EC
120Ω
A 60ENJ9#109 20YL — SEN63 — XJ9EC140 A 60ENJ9#107 20YL — 140ENJ9#103 20YL — SEN23 — 140ENJ9#102 20YL — SEN60 — SEN20 — 140ENJ9#101 20YL — 140ENJ9#100 20YL — XJ5BH-H — 152ENJ9#120 20YL — SEN36 — 152ENJ9#122 20YL → 11EN (E9)
B 60ENJ9#109 20GN — SEN64 — B 60ENJ9#107 20GN — 140ENJ9#103 20GN — SEN24 — 140ENJ9#102 20GN — SEN61 — SEN21 — 140ENJ9#101 20GN — 140ENJ9#100 20GN — XJ5BH-J — 152ENJ9#120 20GN — SEN37 — 152ENJ9#122 20GN → 11EN (E9)
C 60ENJ9#109 20DRN — SEN65 — C 60ENJ9#107 20DRN — 140ENJ9#103 20DRN — SEN25 — 140ENJ9#102 20DRN — SEN62 — 140ENJ9#101 20DRN — SEN22 — 140ENJ9#100 20DRN — XJ5BH-B — 152ENJ9#120 20DRN — SEN38 — 152ENJ9#122 20DRN → 11EN (E9)

13TR (F3) ← 152ENJ9#53 20YL
13TR (F3) ← 152ENJ9#53 20GN
13TR (F3) ← 152ENJ9#53 20DRN

RR DIAG
C 140ENJ9#50 20YL
D 140ENJ9#50 20GN
E 140ENJ9#50 20DRN
A 140EN48E 18WH → GNDPECR
H 140EN48#1 18BK — A
J 140EN48#1 18CLR — B
140EN48#1 18DRN — C
TRIM
XDIAGAUX
B 140EN48B 18RD → 14EN48B 18RD → O6PS (C1)
XEFB140-10
F
G

EMP RAD FAN SYSTEM
XJ1939EMP
A 60ENJ9#64 20YL
B 60ENJ9#64 20GN
C 60ENJ9#64 20DRN
24VBATFB
F6EN 300A
PWR — EN95PC 4/0BK
GND — EN96PC 4/0BK → GNDPBAT

BRACKET FOR :
FAN REVERSE SW
& DIAGNOSTIC LED

XEMP1 IGN A — 60EN49 16TN — XBHR4-4 — 53EN49 16TN — XRR53-19 — 10EN49 16TN

NODE 13	RR	VMM1615	
ENG_RAD_FAN_SIG			
J3-12	0-11	2.5A	24V

DRAWN BY			
SCOTT KIM			
DATE (DD-MMM-YY)	V	XJ1939BH - REMOVED (D4) XJ5BH - ADDED (D4)	ECN-056280
04-JAN-16	REV	DESCRIPTION	ECO

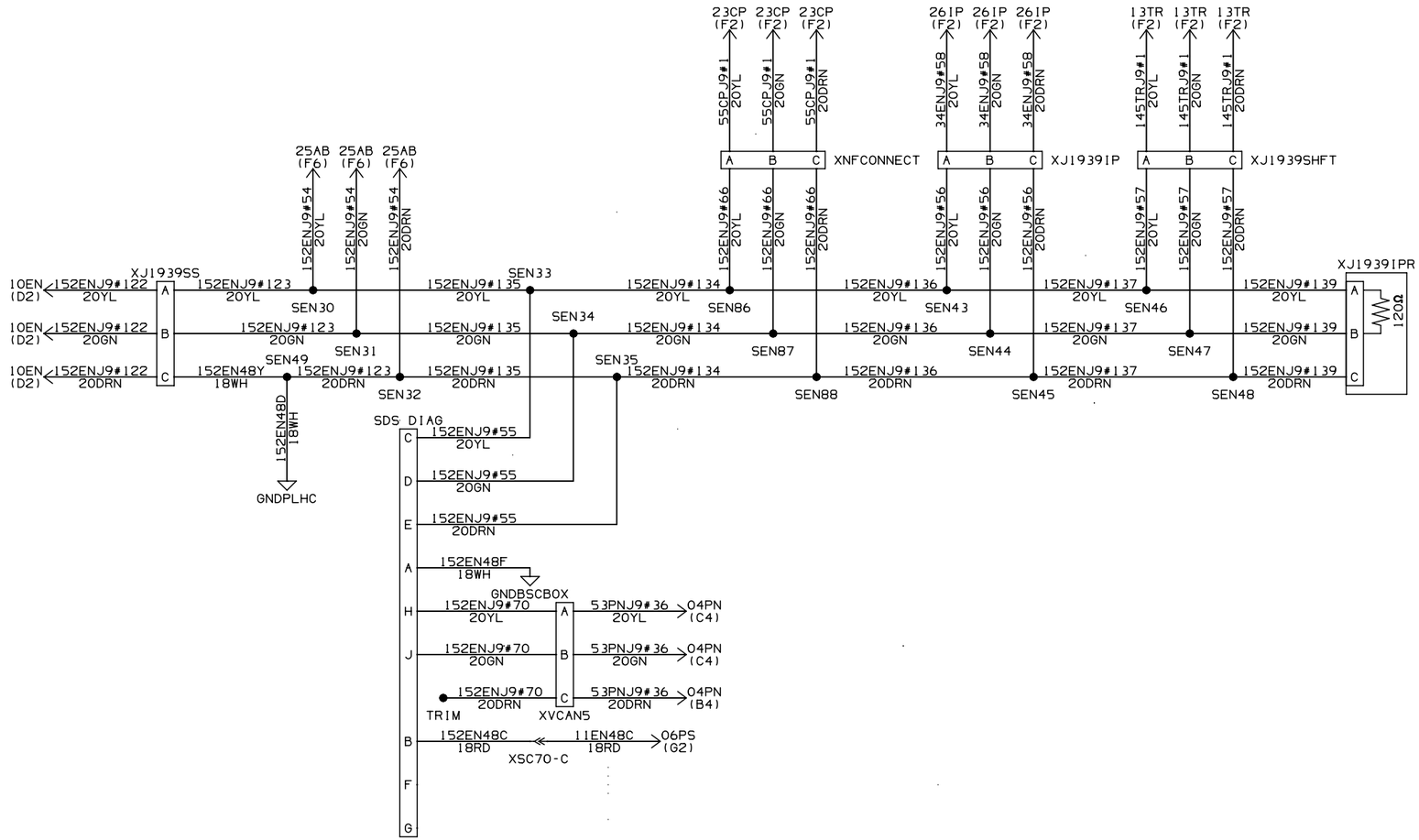
REPORT ALL ERRORS TO ENG. DEPT.

TITLE
ES-ELECTRICAL SCHEMATICS

SHEET NAME EN | SHEET 10 OF 27 | SCALE NTS | B

NEW FLYER

PART Nº
454970
(NX)



DRAWN BY			
SCOTT KIM			
DATE (DD-MMM-YY)	V	FRT DIAG, XVCAN3 WIRES - REMOVED (C4) WIRE ENJ9#52,EN48J,ENJ9#73,ENJ9#138 - REMOVED (C4) WIRE PNJ9#73,EN48H,EN48G AND XSC70 - REMOVED (B3) SEN83, SEN84 AND SEN85 - REMOVED (D3)	ECN-056280
04-JAN-16	REV	DESCRIPTION	ECO

REPORT ALL ERRORS TO ENG. DEPT.

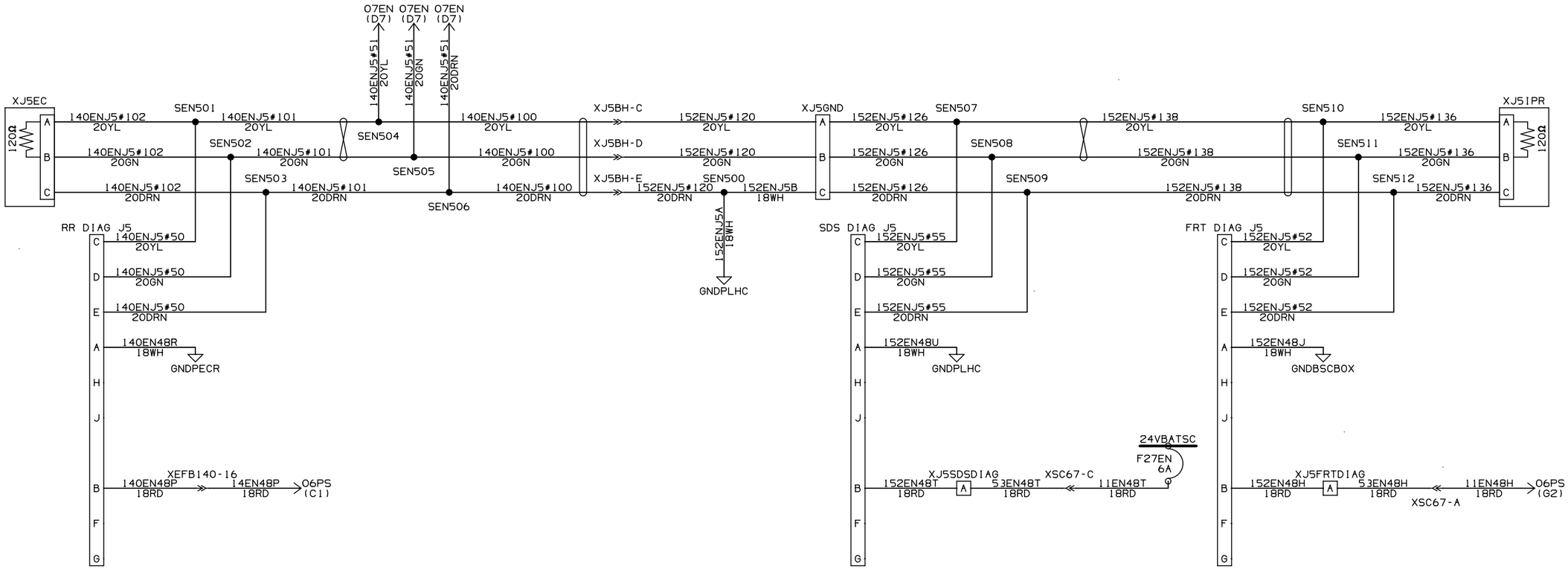
TITLE
ES-ELECTRICAL SCHEMATICS

SHEET NAME EN | SHEET 11 OF 27 | SCALE NTS | B

NEW FLYER

PART N°
454970

(NX)



DRAWN BY			
SCOTT KIM			
DATE (DD-MMM-YY)	V	NEW SHEET - ADDED RR DIAG J5, SDS DIAG J5, FRT DIAG J5 - ADDED (D9) XJ5EC,XJ5IPR AND ASSOCIATING WIRE/CONN - ADDED (E9)	ECN-056280
04-JAN-16	REV	DESCRIPTION	ECO

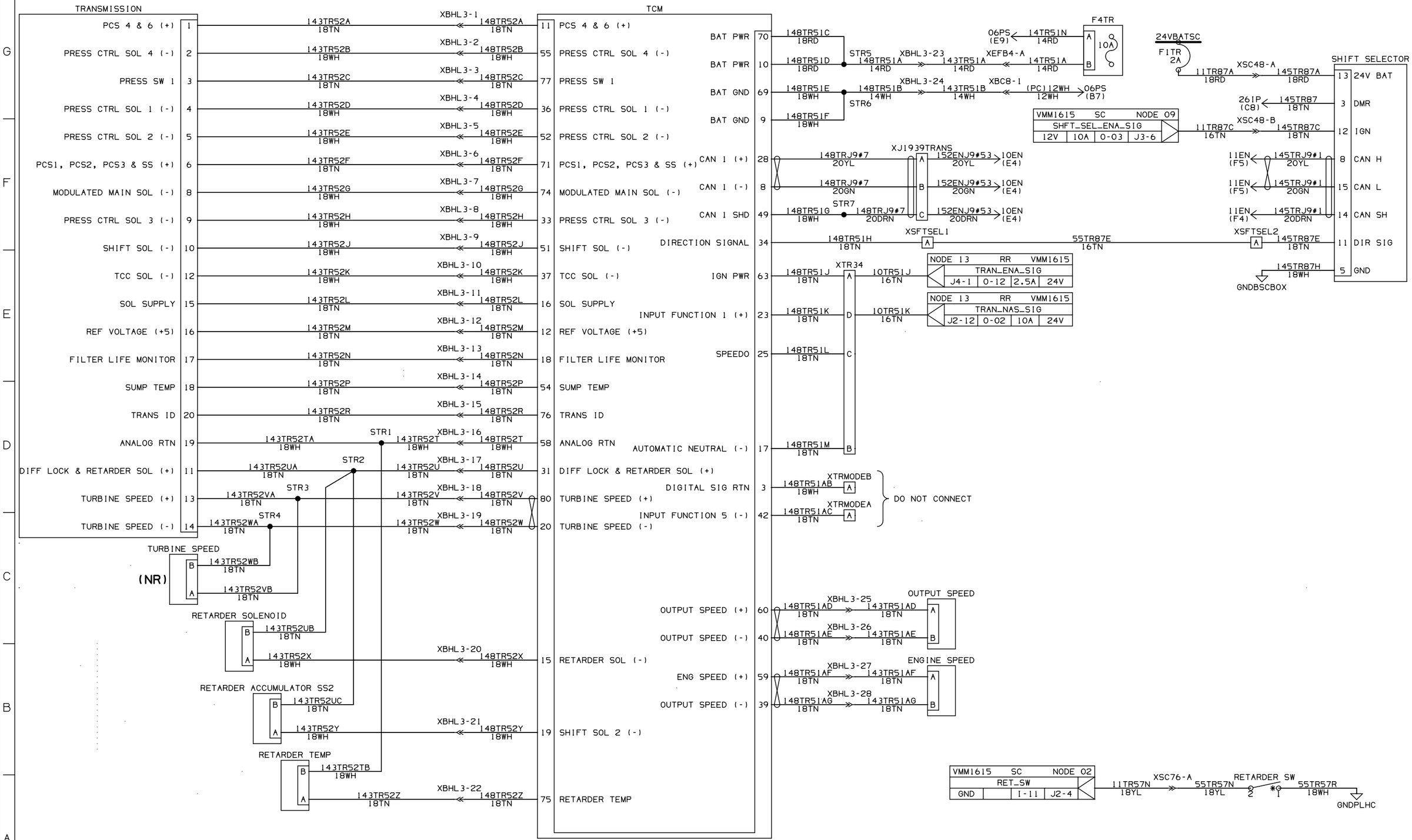
REPORT ALL ERRORS TO ENG. DEPT.

TITLE
ES-ELECTRICAL SCHEMATICS

SHEET NAME EN | SHEET 12 OF 27 | SCALE NTS | B

NEW FLYER

PART N°
454970
(NX)



DRAWN BY			
SCOTT KIM			
DATE (DD-MMM-YY)	V	SHEET UNCHANGED	ECN-056280
04-JAN-16	REV	DESCRIPTION	ECO

REPORT ALL ERRORS TO ENG. DEPT.

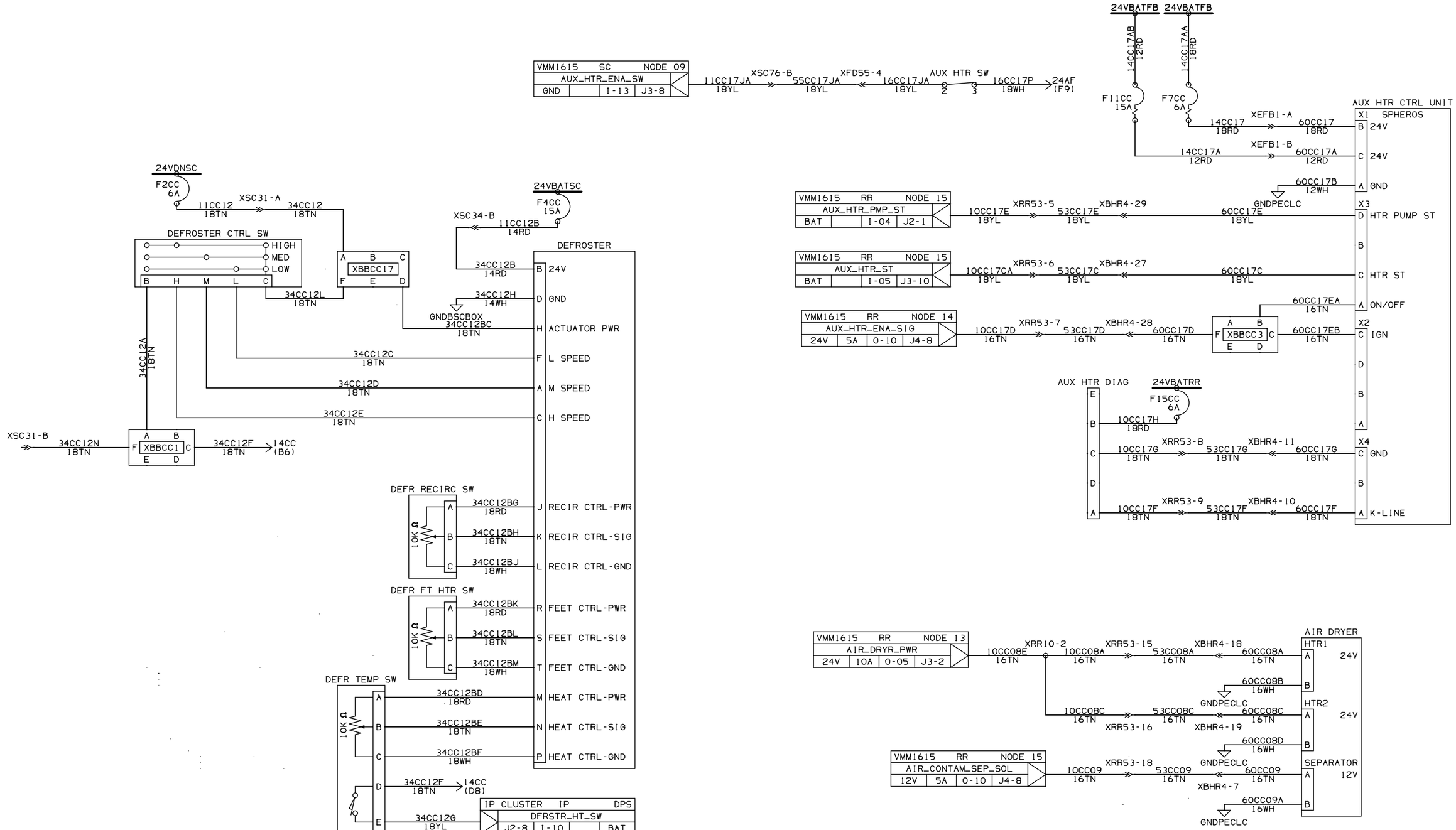
TITLE
ES-ELECTRICAL SCHEMATICS

SHEET NAME TR | SHEET 13 OF 27 | SCALE NTS | B

NEW FLYER

PART N°
454970

(NX)



DRAWN BY			
SCOTT KIM			
DATE (DD-MMM-YY)	V	AUX HTR BYPASS MV AND CIRCUITS - REMOVED (F3)	ECN-056280
04-JAN-16	REV	DESCRIPTION	ECO

REPORT ALL ERRORS TO ENG. DEPT.

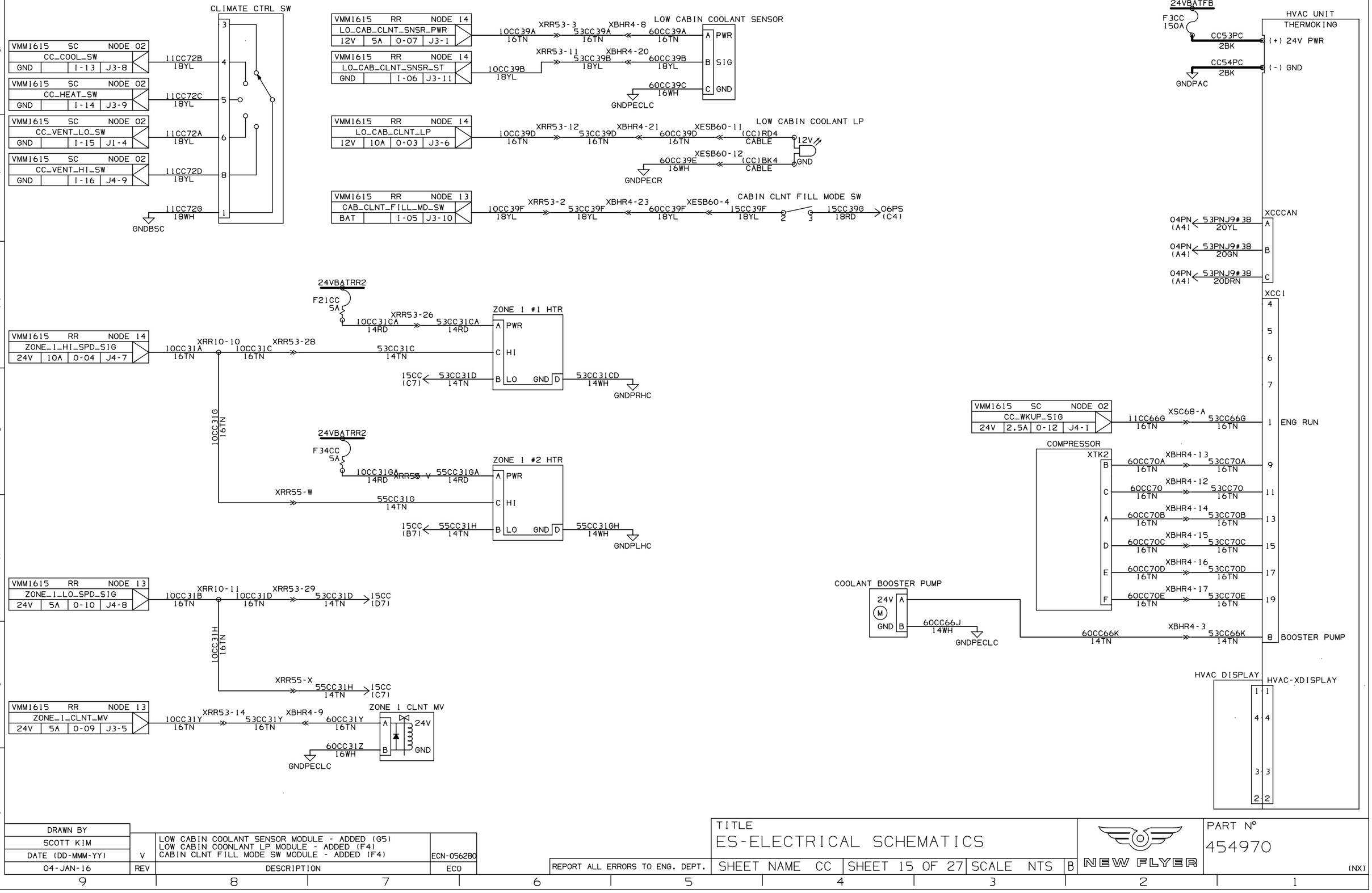
TITLE
ES-ELECTRICAL SCHEMATICS

SHEET NAME CC | SHEET 14 OF 27 | SCALE NTS | B

NEW FLYER

PART N°
454970

(NX)



DRAWN BY			
SCOTT KIM			
DATE (DD-MMM-YY)	V	LOW CABIN COOLANT SENSOR MODULE - ADDED (G5) LOW CABIN COONLANT LP MODULE - ADDED (F4) CABIN CLNT FILL MODE SW MODULE - ADDED (F4)	ECN-056280
04-JAN-16	REV	DESCRIPTION	ECO

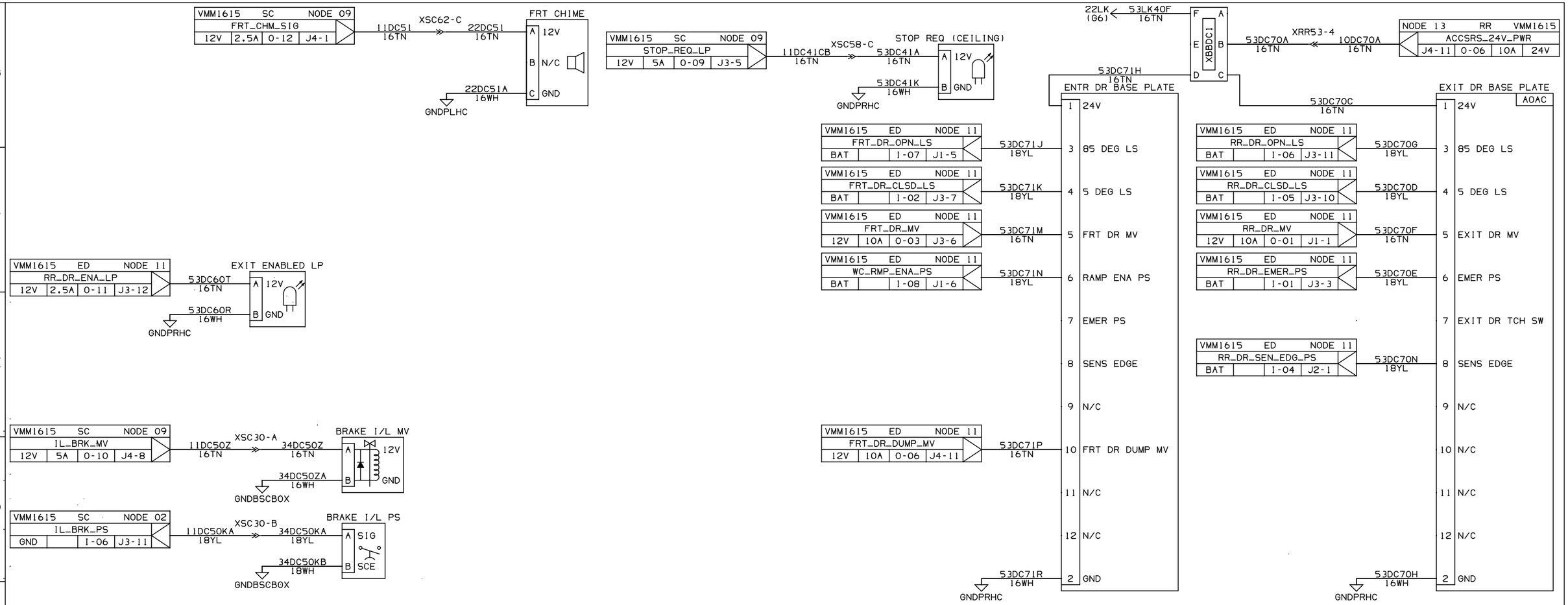
REPORT ALL ERRORS TO ENG. DEPT.

TITLE
ES-ELECTRICAL SCHEMATICS

SHEET NAME CC | SHEET 15 OF 27 | SCALE NTS | B

NEW FLYER

PART Nº
454970
(NX)



DRAWN BY			
SCOTT KIM			
DATE (DD-MMM-YY)	V	SHEET UNCHANGED	ECN-056280
04-JAN-16	REV	DESCRIPTION	ECO

REPORT ALL ERRORS TO ENG. DEPT.

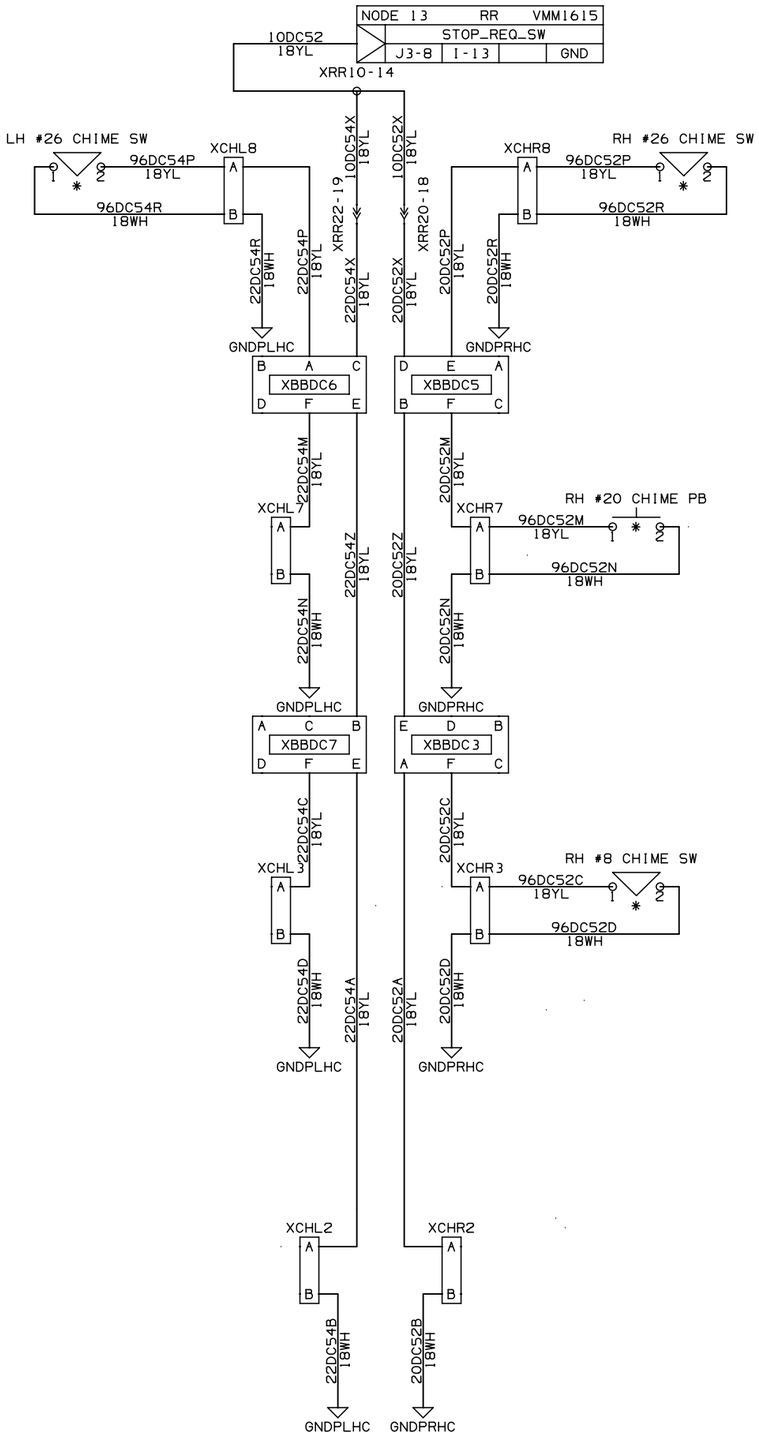
TITLE
ES-ELECTRICAL SCHEMATICS

SHEET NAME DC | SHEET 16 OF 27 | SCALE NTS | B

NEW FLYER

PART Nº
454970

(NX)



DRAWN BY			
SCOTT KIM			
DATE (DD-MMM-YY)	V	SHEET UNCHANGED	ECN-056280
04-JAN-16	REV	DESCRIPTION	ECO

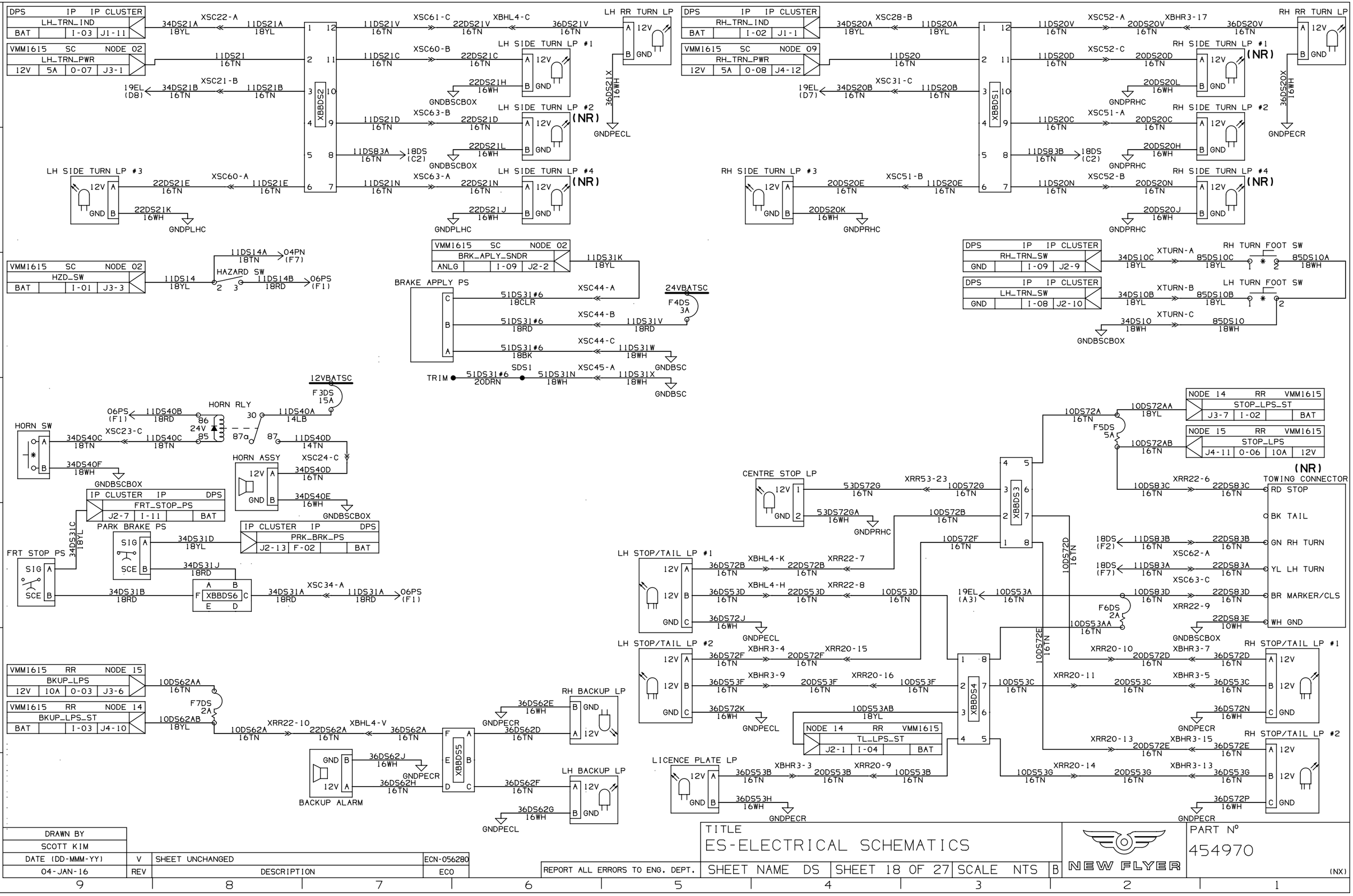
REPORT ALL ERRORS TO ENG. DEPT.

TITLE
ES-ELECTRICAL SCHEMATICS

SHEET NAME DC | SHEET 17 OF 27 | SCALE NTS | B

NEW FLYER

PART Nº
454970
(NX)



DRAWN BY			
SCOTT KIM			
DATE (DD-MMM-YY)	V	SHEET UNCHANGED	ECN-056280
04-JAN-16	REV	DESCRIPTION	ECO

REPORT ALL ERRORS TO ENG. DEPT.

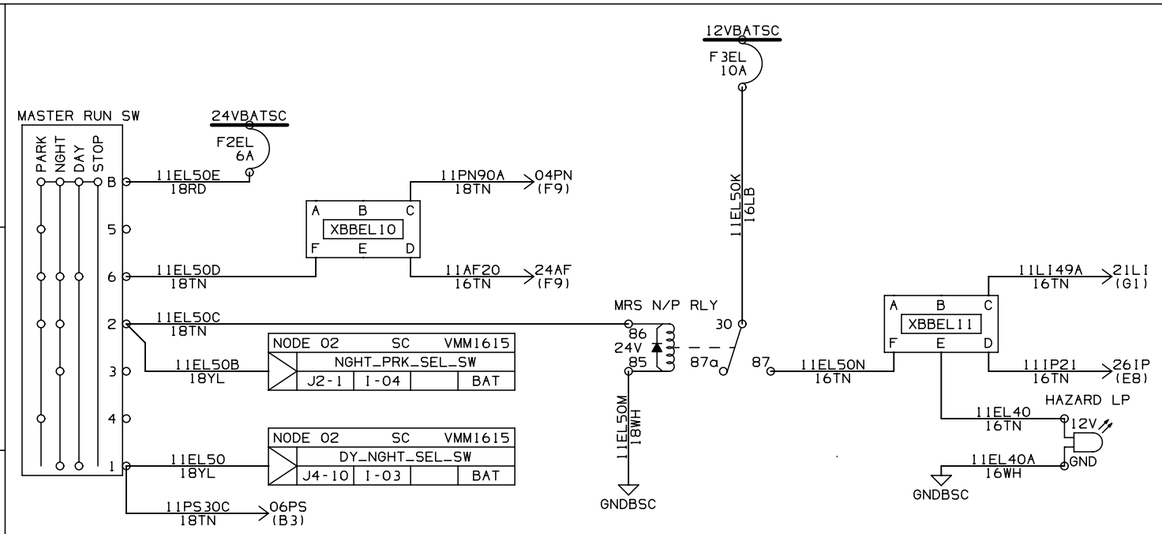
TITLE
ES-ELECTRICAL SCHEMATICS

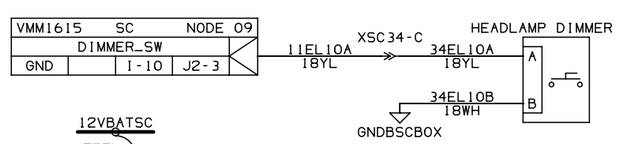
SHEET NAME DS | SHEET 18 OF 27 | SCALE NTS | B

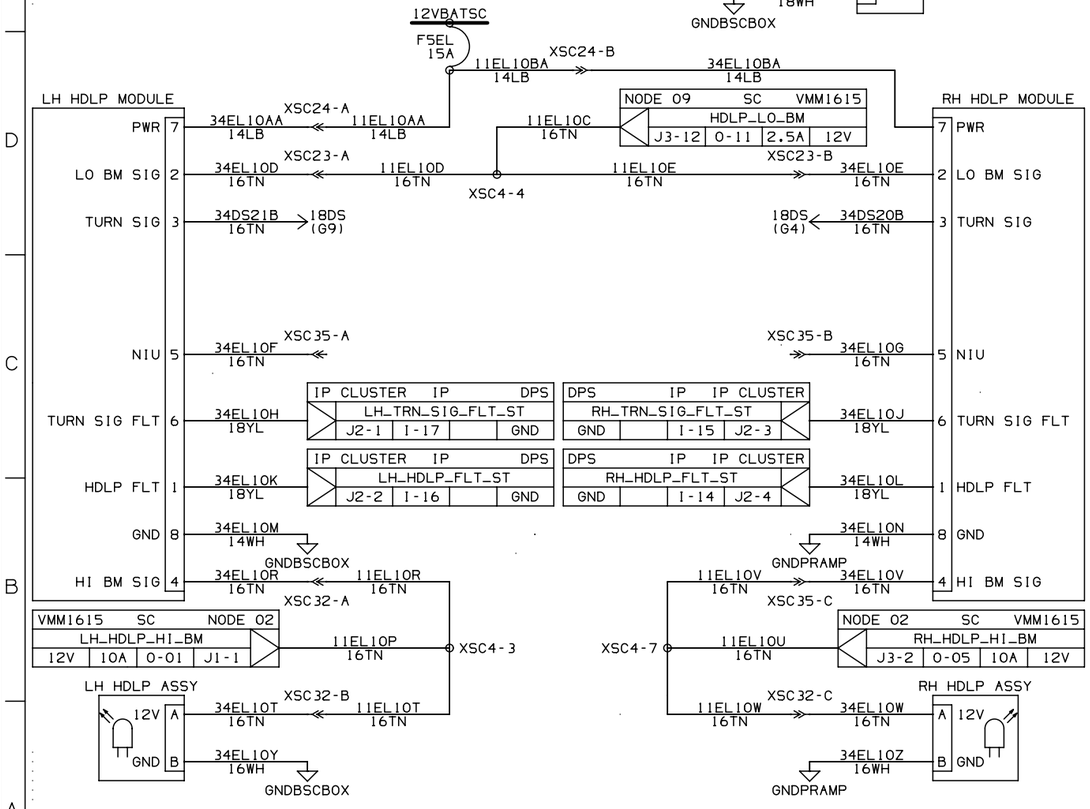
NEW FLYER

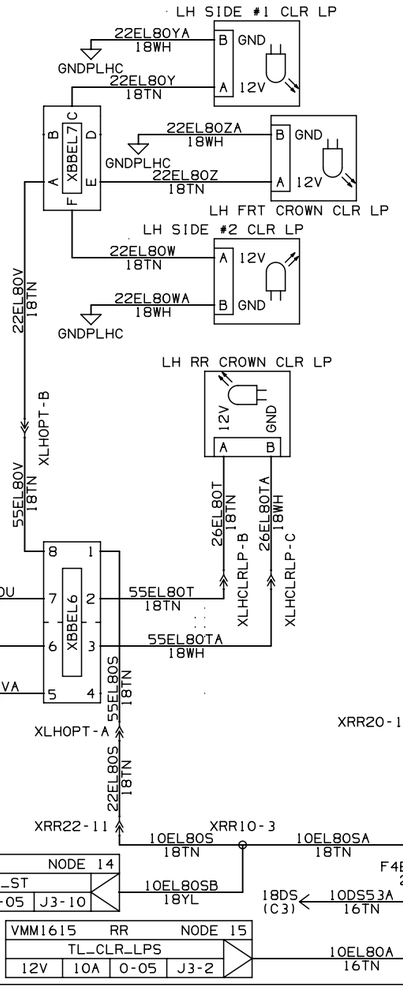
PART N°
454970

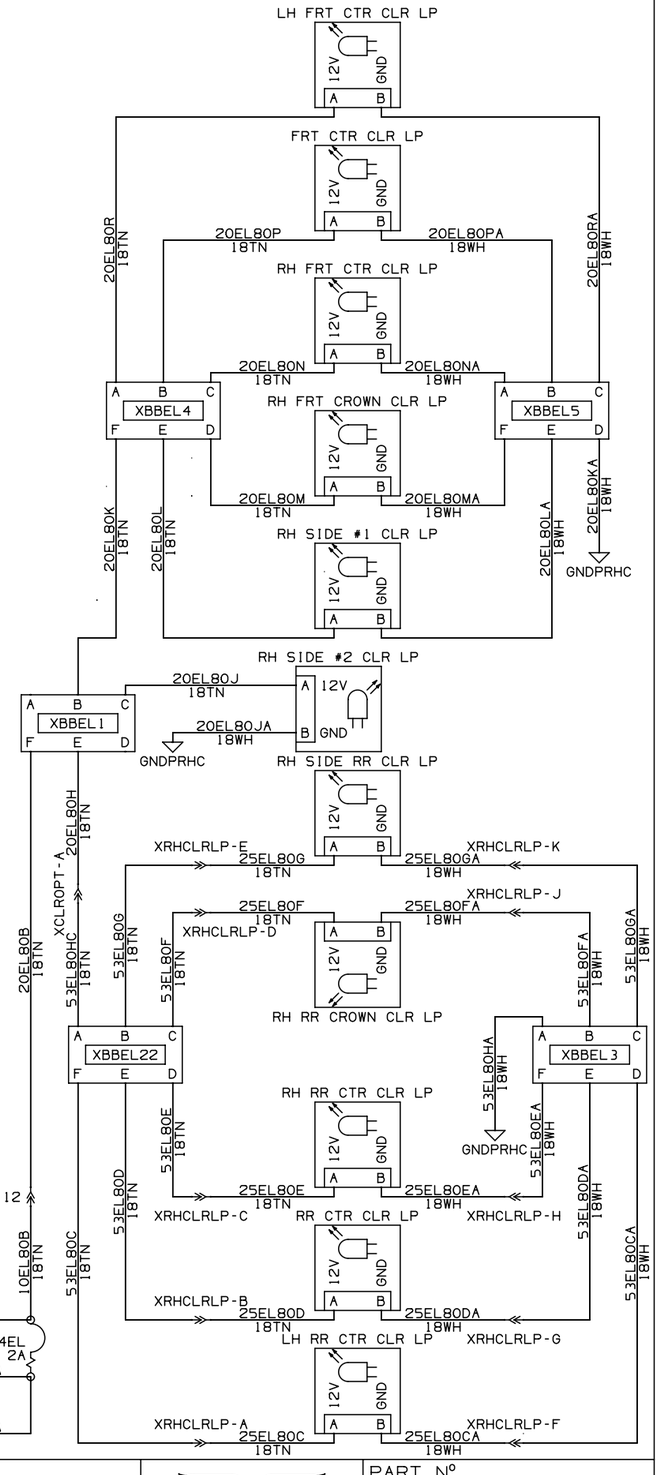
(NX)











DRAWN BY			
SCOTT KIM			
DATE (DD-MMM-YY)	V	SHEET UNCHANGED	ECN-056280
04-JAN-16	REV	DESCRIPTION	ECO

REPORT ALL ERRORS TO ENG. DEPT. | SHEET NAME EL | SHEET 19 OF 27 | SCALE NTS | B

TITLE
ES-ELECTRICAL SCHEMATICS

NEW FLYER

PART N°
454970
(NX)

9 8 7 6 5 4 3 2 1

AISLE LP AUX PWR

1 — 101L50A 16TN → 201L (G7)
2 — 101L50B 16TN → 201L (F7)
3 — 101L50C 16TN → 201L (F3)
4
5
6
7 — 101L50G 14WH → GNDBRR
8 — 101L50H 14WH → GNDBRR

VMM1615 RR NODE 14 | AISL_1_LPS | 24V | 5A | 0-08 | J4-12
101L64 16TN → XBB1L1 C
201L (G2) ← 101L64C 16TN ← XBB1L1 B
201L (G9) ← 101L50A 16TN ← XBB1L1 A
XBB1L1 D → 101L64E 16TN → XRR22-12 → 221L64E 16TN → LH #1 AISLE LP A 24V
XBB1L1 E → 221L64F 16WH → LH #1 AISLE LP B GND → GNDPLHC
XBB1L1 F

VMM1615 RR NODE 14 | AISL_2_LPS | 24V | 10A | 0-06 | J4-11
101L64N 16TN → XBB1L2 C
201L (G9) ← 101L50B 16TN ← XBB1L2 A
XBB1L2 D → 101L42A 16TN → XRR22-13 → 221L42A 16TN → LH #2 AISLE LP A 24V
XBB1L2 E → 221L42E 16WH → LH #2 AISLE LP B GND → GNDPLHC
XBB1L2 F → 101L42B 16TN → XRR22-14 → 221L42B 16TN → LH #3 AISLE LP A 24V
221L42F 16WH → LH #3 AISLE LP B GND → GNDPLHC
101L42C 16TN → XRR22-15 → 221L42C 16TN → LH #4 AISLE LP A 24V
221L42H 16WH → LH #4 AISLE LP B GND → GNDPLHC

VMM1615 RR NODE 14 | AISL_3_LPS | 24V | 10A | 0-02 | J2-12
101L64V 16TN → XBB1L3 C
201L (G9) ← 101L50C 16TN ← XBB1L3 A
XBB1L3 D → 101L41A 16TN → XRR20-21 → 201L41A 16TN → RH #1 AISLE LP A 24V
XBB1L3 E → 201L41E 16WH → RH #1 AISLE LP B GND → GNDPRHC
XBB1L3 F → 101L41B 16TN → XRR20-22 → 201L41B 16TN → RH #2 AISLE LP A 24V
201L41F 16WH → RH #2 AISLE LP B GND → GNDPRHC
101L41C 16TN → XRR20-25 → 201L41C 16TN → RH #3 AISLE LP A 24V
201L41H 16WH → RH #3 AISLE LP B GND → GNDPRHC
201L (G7) ← 101L64C 16TN ← XRR20-19 ← 201L64C 16TN ← RH #4 AISLE LP A 24V
201L64J 16WH → RH #4 AISLE LP B GND → GNDPRHC

VMM1615 SC NODE 02 | AISL_LPS_DIM_SIG | 24V | 1A | 0-15B | J2-9
111L64PA 16RD → 06PS (F2)

VMM1615 SC NODE 02 | AISL_LPS_DIM_SIG | 24V | 1A | 0-15A | J2-10
111L64P 16TN → XSC4-9 → 111L64EE 16TN → XSC68-B → 531L64EE 16TN → XBB1L8 A
111L64H 16TN → XSC72-A → 551L64H 16TN → XBB1L9 A

XBB1L8 B → 531L64EF 16TN → RH #1 AISLE LP CTRL A CTRL 24V
XBB1L8 C → 531L64EG 16TN → RH #2 AISLE LP CTRL A CTRL 24V
XBB1L8 D → 531L64EH 16TN → RH #3 AISLE LP CTRL A CTRL 24V
XBB1L8 E → 531L64EJ 16TN → RH #4 AISLE LP CTRL A CTRL 24V
XBB1L8 F

XBB1L9 B → 551L64HA 16TN → LH #1 AISLE LP CTRL A CTRL 24V
XBB1L9 C → 551L64HB 16TN → LH #2 AISLE LP CTRL A CTRL 24V
XBB1L9 D → 551L64HC 16TN → LH #3 AISLE LP CTRL A CTRL 24V
XBB1L9 E → 551L64HD 16TN → LH #4 AISLE LP CTRL A CTRL 24V
XBB1L9 F

VMM1615 SC NODE 09 | AISL_NRML_SW | GND | | I-15 | J1-4
111L56A 18YL → AISLE LP SW 1
AISLE LP SW OFF 2 → 111L56C 18WH → GNDBSC
AISLE LP SW 3

VMM1615 SC NODE 09 | AISL_ON_SW | GND | | I-16 | J4-9
111L56B 18YL → AISLE LP SW 3

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SCOTT KIM			
DATE (DD-MMM-YY)	V	SHEET UNCHANGED	ECN-056280
04-JAN-16	REV	DESCRIPTION	ECO

REPORT ALL ERRORS TO ENG. DEPT.

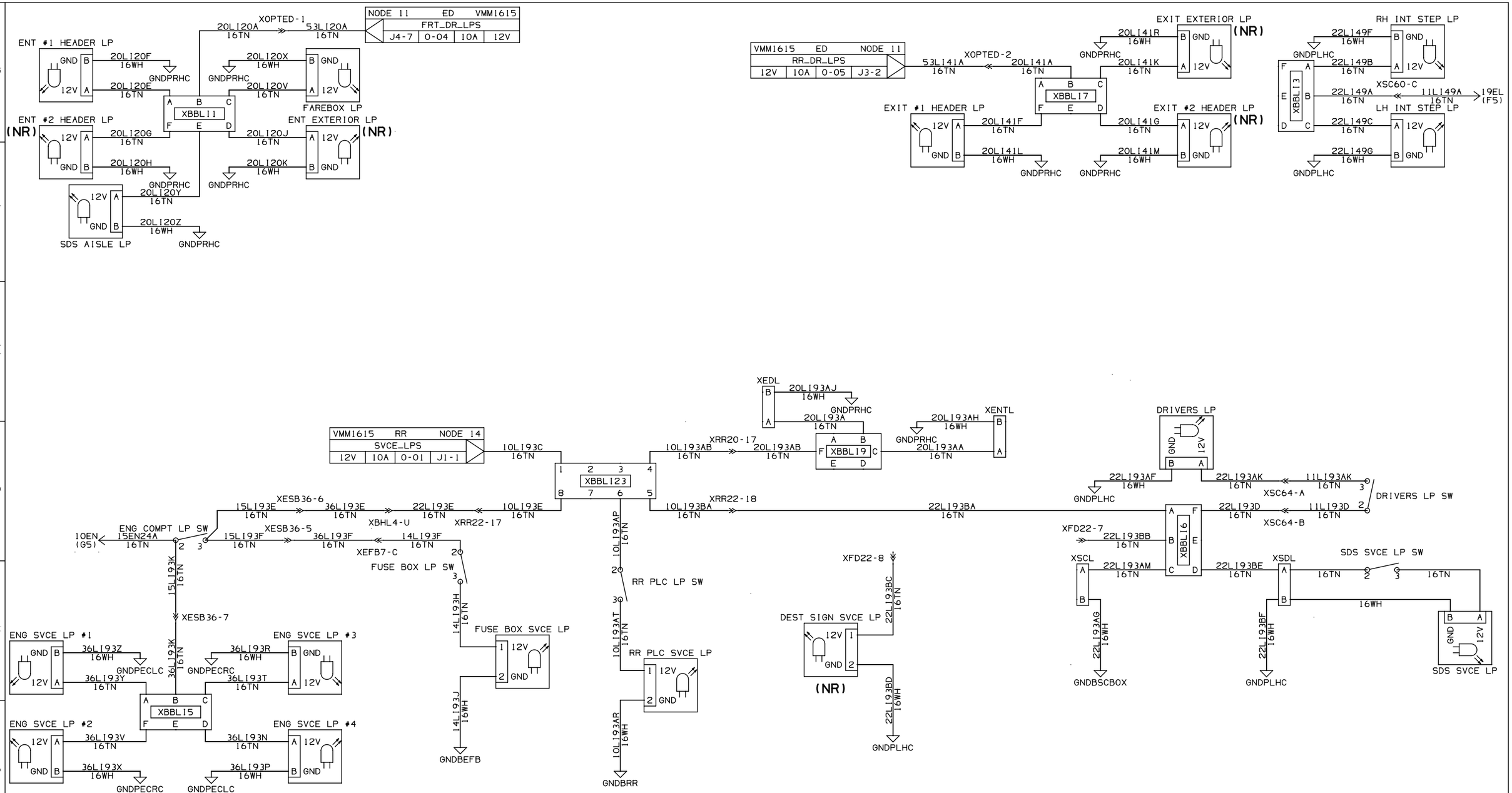
TITLE
ES-ELECTRICAL SCHEMATICS

SHEET NAME IL | SHEET 20 OF 27 | SCALE NTS | B

NEW FLYER

PART Nº
454970
(NX)

9 8 7 6 5 4 3 2 1



DRAWN BY			
SCOTT KIM			
DATE (DD-MMM-YY)	V	SVCE LP RLY AND CIRCUITS - REMOVED (E7) SVCE_LPS WITH NODE 14 0-01 - ADDED (D7)	ECN-056280
04-JAN-16	REV	DESCRIPTION	ECO

REPORT ALL ERRORS TO ENG. DEPT.

TITLE
ES-ELECTRICAL SCHEMATICS

SHEET NAME LI | SHEET 21 OF 27 | SCALE NTS | B

NEW FLYER

PART Nº
454970

(NX)

9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1

VMM1615 SC NODE 09 | HLD_KNL_MV | 12V | 5A | 0-07 | J3-1
11LK56 16TN → XSC4-1
11LK56A 16TN → XSC33-B
34LK56A 16TN → KNEELING 8 12V LH HLD MV#4
34LK56B 16WH → GNDBSCBOX → KNEELING 1 GND
11LK56K 16TN → XSC25-A
34LK56K 16TN → KNEELING 5 12V RH HLD MV#1
34LK56M 16WH → GNDBSCBOX → KNEELING 4 GND

VMM1615 SC NODE 09 | RAISE_KNL_MV | 12V | 10A | 0-06 | J4-11
11LK56C 16TN → XSC33-C
34LK56C 16TN → KNEELING 6 12V RAISE MV #2
34LK56D 16WH → GNDBSCBOX → KNEELING 3 GND

VMM1615 SC NODE 09 | LOWR_KNL_MV | 12V | 10A | 0-05 | J3-2
11LK56E 16TN → XSC33-A
34LK56E 16TN → KNEELING 7 12V LOWER MV #3
34LK56N 16WH → GNDBSCBOX → KNEELING 2 GND

VMM1615 ED NODE 11 | WRN_LP | 12V | 5A | 0-07 | J3-1
53LK43M 16TN → XOPTED-3
20LK43M 16TN → WARNING LP A 12V
20LK43N 16WH → GNDPRHC → WARNING LP B GND

VMM1615 SC NODE 02 | WRN_ALM | 12V | 2.5A | 0-11 | J3-12
11LK43P 16TN → XSC22-C
34LK43P 16TN → WARNING BEEPER +
34LK43R 16WH → GNDPRAMP → WARNING BEEPER -

DPS IP IP CLUSTER | RMP_STWD_ST | BAT | | I-20 | J2-18
XRMP-5 34LK50V 16YL → 61LK50#1 18WH → RAMP STOWED PROX SW 2
XRMP-6 34LK50U 16TN → 61LK50#1 18BN → RAMP STOWED PROX SW 1
XRMP-7 → 61LK50#1 18BK → RAMP STOWED PROX SW 4
XRMP-8 34LK50K 16WH → GNDPRAMP → 61LK50#1 18BL → RAMP STOWED PROX SW 3
RAMP STOWED PROX SW 5

16DC (G3) → XUSC40-A 53LK40F 16TN → XBBLK1 A
34LK40F 16TN → XBBLK1 F

DPS IP IP CLUSTER | KNL_SW | TRI | | A-02 | J1-17
34LK40C 16YL → KNEEL SW B
34LK40 16WH → GNDBSCBOX → KNEEL SW A (3 OFF 1)
34LK40B 16TN → XBBLK1 C → KNEEL SW C

DPS IP IP CLUSTER | RMP_SW | TRI | | A-03 | J2-11
34LK40E 16YL → RAMP SW B
34LK40A 16WH → GNDBSCBOX → RAMP SW A (3 OFF 1)
34LK40D 16TN → XBBLK1 B → RAMP SW C

24VBATSC → F1LK 15A → RAMP PUMP RLY 30
11LK50A 16TN → RAMP PUMP RLY 86
24V → RAMP PUMP RLY 85
11LK50B 16WH → GNDBSC
RAMP PUMP RLY 87a
RAMP PUMP RLY 87 → 11LK50C 14TN → XSC20 A
34LK50C 14TN → XRMP-1 → 61LK50C 14TN → RAMP PUMP A 24V (M)
RAMP PUMP B GND
GNDBSC → XSC4-12
11LK50E 16TN → DLK1 +
DLK1 - → 11LK50N 16TN → XSC20 B
34LK50N 16TN → XRMP-2 → 61LK50N 16TN → RAMP MV A
DLK1 ~1 ~2 → XSC4-2
11LK50F 16TN → 11LK50L 16TN → XSC20 C
34LK50L 16TN → XRMP-3 → 61LK50H 16WH → RAMP MV B
61LK50J 14WH
34LK50D 14WH → XRMP-4 → GNDPRAMP → 61LK50L 16TN → RAMP MV C
61LK50D 14WH → XBBLK5 E
RAMP MV 24V
61LK50M 16WH → RAMP MV D

NODE 02 SC VMM1615 | RMP_DPLY_MV | J4-7 | 0-04 | 10A | 24V
11LK50R 16TN → XBBLK5 A
NODE 02 SC VMM1615 | RMP_STW_MV | J2-12 | 0-02 | 10A | 24V
11LK50T 16TN → XBBLK5 F

VMM1615 SC NODE 02 | HGT_SNSR_PWR | 24V | 5A | 0-08 | J4-12
11LK54D 16TN → XSC71-A → 55LK54D 16TN → HEIGHT SNSR 2 PWR
VMM1615 SC NODE 02 | HGT_SNDR | ANLG | | I-12 | J2-5
11LK54F 16YL → XSC71-B → 55LK54F 14YL → HEIGHT SNSR 3 SIG
55LK54J 16WH → GNDBSCBOX → HEIGHT SNSR 1 GND

DRAWN BY			
SCOTT KIM			
DATE (DD-MMM-YY)	V	SHEET UNCHANGED	ECN-056280
04-JAN-16	REV	DESCRIPTION	ECO

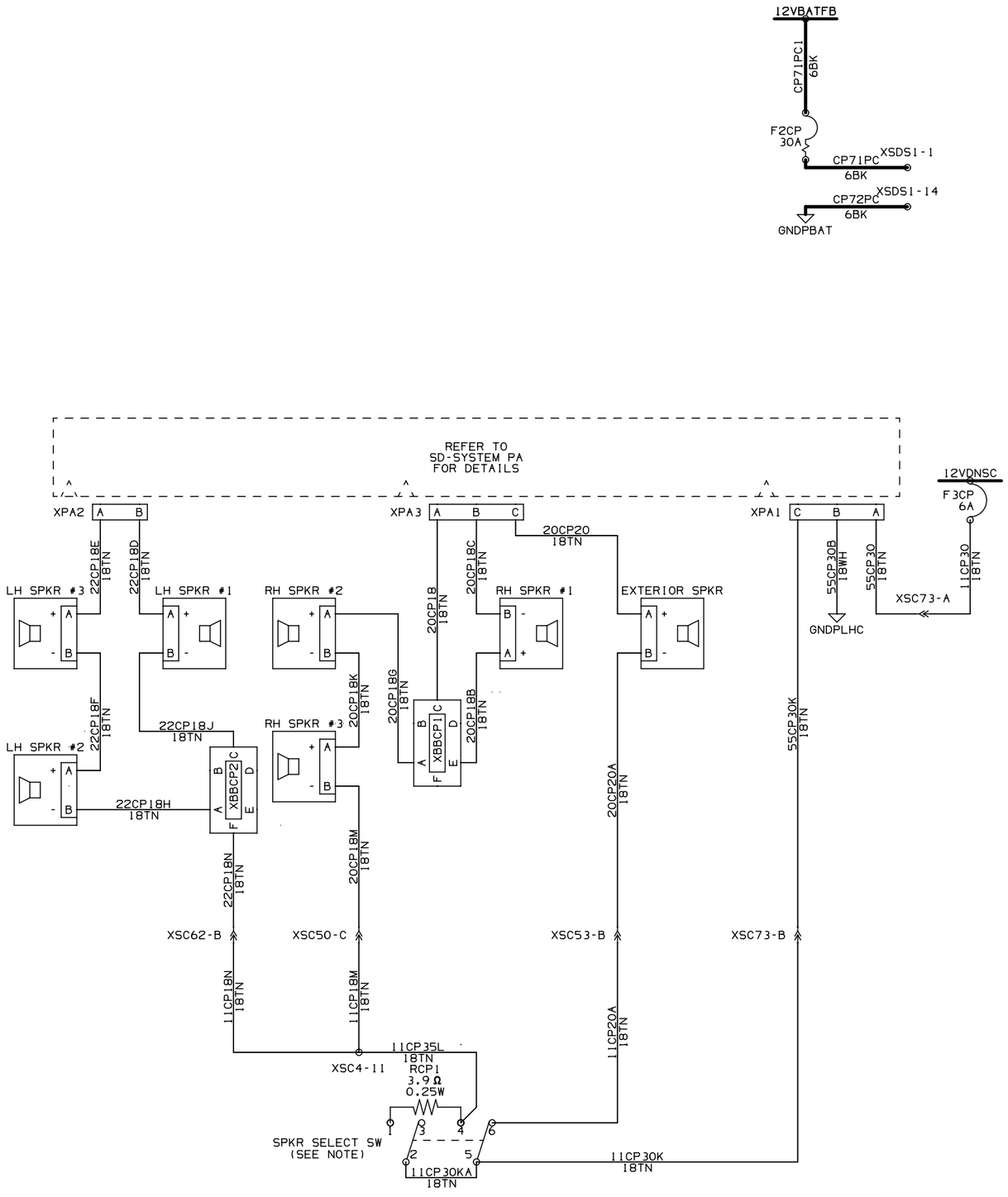
REPORT ALL ERRORS TO ENG. DEPT.

TITLE: ES-ELECTRICAL SCHEMATICS

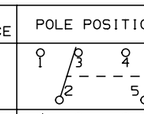
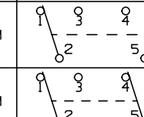
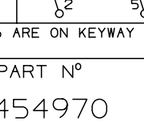
SHEET NAME LK | SHEET 22 OF 27 | SCALE NTS | B

NEW FLYER

PART Nº 454970 (NX)



NOTE: SPKR SELECT SW

	SYSTEM IMPEDANCE	POLE POSITIONS	TOGGLE POSITION
EXTERIOR	8 OHM		UP
BOTH	4.3 OHM		CENTER
INTERIOR	5.3 OHM		DOWN

3 AND 6 ARE ON KEYWAY SIDE

DRAWN BY			
SCOTT KIM			
DATE (DD-MMM-YY)	V	SHEET UNCHANGED	ECN-056280
04-JAN-16	REV	DESCRIPTION	ECO

REPORT ALL ERRORS TO ENG. DEPT.

TITLE
ES-ELECTRICAL SCHEMATICS

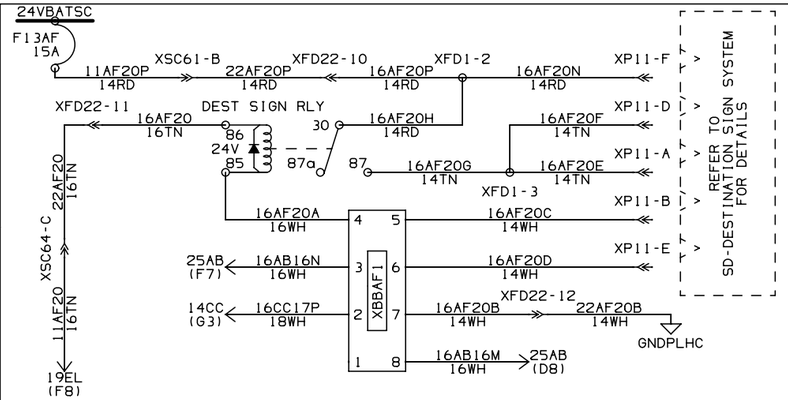
SHEET NAME CP | SHEET 23 OF 27 | SCALE NTS | B

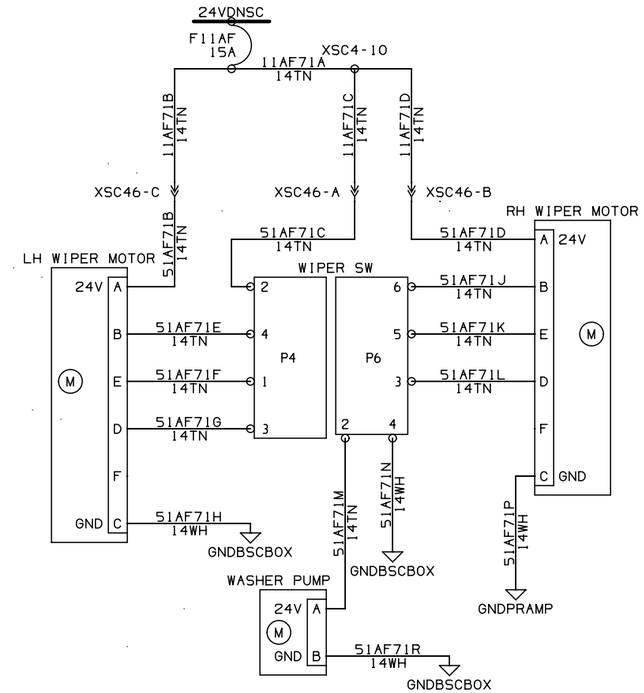
NEW FLYER

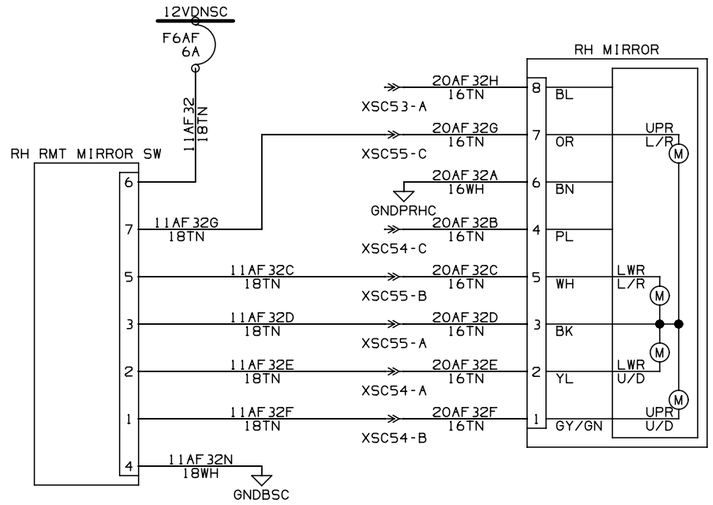
PART Nº
454970
(NX)

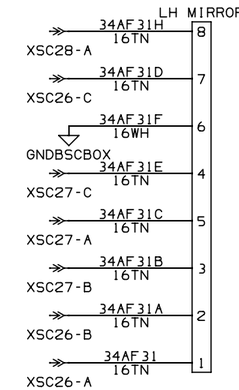
9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1

A | B | C | D | E | F | G









DRAWN BY			
SCOTT KIM			
DATE (DD-MMM-YY)	V	SHEET UNCHANGED	ECN-056280
04-JAN-16	REV	DESCRIPTION	ECO

REPORT ALL ERRORS TO ENG. DEPT.

TITLE
ES-ELECTRICAL SCHEMATICS

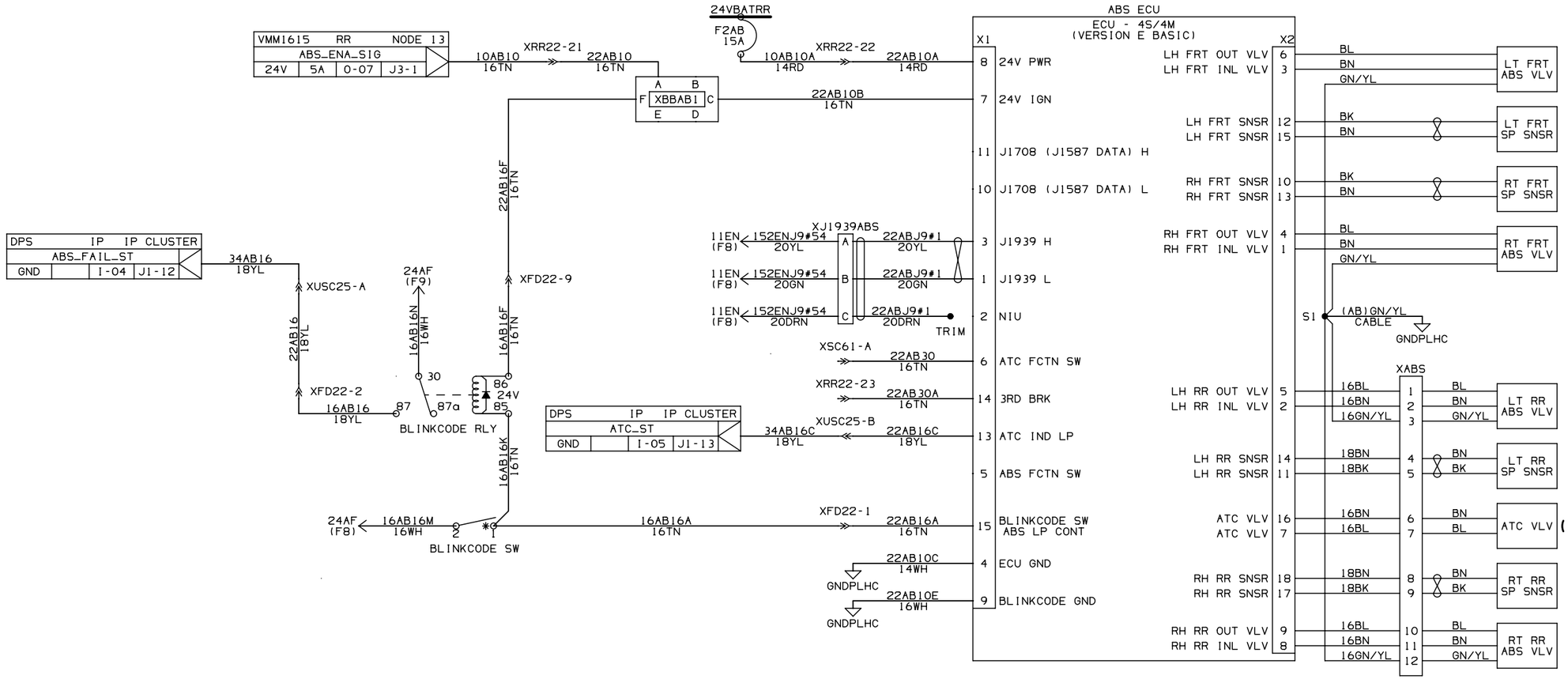
SHEET NAME AF | SHEET 24 OF 27 | SCALE NTS | B

NEW FLYER

PART N°
454970

(NX)

9 8 7 6 5 4 3 2 1



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SCOTT KIM			
DATE (DD-MMM-YY)	V	SHEET UNCHANGED	ECN-056280
04-JAN-16	REV	DESCRIPTION	ECO

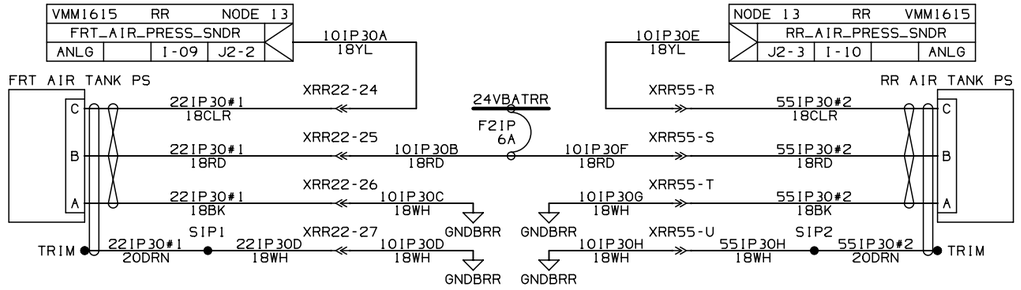
REPORT ALL ERRORS TO ENG. DEPT.

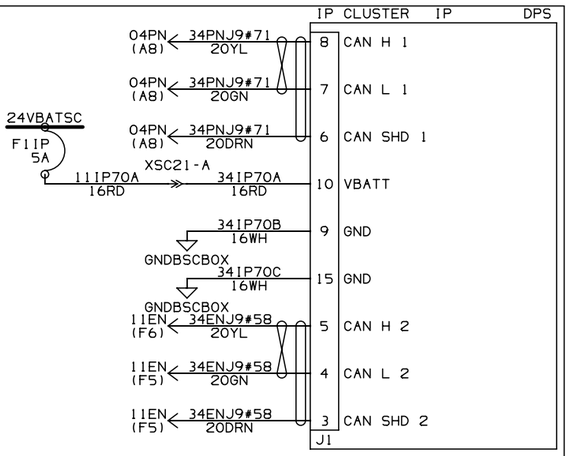
TITLE
ES-ELECTRICAL SCHEMATICS

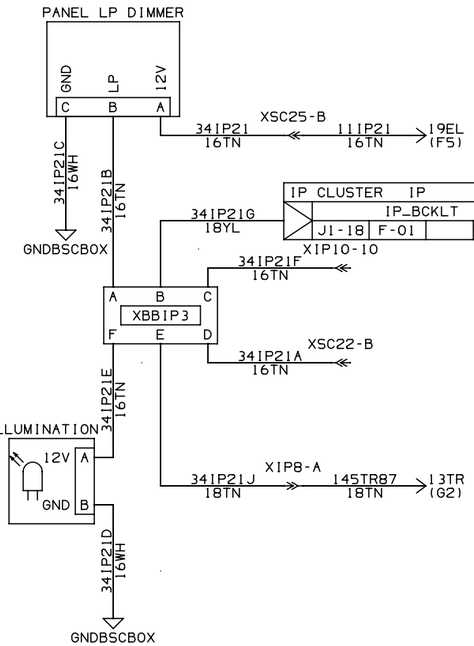
SHEET NAME AB | SHEET 25 OF 27 | SCALE NTS | B

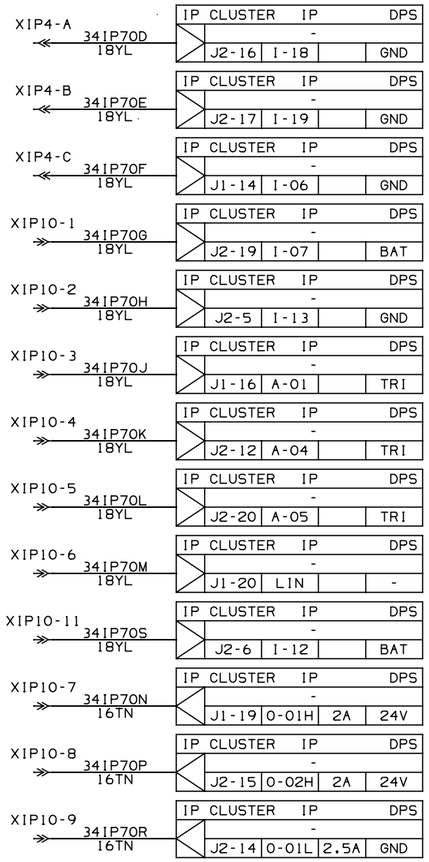
NEW FLYER

PART Nº
454970
(NX)









DRAWN BY			
SCOTT KIM			
DATE (DD-MMM-YY)	V	SHEET UNCHANGED	ECN-056280
04-JAN-16	REV	DESCRIPTION	ECO

REPORT ALL ERRORS TO ENG. DEPT.

TITLE
ES-ELECTRICAL SCHEMATICS

SHEET NAME IP | SHEET 26 OF 27 | SCALE NTS | B

NEW FLYER

PART Nº
454970
(NX)

9 8 7 6 5 4 3 2 1

A B C D E F G

BLKD TO ENG COMPT

XEFB (SPARE) — 36SPR36A 140R — XBHR3-18 — 20SPR20E 140R — 27SP (F4)

XEFB (SPARE) — 36SPR36B 140R — XESB (SPARE)

XESB (SPARE) — 36SPR36C 140R — XBHL4-G

XESB (SPARE) — 36SPR36D 140R — XBHL4-D

LH RR TURN LP (SPARE) — 36SPR36E 140R — XBHL4-E

RH RR TURN LP (SPARE) — 36SPR36F 140R — XBHR3-16 — 20SPR20F 140R — 27SP (F4)

XEFB (SPARE) — 36SPR36G 140R — XBHR3-14 — 20SPR20G 140R — 27SP (F4)

ENGINE HARNESS

27SP (D4) — 63SPR63A 180R — XBHRSCR-12 CUM ECM (SPARE) — 140SPR140A 200R

27SP (C4) — 63SPR63B 180R — XBHRSCR-18 CUM ECM (SPARE) — 140SPR140B 200R

27SP (D7) — 152SPR152A 160R — XBHR2-15 CUM ECM (SPARE) — 140SPR140C 200R

27SP (C4) — 63SPR63C 180R — XBHRSCR-30 CUM ECM (SPARE) — 140SPR140D 200R

27SP (C4) — 63SPR63D 180R — XBHRSCR-31 CUM ECM (SPARE) — 140SPR140E 180R

XBBEN9 (SPARE) — 140SPR140F 200R — CUM ECM (SPARE)

XBBEN13 (SPARE) — 140SPR140G 200R — CUM ECM (SPARE)

27SP (D7) — 152SPR152B 160R — XBHR2-23 XEFB (SPARE) — 140SPR140H 160R

27SP (D7) — 152SPR152C 160R — XBHR2-26 XEFB (SPARE) — 140SPR140J 160R

LH CROWN

SC PANEL (SPARE) — 22SPR22B 140R — TOWING CONN (SPARE)

SC PANEL (SPARE) — 22SPR22C 140R — LH SIDE TURN LP #3 (SPARE)

SC PANEL (SPARE) — 22SPR22D 140R — ABS ECU (SPARE)

SC PANEL (SPARE) — 22SPR22E 140R — RR PANEL (SPARE)

SC PANEL (SPARE) — 22SPR22F 140R — RR PANEL (SPARE)

RR PANEL (SPARE) — 22SPR22G 140R — LH #1 AISLE LP (SPARE)

RR PANEL (SPARE) — 22SPR22H 140R — LH #1 AISLE LP (SPARE)

RR PANEL (SPARE) — 22SPR22J 140R — TOWING CONN (SPARE)

RR PANEL (SPARE) — 22SPR22K 140R — RH INT STEP LP (SPARE)

RR PANEL (SPARE) — 22SPR22L 140R — DEST SIGN (SPARE)

RR PANEL (SPARE) — 22SPR22M 140R — DEST SIGN (SPARE)

ENGINE INTERIOR

27SP (E9) — 152SPR152A 160R — RR PANEL (SPARE)

27SP (C9) — 152SPR152B 160R — RR PANEL (SPARE)

27SP (C9) — 152SPR152C 160R — SC PANEL (SPARE)

RH CROWN

SC PANEL (SPARE) — 20SPR20A 140R — ENT DOOR (SPARE)

SC PANEL (SPARE) — 20SPR20B 140R — ENT DOOR (SPARE)

SC PANEL (SPARE) — 20SPR20C 140R — EXIT DOOR (SPARE)

SC PANEL (SPARE) — 20SPR20D 140R — EXIT DOOR (SPARE)

RR PANEL (SPARE) — 20SPR20E 140R — 27SP (G8)

SC PANEL (SPARE) — 20SPR20F 140R — 27SP (F8)

RR PANEL (SPARE) — 20SPR20G 140R — 27SP (F8)

RR PANEL (SPARE) — 20SPR20H 140R — EXIT DOOR (SPARE)

RR PANEL (SPARE) — 20SPR20J 140R — EXIT DOOR (SPARE)

ENT DOOR (SPARE) — 20SPR20K 140R — EXIT DOOR (SPARE)

ENT DOOR (SPARE) — 20SPR20L 140R — EXIT DOOR (SPARE)

SC PANEL (SPARE) — 20SPR20M 140R — RR PANEL (SPARE)

SC PANEL (SPARE) — 20SPR20N 140R — RR PANEL (SPARE)

ENGINE SCR

SUPPLY MODULE (SPARE) — 63SPR63A 180R — 27SP (E9)

SUPPLY MODULE (SPARE) — 63SPR63B 180R — 27SP (E9)

DPF SNSR (SPARE) — 63SPR63C 180R — 27SP (D9)

AMB TEMP SNSR (SPARE) — 63SPR63D 180R — 27SP (D9)

ENG COMPT OPTIONS

27SP (F2) — 53SPR53C 140R — COOLANT BOOSTER PUMP (SPARE) — 60SPR60A 140R

XBHR4-1

27SP (E2) — 53SPR53D 140R — XBHR4-2 XEFB (SPARE) — 60SPR60B 140R

27SP (E1) — 53SPR53G 140R — XBHR4-6 COMPRESSOR (SPARE) — 60SPR60C 140R

XESB (SPARE) — 60SPR60D 140R — EMP RAD FAN SYSTEM (SPARE)

XESB (SPARE) — 60SPR60E 140R — XEFB (SPARE)

LH OPTIONS

RR PANEL (SPARE) — 55SPR55A 140R — SC PANEL (SPARE)

RR PANEL (SPARE) — 55SPR55B 140R — SC PANEL (SPARE)

RR PANEL (SPARE) — 55SPR55C 140R — XPA (SPARE)

SDS (SPARE) — 55SPR55D 140R — SC PANEL (SPARE)

SDS (SPARE) — 55SPR55E 140R — SC PANEL (SPARE)

SC TO DASH OPTIONS

SC PANEL (SPARE) — 51SPR51C 160R — WASHER PUMP (SPARE)

WIPER SW (SPARE) — 51SPR51D 160R — RH WIPER MOTOR (SPARE)

WIPER SW (SPARE) — 51SPR51E 160R — LH WIPER MOTOR (SPARE)

RH OPTIONS

RR PANEL (SPARE) — 53SPR53A 140R — HVAC UNIT (SPARE)

RR PANEL (SPARE) — 53SPR53B 140R — HVAC UNIT (SPARE)

27SP (G4) — 53SPR53C 140R — HVAC UNIT (SPARE)

27SP (G4) — 53SPR53D 140R — EXIT DOOR (SPARE)

SC PANEL (SPARE) — 53SPR53E 140R — RR PANEL (SPARE)

SC PANEL (SPARE) — 53SPR53F 140R — RR PANEL (SPARE)

SC PANEL (SPARE) — 53SPR53G 140R — 27SP (G4)

SC PANEL (SPARE) — 53SPR53H 140R — HVAC UNIT (SPARE)

SDS (SPARE) — 53SPR53J 140R — SC PANEL (SPARE)

SDS (SPARE) — 53SPR53K 140R — SC PANEL (SPARE)

SC TO LWR LH DASH

SC PANEL (SPARE) — 34SPR34A 140R — KNEELING MV (SPARE)

SC PANEL (SPARE) — 34SPR34C 140R — DIMMER SW (SPARE)

SC PANEL (SPARE) — 34SPR34D 140R — RAMP (SPARE)

SC PANEL (SPARE) — 34SPR34E 140R — DEFROSTER CTRL SW (SPARE)

SC PANEL (SPARE) — 34SPR34F 140R — DEFROSTER CTRL SW (SPARE)

SC PANEL (SPARE) — 34SPR34J 140R — RH HEADLAMP (SPARE)

SC PANEL (SPARE) — 34SPR34K 140R — HORN SW (SPARE)

SC PANEL (SPARE) — 34SPR34M 140R — WARNING BEEPER (SPARE)

SC PANEL (SPARE) — 34SPR34N 140R — RAMP (SPARE)

SC PANEL (SPARE) — 34SPR34P 140R — PARK BRAKE (SPARE)

DRAWN BY			
SCOTT KIM			
DATE (DD-MMM-YY)	V	SHEET UNCHANGED	ECN-056280
04-JAN-16	REV	DESCRIPTION	ECO

REPORT ALL ERRORS TO ENG. DEPT.

TITLE: ES-ELECTRICAL SCHEMATICS

SHEET NAME SP | SHEET 27 OF 27 | SCALE NTS | B

NEW FLYER

PART Nº 454970 (NX)

SYM	REVISION	ECO
U	REMOVED CONVOLUTED TUBING FROM J1939 SPLICES.	ECN-021248

NFIL MAIN CABLE & BODY HARNESS SPECIFICATIONS

1. USE BLACK FLAME-RETARDANT SPLIT CONVOLUTED LOOM IN ALL AREAS (THICK LINES) UNLESS OTHERWISE NOTED.
   CONVOLUTED LOOM MUST MEET THE FOLLOWING SPECIFICATIONS:
   - MELTING POINT – 320° F
   - HEAT DEFLECTION – 208° F AT 66 PSI
   - BRITTLENESS – (-30° F)
   - SOFTENING POINT – (LOAD) 300° F (NO LOAD) 245° F
   - CONTINUOUS USE TEMPERATURE – 257° F
   - INTERMITTENT USE TEMPERATURE – 260° F - 300° F
2. BLACK FLAME RETARDANT FIBRELOOM TO MEET THE FOLLOWING SPECIFICATIONS:
   - CLASS 240 TEMPERATURE RANGE – (-75° F) - 1200° F
   - CONTINUOUS OPERATING TEMPERATURE – 840° F
   - NEMA GRADE 3
   - FIBREGLASS YARN CONFORMS TO MILITARY SPECIFICATIONS MIL-Y-1140
3. ENSURE THE SMALLEST POSSIBLE DIAMETER OF LOOM IS APPLIED TO THE WIRE BUNDLE.
4. ALL WIRES MUST BE INKJET STAMPED AND SPACED 2.5” APART ALONG THE ENTIRE LENGTH.
5. ALL RING TONGUE AND BLADE TERMINALS TO MEET THE FOLLOWING SPECIFICATIONS:
   - MUST BE CRIMPED TO SAE J2202 SPECIFICATIONS
   - FROM 18 AWG TO 8 AWG MUST BE VINYL INSULATED BARRELS
   - MUST BE TIN PLATED COPPER
6. ALL TYRAPS TO MEET THE FOLLOWING SPECIFICATIONS:
   - OPERATE WITHIN TEMPERATURES OF (-40° F) TO 185° F
   - TENSILE STRENGTH OF 18 LBS
   - MILITARY STANDARD MS3367
7. FOR ALL CONNECTORS, INSERT CAVITY PLUGS WHENEVER THERE ARE EMPTY CAVITIES. ENSURE WIRE SEALS ARE PROVIDED ON ALL TERMINATIONS AND CONNECTOR LOADING APPLICATION WHERE THE MANUFACTURER OF SUCH CONNECTORS CALLS FOR USE OF WIRE SEALS.
8. ALL WIRES MUST BE GXL TYPE MEETING SAE J1128 SPECIFICATIONS UNLESS OTHERWISE STATED.
9. APPLY ONE TYRAP EVERY 8” OF A WIRE BUNDLE.
10. APPLY 5 WRAPS OF ELECTRICAL TAPE AT LOOM BREAKOUTS ONLY. USE 342C HIGH TEMP ALUMINUM TAPE ONLY AT ALL HIGH TEMP LOOM JOINTS, “T” JUNCTIONS AND BREAKOUTS ON ALL HARNESS LAYOUTS OR SEGMENTS WHERE USE OF HIGH TEMP LOOM IS SPECIFIED.
11. TYRAP LOOM AT LOOM ENDS TO WIRE BUNDLE.
12. LABEL ALL CONNECTOR ENDS. USING A FLAGGED TYPE TYRAP OR A PRINTED LABEL.
13. ENSURE ALL REFERENCE STN, WL AND BL ARE WRITTEN ON A WHITE LOCATOR TAPE.
14. IDENTIFY HARNESSES BY PART NUMBER AND DESCRIPTION ON A LABEL APPLIED AT EITHER END.
15. ALL SPARE WIRES MUST BE DIPPED IN GLUE THEN CAPPED WITH THE PROPER SIZED END CAP.
16. LABEL BRANCH ENDS TO INDICATE CONNECTING DEVICES WHERE NO CONNECTOR IS REQUIRED. USE A WRAP AROUND PRINTED LABEL. ENSURE DESCRIPTION IS VISIBLE.

	NAME	DATE	TITLE: **SPEC-BODY HARNESS**	
DRAWN	T.J.M.	06-JUN-13	NEW FLYER	PART NO. **220140** (MS WORD)
CHK’D				
APP’D				
SCALE: NTS		DWG SIZE: A		SHEET 1 OF 19

17. ALL J1939 CABLE DRAIN, SHIELDING, SPLICING AND CONNECTOR APPLICATIONS SHOULD BE MANUFACTURED AS DETAILED IN THE FOLLOWING PROCEDURES:
    - ALL CABLES AND HARNESSES MUST BE BUILT AND INSTALLED TO CONFORM TO SPECIFICATION REQUIREMENTS OF SAE RECOMMENDED PRACTICE J1127, J1128, J1292.
    - ALL SHIELDS SHALL BE SOLDERED WITH A DRAIN WIRE TERMINATED INTO THE CONNECTOR.
    - ENSURE ALL J1939 APPLICATIONS USE GOLD TERMINALS AS PER SAE J1939 SPECIFICATION.
    - ALL SPLICES SHALL BE LABELED FOR IDENTIFICATION AS INDICATED ON HARNESS LAYOUT.

18. ENSURE ALL LOOMED BREAKOUTS AND BRANCHES OFF THE UNLOOMED MAIN TRUNK ON ALL RH/LH CROWNS, RH/LH OPTIONS, AND PRPLN INTERIOR (FRT AND REAR) HARNESSES ARE BUILT ORIENTED DOWNWARDS.

J1939 DRAIN WIRE AND SHIELD IMPLEMENTATION AT SPLICES

The following explains how NFIL splices and cable terminations are to be performed for J1939 cables.

The figure below shows how the drain wire is to be implemented across the splice area. On the left is the main backbone with the node drop cable having their drain wires twisted together or kept in parallel and wrapped around both cable jackets and over top itself. On the right, the other end of the backbone has the drain wire wrapped around the cable jacket and over top of itself. The vendor will join the drains in the middle of the splice, by means of ultrasonic splicing. The solder joint shown is one possible implementation used for the purposes of this document.

Figure 1 – Drain wire implementation over the entire splice

The following figures give a closer view of the left side of the splice.

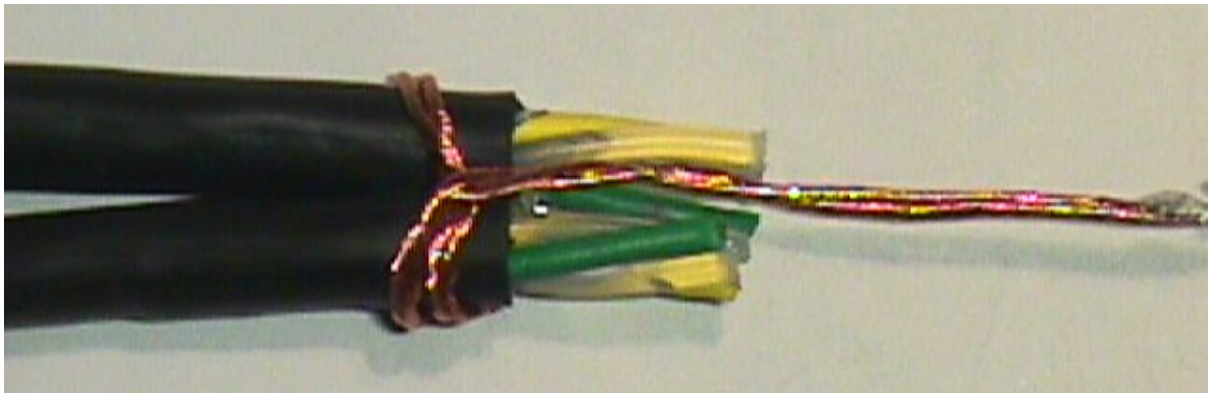


Figure 2 – Top view of left side of splice with cable drop

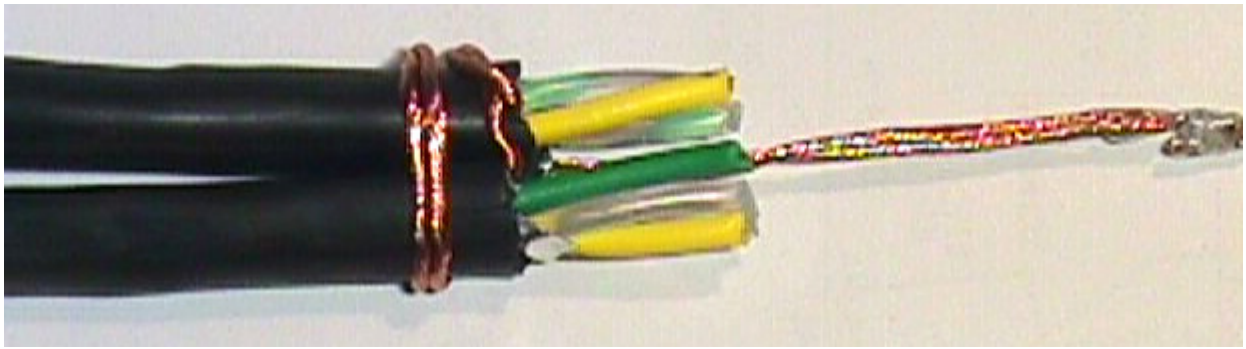


Figure 3 – Bottom view of left side of splice with cable drop

The following figures give a closer view of the right side of the splice.

Figure 4 – Top view of right side of splice

Figure 5 – Bottom view of right side of splice

In the following figure, the foil wrap is shown before being wrapped around the cable to make contact with the drain wires, which have been wrapped around the left and right hand side cables of the splice. The part that is to make contact with the drain wire is to be the conductive side of the foil. The foil is extending ½ inch minimum past the wrapped drain wires.

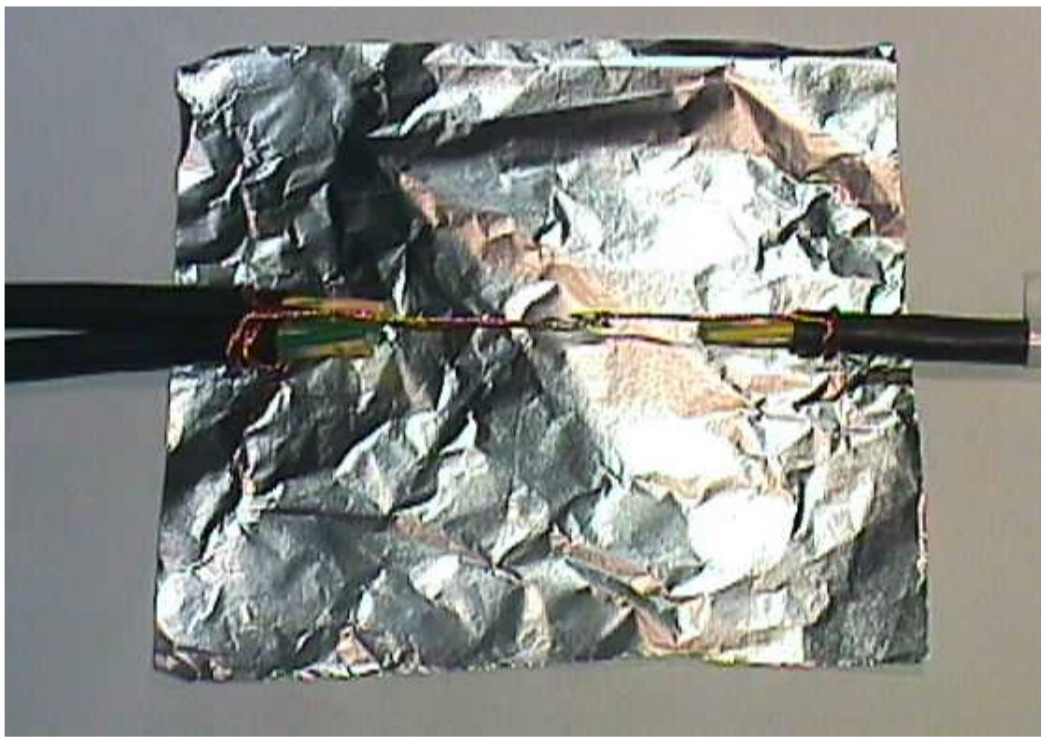


Figure 6 - Cable on foil before being wrapped

The foil is wrapped firmly around the cable. This foil is conductive both sides in this example, but vendors usually use foil with blue on one side (non-conductive) with the other side being conductive. With the blue type of foil, the blue side will only be visible since the conductive side will be making contact with the drain wires. After the cable is wrapped with the foil then the heat shrink is to be applied.

Figure 7 – Cable after being wrapped with foil wrap

HEATSHRINK TO BE APPLIED WHERE COVERED DRAIN WIRE MEETS CABLE JACKET

For pull to seat terminals, heatshrink is to be applied over drain wire with enough wire strands to allow for terminal crimping. Ship terminals loose in a bag attached to the cable end. Where heatshrink joins with cable jacket, apply heatshrink over area to cover remaining exposed drain wire as shown in figure below. Heat shrink tubing must be flame retardant, and adhesive lined polyolefin tubing type operating temp range of –40°C to 130°C or higher.

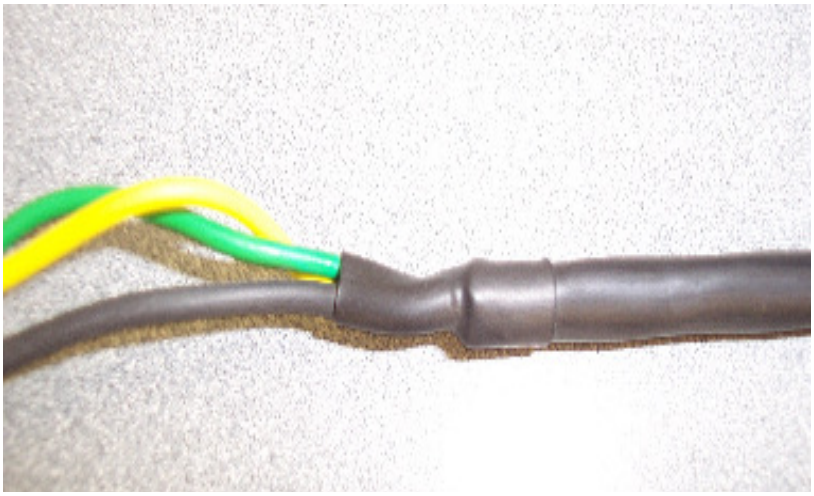


Figure 8 - Heatshrink applied where drain wire heatshrink meets cable jacket

J1939 DRAIN WIRE, CAN HIGH WIRE, AND CAN LOW WIRE SPLICES

The following section explains how NFIL splices and cable terminations are to be performed for J1939 cables.

The figure below shows how the CAN HIGH wire, CAN LOW wire, and drain wire are to be implemented across the splice area. On the left is the main backbone with the node drop cable having their drain wires twisted together or kept in parallel and wrapped around both cable jackets and over top itself. On the right, the other end of the backbone and the drop cable have drain wires wrapped around the cable jacket and over top of cables

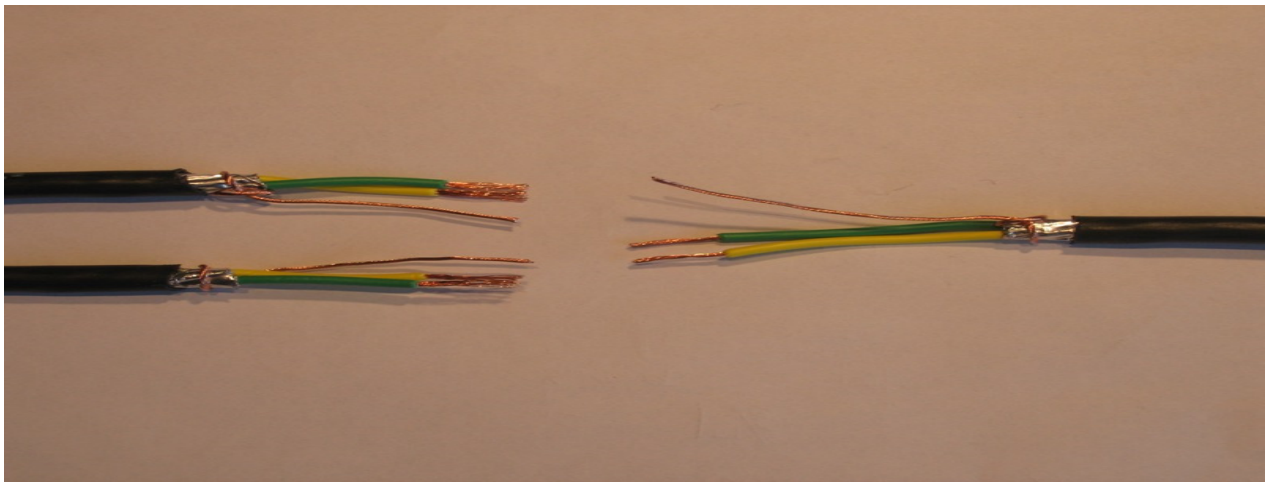


Figure 9 - Stripped cables before applying inside heat shrink.

As shown in Figure 10, the vendor will join the wires in the middle of the splice, by means of ultrasonic splicing. Ensure no raised strands are evident after ultrasonic splicing has been performed.

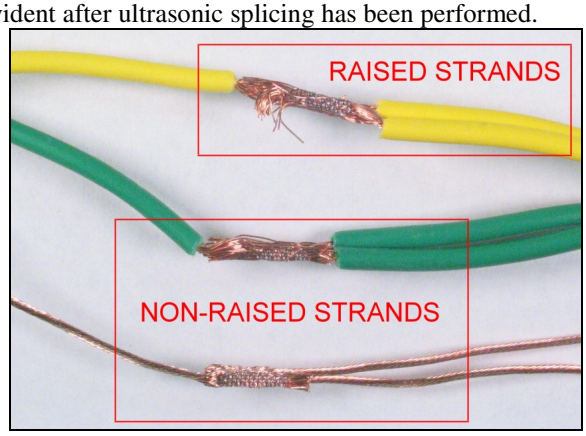


Figure 10 – Raised vs. non-raised strands

Apply heatshrink over each ultrasonic splices of the yellow, green and drain wires as shown in Figure 11.

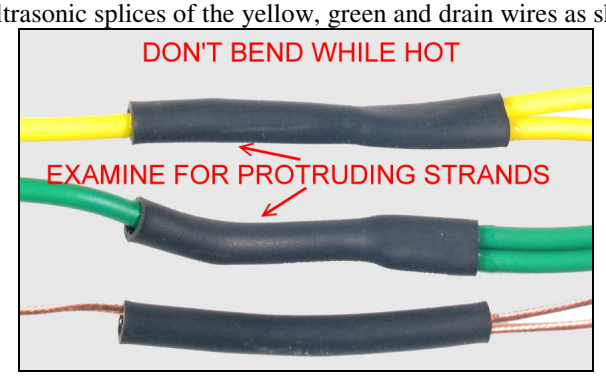


Figure 11 – Examining for raised strands after applying heatshrink

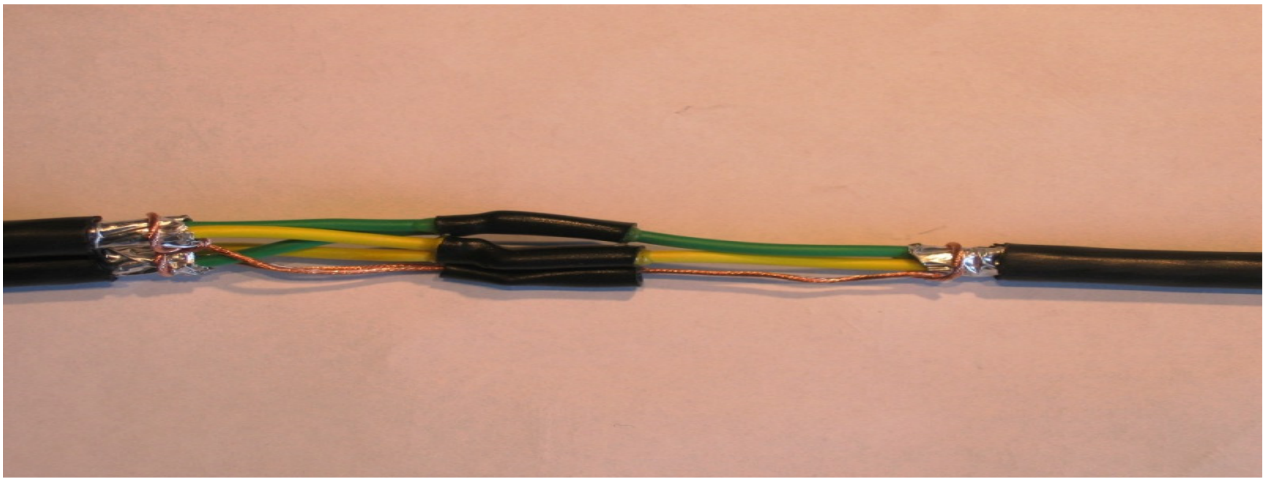


Figure 12 – Drain and other wires after applying inside heat shrinks.

In the figure 13, the foil is shown being wrapped around cables.

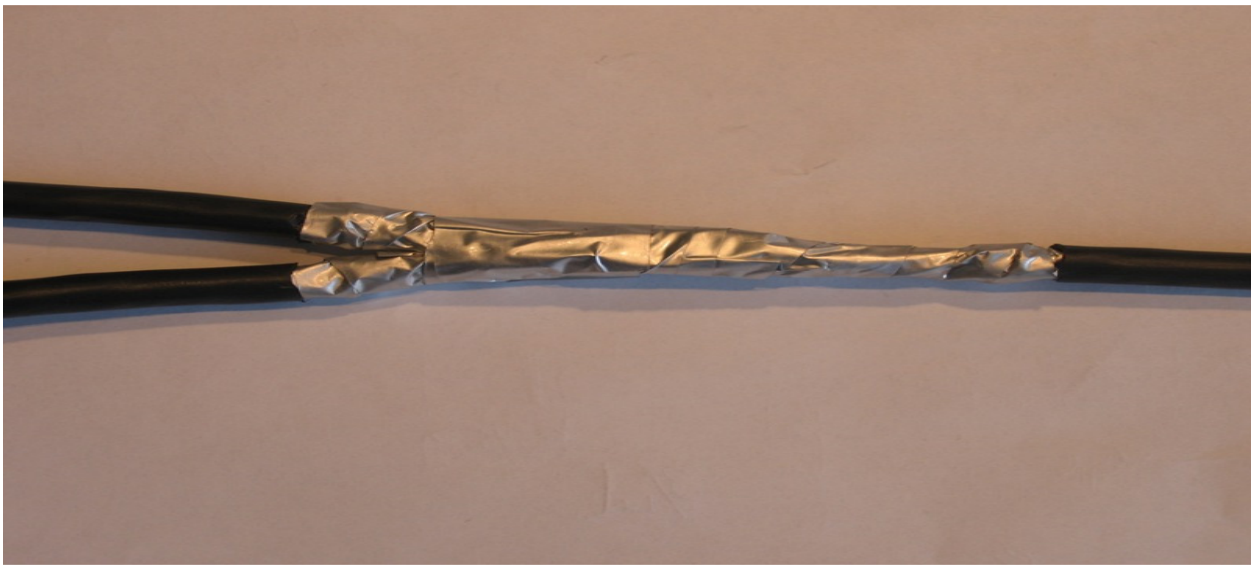


Figure 13 – Cabel after being wrapped with foil wrap

Apply heatshrink over ultrasonic splice ensuring that there are no protruding strands through the heatshrink. Heat shrink tubing must be flame retardant, and adhesive lined polyolefin tubing type operating temp range of –40°C to 130°C or higher. **USE RAYCHEM ES2000 OR EQUIVALENT.** Finished cable with Y-Shrink is shown in Figure 14 and Figure 14a.

Figure 14 – Finished cable with Raychem Y- Shrink.

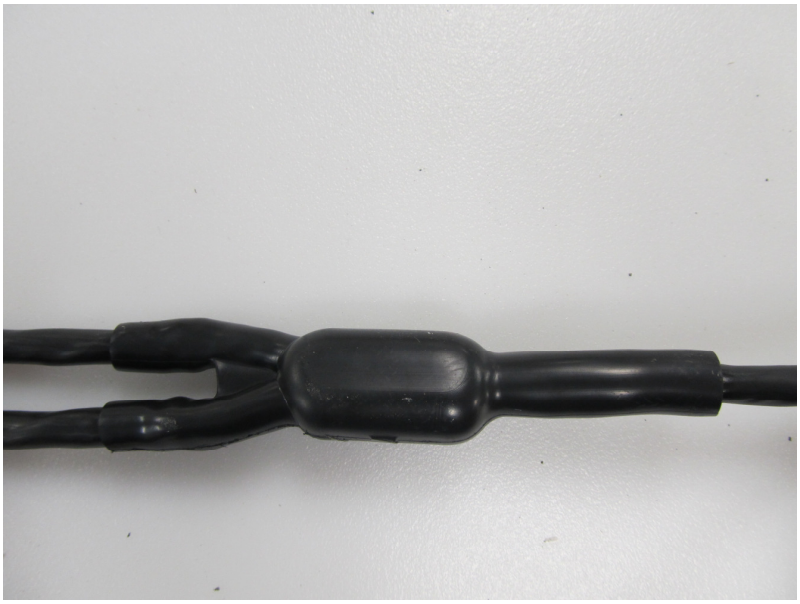


Figure 14a – Finished cable with Imeco Y-Shrink

SYM	REVISION	ECO
U	REMOVED CONVOLUTED TUBING FROM J1939 SPLICES.	ECN-021248

J1939 DRAIN WIRE AND SHIELD IMPLEMENTATION AT CONNECTOR

For the connector end of the cable the following drain and shield procedures are to be applied.

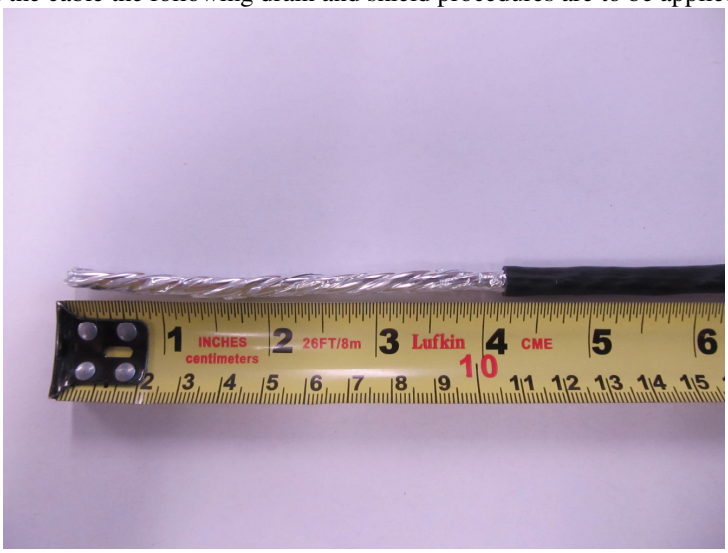


Figure 16 – Remove 4 ⅛ inches of the cable jacket

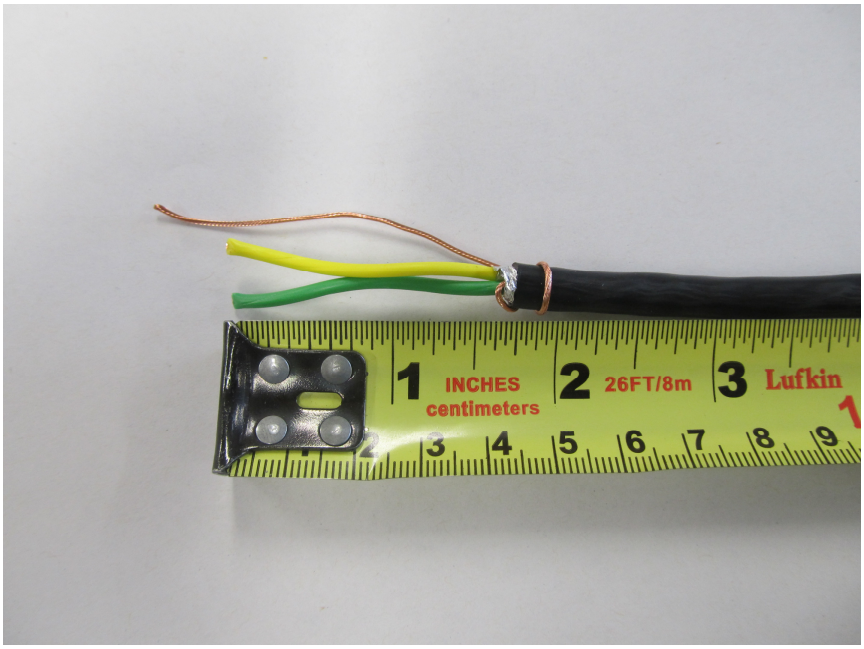


Figure 17 – Cut yellow and green wire to 1 ¾ inches. Wrapped the drain wire around cable jacket and over top itself

	NAME	DATE	TITLE: SPEC-BODY HARNESS	
DRAWN	T.J.M.	06-JUN-13	NEW FLYER	PART NO. 220140 (MS WORD)
CHK'D				
APP'D				
SCALE: NTS			DWG SIZE: A	SHEET 10 OF 19

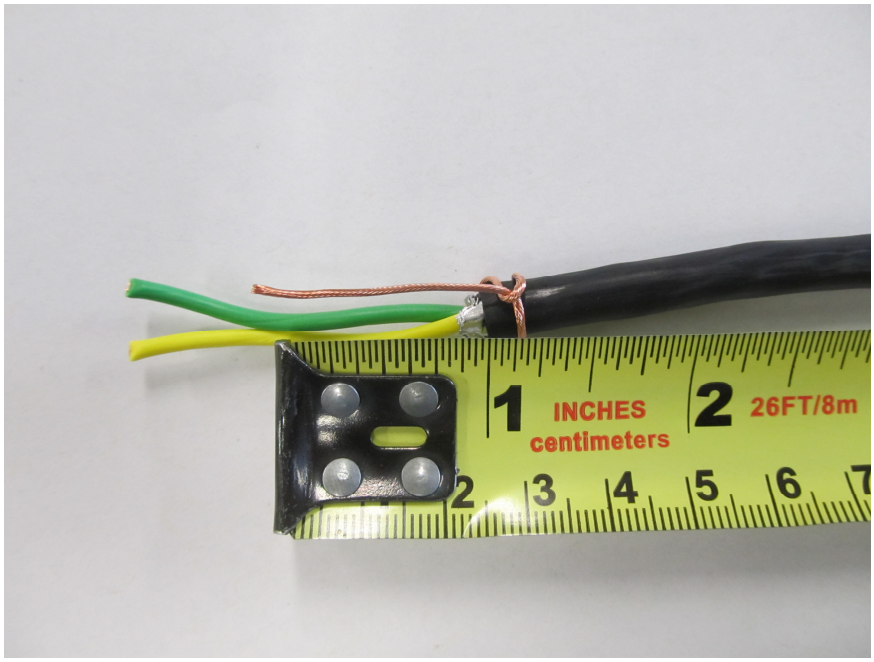
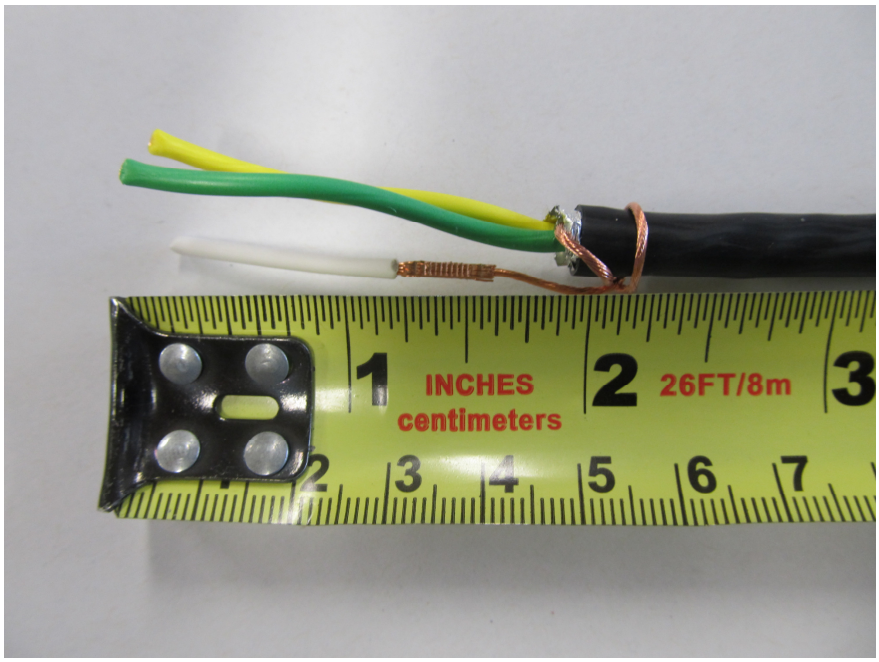


Figure 18 – Trim drain wire to 1 inch length



Figures 19 – Ultrasonic splice the white color wire at trimmed drain wire as total length reaches 2 inches

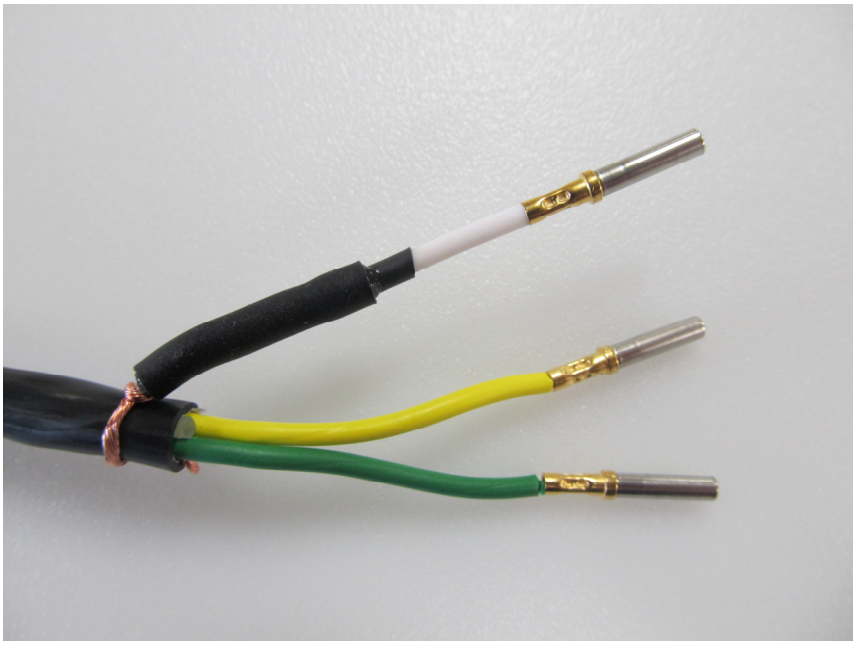


Figure 20 – Crimp terminals at end of yellow, green, and white wires and cover splice with shrink

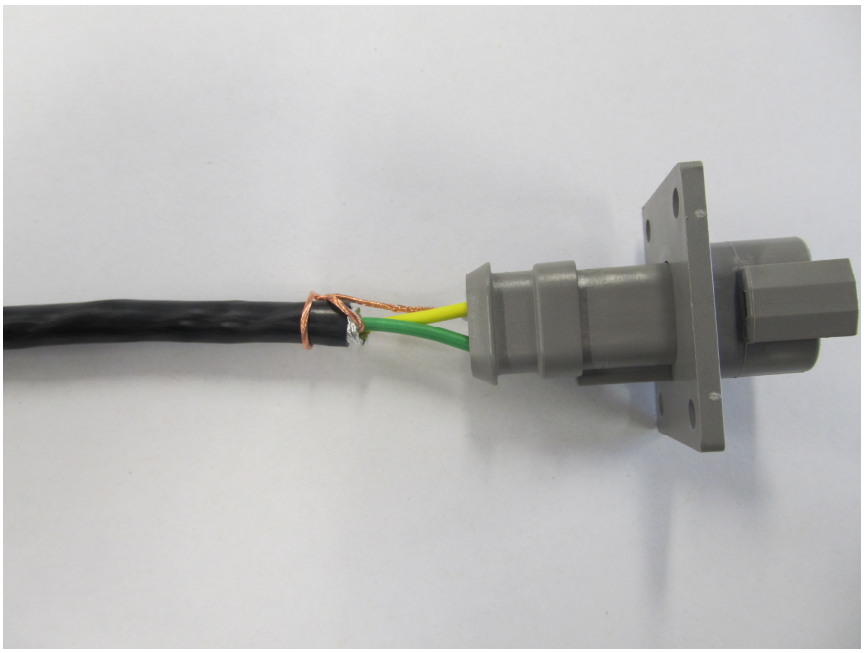


Figure 21 – Apply 3-way connector

In the figure 22, the foil is shown being wrapped around the cable to the connector. The foil is to extend minimum of ½ inch past the wrapped drain wire and is to come right up to the connector.

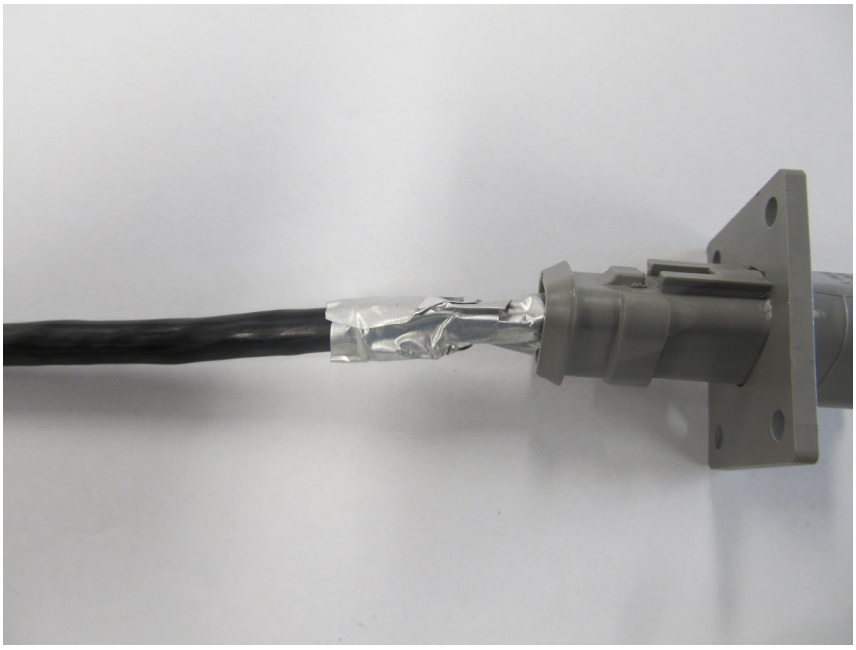


Figure 22 – Foil wrapped around cable

Figure 23 – Cut heat shrinking tube to 2 ¼ inches

Heat shrink tubing must be applied to cover finished cable assembly and extend over loading end of Deutsch connector as shown in figure 24. Heat shrink tubing must be flame retardant, and adhesive lined polyolefin tubing type operating temp range of –40°C to 130°C or higher.

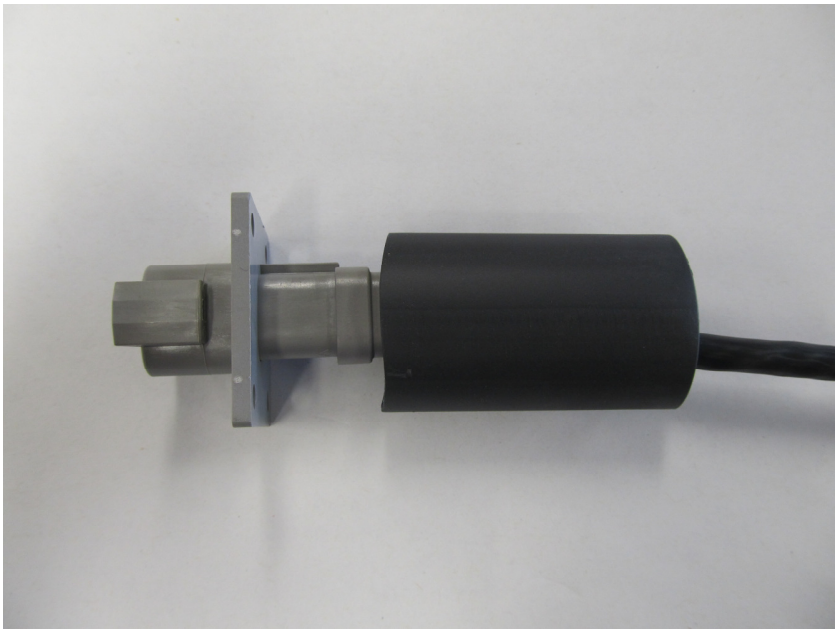


Figure 24 – Apply heat shrink tube right up to the shrink boot adapter on connector

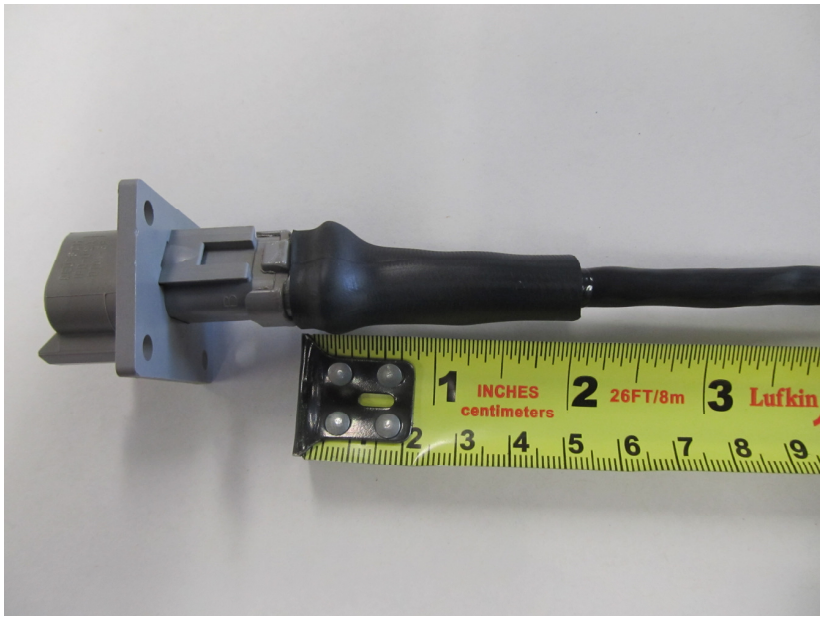


Figure 25 – Finished 3-way connector assembly

APPLYING RAYCHEM SOLDER SLEEVE SPLICES

SolderSleeve is a one-step terminator that can provide electrical termination in a variety of applications. The SolderSleeve is a precisely engineered fluxed solder preform within a heat shrinkable thermoplastic sleeve. The transparent insulation makes inspection easy.

Figure 26 – A Raychem CWT-9002 SolderSleeve

Recommended Heat Application Tools:

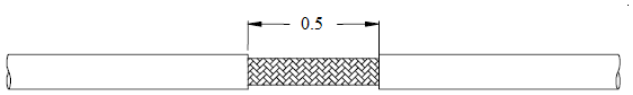
- Steinel HL-1802 Hot-Air Gun
- CV-5300 Hot-Ai Gun
- CV-5000 Thermogun
- AA-400 Superheater
- IR-550 Mark II Infrared Heating Tool
- MiniRay Infrared Heating Tool
- Process Belt Heaters
- Holding Fixture AD-1319

*Equivalent tools may be used.

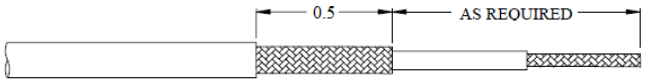
SHIELD TERMINATION

Cable Preparation

1. Remove length specified from the cable jacket at the point where the termination is to be made.

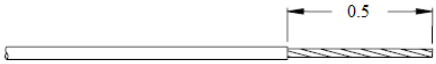


Center Stripped



End Stripped

2. Remove length specified of insulation from the end of the ground lead. (If part has pre-installed lead, omit this step.)



3. Position the one-step SolderSleeve terminator so that the solder perform is centered over the exposed shield.
4. Place the assembly centrally in the reflector.
5. Heat solder perform until it melts and forms a fillet between the lead and the shield.

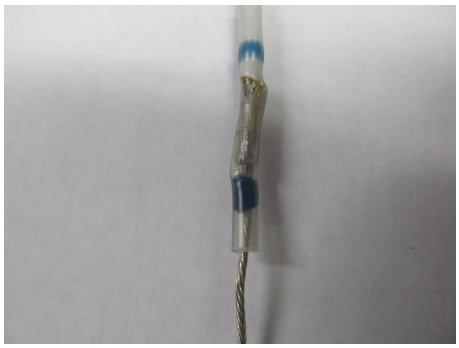
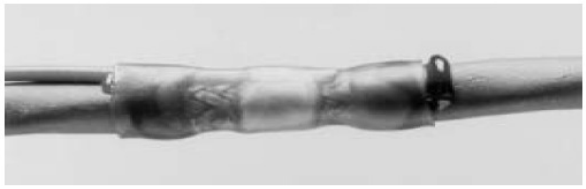


Figure 27 – A completed drain wire splice

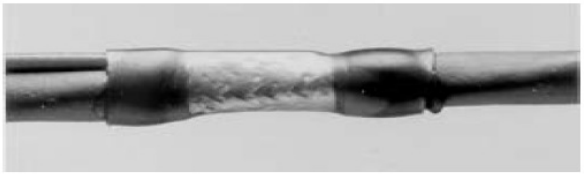
SYM	REVISION	ECO
U	REMOVED CONVOLUTED TUBING FROM J1939 SPLICES.	ECN-021248

INSPECTION

Positioning: The ground lead conductor should overlap by at least 0.375".
Heating: The solder ring shape should not be visible and a solder fillet, of at least 0.188" long should be visible on one side of the lead. Lack of a solder fillet may indicate overheating.
Damage: The sleeve should not be split or cut and no wire strands should poke through the sleeve.



***Unacceptable**:* Insufficient heat.
Contour of solder perform is visible.



***Acceptable**:* Fillet is clearly visible between the lead and shield.

Figure 28 – Inspection of cable splice

WIRE TO WIRE IN-LINE SPLICES

Wire Preparation

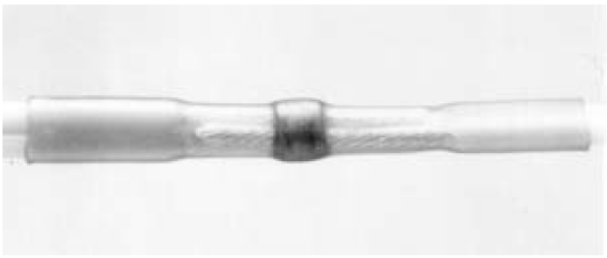
1. Wires from up to 18 AWG (1.5mm^2) having 19 or fewer strands: Remove 9.5 (.375) of insulation from all wires to be spliced.

2. All other wires: Remove 12.5 (.500) of insulation and pre-tin the exposed conductors with solder.

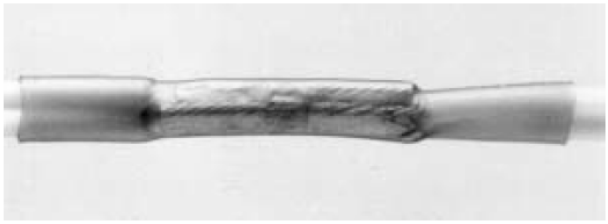
	NAME	DATE	TITLE: SPEC-BODY HARNESS	
DRAWN	T.J.M.	06-JUN-13	NEW FLYER	PART NO. 220140 (MS WORD)
CHK'D				
APP'D				
SCALE: NTS		DWG SIZE: A		SHEET 17 OF 19

Assembly

1. Overlap the exposed conductors and position the one-step terminators so that the solder preform is centered over the conductors. *For small gauge wires (18AWG and smaller) secure the 2 wire ends by twisting them together. Align carefully the strands in order to avoid any poking through the sleeve.
2. Slide the sleeve over the splice area and center the preform of the sleeve at the center of the splice length.
3. Heat the solder until it melts to form a fillet between the conductors.



Unacceptable: Insufficient heat.
Contour of solder perform is visible.



Acceptable: Solder has lost all appearance of ring shape.
There is a definite fillet visible along the wire interface.

Figure 29 – Inspection of in-line splice.

APPLYING ADHESIVE HEAT SHRINK TUBING OVER SOLDER SLEEVE

After solder sleeve is applied, apply an additional adhesive shrink tube over the splice to ensure the splice is protected from moisture.

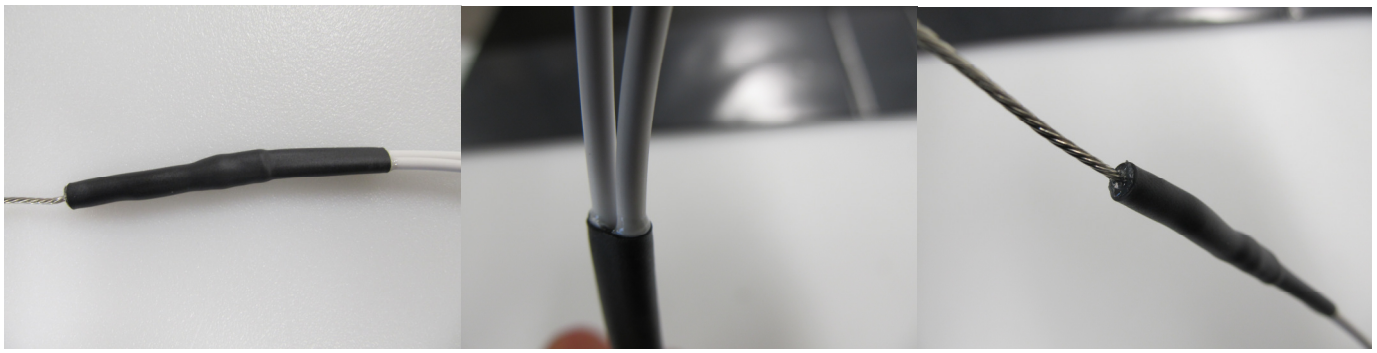
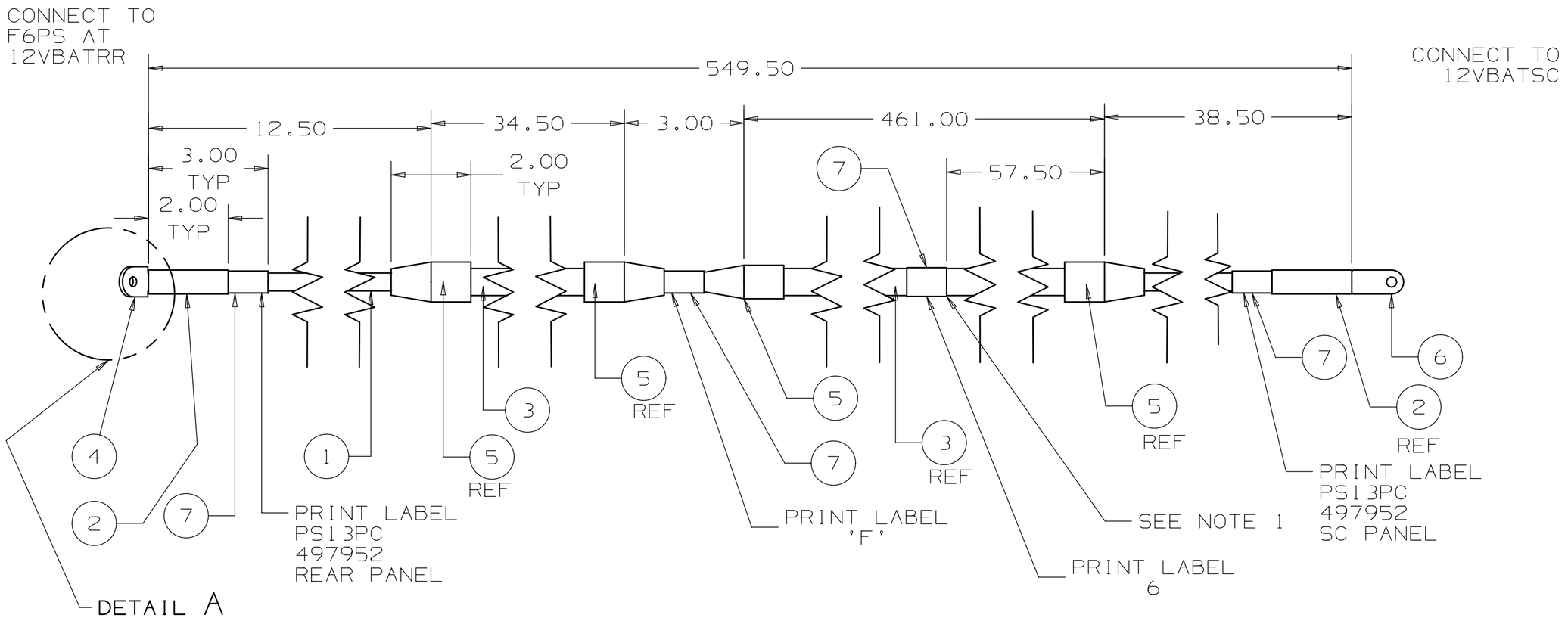
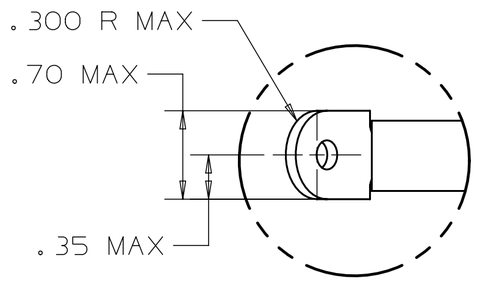


Figure 30 – A completed splice with additional adhesive shrink tube applied.

NOTE: FOR INSTALLATION DRAWINGS PLEASE REFER TO ATTACHED MRP BOM SHEET FOR PARTS LISTING





DETAIL A

IF TERMINALS REQUIRE MODIFICATION,
RE-TINNING IS REQUIRED

NOTE:

1. NUMBER '6' TO BE BOLD
0.15 MAXIMUM HEIGHT,
UNLESS OTHERWISE NOTED

STANDARD NOTES:

ALL CABLES MUST BE BUILT TO CONFORM WITH SPECIFICATION REQUIREMENTS OF SAE RECOMMENDED PRACTICE J1127, J1128, J1292 CRIMPED TERMINALS SHALL MEET THE PULL TEST REQUIREMENTS OF SAE J1742

USE ELECTRICAL TAPE AT LOOM ENDS, MIN. TWO WRAPS ENSURE STRIPPED PORTION OF CABLE IS INSERTED INTO FULL LENGTH OF TERMINAL

QTY	U/M	ITEM	PART NO.	DESCRIPTION	WEIGHT
4	EA	7	8112067	MARKER-WRITE ON	-
1	EA	6	8110711	TERM-R 1/4 2AWG NIN	-
0.120	EA	5	5962260	TAPE-ELECTRICAL, .75 WIDE	-
1	EA	4	259626	TERM-R1/4 2AWG 45 DEG	-
41.30	FT	3	129928	TUBE CONVOL .50 SPLIT	-
0.400	FT	2	117201	TUBING-HEATSHRINK .5BL	-
45.80	FT	1	037514	WIRE-2 AWG BLK	-

DO NOT SCALE DRAWING		
DIMENSIONS IN [ ] ARE IN m.m.		
THD ANGLE		
BY	NAME	DD-MMM-YY
DRAWN	V.R.V.	13-NOV-12
CHK'D		
APP'D		

REV	DESCRIPTION	ECO
A	RELEASED TO PRODUCTION	ECN-013075

MATERIAL N/A	UNSPEC'D TOLS.	DEC.IN.
	.X	±.12
	.XX	±.06
	.XXX	±.03
	HOLE DIA.	±.015
	BEND RADII.	±.03
	ANGLE TOL.	±1°
WEIGHT N/A		
TREATMENT NOT REQUIRED	SIMILAR TO -	

TITLE

PS13PC-12V PWR TO SC

NEW FLYER

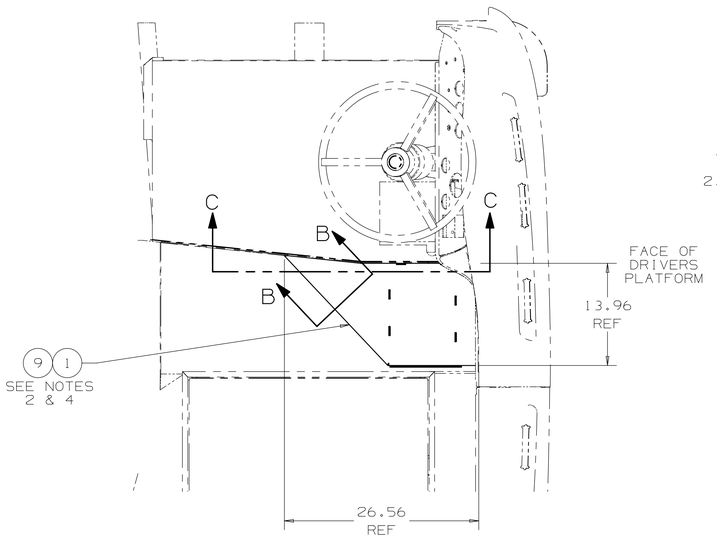
PART Nº 497952 (NX)

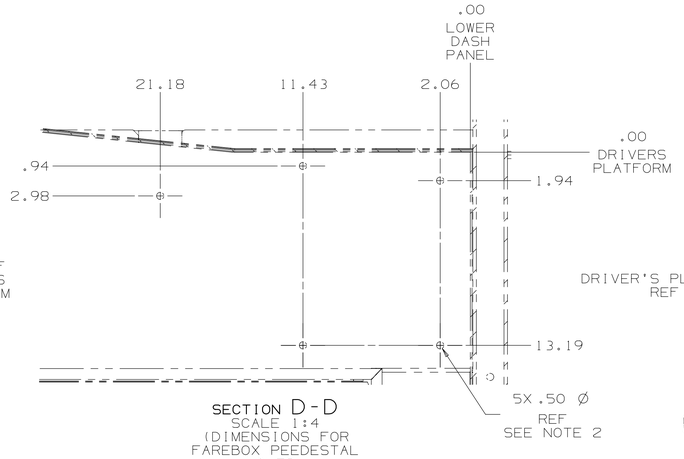
SCALE NTS | C | SHEET 1 OF 1

REPORT ALL ERRORS TO ENG. DEPT.

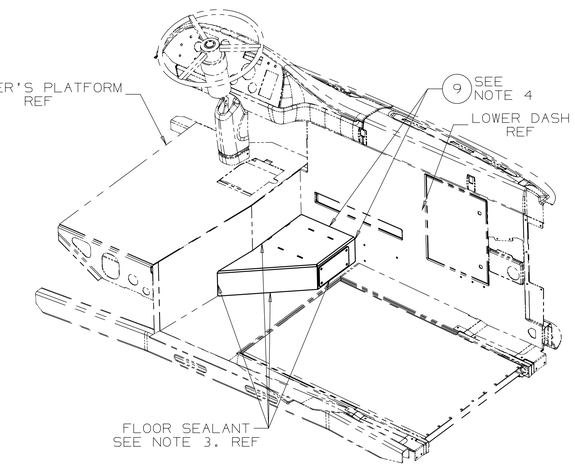
NOTE: FOR INSTALLATION DRAWINGS PLEASE REFER TO ATTACHED MRP BOM SHEET FOR PARTS LISTING

DRAWING Nº
563139

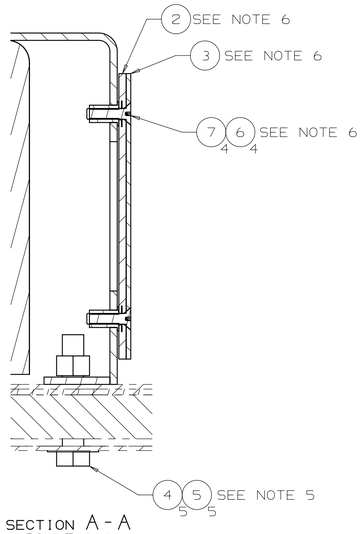




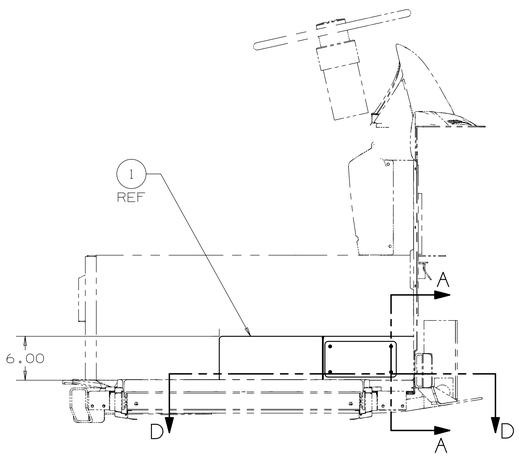
SECTION D-D
SCALE 1:4
(DIMENSIONS FOR FAREBOX PEEDESTAL HOLES)

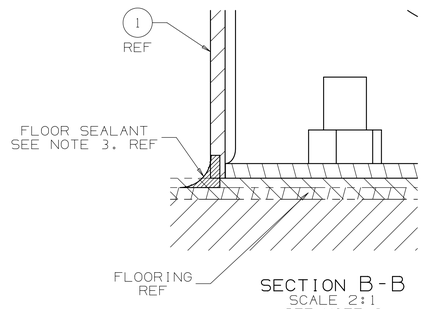


ISOMETRIC VIEW
(REFERENCE ONLY)

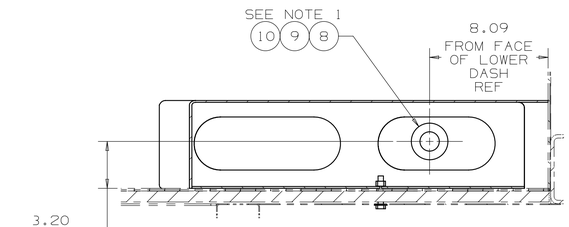


SECTION A-A
SCALE 1:1





SECTION B-B
SCALE 2:1
SEE NOTE 3
TYP
ROTATED 43.3°



SECTION C-C
SCALE 1:4

NOTES:

1) KNOCKOUT 2.00 Ø HOLE THRU SIDE OF DRIVER'S PLATFORM AS SHOWN IN SECTION C-C(KNOCKOUT PROVIDED IN STRUCTURE PANEL). RE-DRILL THE HOLE IN THE RUBBER FLOORING ONLY TO 2.56 Ø, TO ALLOW FOR GROMMET (ITEM 8) TO SIT FLUSH ON THE SIDE OF THE DRIVER'S PLATFORM. ROUTE EXISTING FAREBOX HARNESSES THRU GROMMET THEN SEAL WITH BLACK SIKA (ITEM 9) & BUTYL TAPE (ITEM 10).

2. BUTT THE WELDED PEDESTAL ASSY (ITEM 1) TO THE DASH PANEL AND THE DRIVER'S PLATFORM. DRILL HOLES AT .500 DIA IN FLOOR (SEE SECTION D-D).

3. USE FLOOR SEALANT FROM OPTION GROUP 450-XXXXC LINE ITEM 26 TO SEAL PEDESTAL ASSY (ITEM 1) TO FLOOR AND DRIVER'S PLATFORM. TOOL SEALANT TO CREATE A SMOOTH RADIUS AS SHOWN IN SECTION B-B. ENSURE THE GAP BETWEEN PEDESTAL AND FLOOR IS COMPLETELY FILLED.

4. USE BLACK ADHESIVE (ITEM 9) ON VERTICAL EDGE AND TOP HORIZONTAL EDGE OF PEDESTAL TO SEAL PEDESTAL TO DASH PANEL.

5. APPLY 1 TO 2 DROPS OF LOCTITE (ITEM 11) TO THREADS OF HARDWARE. IF HARDWARE IS ALREADY SUPPLIED WITH LOCTITE, NO LOCTITE WILL BE REQUIRED. IF HARDWARE IS LOOSENED FOR ADJUSTMENTS, RE-APPLY NEW LOCTITE TO THREADS OF HARDWARE.

6. APPLY GASKET (ITEM 2) TO ACCESS PLATE (ITEM 3). PLACE PUSHNUT (ITEM 6) ON SCREWS (ITEM 7) BEFORE INSTALLING. TIGHTEN PLATE (ITEM 3) DOWN, SLIGHTLY COMPRESSING GASKET (ITEM 2).

DESIGN REFERENCE:

- XCELSIOR FAREBOX PEDESTAL DESIGN
- 6.00" HIGH PEDESTAL.
- BLACK METAL JACKET COATING.
- NO FAREBOX MOUNTING PROVISIONS
- STAINLESS STEEL PEDESTAL ASSEMBLY
- WITH SST WELD NUTS FOR MOUNTING FROM UNDERSIDE OF COACH
- WHEELCHAIR BOX TEST COMPLIANT.

QTY	U/M	ITEM	PART NO.	DESCRIPTION	WEIGHT
0.010	EA	11	081034	LOCTITE-243 MEDIUM 10ML	-
1	FT	10	5946376	TAPE-BUTYL .06X1.0	-
0.100	EA	9	056380	SIKA 221 BLACK UNIPAC	-
1	EA	8	006569	GROMMET 2.0 X 1.38	-
4	EA	7	10S00012BK	SCREW-MACH FHC NO.10UNC X 0.75	-
4	EA	6	047001	PUSHNUT-NO. 10 NOM	-
5	EA	5	50W06000	WASHER FLAT SS 3/8 NOM	-
5	EA	4	20B06032	BOLT-HEX SST 3/8UNC 2.00	-
1	EA	3	563372	PLATE-FRBX PEDESTAL ACCESS	1.04 LBS
1	EA	2	569166	GASKET-FRBX PEDESTAL	0.26 LBS
1	EA	1	563140	ASSY-FAREBOX PEDESTAL	25.80 LBS

DO NOT SCALE DRAWING			
DIMENSIONS IN [ ] ARE IN m.m.			
THD ANGLE			
DRAWN BY			
REUBEN HOOGERDIJK			
DATE (DD-MMM-YY)	A	RELEASE TO PRODUCTION	ECN-040042
03-SEP-14	REV	DESCRIPTION	ECO

MATERIAL N/A

WEIGHT TBD

TREATMENT NONE

UNSPEC'D TOLS. DEC.IN.
.X ±.12
.XX ±.06
.XXX ±.03
HOLE DIA. ±.015
BEND RADII. ±.03
ANGLE TOL. ±1°

SIMILAR TO

TITLE
INSTL-FAREBOX PEDESTAL

NEW FLYER

PART Nº
563139
(NX)

SCALE 1:12 | E | SHEET 1 OF 1

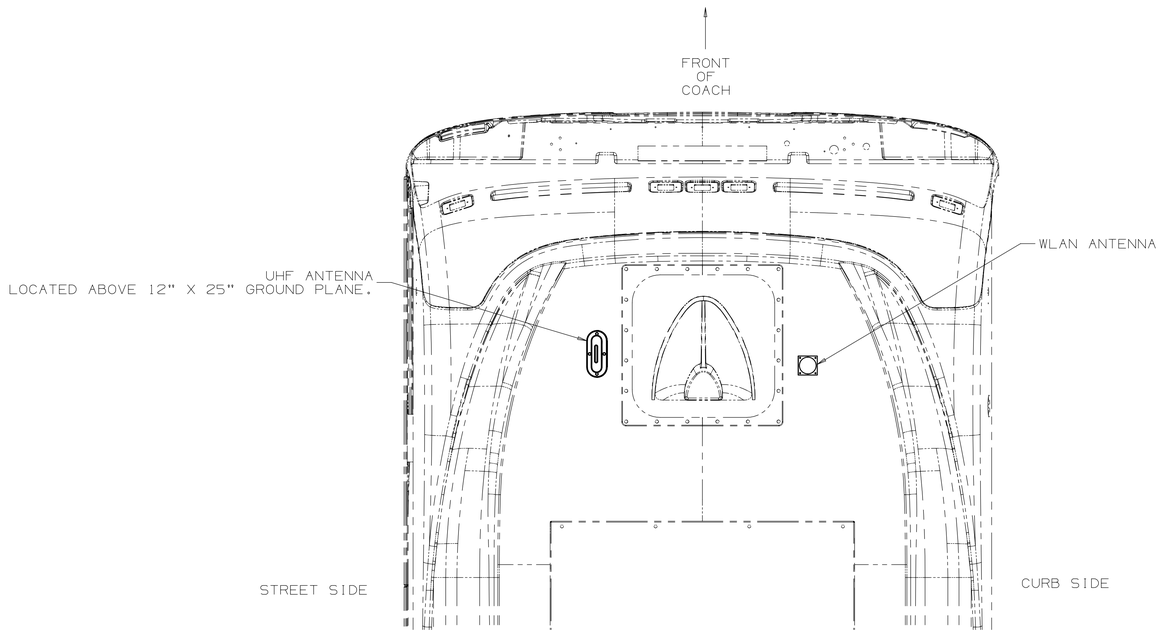
REPORT ALL ERRORS TO ENG. DEPT.

NOTE: FOR INSTALLATION DRAWINGS PLEASE REFER TO ATTACHED MRP BOM SHEET FOR PARTS LISTING

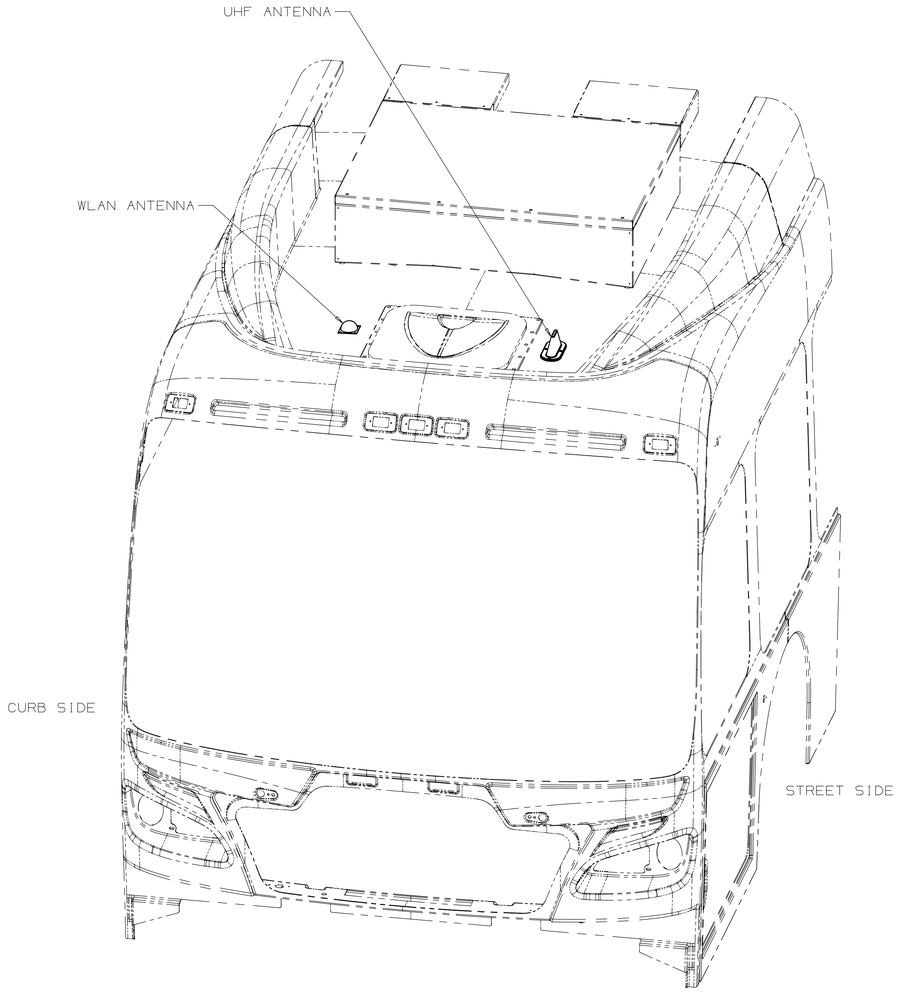
DRAWING Nº
456075

XD AND XDE BUSES

2 ANTENNAS AT STANDARD LOCATIONS



TOP VIEW



ISOMETRIC VIEW

REFERENCE ONLY

GENERAL NOTES:

1. COMPONENTS: UHF ANTENNA.
WLAN ANTENNA

REQUIRED ANTENNA CABLES

2. ACCESS: THROUGH ACCESS PLATES IN THE DRIVERS CEILING PANEL.

3. ROUTING: THE ANTENNA CABLES CAN BE ROUTED THROUGH EITHER:

-BUSHED HOLES IN THE ROOF STRUCTURE TO THE APPLICABLE STREET SIDE, CURB SIDE AND OVERHEAD WIRE DUCT HARNESS SUPPORT ASSEMBLIES TO THE SDS AREA OR WHERE REQUIRED.

OR

-THROUGH CONTINUOUS CONDUIT FROM UNDER THE ANTENNAS.

OR

-THROUGH A COMBINATION OF THE ABOVE.

DO NOT SCALE DRAWING		
DIMENSIONS IN [ ] ARE IN m.m.		
THD ANGLE		
BY	NAME	DD-MMM-YY
DRAWN	R.K.	05-DEC-11
CHK'D		
APP'D		

REV	DESCRIPTION	ECO
A	RELEASED TO PRODUCTION	ECN-002721

MATERIAL	UNSPEC'D TOLS.	DEC.IN.
N/A	.X	±.12
-	.XX	±.06
WEIGHT	.XXX	±.03
-	HOLE DIA.	±.015
TREATMENT	BEND RADII.	±.03
NOT REQUIRED	ANGLE TOL.	±1°
-	SIMILAR TO 452005	

TITLE
APPROV-LAYOUT ANTENNA

NEW FLYER

PART Nº
456075
(NX)

SCALE 1:16 | E | SHEET 1 OF 5

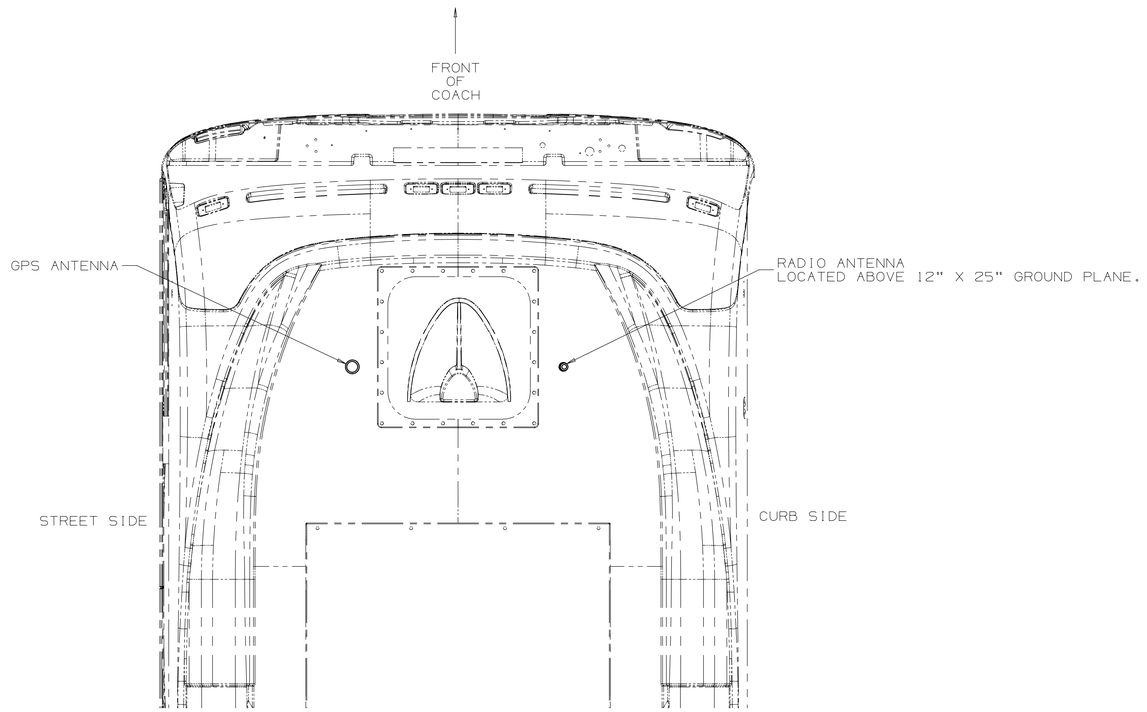
REPORT ALL ERRORS TO ENG. DEPT.

NOTE: FOR INSTALLATION DRAWINGS PLEASE REFER TO ATTACHED MRP BOM SHEET FOR PARTS LISTING

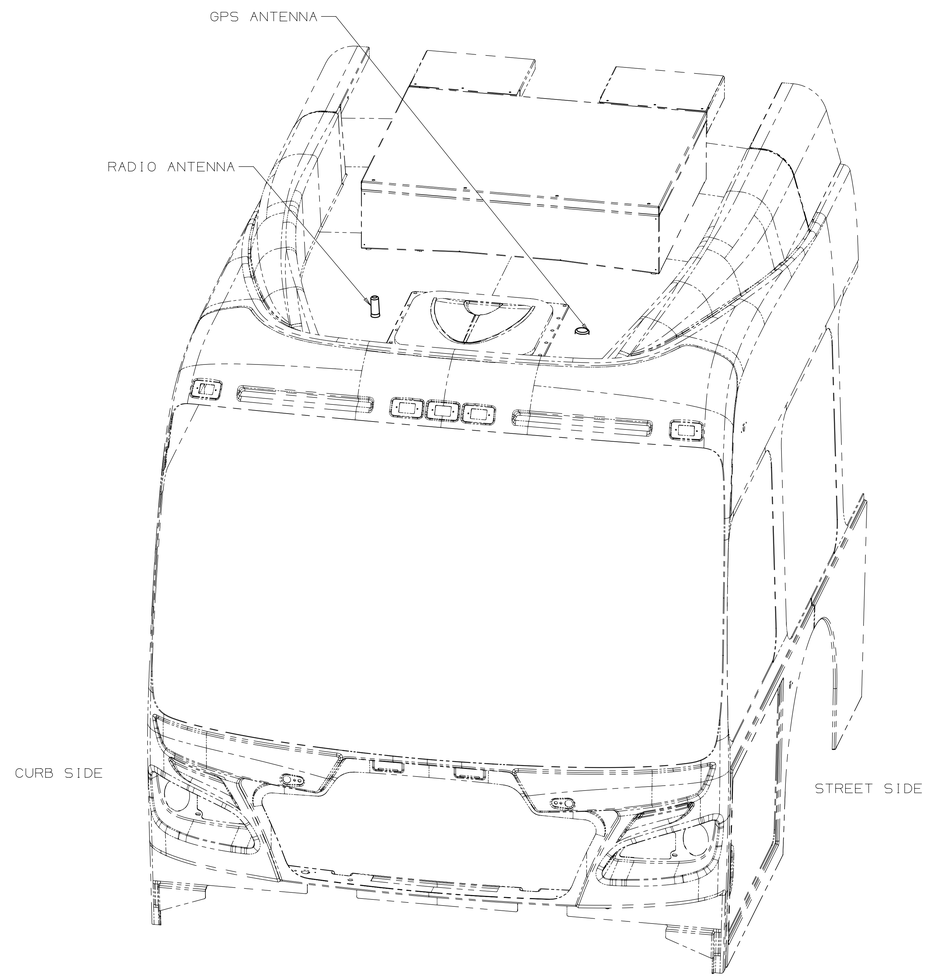
DRAWING Nº
456075

XD AND XDE BUSES

2 ANTENNAS AT STANDARD LOCATIONS



TOP VIEW



ISOMETRIC VIEW

REFERENCE ONLY

GENERAL NOTES:

1. COMPONENTS: RADIO ANTENNA
GPS ANTENNA

REQUIRED ANTENNA CABLES

2. ACCESS: THROUGH ACCESS PLATES IN THE DRIVERS CEILING PANEL.

3. ROUTING: THE ANTENNA CABLES CAN BE ROUTED THROUGH EITHER:

-BUSHED HOLES IN THE ROOF STRUCTURE TO THE APPLICABLE STREET SIDE, CURB SIDE AND OVERHEAD WIRE DUCT HARNESS SUPPORT ASSEMBLIES TO THE SDS AREA OR WHERE REQUIRED.

OR

-THROUGH CONTINUOUS CONDUIT FROM UNDER THE ANTENNAS.

OR

-THROUGH A COMBINATION OF THE ABOVE

DO NOT SCALE DRAWING		
DIMENSIONS IN [ ] ARE IN m.m.		
THD ANGLE		
BY	NAME	DD-MMM-YY
DRAWN	R.K.	05-DEC-11
CHK'D		
APP'D		

REV	DESCRIPTION	ECO
A	RELEASED TO PRODUCTION	ECN-002721

MATERIAL	UNSPEC'D TOLS.	DEC. IN.
N/A	.X	±.12
-	.XX	±.06
WEIGHT	.XXX	±.03
-	HOLE DIA.	±.015
TREATMENT	BEND RADII.	±.03
NOT REQUIRED	ANGLE TOL.	±1°
-	SIMILAR TO 452005	

TITLE
APPROV-LAYOUT ANTENNA

PART Nº
456075
(NX)

NEW FLYER

SCALE NTS | E | SHEET 2 OF 5

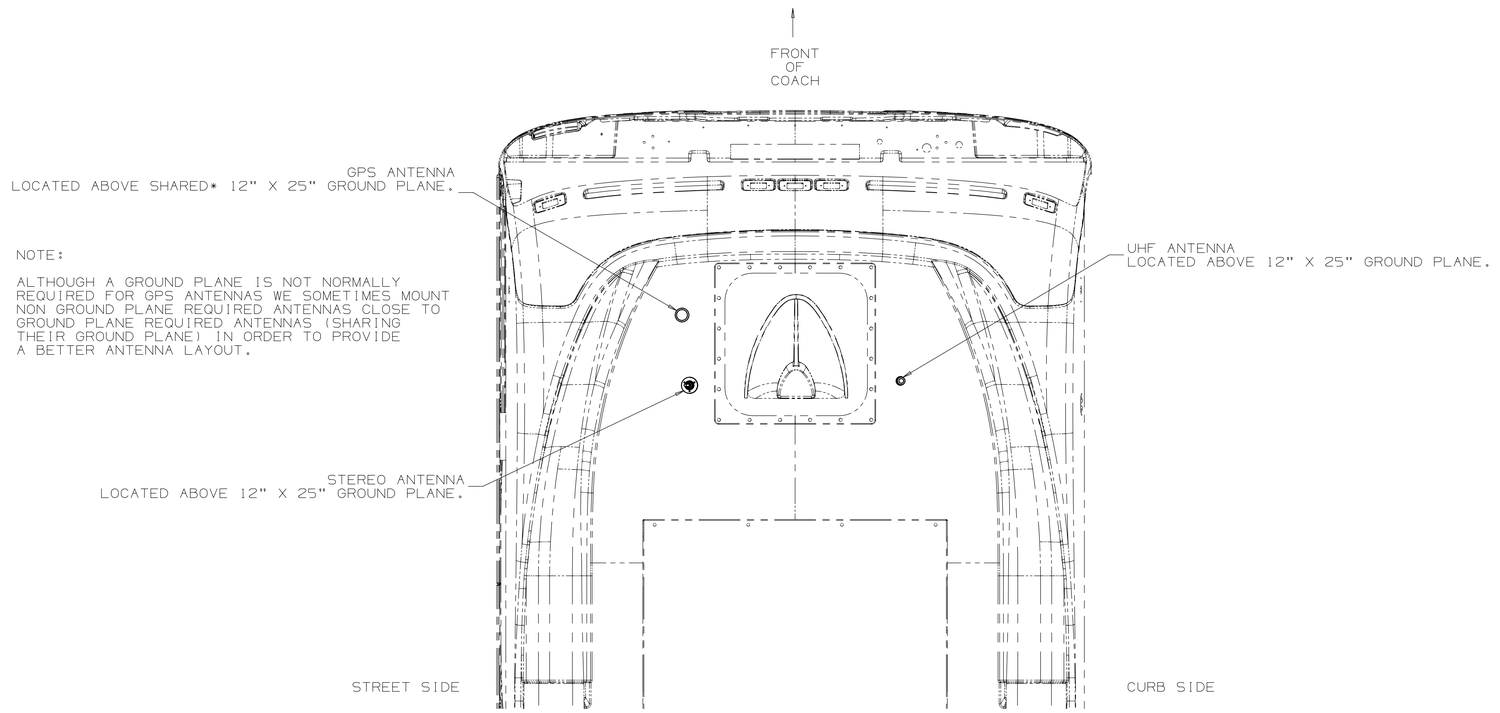
REPORT ALL ERRORS TO ENG. DEPT.

NOTE: FOR INSTALLATION DRAWINGS PLEASE REFER TO ATTACHED MRP BOM SHEET FOR PARTS LISTING

DRAWING Nº
456075

XD AND XDE BUSES

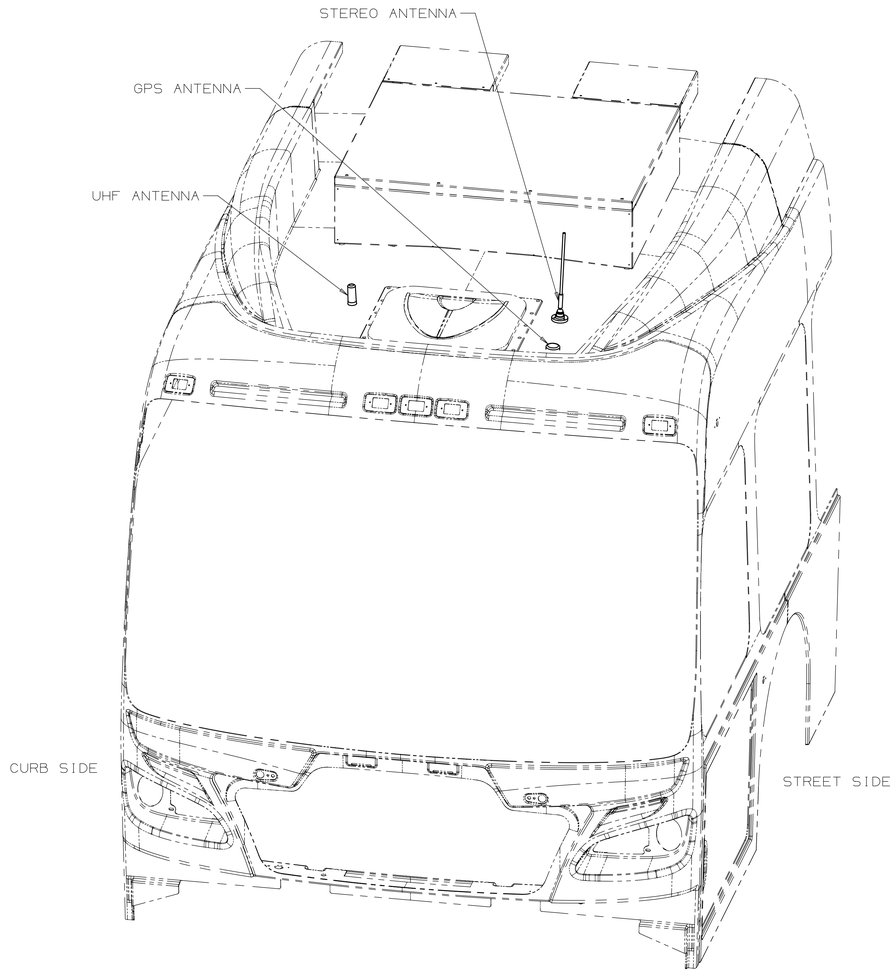
3 ANTENNAS AT STANDARD LOCATIONS



NOTE:

ALTHOUGH A GROUND PLANE IS NOT NORMALLY REQUIRED FOR GPS ANTENNAS WE SOMETIMES MOUNT NON GROUND PLANE REQUIRED ANTENNAS CLOSE TO GROUND PLANE REQUIRED ANTENNAS (SHARING THEIR GROUND PLANE) IN ORDER TO PROVIDE A BETTER ANTENNA LAYOUT.

TOP VIEW



ISOMETRIC VIEW
REFERENCE ONLY

GENERAL NOTES:

1. COMPONENTS: GPS ANTENNA
UHF RADIO ANTENNA
STEREO ANTENNA

REQUIRED ANTENNA CABLES

2. ACCESS: THROUGH ACCESS PLATES IN THE DRIVERS CEILING PANEL.

3. ROUTING: THE ANTENNA CABLES CAN BE ROUTED THROUGH EITHER:

-BUSHED HOLES IN THE ROOF STRUCTURE TO THE APPLICABLE STREET SIDE, CURB SIDE AND OVERHEAD WIRE DUCT HARNESS SUPPORT ASSEMBLIES TO THE SDS AREA OR WHERE REQUIRED.

OR

-THROUGH CONTINUOUS CONDUIT FROM UNDER THE ANTENNAS.

OR

-THROUGH A COMBINATION OF THE ABOVE.

DO NOT SCALE DRAWING		
DIMENSIONS IN ( ) ARE IN m.m.		
THD ANGLE		
BY	NAME	DD-MMM-YY
DRAWN	R.K.	05-DEC-11
CHK'D		
APP'D		

REV	DESCRIPTION	ECO
A	RELEASED TO PRODUCTION	ECN-002721

MATERIAL N/A -	UNSPEC'D TOLS.	DEC.IN.
WEIGHT -	.X .XX .XXX HOLE DIA. BEND RADII. ANGLE TOL.	±.12 ±.06 ±.03 ±.015 ±.03 ±1°
TREATMENT NOT REQUIRED -	SIMILAR TO 452005	

TITLE
APPROV-LAYOUT ANTENNA

NEW FLYER

PART Nº
456075
(NX)

SCALE NTS

E

SHEET 3 OF 5

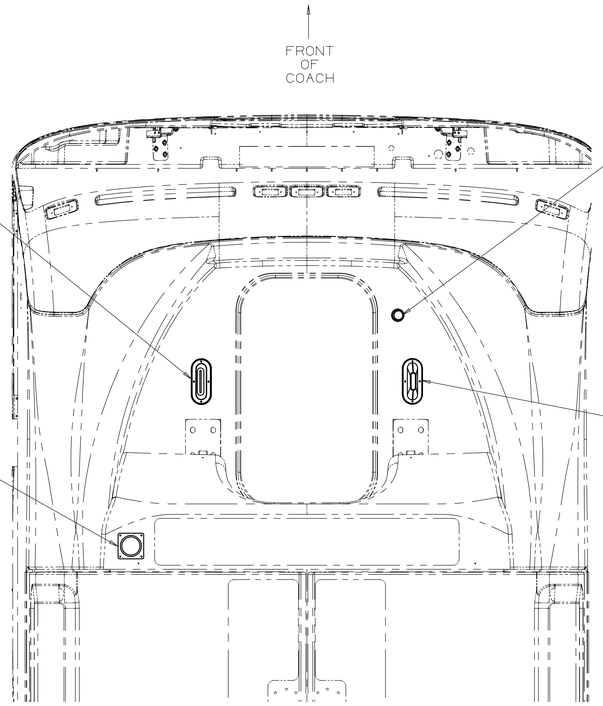
REPORT ALL ERRORS TO ENG. DEPT.

NOTE: FOR INSTALLATION DRAWINGS PLEASE REFER TO ATTACHED MRP BOM SHEET FOR PARTS LISTING

DRAWING Nº
456075

XN BUSES

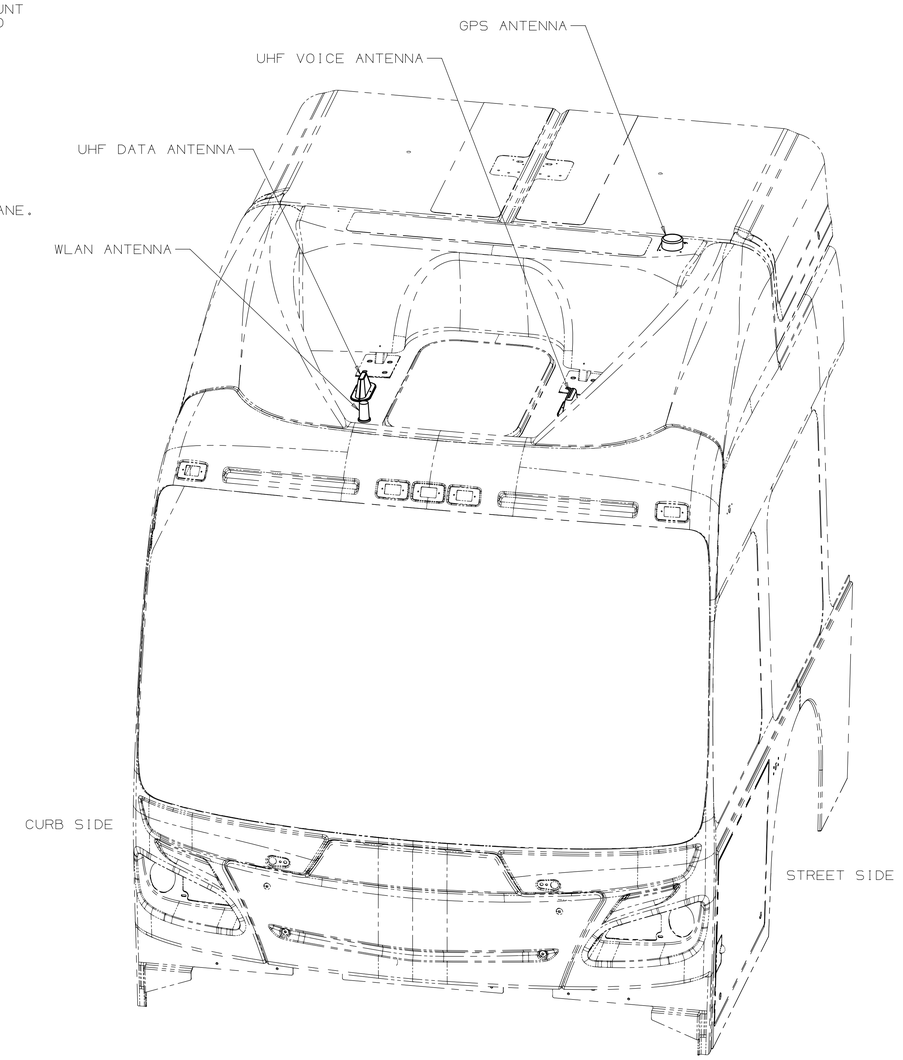
3 ANTENNAS AT STANDARD LOCATIONS AND 1 ANTENNA AT CUSTOM LOCATION



NOTE:

ALTHOUGH A GROUND PLANE IS NOT NORMALLY REQUIRED FOR WLAN ANTENNAS WE SOMETIMES MOUNT NON GROUND PLANE REQUIRED ANTENNAS CLOSE TO GROUND PLANE REQUIRED ANTENNAS (SHARING THEIR GROUND PLANE) IN ORDER TO PROVIDE A BETTER ANTENNA LAYOUT.

TOP VIEW



ISOMETRIC VIEW
REFERENCE ONLY

GENERAL NOTES:

1. COMPONENTS: GPS ANTENNA
   2 UHF ANTENNAS, 1 VOICE & 1 DATA
   WLAN ANTENNA

   ALL REQUIRED ANTENNA CABLES

2. ACCESS: THROUGH ACCESS PLATES IN THE DRIVERS CEILING PANEL.

   EXCEPT FOR THE GPS ANTENNA; IN THIS EXAMPLE THERE IS A GPS ANTENNA LOCATED AT A CUSTOM LOCATION DUE TO ANTENNA SPACING CONSTRAINTS AND THE ONLY ACCESS THAT CAN BE PROVIDED IS FROM OUTSIDE OF THE BUS THROUGH A REMOVABLE COVER ON THE ANTENNA MOUNTING PLATE.

3. ROUTING: THE ANTENNA CABLES FOR THE THREE ANTENNAS SHOW AT THE BASIC LOCATIONS CAN BE ROUTED THROUGH EITHER:

- BUSHED HOLES IN THE ROOF STRUCTURE TO THE APPLICABLE STREET SIDE, CURB SIDE AND OVERHEAD WIRE DUCT HARNESS SUPPORT ASSEMBLIES TO THE SDS AREA OR WHERE REQUIRED.

OR

- THROUGH CONTINUOUS CONDUIT FROM UNDER THE ANTENNAS.

OR

- THROUGH A COMBINATION OF THE ABOVE.

THERE IS A CUSTOM ROUTING FOR THE GPS ANTENNA:

- FROM INSIDE CRASH GUARD FAIRING, DOWN THROUGH CONTINUOUS CONDUIT TO THE SDS WIRE TRACK TOP BRACKET. OUT OF CONDUIT AND DOWN ALONG AND SECURED TO SDS WIRE RACK AND INTO SDS ENCLOSURE.

DO NOT SCALE DRAWING		
DIMENSIONS IN [ ] ARE IN m.m.		
THD ANGLE		
BY	NAME	DD-MMM-YY
DRAWN	R.K.	05-DEC-11
CHK'D		
APP'D		

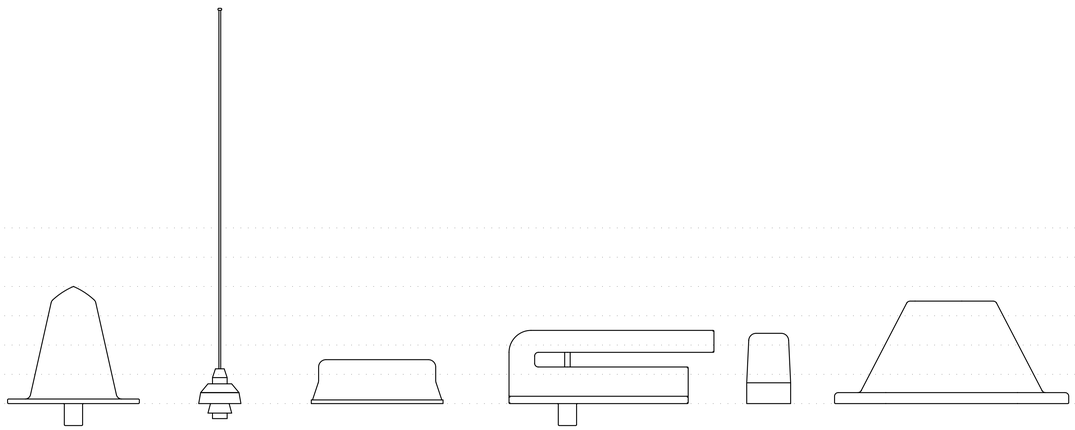
REV	DESCRIPTION	ECO
A	RELEASED TO PRODUCTION	ECN-002721

MATERIAL N/A -	UNSPEC'D TOLS. .X .XX .XXX HOLE DIA. BEND RADII. ANGLE TOL.	DEC. IN. ±.12 ±.06 ±.03 ±.015 ±.03 ±1°	TITLE APPROV-LAYOUT ANTENNA
WEIGHT -			PART Nº 456075 (NX)
TREATMENT NOT REQUIRED -	SIMILAR TO 452005		NEW FLYER
			SCALE NTS
			E SHEET 4 OF 5

REPORT ALL ERRORS TO ENG. DEPT.

NOTE: FOR INSTALLATION DRAWINGS PLEASE REFER TO ATTACHED MRP BOM SHEET FOR PARTS LISTING

DRAWING Nº
456075



ALL ANTENNAS ARE TO SCALE
LINE SPACING 1.00"

GROUND PLANE SIZE :

IN GENERAL THE GROUND PLANE'S SMALLEST SURFACE DIMENSION SHOULD BE GREATER THAN 1/2 THE WAVELENGTH OF THE OPERATING FREQUENCY. GREATER WHERE SIGNAL STRENGTH IS A CONCERN. AS A STANDARD WE US A GROUND PLANE WITH AN EFFECTIVE SIZE OF 12" X 25".

UHF VOICE AND DATA ANTENNAS :

NORMAL OPERATING FREQUENCY BETWEEN 300 AND 1000 MHZ.
A GROUND PLANE IS NORMALLY REQUIRED UNLESS MOUNTED ON METAL SURFACE.
GROUND PLANE SIZE REQUIREMENT RANGES FROM 20" X 20" (300 MHz) TO 6" X 6" (1000 MHz)
AS A RULE OF THUMB, UHF ANTENNAS REQUIRE A MINIMUM SPACING OF 36" FROM OTHER ANTENNAS. THE EXCEPTIONS BEING SOME GPS AND MOST WLAN ANTENNAS, IT DEPENDS ON THE APPLICATION AND SYSTEMS THAT THE ANTENNAS ARE SUPPORTING.

WLAN ANTENNAS :

MOST WLAN ANTENNAS OPERATE IN THE 2.4GHz TO 2.5GHz FREQUENCY RANGE AND NORMALLY DON'T REQUIRE A GROUND PLANE. THERE ARE SELDOM ISSUES WITH THEIR PLACEMENT RELATIVE TO OTHER ANTENNAS. ALTHOUGH CERTAIN TYPES OF GPS ANTENNAS (SEE BELOW) SHOULD BE LOCATED NO CLOSER THAN 30" IF POSSIBLE.

GPS ANTENNAS :

GPS ANTENNAS OPERATE ON A FREQUENCY OF 1575.42 MHz AND FOR THE MOST PART DO NOT REQUIRE GROUND PLANES.
THE GPS ANTENNAS WE COMMONLY USE CAN BE DIVIDED INTO TWO MAIN CATEGORIES. THOSE WITH THE FILTERING AND ELECTRONICS LOCATED AWAY FROM THE ANTENNA (RADIO BOX) AND THOSE WITH THE ENTIRE RECEIVER IN THE ANTENNA.
THE ANTENNAS WITH THE FILTERING AND ELECTRONICS MOUNTED AWAY FROM THE ANTENNA ITSELF HAVE FEWER PROBLEMS WHEN LOCATED NEAR EMITTING ANTENNAS.
WITH A GPS ANTENNA CONTAINING THE ENTIRE RECEIVER A TRANSMISSION FROM AN EMITTING ANTENNA THAT IS TOO CLOSE CAN BE COUPLED BACK INTO THE ELECTRONICS. BECAUSE OF THIS MANUFACTURERS RECOMMEND THAT WE PLACE THESE ANTENNAS NO CLOSER THAN 30 INCHES AWAY FROM ANY EMITTING ANTENNA. THIS IS NOT ALWAYS POSSIBLE BUT IT SHOULD BE CONSIDERED WHEN REVIEWING CUSTOMER REQUIREMENTS.

COMBO OR MULTI BAND ANTENNAS :

WE USE A NUMBER OF COMBO OR MULTI BAND ANTENNAS. ANY WHERE FROM DUAL BAND WHICH SUPPORT GPS AND WLAN FOR EXAMPLE, UP TO QUAD BAND ANTENNAS WHICH CAN SUPPORT CELLULAR, PCS, 2.4GHz, 802.11G AND GPS IN ONE ANTENNA.
THESE ANTENNAS ARE FOR THE MOST PART GOVERNED BY THE SAME CONSIDERATIONS AS NOTED FOR THE OTHER ANTENNA TYPES LISTED ABOVE. IN TERMS OF POSITIONING RELATIVE TO OTHER ANTENNAS AND GROUND PLANES THE REQUIREMENTS ARE BASED ON THE LOWEST FREQUENCY OF THE VARIOUS APPLICATIONS APPLICABLE TO THE ANTENNA IN QUESTION.
NORMALLY THERE IS A SEPARATE CABLE ASSIGNED TO EACH FUNCTION OF A MULTI BAND ANTENNA FOR EXAMPLE IN A QUAD BAND ANTTENNA THERE WOULD BE 4 (1 EA FOR GPS, PCS, CELLULAR AND WLAN)
LOCATING THESE ANTENNAS IS IMPACTED BY THE NUMBER OF CABLES AND CONNECTOR TYPES ASSOCIATED WITH EACH OF THE CABLES.

ANTENNA CABLES AND CONNECTORS :

ANTENNA CABLES ARE NORMALLY SPECIFIED BY THE EQUIPMENT (AVA/AVL, CAMERA, COMMUNICATION SYSTEM ETC) OEM. BUT AS A RULE OF THUMB, IF FOR SOME REASON WE ARE REQUIRED TO SPECIFY THE ANTENNA CABLE WE DEFAULT TO RG58U OR RG174 FOR RUNS UP TO 25'-30' BEYOND THAT WE GO TO A LOW LOSS TYPE SUCH AS LMR240. LOW LOSS CABLES ARE MORE EXPENSIVE, ARE HEAVY AND HAVE REDUCED BEND RADII. IT SHOULD BE NOTED THAT THIS IS ONLY A VERY GENERAL RECOMMENDATION AND BY NO MEANS CONSTITUTES A DEFINITIVE RULE.
CABLE CONNECTOR TYPES ARE ALSO A FACTOR, THE CABLE CONNECTORS ARE PRIMARILY DETERMINED BY THE ANTENNA AND THE DEVICE THAT THE ANTENNA SERVES. ALTHOUGH SOME ANTENNAS OFFER A VARIETY OF CONNECTOR TYPES TO CHOOSE FROM THE CHOICE IS VERY RARELY OURS. THE SIGNIFIGANCE OF THE CONNECTOR TYPE TO US IS THAT THE CONNECTOR SIZE CAN DICTATE WHERE THE ANTENNAS ARE LOCATED BY THE NATURE OF THE ROUTING CONSTRAINTS IMPOSED BY SIZE OF THE PRE-DRILLED (.88) Ø HOLES IN THE STRUCTURE TUBES AND THE CONDUIT SIZES IF REQUIRED.

DO NOT SCALE DRAWING		
DIMENSIONS IN [ ] ARE IN m.m.		
THD ANGLE		
BY	NAME	DD-MMM-YY
DRAWN	R.K.	05-DEC-11
CHK'D		
APP'D		

REV	DESCRIPTION	ECO
A	RELEASED TO PRODUCTION	ECN-002721

MATERIAL N/A -	UNSPEC'D TOLS. .X ±.12 .XX ±.06 .XXX ±.03 HOLE DIA. ±.015 BEND RADII. ±.03 ANGLE TOL. ±1°	DEC.IN.
WEIGHT -		
TREATMENT NOT REQUIRED -	SIMILAR TO 452005	

TITLE
APPROV-LAYOUT ANTENNA

NEW FLYER

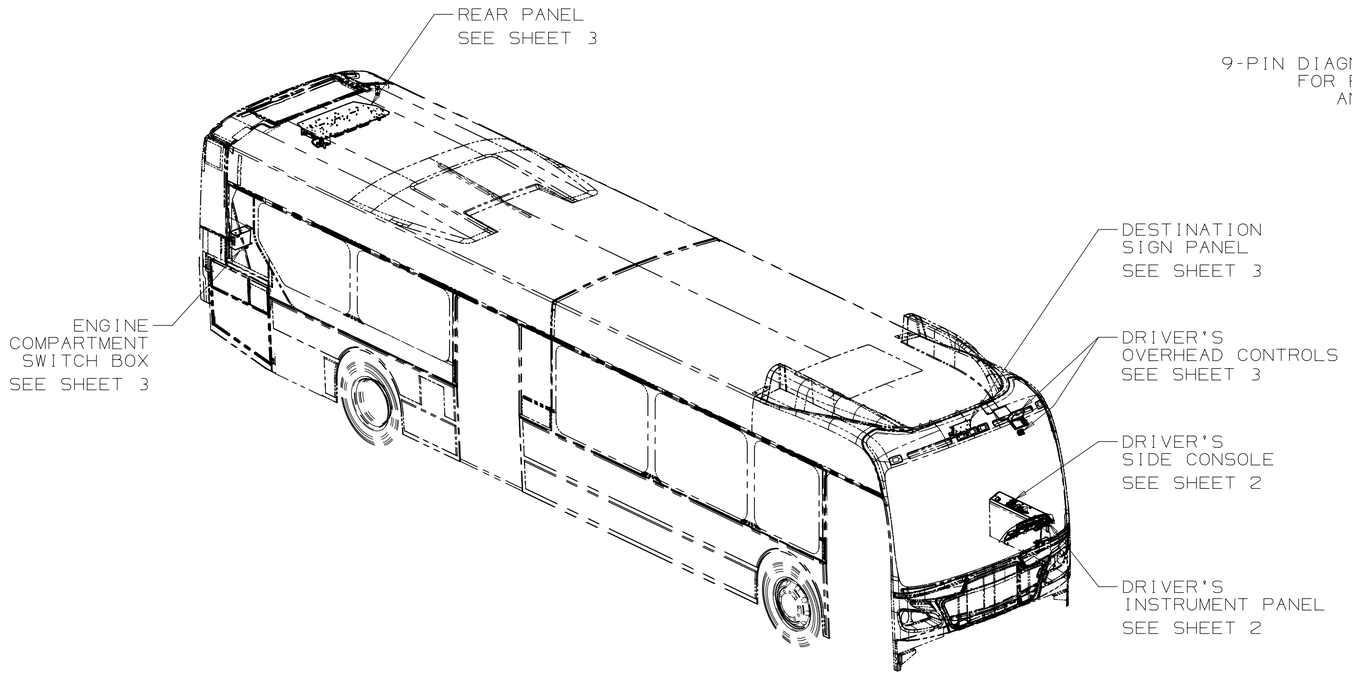
PART Nº
456075
(NX)

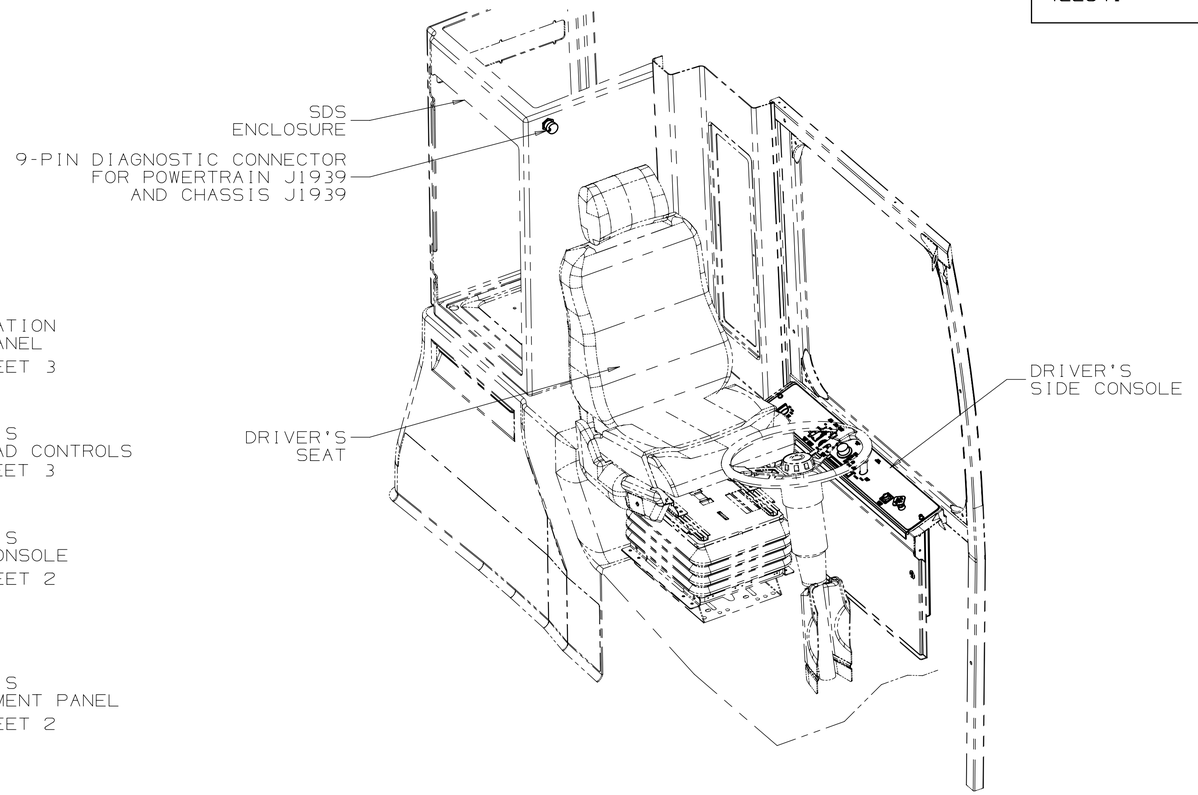
SCALE NTS | E | SHEET 5 OF 5

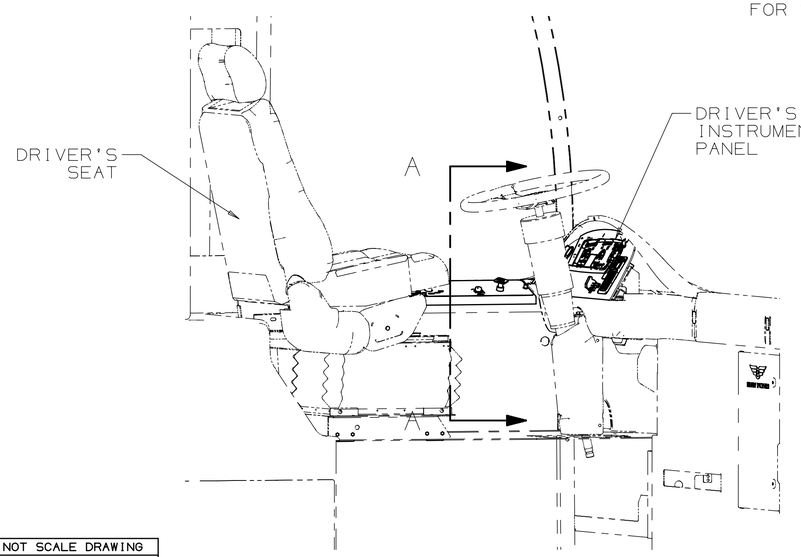
REPORT ALL ERRORS TO ENG. DEPT.

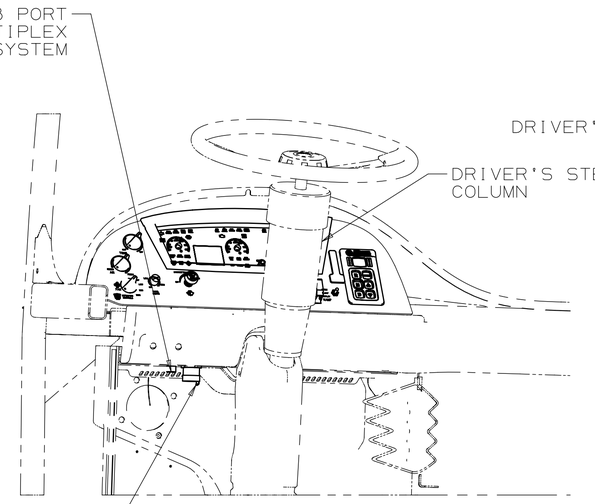
NOTE: FOR INSTALLATION DRAWINGS PLEASE REFER TO ATTACHED MRP BOM SHEET FOR PARTS LISTING

DRAWING Nº
422841

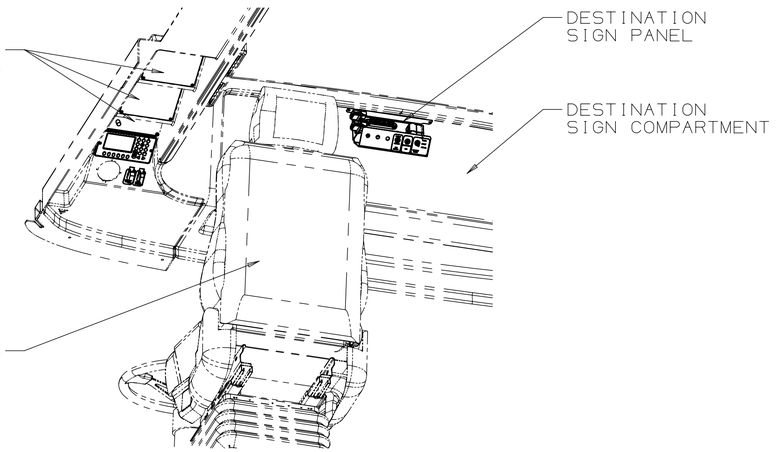








SECTION A - A



DO NOT SCALE DRAWING			
DIMENSIONS IN [ ] ARE IN m.m.			
THD ANGLE			
DRAWN BY			
JASEN FULLANTE			
DATE (DD-MMM-YY)	R	SHEETS AFFECTED (4) SHEET UNCHANGED	ECN-032646
25-FEB-14	REV	DESCRIPTION	ECO

MATERIAL N/A	UNSPEC'D TOLS.	DEC.IN.
	.X	±.12
	.XX	±.06
	.XXX	±.03
WEIGHT N/A	HOLE DIA.	±.015
	BEND RADII.	±.03
	ANGLE TOL.	±1°
TREATMENT NOT REQUIRED	SIMILAR TO -	

TITLE
APPROV-DRIVER'S CONTROL

NEW FLYER

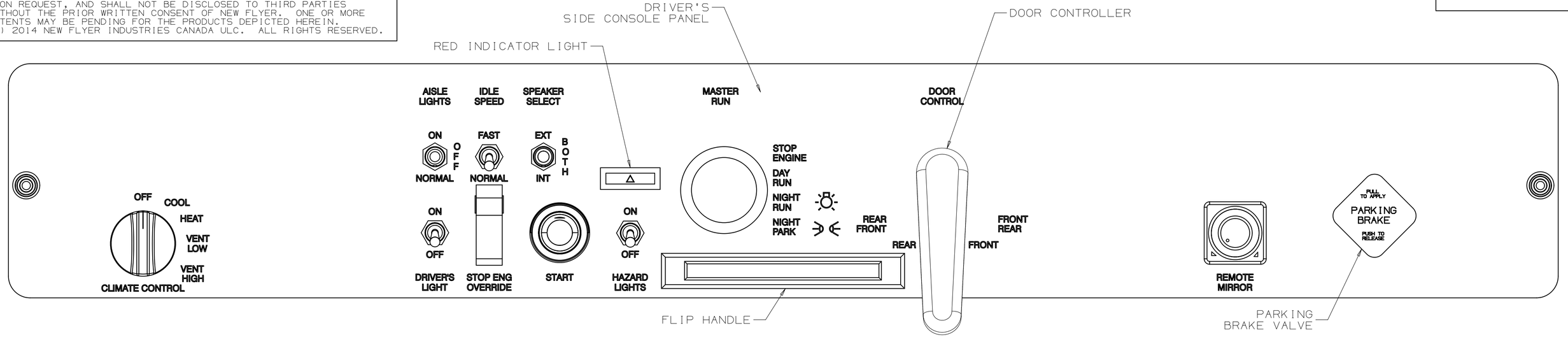
PART Nº
422841
(NX)

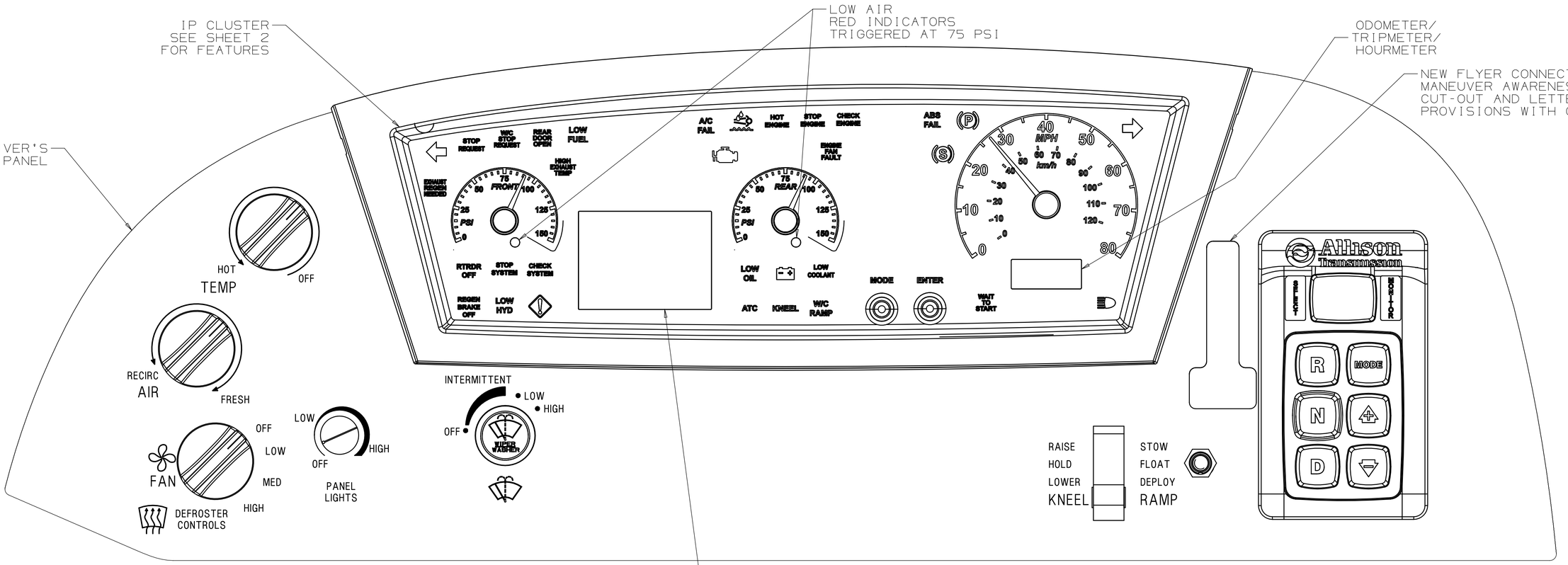
SCALE NTS | D | SHEET 1 OF 4

REPORT ALL ERRORS TO ENG. DEPT.

NOTE: FOR INSTALLATION DRAWINGS PLEASE REFER TO ATTACHED MRP BOM SHEET FOR PARTS LISTING

DRAWING N°
422841





DO NOT SCALE DRAWING		
DIMENSIONS IN [ ] ARE IN m.m.		
THD ANGLE		
DRAWN BY		
JASEN FULLANTE		
DATE (DD-MMM-YY)	R	SHEET UNCHANGED — ECN-032646
25-FEB-14	REV	DESCRIPTION — ECO

MATERIAL N/A	UNSPEC'D TOLS.	DEC.IN.
WEIGHT N/A	.X .XX .XXX HOLE DIA. BEND RADII. ANGLE TOL.	±.12 ±.06 ±.03 ±.015 ±.03 ±1°
TREATMENT NOT REQUIRED	SIMILAR TO -	

TITLE
APPROV-DRIVER'S CONTROL

NEW FLYER

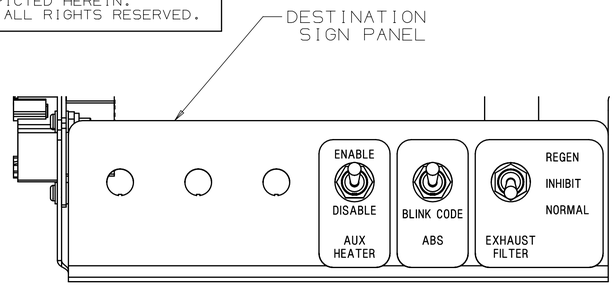
PART N°
422841
(NX)

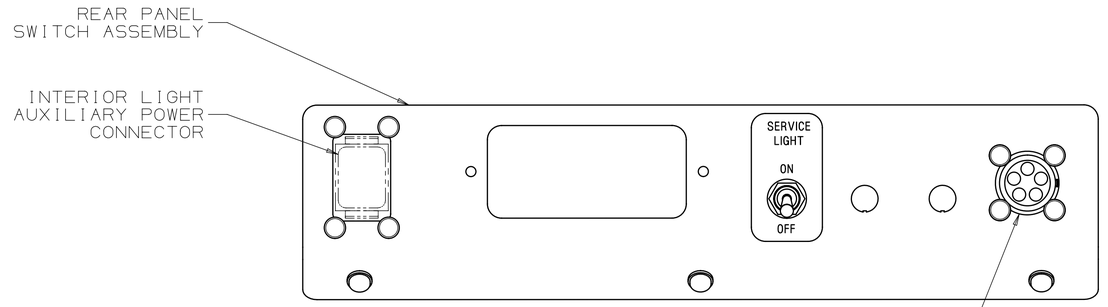
SCALE NTS | D | SHEET 2 OF 4

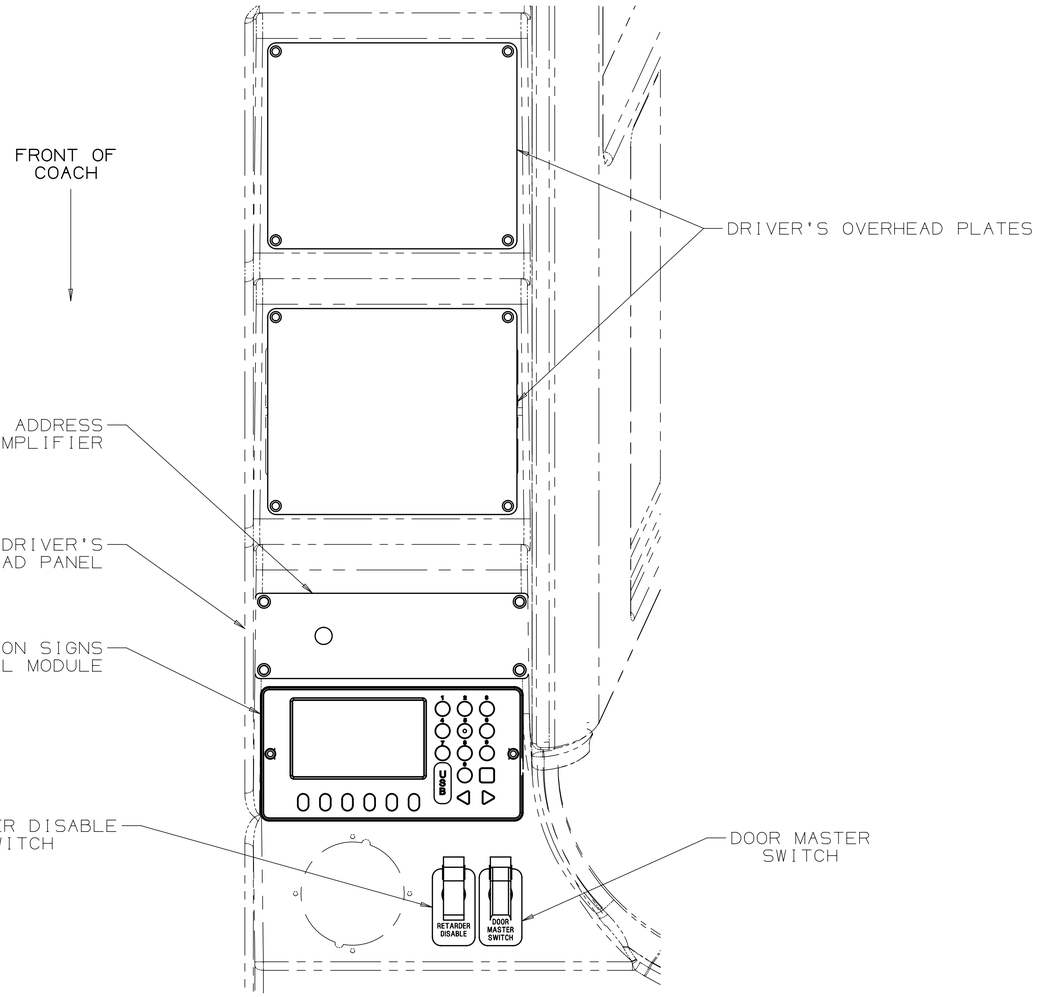
REPORT ALL ERRORS TO ENG. DEPT.

NOTE: FOR INSTALLATION DRAWINGS PLEASE REFER TO ATTACHED MRP BOM SHEET FOR PARTS LISTING

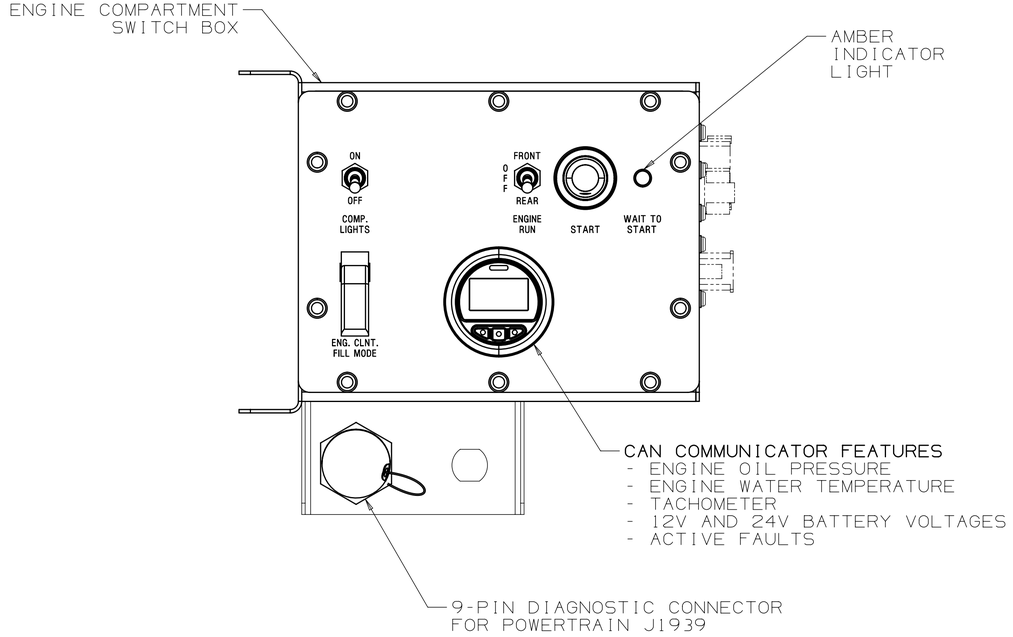
DRAWING N°
422841







VIEW LOOKING UP FROM DRIVER'S SEAT



DO NOT SCALE DRAWING	
DIMENSIONS IN [ ] ARE IN m.m.	
THD ANGLE	
DRAWN BY	JASEN FULLANTE
DATE (DD-MMM-YY)	25-FEB-14

REV	DESCRIPTION	ECO
R	SHEET UNCHANGED	ECN-032646

MATERIAL N/A	UNSPEC'D TOLS. .X ±.12, .XX ±.06, .XXX ±.03, HOLE DIA. ±.015, BEND RADII. ±.03, ANGLE TOL. ±1°	DEC. IN.	TITLE: APPROV-DRIVER'S CONTROL
WEIGHT N/A			
TREATMENT NOT REQUIRED	SIMILAR TO -		NEW FLYER
			PART N° 422841 (NX)
			SCALE NTS / D / SHEET 3 OF 4

REPORT ALL ERRORS TO ENG. DEPT.

NOTE: FOR INSTALLATION DRAWINGS PLEASE REFER TO ATTACHED MRP BOM SHEET FOR PARTS LISTING

DRAWING Nº
422841

IP CLUSTER INDICATORS

INDICATOR NAME	COLOR	BUZZER YES/NO	ENABLE/DISABLE
LEFT TURN	GREEN	CLICKER	ENABLED
EXHAUST REGEN NEEDED	AMBER	NO	ENABLED
STOP REQUEST	RED	NO	ENABLED
W/C STOP REQUEST	AMBER	NO	ENABLED
REAR DOOR OPEN	RED	NO	ENABLED
HIGH EXHAUST TEMP	AMBER	NO	ENABLED
LOW FUEL	AMBER	NO	DISABLED
A/C FAIL	RED	NO	ENABLED
MIL SYMBOL	AMBER	NO	ENABLED
LOW DEF SYMBOL	AMBER	NO	ENABLED
HOT ENGINE	RED	YES	ENABLED
STOP ENGINE	RED	YES	ENABLED
ENGINE FAN FAULT	AMBER	NO	ENABLED
CHECK ENGINE	AMBER	NO	ENABLED
ABS FAIL	AMBER	NO	ENABLED
STOP LAMPS	RED	NO	ENABLED
PARKING BRAKE	RED	NO	ENABLED
RIGHT TURN	GREEN	CLICKER	ENABLED
RTRDR OFF	RED	NO	ENABLED
REGEN BRAKE OFF	RED	NO	DISABLED
STOP SYSTEM	RED	NO	DISABLED
LOW HYD	RED	NO	DISABLED
WAIT TO START	AMBER	NO	ENABLED
HIGH BEAM	BLUE	NO	ENABLED
LOW OIL	RED	YES	ENABLED
ATC	AMBER	NO	DISABLED
LOW BATTERY	RED	NO	ENABLED
KNEEL	AMBER	NO	ENABLED
LOW COOLANT	AMBER	YES	ENABLED
W/C RAMP	RED	NO	ENABLED
CHECK SYSTEM	AMBER	NO	DISABLED
EXCLAMATION SYMBOL	ON WITH LCD INDICATOR	NO	ENABLED

IP LCD INDICATORS

INDICATOR NAME	COLOR	BUZZER YES/NO
AUX HEATER FAULT	AMBER	NO
RH HDLP FLT	AMBER	NO
RH TRN FLT	AMBER	NO
LH HDLP FLT	AMBER	NO
LH TRN FLT	AMBER	NO
STRTR LOCK OUT	AMBER	NO
KNEEL SNSR FAULT	AMBER	NO
HOT TRANS	RED	YES
CHECK TRANS	AMBER	NO
INTER LOCK	RED	NO
TAIL LAMPS FAULT	AMBER	NO
STOP LAMPS FAULT	RED	YES
EXT LAMPS FAULT	AMBER	NO
CLNT FILL MODE	RED	NO

IP LCD BAR GRAPHS

GAUGE NAME	RANGE	UNIT OF MEASURE	INDICATOR
DEF GAUGE	0-100	PERCENT	LOW DEF CLUSTER INDICATOR ACTIVATED AT 10%, FLASHING AT 5%
12V VOLTMETER	9-18	VOLTS	LOW BATTERY CLUSTER INDICATOR ACTIVATED AT 11V
24V VOLTMETER	18-36	VOLTS	LOW BATTERY CLUSTER INDICATOR ACTIVATED AT 23V

DO NOT SCALE DRAWING
DIMENSIONS IN [ ] ARE IN m.m.
THD ANGLE
DRAWN BY
JASEN FULLANTE
DATE (DD-MMM-YY)
25-FEB-14

REV	DESCRIPTION	ECO
R	IP LCD INDICATORS "BRAKE DRAG ALERT" TELLTALE REMOVED (D3)	ECN-032646

MATERIAL
N/A

WEIGHT
N/A

TREATMENT
NOT REQUIRED

UNSPEC'D TOLS.	DEC. IN.
.X	±.12
.XX	±.06
.XXX	±.03
HOLE DIA.	±.015
BEND RADII.	±.03
ANGLE TOL.	±1°

SIMILAR TO
-

TITLE
APPROV-DRIVER'S CONTROL

NEW FLYER

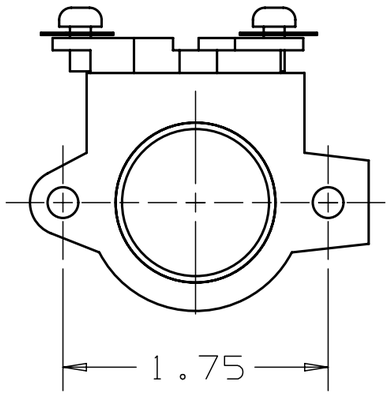
PART Nº
422841
(NX)

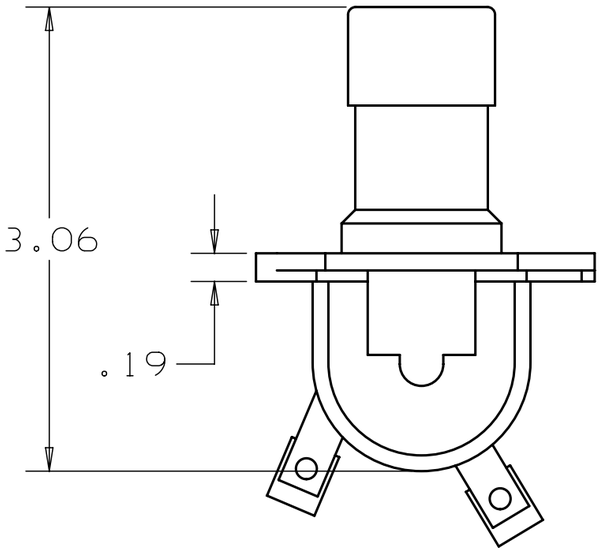
SCALE NTS | D | SHEET 4 OF 4

REPORT ALL ERRORS TO ENG. DEPT.

NOTE: FOR INSTALLATION DRAWINGS PLEASE REFER TO ATTACHED MRP BOM SHEET FOR PARTS LISTING

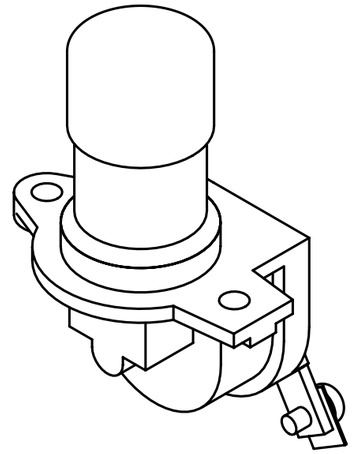
REV	DESCRIPTION	ECO
C	1) CHANGED FROM FABRICATED PART TO PURCHASE PART. 2) ADDED NOTE.	ECN-026351





DESCRIPTION: TURNSIGNAL/PA SWITCH OFF-ON, NORMALLY OFF, DEPRESS TO ON, SPRING RETURN TO OFF, 7792
HOUSING: CORROSION-RESISTANT DIECAST METAL
ISOLATORS: MOISTURE REPELLENT, ENCASED IN GREY HENCOL SEAL NO. 22
TERMINALS: TWO SCREWS

MANUFACTURER: SMARTREND
VENDOR: WESTBURNE



ISOMETRIC VIEW
REFERENCE ONLY

ALL DIMENSIONS ARE FOR REFERENCE ONLY

DO NOT SCALE DRAWING	
DIMENSIONS IN [ ] ARE IN m.m.	
THD ANGLE	
DRAWN BY	
BO HUANG	
DATE (DD-MMM-YY)	
25-SEP-13	

MATERIAL - -	UNSPEC'D TOLS.	DEC. IN.	TITLE SWITCH-FOOT, TURN SIGNAL/PA MOD
WEIGHT -	.X .XX .XXX HOLE DIA. BEND RADII. ANGLE TOL.	±.12 ±.06 ±.03 ±.015 ±.03 ±1°	NEW FLYER
TREATMENT SEE NOTE -	SIMILAR TO 5925958		PART Nº 5925959 (NX)
			SCALE 1:1 / B / SHEET 1 OF 1

REPORT ALL ERRORS TO ENG. DEPT.

NEW FLYER

XCELSIOR
BETTER BY DESIGN.

SALES INFORMATION BULLETIN

#203-002 | **Model:** Xcelsior | **Lengths:** ALL | **Propulsions:** DSL, CNG, LNG, ELEC

Front Axle and Suspension

Product Features

The front suspension system consists of the front axle with disc brakes and its brake components: air springs (bellows), height control valves, radius arm assembly, shock absorbers, axle stops and mechanical brake components. Front axle can be fitted with an anti-lock brake system (ABS). This suspension design also consists of a steering damper located in the curb-side wheel-well. Wheel parts are swivel–mounted on king-pins.

Benefits

- An estimated cost savings of $1,225 over 12 years for all disc brakes (front and rear) compared to drum brakes
- Less brake noise
- Brakes run cooler
- Larger suspension travel (4" jounce – 4" rebound) to allow for better suspension travel and a smoother ride for customers
- Drop axle allows for lower kneeling and better ramp slope

AXLE SPECIFICATIONS

Manufacturer	M.A.N.
Model Number	VOK-07F
Type	Cast iron dropped beam with hollow center section, steered, non-driven
Lubrication	M.A.N. utilizes non-serviceable, maintenance-free wheel bearings
Gross axle weight rating	15,873 lbs

Operations

Knorr Brakes

Brakes contain internal automatic adjustments.

Ride Height

Suspension travel consists of 4" jounce and 4" rebound. Ride height for the front suspension is measured between the axle beam and the rubber stop mounted to the frame of the vehicle.

Height Control Valve

The height of the air springs is controlled by height control valves on both front and rear axles. One height control valve on the front axle retains the height of the body in relation to the axle under all loading conditions. The valve has three ports (one for air supply, one for air springs and one for exhaust) and a control arm. A two degree "center dead zone" allows for minor bounces in the suspension without modifying the ride height. Barksdale Leveling Valves are standard.

Radius Arm Assemblies

The front axle is positioned at the front by four rubber bushed radius arm assemblies, which are also the reaction members of the driving, braking and cornering forces from the road to the bus understructure. The radius rods have been specially designed for reduced axle noise.

Shock Absorbers

The two KONI front shock absorbers are a double-acting, telescoping type and consist of a piston assembly, a piston rod, a compression head assembly, an inner cylinder, an intermediate cylinder, a dust tube, and a rod seal.

Axle Stops

Elastomeric axle stops are provided between the axle and frame on each side of the axles to prevent axle and/or frame damage in severe bounce conditions and to allow emergency operation of the vehicle if one or more air bellows are deflated. Front axle stops are incorporated internally in the front air spring/bellows.

NEW FLYER

XCELSIOR
BETTER BY DESIGN.

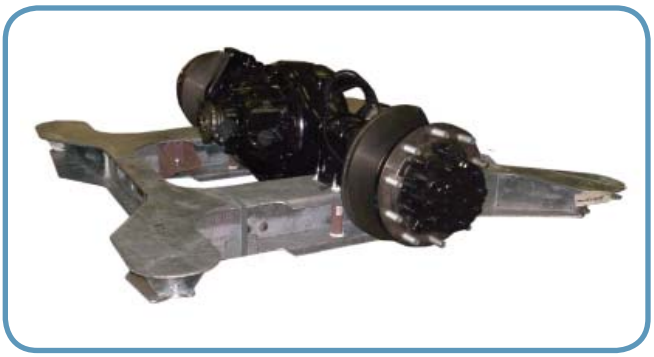
SALES INFORMATION BULLETIN

#204-002 | **Model:** Xcelsior | **Lengths:** 35FT, 40FT, 60FT | **Propulsions:** DSL, CNG, LNG, ELEC

Rear Axle and Suspension

Product Features

The rear axle with disc brakes and suspension installation consists of a M.A.N. HY-1336-F axle and a rear suspension assembly. The air springs and shock absorbers are mounted to structural supports in support brackets in the vehicle structure. Two lower radius rods are bolted to the main beam of the suspension unit and to mounting blocks in the vehicle structure. Two upper radius rods connect the axle housing to mounting blocks in the vehicle structure. The brake chambers are mounted directly to the disc brake caliper.



Benefits

- An estimated cost savings of $1,225 over 12 years for all disc brakes (front and rear) compared to drum brakes
- Less brake noise
- Brakes run cooler
- Noise reduction due to hypoid-gearing single-reduction rear axle
- Air bags moved outboard to offer better ride quality and less body roll

Operations

Rear Axle

This rigid, driven, non-steerable axle is made of high-quality spherical center castings, utilizing a single-stage power reduction gear train. Power is transferred through a differential/ hypoid gear set-up. The power flows from the transmission through the driveshaft to the pinion gear set and differential carrier.

Power is then transmitted along the left and right axle shafts to the corresponding wheel ends, which consists of unitized wheel bearings/hubs.

The wheels and tires represent the final stage of power transfer to the road surface.

(Please refer to attached MAN brochure for more information)

AXLE SPECIFICATIONS

Maximum Axle Load	28.660 lbs
Input Torque	7080.59 lbs-ft
Overall width without tires	83.42 inches
Width across brake drums/hubs	73.27 inches
Spring Track	37.52 inches
Flange to axle centerline, horizontal	2.17 inches
Flange to axle centerline, cross-serrated	15.41 inches
Qty. of wheel studs / hole circle diameter	10/335 mm
Weight without wheels, with oil	1455.05 lbs

Rear Suspension

The rear suspension assembly consists of a one-piece galvanized steel suspension beam assembly. The assembly incorporates four mounting pads for the air springs, mount supports for the four shock absorbers, two lower radius rods and the rear axle.

Air Springs (Bellows)

The air springs act as the vertical flexible connection between the axles and body to minimize road shocks. Four rolling lobe-type bellows are standard for the rear suspension. The bellows are mounted to a suspension frame which is bolted to the rear axle.

Height Control Valve

The height of the air springs is controlled by height-control valves on both front and rear axles. Two Barksdale height-control valves on the rear axle retain the height of the body in relation to the axles under all loading conditions. Each valve has three ports (air supply, air springs and exhaust). A two degree "center dead zone" allows for minor bounces in the suspension, without modifying the ride height.

Radius Arm Assemblies

The axle is positioned at the rear by rubber-bushed radius arm assemblies, which are also the reaction members of the driving, braking and cornering forces from the road to the bus understructure. The rear axle has four rubber-bushed (lubrication-free) radius rods to locate the axle position and to transmit the driving, braking, and cornering forces from the road to the bus understructure. The radius rods have been specially for reduced axle noise. Stabilizer bars are not utilized.

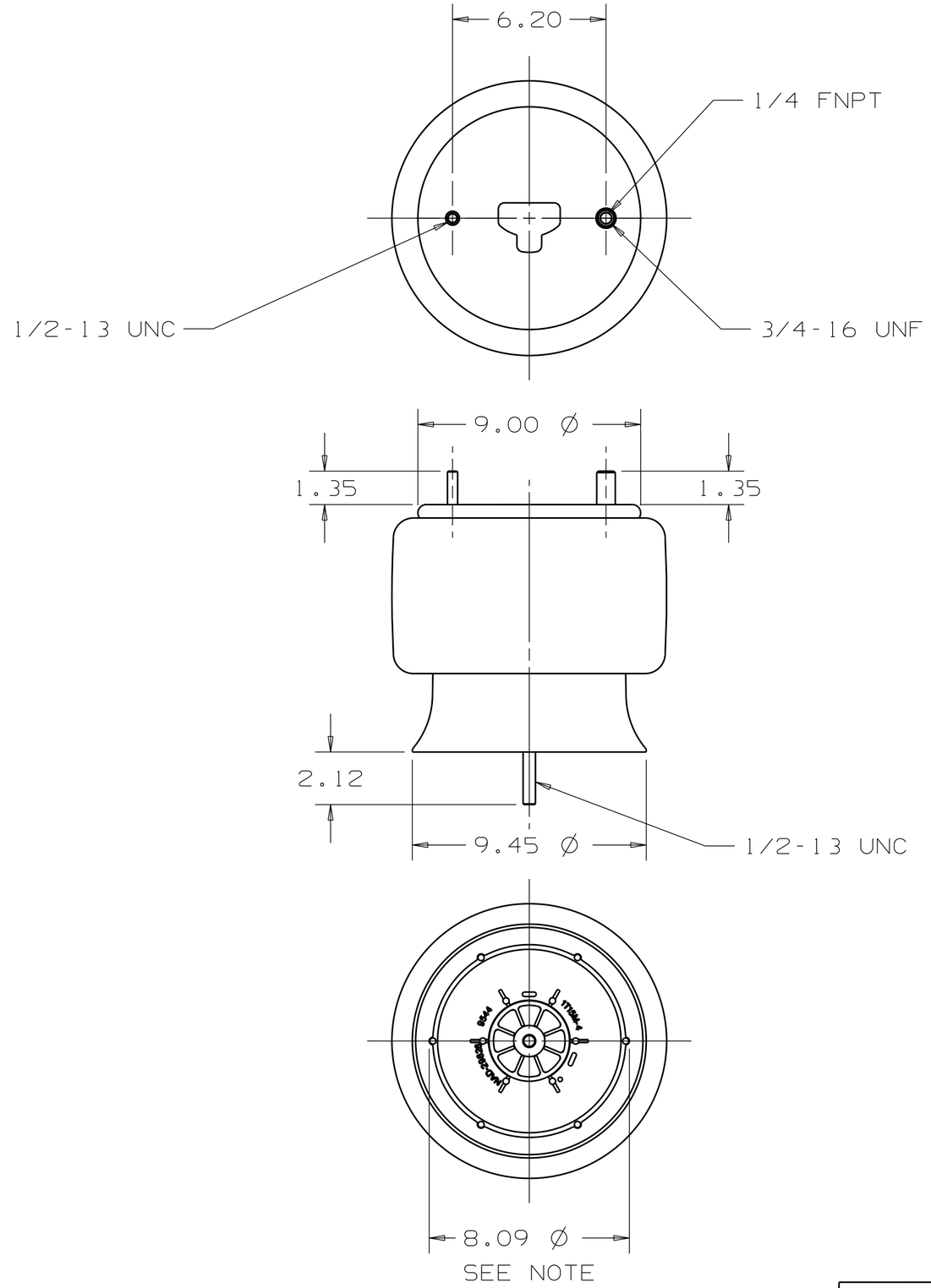
Shock Absorbers

The four KONI rear shock absorbers are a double-acting, telescoping type and consist of a piston assembly, piston rod, compression head assembly, inner cylinder, intermediate cylinder, dust tube, and a rod seal.

Axle Stops

Elastomeric axle stops are provided between the axle and frame on each side of the axles to prevent axle and/or frame damage in severe bounce conditions and to allow emergency operation of the vehicle if one or more air bellows are deflated.

NOTE: FOR INSTALLATION DRAWINGS PLEASE REFER TO ATTACHED MRP BOM SHEET FOR PARTS LISTING



DESCRIPTION:	AIR SPRING (BELLOWS) WITH INTERNAL STOP SINGLE STUD MOUNT
VENDOR:	FIRESTONE
VENDOR PN:	W01-W35-8497
AIR SPRING:	IT15L-4
BUMPER:	NCD 3159
PISTON:	NAD-29826-3
BUMPER CONTACT HEIGHT:	7.1"
DESIGN HEIGHT RANGE:	10"-11.94"
MAX USABLE HEIGHT	18.50"
20 PSI FREE HEIGHT:	19.06"

NOTE:

8.09Ø - MINIMUM DIAMETER OF SUPPORTING MEMBER

REV	DESCRIPTION	ECO
E	1. ANNOTATION "MAX HEIGHT 19.06" DELETED. 2. ANNOTATION "MAX USABLE HEIGHT 18.50" ADDED. 3. ANNOTATION "20 PSI FREE HEIGHT 19.06" ADDED.	201393

DRAWN	J.A.M.	08-MAR-10
CHK'D		
APP'D		

DO NOT SCALE DRAWING
DIMENSIONS IN [ ] ARE IN m.m.
THD ANGLE

MATERIAL	UNSPEC'D TOLS.	DEC. IN.
N/A	.X	±.12
	.XX	±.06
	.XXX	±.03
	HOLE DIA.	±.015
	BEND RADII.	±.03
	ANGLE TOL.	±1°
WEIGHT TBD		
TREATMENT NONE	SIMILAR TO	

TITLE
BELLOWS-AIR SPRING IT15L-4

NEW FLYER

PART Nº
303734
(NX)

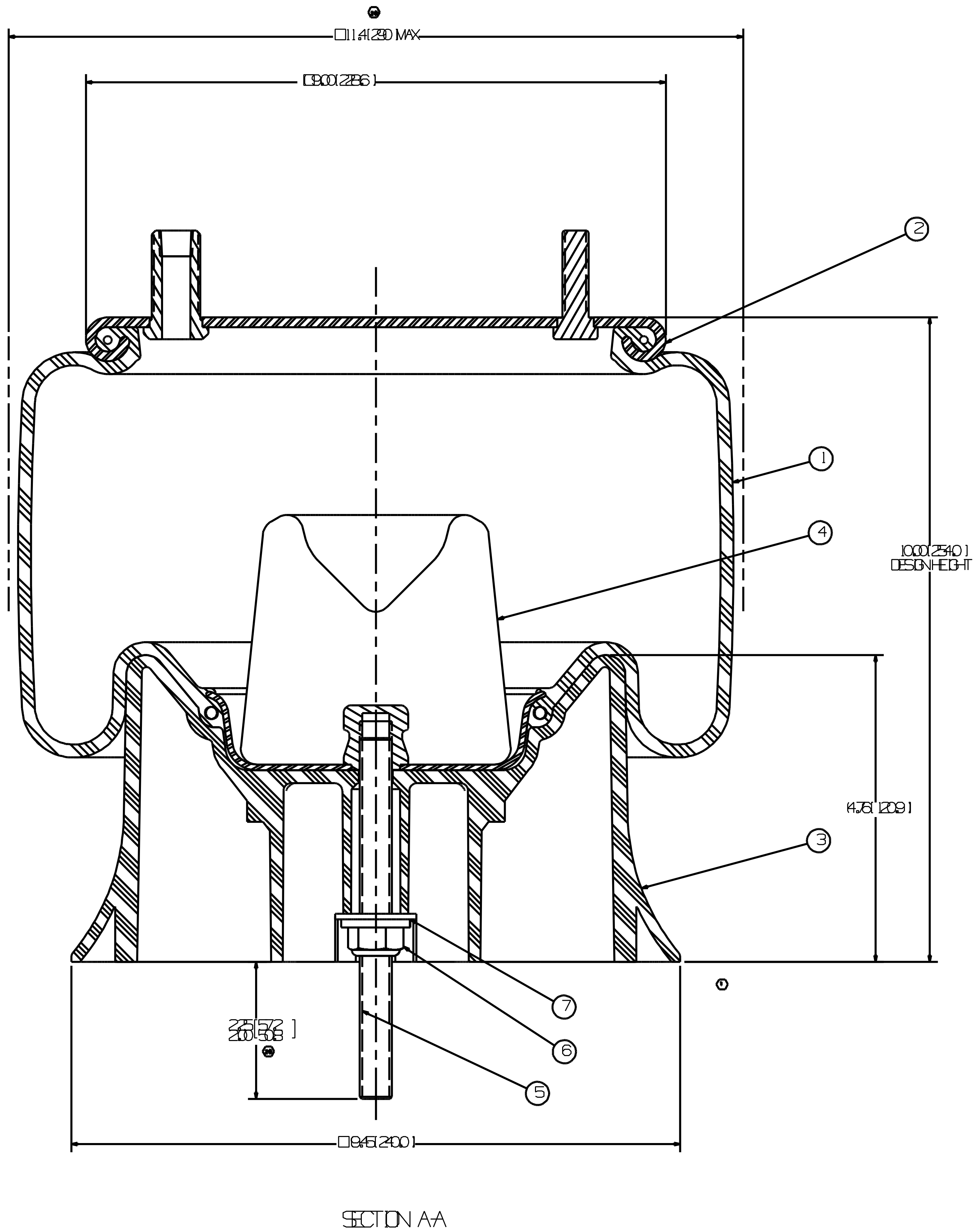
SCALE 1:4 | C | SHEET 1 OF 2

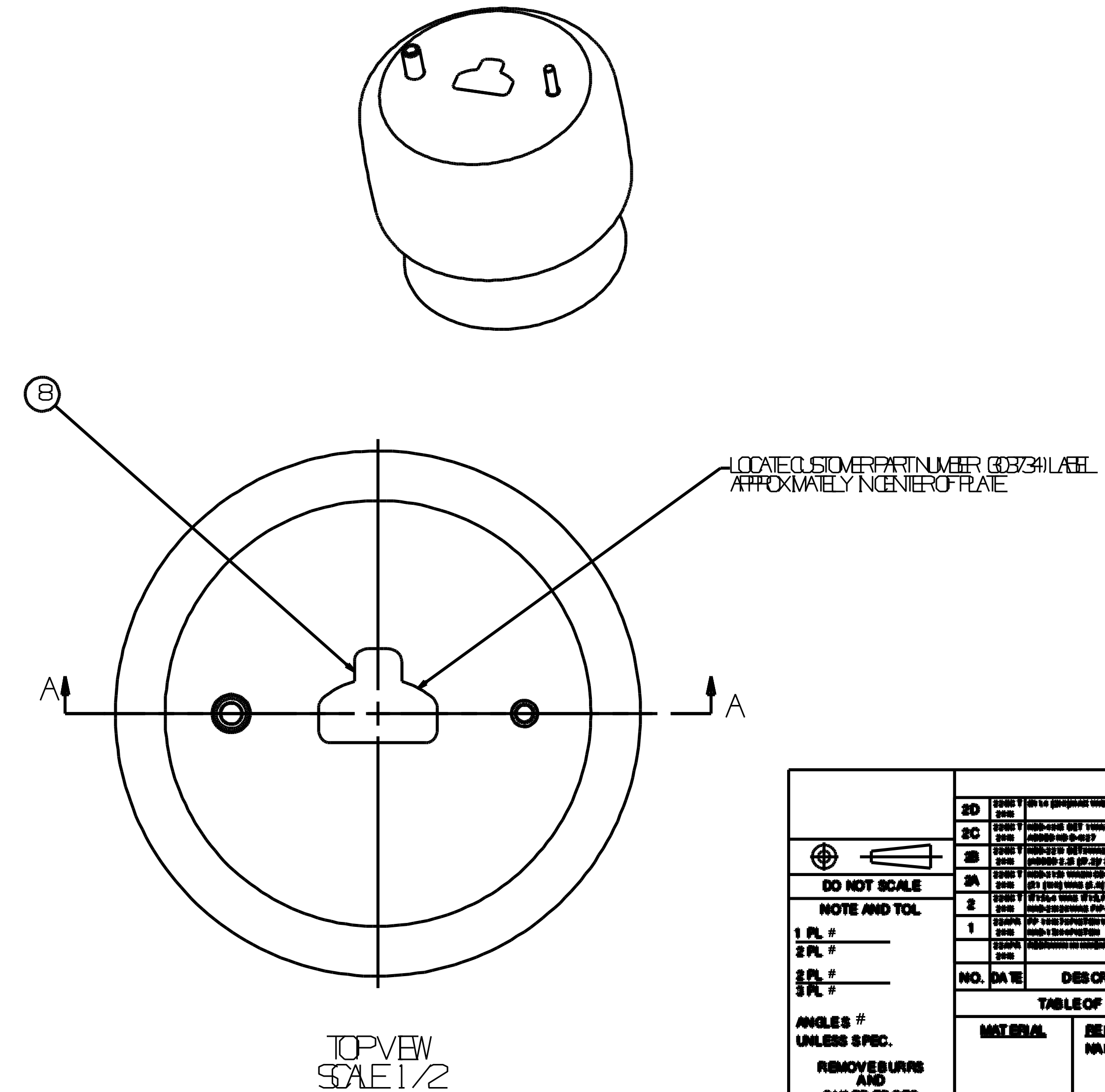
REPORT ALL ERRORS TO ENG. DEPT.

NOTE: FOR INSTALLATION DRAWINGS PLEASE REFER TO ATTACHED MRP BOM SHEET FOR PARTS LISTING

BASIC ASSEMBLY

DET	DESCRIPTION	QTY	DRAWING NUMBER	FSN	AON	BUMPER CONTACT HEIGHT
1	1T15L-4 AIR SPRING PART	1		C01-358-0095	W01-M58-4997	(7.1 [180])
2	BEAD PLATE	1	NBD-8062	70-358-2-3271		
3	PISTON	1	NAD-2986	70-358-2-9544		
4	BUMPER	1	NCD-3159	C71-358-0354		
5	1/2-13UNC-2A X 5.6 [142.2] LG. STUD	1	NDD-2210 DET 9	70-358-2-9927		
6	1/2-13UNC-2B FLANGE NUT	1	NDD-4905 DET 1	70-358-2-8890		
7	1/2 WASHER/SPACER	1	NDD-4327	70-358-2-8893		
8	PRODUCT IDENTIFICATION LABEL	1	NDD-4610	70-358-2-7225		





DO NOT SCALE
NOTE AND TOL

TABLE OF REVISIONS

MATERIAL: REF. DWG. NAD-2934

1T15L-4
ASSEMBLY
NEW FLYER (303734)

Firestone INDUSTRIAL PRODUCTS CO.
INDIANAPOLIS, INDIANA

Drawn By: T. H. GRAY Checked By: RLR Appr'd By: AJG
Scale: FULL

FIP-100798-2

DO NOT SCALE DRAWING		
DIMENSIONS IN [ ] ARE IN m.m.		
THD ANGLE		
BY	NAME	DD-MMM-YY
DRAWN	J.A.M.	08-MAR-10
CHK'D		
APP'D		

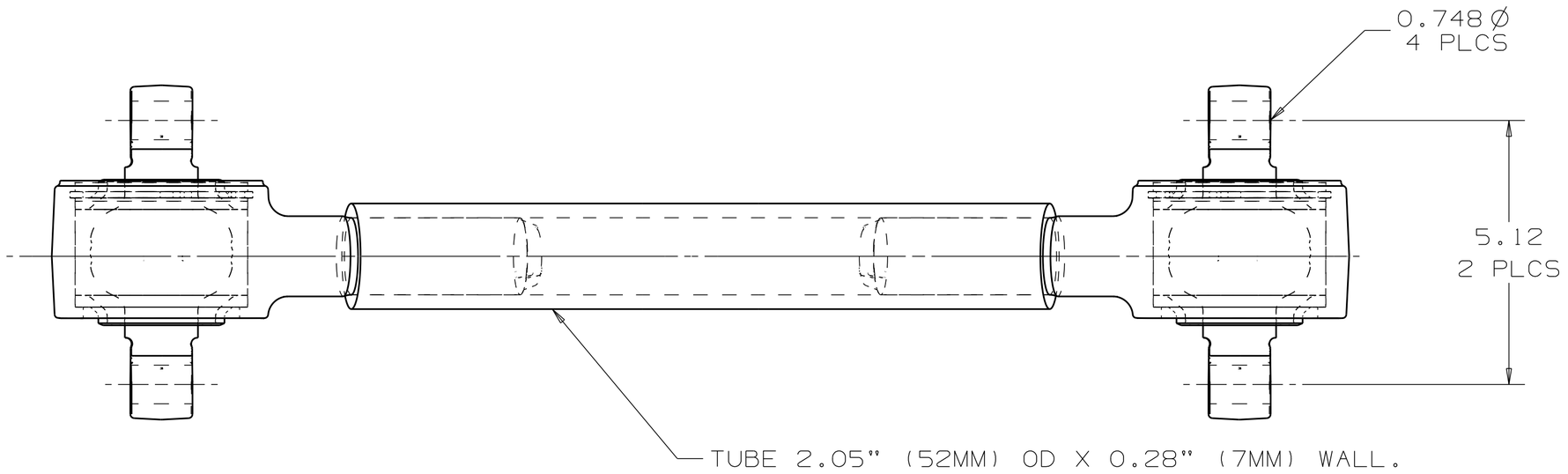
REV	DESCRIPTION	ECO
E	1. SEE SHEET 1.	201393

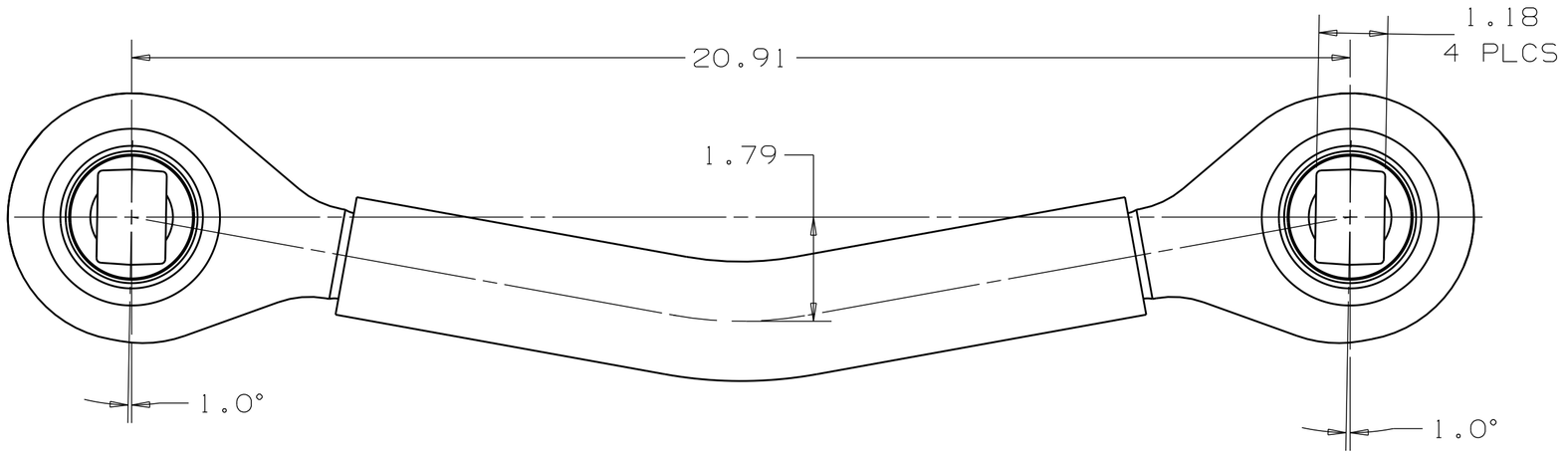
MATERIAL N/A	UNSPEC'D TOLS.	DEC. IN.	TITLE
	.X	±.12	BELLOWS-AIR SPRING 1T15L-4
WEIGHT TBD	.XX	±.06	
	.XXX	±.03	PART Nº 303734
	HOLE DIA.	±.015	
	BEND RADII.	±.03	
	ANGLE TOL.	±1°	
TREATMENT NONE	SIMILAR TO		NEW FLYER
			SCALE 1:4
			C
			SHEET 2 OF 2

(NX)

REPORT ALL ERRORS TO ENG. DEPT.

NOTE: FOR INSTALLATION DRAWINGS PLEASE REFER TO ATTACHED MRP BOM SHEET FOR PARTS LISTING





NOTES:

DESCRIPTION: RADIUS TORQUE ROD
FOR FRONT SUSPENSION
70mm BUSHING DESIGN

VENDOR: ZF LEMFORDER CORPORATION
VENDOR P/N: 070.345.302.800
SPECIFICATION:
- MATERIAL: STEEL BODY, RUBBER BUSHINGS
- ROD TENSILE STRENGTH 70,000 LBS
- FINISH: LA BLACK, AS PER LMN

DO NOT SCALE DRAWING		
DIMENSIONS IN [ ] ARE IN m.m.		
THD ANGLE		
BY	NAME	DD-MMM-YY
DRAWN	T.C.	24-JUN-08
CHK'D		
APP'D		

REV	DESCRIPTION	ECO
A	RELEASE FOR PRODUCTION.	174804

MATERIAL	UNSPEC'D TOLS.	DEC. IN.
SEE NOTES	.X .XX .XXX HOLE DIA. BEND RADII. ANGLE TOL.	±.12 ±.06 ±.03 ±.015 ±.03 ±1°
WEIGHT 29.76 LBS		
TREATMENT SEE NOTES	SIMILAR TO	

TITLE
ROD-RADIUS LOWER FRONT

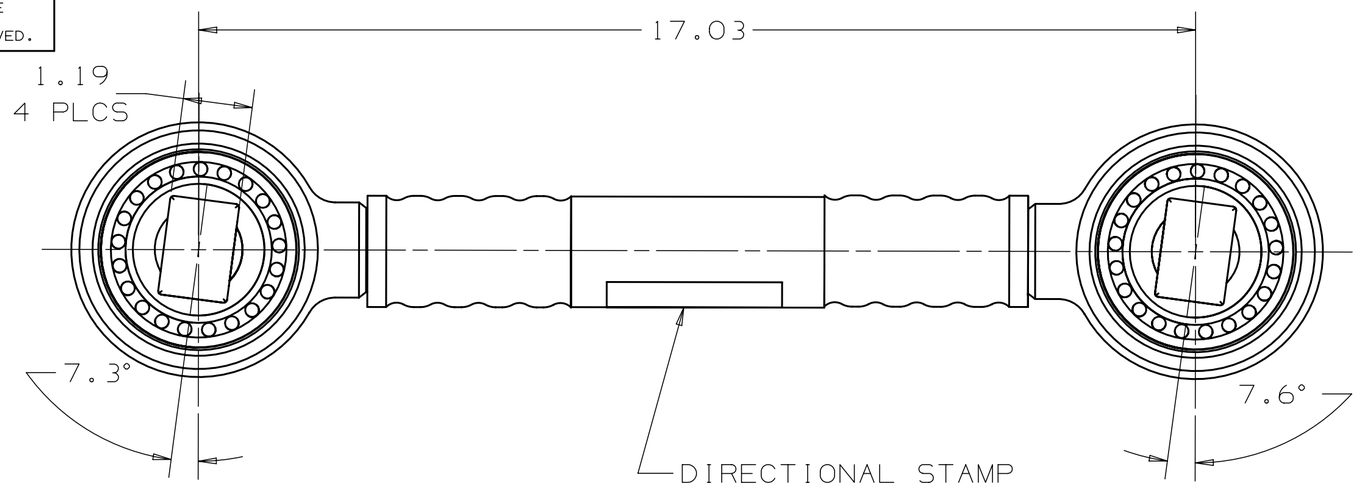
NEW FLYER

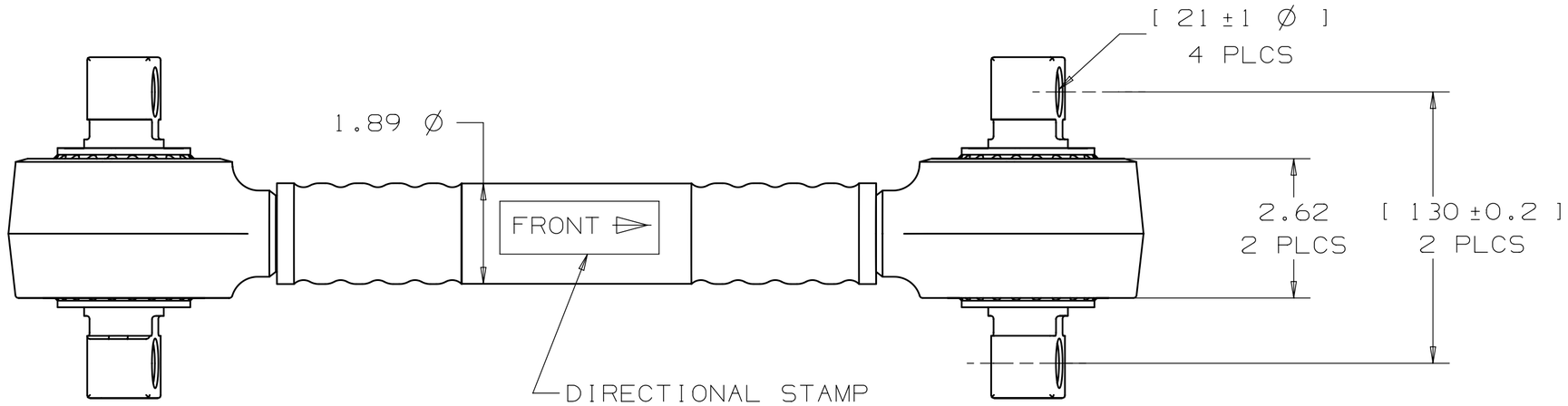
PART Nº
344499
(UNIGRAPHICS)

SCALE 1:2 | C | SHEET 1 OF 1

REPORT ALL ERRORS TO ENG. DEPT.

NOTE: FOR INSTALLATION DRAWINGS PLEASE REFER TO ATTACHED MRP BOM SHEET FOR PARTS LISTING





NOTES:

DESCRIPTION: RADIUS TORQUE ROD
FOR REAR SUSPENSION
70MM BUSHING - WINDOWED DESIGN

VENDOR: ZF -LEMFORDER CORPORATION
VENDOR P/N: 070 345 387 800
SPECIFICATION:
- MATERIAL: STEEL BODY, RUBBER BUSHINGS
- ROD TENSILE STRENGTH 70,000 LBS
- BUSHING MECHANICAL CHARACTERISTICS
  SAME AS ON LEMFORDER P/N 070 480 013 000
- FINISH: LA BLACK, AS PER LMN
- ADD DIRECTIONAL STAMP AS INDICATED.

DO NOT SCALE DRAWING			
DIMENSIONS IN [ ] ARE IN m.m.			
THD ANGLE			
DRAWN BY			
DAVID CAVALLIN			
DATE (DD-MMM-YY)	B	PROJECTION VIEWS UPDATED	ECN-029546
05-DEC-13	REV	DESCRIPTION	ECO

MATERIAL SEE NOTES	UNSPEC'D TOLS.	DEC. IN.
	.X .XX .XXX HOLE DIA. BEND RADII. ANGLE TOL.	±.12 ±.06 ±.03 ±.015 ±.03 ±1°
WEIGHT 26.4 LB		
TREATMENT SEE NOTES	SIMILAR TO 313008	

TITLE
ROD-LOWER REAR RADIUS WINDOWED

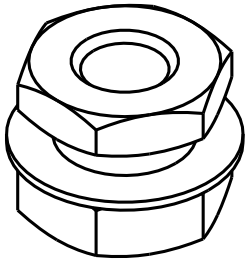
NEW FLYER

PART Nº
466467 (NX)

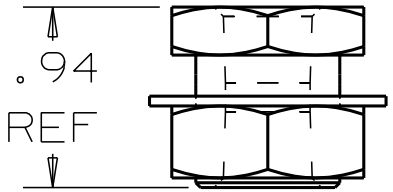
SCALE 1:2 | C | SHEET 1 OF 1

REPORT ALL ERRORS TO ENG. DEPT.

REV	DESCRIPTION	ECO
D	1. UPDATED CAD MODEL 2. DWG CONVERTED TO NX (WAS HAND DRAWN)	205122



ISOMETRIC VIEW
REFERENCE ONLY



PART INFO:

- 1/4" FPT BULKHEAD CONNECTOR (1" HEAD AND NUT)
- USED WITH 3/4" HOLE (PANEL THICKNESS NOT TO EXCEED .26")
- BRASS OR NICKEL PLATED BRASS
- 1000 PSI RATED
- INTERNAL TOOTH LOCK WASHER AND NUT SUPPLIED WITH BULKHEAD CONNECTOR

VENDORS: PARKER HANNIFIN PN 207ACBHS-4
FAIRVIEW FITTINGS PN 1495B-S
BENDIX CO. PN 221204 OR 221204N

DO NOT SCALE DRAWING

DIMENSIONS IN [ ] ARE IN m.m.

THD ANGLE

BY	NAME	DD-MMM-YY
DRAWN	J.D.N.	11-MAY-10
CHK'D		
APP'D		

MATERIAL
SEE NOTES
-

WEIGHT
-

TREATMENT
NOT REQUIRED
-

UNSPEC'D TOLS.	DEC. IN.
.X	±.12
.XX	±.06
.XXX	±.03
HOLE DIA.	±.015
BEND RADII.	±.03
ANGLE TOL.	±1°

SIMILAR TO
-

TITLE
CONNECTOR BULKHD 1/4 PT

NEW FLYER

PART Nº
5956454
(NX)

SCALE NTS | A | SHEET 1 OF 1

REPORT ALL ERRORS TO ENG. DEPT.

NEW FLYER

NEW FLYER Xcelsior®

SALES INFORMATION BULLETIN

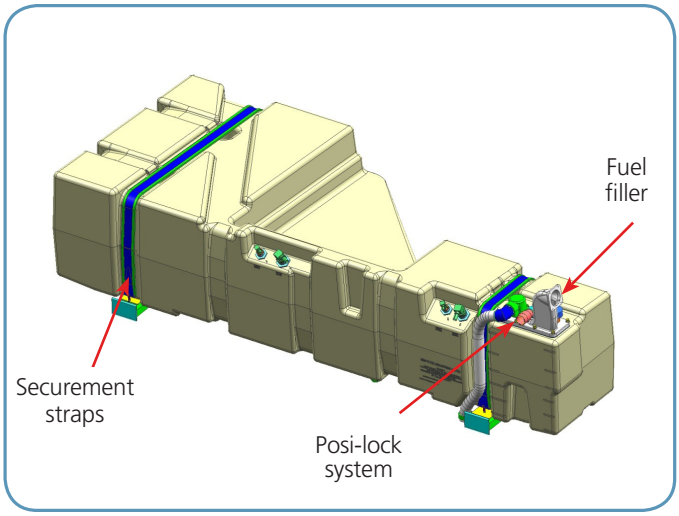
#241-003 | **Model:** Xcelsior® | **Lengths:** 35', 40' and 60' | **Propulsions:** Diesel, Diesel-Electric

Polyethylene Diesel Fuel Tank

Product Features

The fuel system includes:

- Single cross-linked polyethylene fuel tank
- Fuel lines and check valve
- Fuel filters
- Fuel pump
- Fuel filler

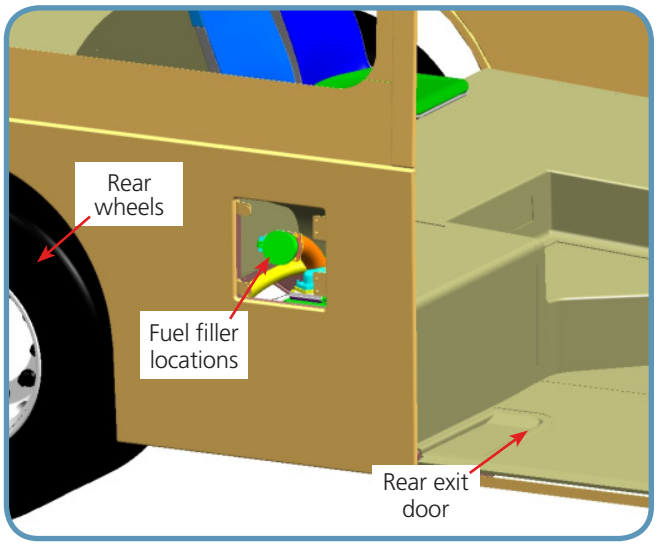


Fuel Tank

A single fuel tank is mounted transversely in the vehicle chassis, forward of the rear axle. A fuel filler neck assembly is bolted to the tank and provides mounting locations for the fuel-filler adapter, pressure relief valve, and fuel-level control valve. Fuel tank fill access is provided through a hinged door on the curbside of the vehicle. Supply and return fuel hoses connect the fuel tank with the engine.

The tank is constructed of cross-linked polyethylene with a nominal thickness of 0.300". The tank is internally baffled to prevent fuel sloshing regardless of fill level.

- All lengths of diesel buses come standard with a 125 useable US Gal (473 L)-size tank and holds up to 144 US gallons (545 L).
- Non-artic diesel-hybrid buses come standard with a 100 useable US Gal (378 L)-size tank and holds up to 144 US gallons (545 L).
- Artic diesel-hybrid buses come standard with a 125 useable US Gal (473 L)-size tank and holds up to 144 US gallons (545 L).



The fuel tank assembly is securely mounted to the bus with two support channels on both sides and a tubular structure in the center. The fuel tank is mounted to the support channels by means of straps to prevent movement. The lightweight design of the tank and the design of the tank supports make the tank easy to remove for maintenance.

Fuel Lines

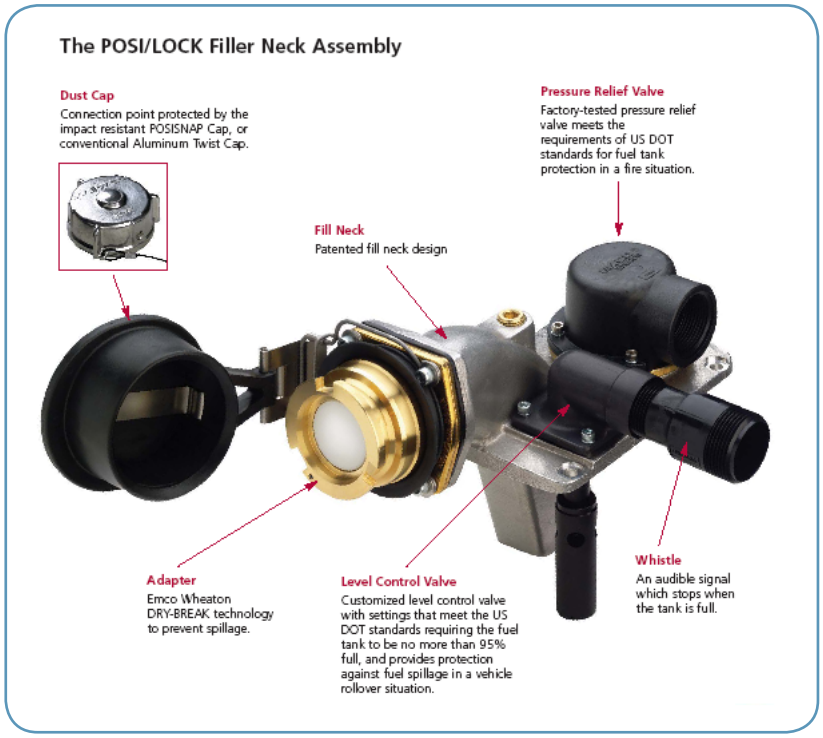
The Xcelsior® bus comes standard with a biofuel-compliant fuel system. The fuel lines from the fuel tank to the bulkhead are nylon fuel-grade tubing and orange in color in both 3/4" and 1/2" outer diameters. Fuel lines in the engine compartment are Eaton GH100 diesel and biodiesel compatible hoses. No copper hard lines are used, only stainless steel.

Fuel Filters

The primary fuel filter is bracket-mounted on the curbside of the engine compartment. The filter assembly consists of a filter head and a replaceable spin-on filter element, with a Water-in-fuel sensor and water drain valve. The secondary fuel filter is bracket-mounted on the curbside of the engine compartment. The filter assembly consists of a filter head and a replaceable spin-on filter element with a Water-in-fuel sensor and water drain valve.

Fuel Filler

By default, Xcelsior® is offered with an Emco POSI/LOCK 105 automatic dry-break fueling filler system although customers can request a non-pressure fill-type system as an option. The dry-break fuel filler is located behind the rear door on the curbside of the bus. The filler cap is recessed into the bus body behind a hinged access door. The filler accommodates a 1½" diameter nozzle and a fill rate of 40 US gallons (151 L) per minute of foam-free fuel without spitting back or causing the nozzle to shut off before the tank is full. An audible signal indicates when the tank is essentially full.



Operations/Procedures

On engine start-up, the lift pump draws fuel from the fuel tank through a primary fuel filter. The low pressure side of the fuel pump discharges fuel through the fuel manifold, the secondary fuel filter and to the inlet of the high pressure fuel pump. High pressure fuel is delivered through a common fuel rail to the fuel injectors. Surplus fuel returns to the fuel tank through a return line.

Service/Maintenance

Replacement of the primary and secondary fuel filter is recommended every 6,000 miles (9,600 km), six months, or 500 operating hours, whichever comes first. Opening of the drain at the bottom of the fuel tank to drain off water and/or sediment is required every 30,000 miles (48,000 km). Every 60,000 miles (96,000 km) or twelve months, whichever comes first, all fuel tank mountings and brackets should be tightened. At the same time, the fuel tank cap seal, the breather hole in the cap, and the condition of the flexible fuel lines should be checked. A thorough inspection of all fuel hoses is required annually for cover damage and for damaged, worn, twisted, crimped, brittle, cracked or leaking lines. Replacement of all hoses in or out of machinery every five years or during major overhaul is recommended.

Examples of detailed maintanance and repair instructions from existing bus service manuals can be supplied upon request.

Warranty

Fuel system componenets are covered by a 1 year, 50,000 mile warranty

Compliance

The Xcelsior® fuel system is compliant to APTA Whitebook guidelines. The fuel pickup location ensures continuous full power operation on a six percent upgrade for more than 15 minutes starting with no more than 25 US gallons (95 L) of fuel over the unusable amount in the tank for the 40' bus. The bus will operate at idle on a six percent downgrade for more than 30 minutes starting with no more than 10 US gallons (38 L) of fuel over the unusable amount in the tank. [1]

[1] Report TR09-35 Xcelsior® Fuel Tank 6% grade Test

NEW FLYER

NEW FLYER Xcelsior®

SALES INFORMATION BULLETIN

#231-005 | **Model:** Xcelsior® | **Lengths:** ALL | **Type:** Low Floor | **Propulsion:** Diesel, Hybrid

Coolant System

Value Proposition

Effectiveness and reliability are the hallmarks of a great cooling system. New Flyer achieves this by continually evaluating our current system against new products and industry know-how. This process, along with quality management and designs that consider component tolerances, creates a truly best value cooling system.

System Overview

The coolant system is a multi component network, with the primary goal of regulating the temperature of the engine and transmission. It has a secondary goal of providing a heat source for warming the passenger cabin and other vehicle components, such as the DEF tank and SCR dosing module. Furthermore, many additional features are included to enhance efficiency, enhance maintainability and enhance ease-of-use.

Equipment

Surge Tanks

Coolant in a vehicle expands and contracts under normal operation. A surge tank is a device that absorbs the excess coolant when at peak volume and feeds it back to the system during the coolant contraction phase.

Xcelsior® offers a stainless steel surge tank as a standard feature, located on the streetside of the engine compartment. This surge tank is cylindrical and vertically mounted, a geometric design that has shown to be beneficial in reducing sloshing, reducing false low coolant alarms and reducing aeration of coolant, which box shaped surge tanks can be prone to. Furthermore, the cylindrical design has shown better resistance to warping by the pressures associated with the operation of a surge tank.

Additional standard surge tank features include a site glass, a coolant level sensor and a low coolant level sensor.

Surge Tank

Hose Types	2807, Manuli NOZ2, Venair
Connection/Fittings/Clamps	JIC Crimped fittings (some reusable), drop tube clamps are Ideal Smartseal
Hose and Line Securement	Clamp-P
Thermal Wrap	On select hoses

Radiator & Transmission Cooler

Hose Types	Venair
Hardlines	Stainless Steel
Connection/Fittings/Clamps	Ideal SmartSeal & WaveSeal
Hose and Line Securement	Stauff blocks, U-bolts & brackets

Coolant Recovery Tank

Hose Types	Venair
Connection/Fittings/Clamps	Ideal Flex-Gear
Hose and Line Securement	P-Clamps
Thermal Wrap	On select hoses

DEF Tank & SCR Dosing Module

Hose Types	Venair
Connection/Fittings/Clamps	Ideal Flex-Gear
Hose and Line Securement	Stauff Blocks, cable Ties/Hellerman clamps, P-Clamps
Thermal Wrap	On select hoses

SALES INFORMATION BULLETIN

#231-001

Radiator & Transmission Cooler

A radiator and transmission cooler (heat exchanger) work together to regulate the operating temperature of the engine and transmission. Depending on the type/model of transmission in the bus, the transmission cooler can be either stand alone, or integrated into the transmission.

An upper and lower rad tube provide the main connection between the radiator, transmission cooler, transmission and engine. The lower rad tube features a 5" diameter expansion section directly below the drop tube. This expansion reduces flow velocity, allowing air from the cabin loop to collect and migrate up the drop tube and into the surge tank, instead of entering the engine water pump.

Coolant Recovery Tank

The coolant recovery tank offers a means to perform coolant level maintenance without breaking the pressure seal of the surge tank. Breaking this seal during operation can have negative long term consequences, as coolant system components need pressure to function properly, avoid cavitation and avoid aeration.

The coolant recovery tank also offers a reserve supply of coolant to the system that is siphoned back upon bus shutdown (cooling), thus periodically and automatically maintaining coolant level.

Lastly, the coolant recovery tank protects against coolant overflowing and spilling out on to the road.

DEF Tank & SCR Dosing Module

To function properly, heat must be provided to the DEF and SCR Dosing module to eliminate freezing. DEF fluid can be prone to freezing, thus a thermal management plan has been implemented.

Booster Pump

A booster pump helps push the coolant through the lengthy coolant system.

Main HVAC

Hot coolant is pumped to the main HVAC unit and front windshield defroster via copper lines that run behind the overhead lighting panels. The HVAC and defroster use this coolant as a heat source to warm the passenger compartment.

Booster Pump Lines

Hose Types	Venair
Hardlines	Copper pipe
Connections/Fittings/Clamps	Ideal Flex-Gear
Hose and Line Securement	Stuaff Block Clamps & P-clamps
Thermal Wrap	On select hoses

Floor Heater Coolant Lines (applicable only to buses with floor heaters)

Hose Types	Venair
Connection/Fittings/Clamps	Ideal WaveSeal
Hardlines	.75" diameter copper wrapped in insulation and a protective nylon sleeve
Hose and Line Securement	Stauff Blocks & P-clamps

Defroster Lines

Hose Types	Venair
Connection/Fittings/Clamps	Ideal Flex-Gear
Hardlines	.75" diameter copper wrapped in insulation and a protective nylon sleeve
Hose and Line Securement	Stauff Blocks & P-clamps

Main HVAC

Connection/Fittings/Clamps	Brazed & JIC
Hardlines	.875" diameter copper wrapped in insulation
Hose and Line Securement	Stauff Blocks

Hoses, Fittings & Clamp Types

Manuli Hoses

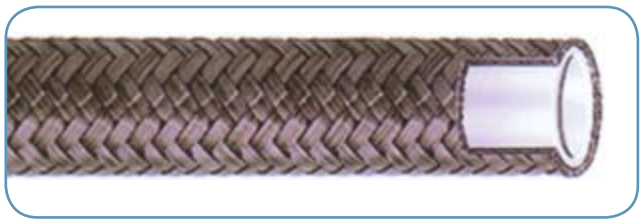
Manuli hoses are constructed from oil-resistant synthetic rubber and reinforced with single high-tensile steel braid. Manuli hoses are known for their high ozone, weather and heat resistant properties. All hose assemblies are skived and crimped with two-piece fittings.

Venair Hoses

Intended for use in vehicle cooling systems, the Venair hoses used in New Flyer cooling systems are constructed from blue VMQ silicone rubber and are reinforced with 4 layers of aramid fabric. An interference fit is used, which improves sealing pressure/ push on force across circumference of the spigot surface.

2807

Highly durable extruded PTFE tube with stainless steel wire braid. Operating temperature Range -73°C to + 260°C. Meets SAE 100R14A.

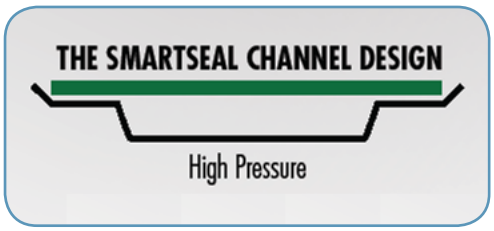


SALES INFORMATION BULLETIN

#100-001

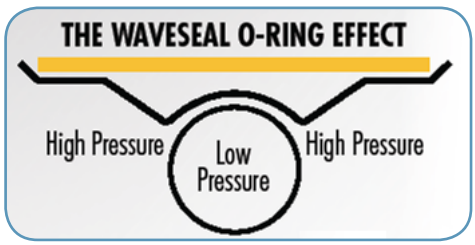
Ideal SmartSeal

Ideal SmartSeal constant torque clamps exhibit superior sealing compared to traditional worm gear hose clamps. These SmartSeal clamps have excellent band loading and even pressure distribution, creating a uniform high quality seal onto hardlines. A unique trough-shaped design creates higher pressure loading compared to a conventional worm gear design, and increases resistance against potential leaks. The trough shape also helps by penetrating deeper into the house wall due to the narrower cross-section. Outside, chamfered liner edge protects the hose component from cutting.



Ideal WaveSeal

Ideal WaveSeal constant torque clamps exhibit superior sealing compared to traditional worm gear hose clamps. These WaveSeal clamps have excellent band loading and even pressure distribution, creating a uniform high quality seal onto hardlines. The O-ring effect allows the hose to act as an additional spring component. Outside, chamfered liner edge protects the hose component from cutting.



Ideal Flex-Gear CT Clamp

Ideal Flex-Gear clamps have high pressure sealing capability compared to other similar constant torque/ Belleville washer clamps, or standard non spring compensating worm gear clamps. The spring deflection of the Ideal Flex-Gear clamp is significantly greater than other similar constant torque/Belleville washer clamps. The Ideal Flex-Gear clamps have large diameter spring washers and a large spring stack height which allows for a considerable range of spring compensation.

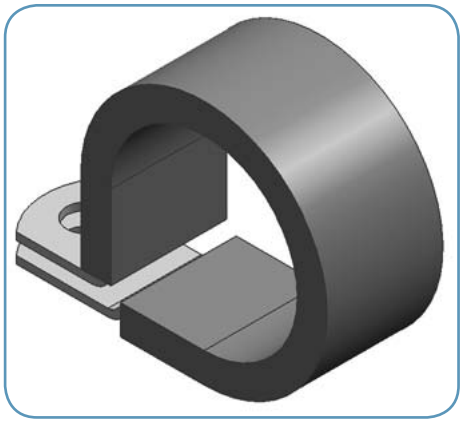
SALES INFORMATION BULLETIN

Block Clamps

Block clamps are used extensively to mount and secure hoses throughout the coolant system. New Flyer uses Stauff Twin series PA Polyamide block clamps.

P-Clamps

P-Clamps are widely used throughout the coolant system to restrain flexible hoses and are typically used when a block clamp is not practical. New Flyer uses P-clamps comprised of a stainless steel strap (ASTM A240, SAE AMS 5516) and a full box, high temperature silicon cushion (SAE AMS 3303, Rated -85°F to +401°F).



Heavy Duty Cable Ties & Hellerman Mounts

Releasable lashing cable ties and Hellerman cable mounts are also widely used by New Flyer in the cooling system and are used in much the same way as P-clamps. Generally cable ties and Hellerman mounts are used when ease of serviceability is concerned.

Heavy Duty Cable Ties

Material	Weather Resistant Nylon 6.6
Operating Temperature	-40 F to +239 F
Flammability	UL94 HB (Horizontal Burn)

Hellerman Mounts

Material	Polyamide 6.6 impact modified, heat stabilized, UV resistant
Operating Temperature	-40 F to +230 F continuous
Flammability	UL94 HB (Horizontal Burn)

JIC Fittings

JIC connection fittings on flexible hoses are also used commonly in the Xcelsior® cooling system. Defined by the SAE J514 and MIL-F-18866 standards, JIC fittings are a type of flare fitting machined with a 37-degree flare seating surface. They provide a high quality leak free seal.

Brazing

It is a New Flyer design goal to minimize the total number of brazed connections in the coolant system. When brazing is required, design is taken into account to ensure an appropriate heat sink is present to avoid detrimental heated affect zones (HAZ). Furthermore, design care is taken to ensure sufficient space is provided for clamping surfaces in and around braze beads.

Thermal Wrap

Thermflex® 1210 is a heat treated and saturated sleeve that provides superior protection against conducted and convected heat. Constructed of braided fiberglass, Thermflex® is used to protect components in high temperature areas.

Quality Standards & Testing

Quality

High quality first time assembly is achieved with close adherence to supplier recommended torque and installation guidelines. Quality inspections are conducted on every bus and torque marks are used to ensure all components are installed properly.

Testing

Every Xcelsior® undergoes a coolant system leak test as a check out procedure. The coolant system is pressurized and any leaks or malfunctioning equipment is identified and fixed.

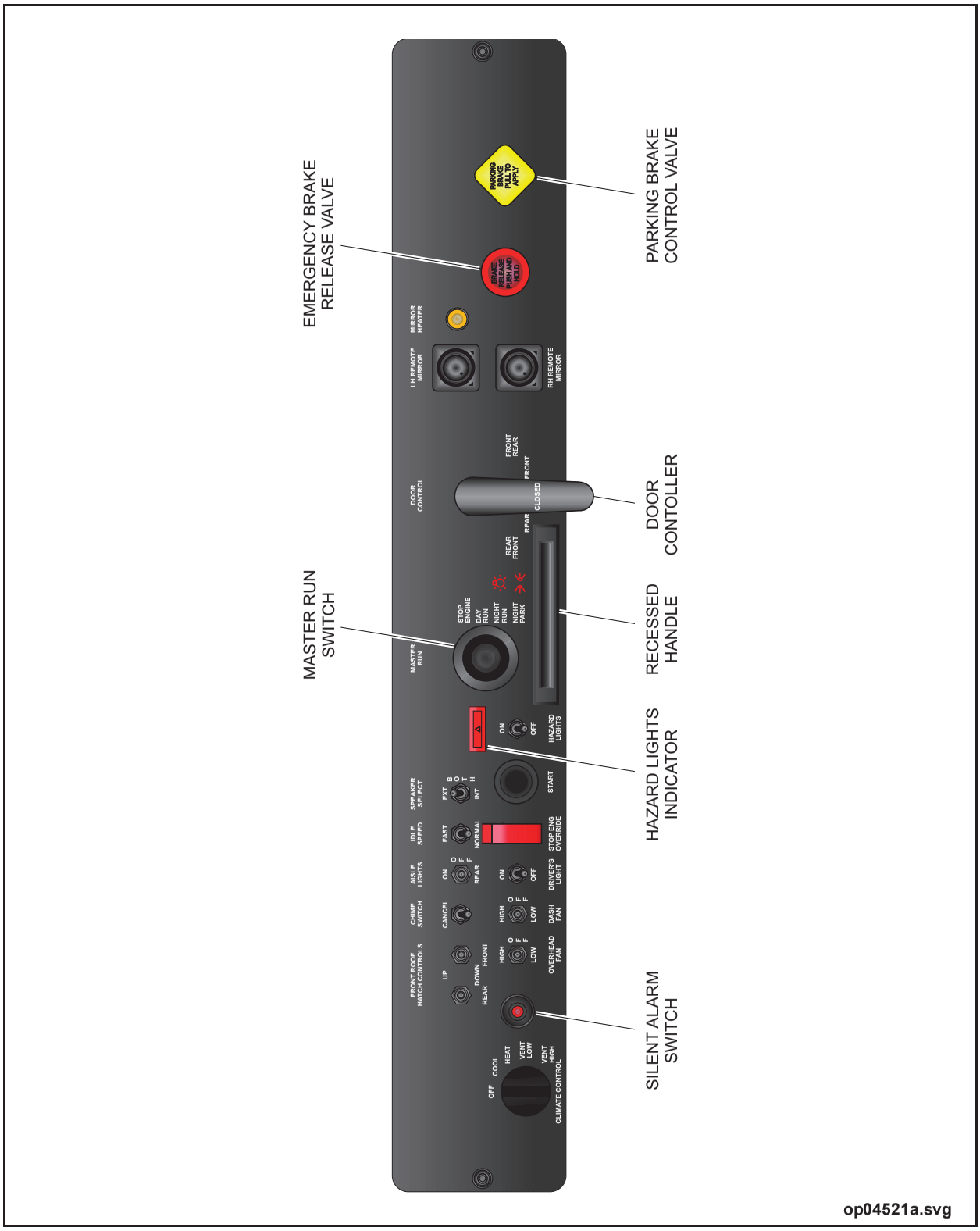


Figure 24: Side Console Panel

Aisle Lights Switch

The following table displays the lights that will be illuminated based on the positions of the Aisle Lights switch and Master Run switch. See “Figure 25: Aisle Lights” on page 76.

AISLE LIGHTS SWITCH OPERATION		
AISLE LIGHTS SWITCH POSITION	**MASTER RUN SWITCH POSITION**	**ILLUMINATED LIGHTS**
ON	DAY-RUN	Streetside (1,2,3) Curbside (1,2,3)
ON	NIGHT-RUN	Streetside (1,2,3) Curbside (1,2,3)
ON	NIGHT-PARK[1]	Streetside (1) Curbside (1)
NORMAL	DAY-RUN[2]	Streetside (2,3) Curbside (2,3)
NORMAL	NIGHT-RUN[3]	Streetside (1,2,3) Curbside (1,2,3)
NORMAL	NIGHT-PARK[1,3]	Streetside (1) Curbside (1)
OFF	ANY POSITION	Streetside (None) Curbside (None)

1 Multiplexing System must be active
2 Engine must be running
3 Light bank 1 on the streetside and curbside will only illuminate when the front entrance door is open

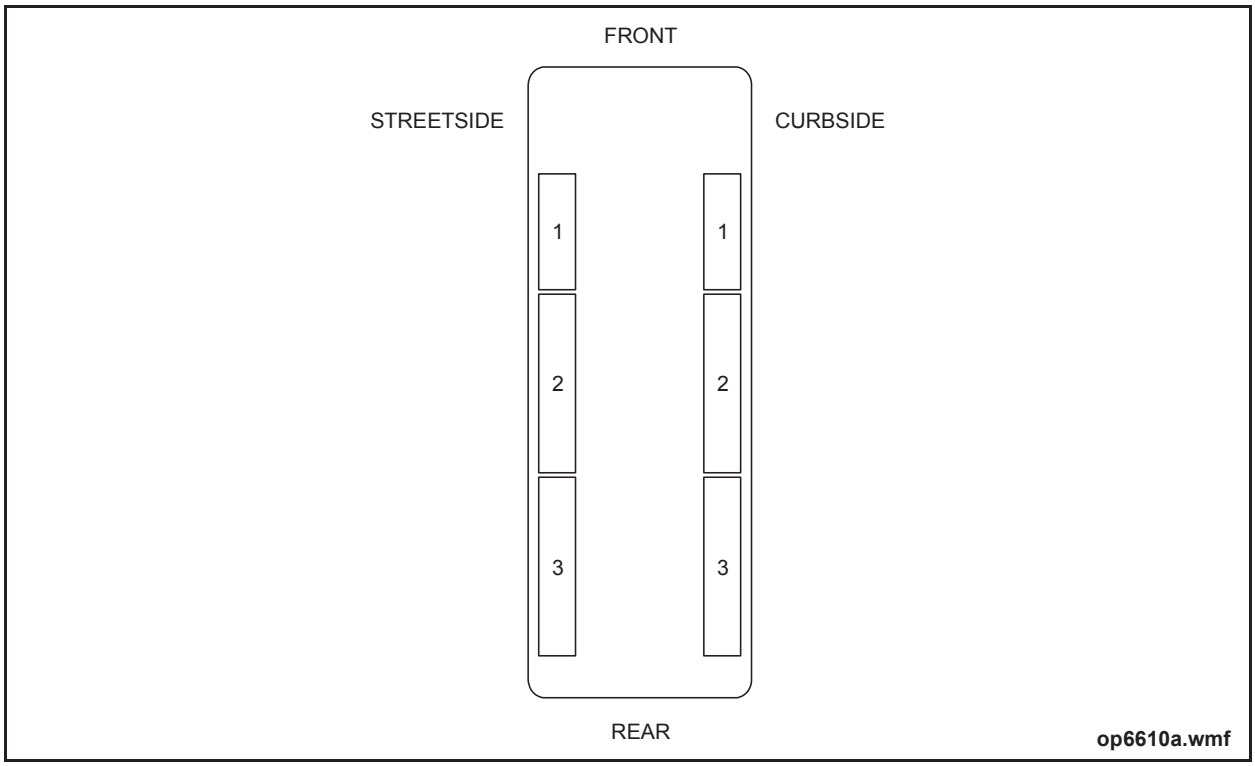


Figure 25: Aisle Lights

Idle Speed Switch

⚠CAUTION

Excessive engine idling is not recommended by the engine manufacturer. Operate engine at fast idle speed if idling for periods longer than 10 minutes. Consult your local transit authority for operating policy.

The Idle Speed toggle switch activates the preset fast idle to increase the engine RPM to maintain optimum engine operating temperature during periods of extended idling. Activating the fast idle following a cold engine start also allows quicker engine warm-up.

☞NOTE:

The FAST position on the Idle Speed switch only operates if the engine is running, the transmission shift selector is in the neutral [N] position and the parking brake is applied.

NEW FLYER

NEW FLYER Xcelsior®

SALES INFORMATION BULLETIN

#304-001 | **Model:** All | **Lengths:**ALL | **Propulsions:** ALL

Corrosion System

Product Features

New Flyer utilizes the best protection coating and application process for Carbon Steel in the industry. Axalta's Alesta® Zinc-Rich primer is used as our primary corrosion protection. Unlike regular paints or epoxies which resist corrosion by forming an impermeable barrier between the metal and atmospheric moisture, zinc-rich primers provide corrosion protection by electrical means. The zinc and the steel form tiny electrical-cathodic cells that protect the steel at the expense of the zinc.

Prior to applying this zinc-rich primer, our steel frames are pressure washed and grit blasted to insure proper adherence of the primer to the steel. Axalta reviews our process weekly to insure we meet the application requirements of its products in order to offer this industry-leading corrosion protection.

Along with our primer on the exterior of our steel, we also coat all of our steel tubes internally from the roof line down with CoraTube® by PPG.

As a final measure of protection, we coat the underside of our chassis with Corashield® 7972 by PPG. This undercoating is a single-component waterborne material and provides sacrificial barrier before the primer.

Benefits

- Dries quickly at room temperatures.
- Unlike inorganic zinc-rich coatings, this product can be used to touch up prepared welded joints and damaged areas.
- Moisture-rich zinc in the primer offers the sacrificial material, which in turn protects the steel substrate.
- All materials used are low VOC (Volatile Organic Compound)
- Axalta will supply field support in conjuntion with New Flyer if any issues arise during the warranty period of your bus

COATING THICKNESS (DRY FILM)

Primer Coating (zinc primer to steel)	3 mils	12-year warranty
Primer Coating (zinc primer to steel)	6 mils	18-year warranty
Undercoating (sprayed over zinc primer on underbody)	8 mils	12-year warranty
Undercoating (sprayed over zinc primer on underbody)	10 mils	18-year warranty

NEW FLYER

NEW FLYER Xcelsior®

SALES INFORMATION BULLETIN

New Flyer's corrosion protection package consists of a 4-step process:

1. Preparation Before Corrosion Protection Package

The frame is welded, including taping plates, brackets, and exterior compartments. Any sharp edges are deburred, and splatter spray minimized. All holes are sealed with plugs and areas of the frame not requiring blasting or priming are protected.

2. Power Wash

The purpose of the power wash operation is to remove mill oils, machine shop oils, and antispatter compounds applied to the structure (de-grease) during the fabrication of the frame. The entire coach is washed and rinsed to prevent oils and grease from being blasted into the steel. Drain holes are plugged to prevent water from entering the tubing and exposed threads are masked off to prevent damage from grit blast. The structure is then washed using a mild detergent and blown dry to prevent flash rusting. This stage does not apply an iron phosphate coating on the frame.

3. Grit blast

The entire structure is then grit blasted to provide the primer a profile which it can anchor itself to. Using 50 grit material, this grit blast process provides the 1 - 2.5 mil profile needed for a uniform "rough" to touch matte surface. The surface is then cleaned to a SSPC-SP6 finish. Any residue grit is then blown off and the masking is removed from the protected areas except for the threaded holes and studs. To prevent distortion of the part, areas of the frame made of sheet metal are not over-blasted.

4. Moisture-Cure Urethane Zinc-Rich Primer

This is a two-part urethane primer from Axalta. This primer is a low VOC organic zinc-rich coating that provides cathodic protection when applied to prepared structural steel substrates. It is an excellent undercoat for the transportation industry, providing galvanic protection similar to galvanizing when applied to properly prepared, hot or cold rolled, sand-blasted steel. Ferrous parts requiring zinc-rich primer include bus frames, fuel tank cradles, suspension bunks and all structural steel components. The product is sprayed on to achieve approx. 3 to 15 mils of Dry Film Thickness (DFT).

SPECIFICATIONS

FILM PROPERTIES	TEST METHOD	VALUE
Colour	N/A	Gray
Film Thickness	N/A	5-6 dry mils
VOC # Gallon	EPA #24	2.8 #Maximum
Gloss - 60°	ASTM D523	60-70
Pencil Hardness	ASTM D523	4H
Crosshatch Adhesion	ASTM D523	5B Pass
Salt Spray	ASTM D523	7000 hours
Humidity	ASTM D523	4000 +hours
Chemical Resistance	N/A	Excellent
Abrasion Resistance	N/A	Excellent
Potlife	N/A	3-4 hours
Dry to touch Dry to handle Dry to recoat	N/A	30 min 2-4 hours 4 hour minimum

Tubular Structure

CoraTube®, a low VOC coating manufactured by PPG, is a long-term treatment for corrosion prevention and is designed to reduce internal corrosion of tubular steel-frame members. As a base option, it is fogged into all structural-steel tubes from the roof line down and its dense viscosity ensures adherence. ASTM based salt-spray tests have shown significant resistance passes at 500 hours of exposure.

Underbody Sacrificial Barrier

The PPG Corashield® is a one-component, water-borne, sprayed coating designed to prevent chipping, cracking, or marring of painted or unpainted surfaces after exposure to high impact sand, gravel, and other abrasive materials. It is applied to the underside of the coach to supply a sacrificial barrier against road debris that would normally attack the PPG urethane zinc-rich primer.

Preparation

All areas of the coach, excluding the underside of the lower chassis, susceptible to over spray are masked including all exposed fittings, hoses and Synflex lines.

Application

Corashield® 7972 is sprayed through the underside of the coach and inside wheel wells to a WFT (wet film thickness) of 20 mils. An acceptable application covers all areas requiring undercoating but does not exhibit cracking from excessive film buildup.

Features and Benefits

- One-Component product means no mixing or measuring to get correct ratios
- Water-borne: environmentally safer alternative. US DOT classification is non-hazardous, nonregulated (CFR Title 49). Also classified as non-hazardous, non-regulated under Federal RCRA Hazardous Waste Program (CFR 40)
- Air Dry: reapplication of surface does not require a dry bake cycle
- High thin film performance (10 mil dry)

Structural Sealing and Undercoating

Seal Lap Joints

Application is a single bead of Sikaflex-221 Polyurethane Sealant. Caulking sealant is applied between the following:

- Structural members and floor panels, wheel wells, etc.
- Fill gaps between stitch welds
- Over miscellaneous welds that have potential to collect water
- Special attention is given to the main structural members and rear A/C area

Properties of Sikaflex-221

Sikaflex-221 is a one-component, flexible, polyurethane-based elastomeric sealant. It is a moisture-cured, non-sag system. The chemical reaction is set in motion as soon as the adhesive is extruded. Sikaflex cures to form a high-grade elastomeric adhesive. This product will bond to materials which have dissimilar coefficients of expansion and exhibits tenacious adhesion to aluminum, FRP, steel, wood, SMC, RIM, pre-painted metals, oily GALVALUME, ZINCALUME, Zincgrip, and aluminized steel, without attacking the metal coating. It has excellent weather resistance and it exhibits high recovery, making it ideal for sealing dynamically moving joints, resistant to road salts.

SPECIFICATIONS

Density	1.23 kg/L
Tack-free time*	1 to 2 hours
Cure Rate*	4mm per 24 hours
Elongation @ Break	600%
Tensile Strength	1.55 N/mm2
Lap Shear Strength	1.13 N/mm2
Peel Strength	5.2 N/mm on aluminum
Color	White
Application Temperature	5 to 40° C

* Temperature 21°C @ 65% R.H.

Service / Repair

- Corrosion coating system is simple to maintain over the life of your bus, a simple inspection and "touch up " (if required) from erosion is required once every 3 years from years 1 through 12 and yearly after year 12 to 18
- If accident repairs are required to the frame, our service manual provides detailed instructions for applying the products required

Warranty

We have partnered with Axalta to offer a 12-year warranty with an optional 18-year warranty.

NOTE: FOR INSTALLATION DRAWINGS PLEASE REFER TO ATTACHED MRP BOM SHEET FOR PARTS LISTING

VENDOR: ARTIK/OEM INC.

MATERIAL P/N: TBD

DESCRIPTION: COMPOSITION IS MADE OF FOLLOWING COMPONENTS

FOAM:

ACOUSTICAL FOAM
1.62" TOP LAYER (MELAMINE)
0.25" DECOUPLER LAYER (POLYESTER)

BY ARTIK/OEM INC.

BARRIER:

BARRIER 1LB/SQFT
.078" THICK

BY ARTIK/OEM INC.

TOP FACING

METALIZED REINFORCED MYLAR FACING

BY ARTIK/OEM INC.

BOTTOM FACING

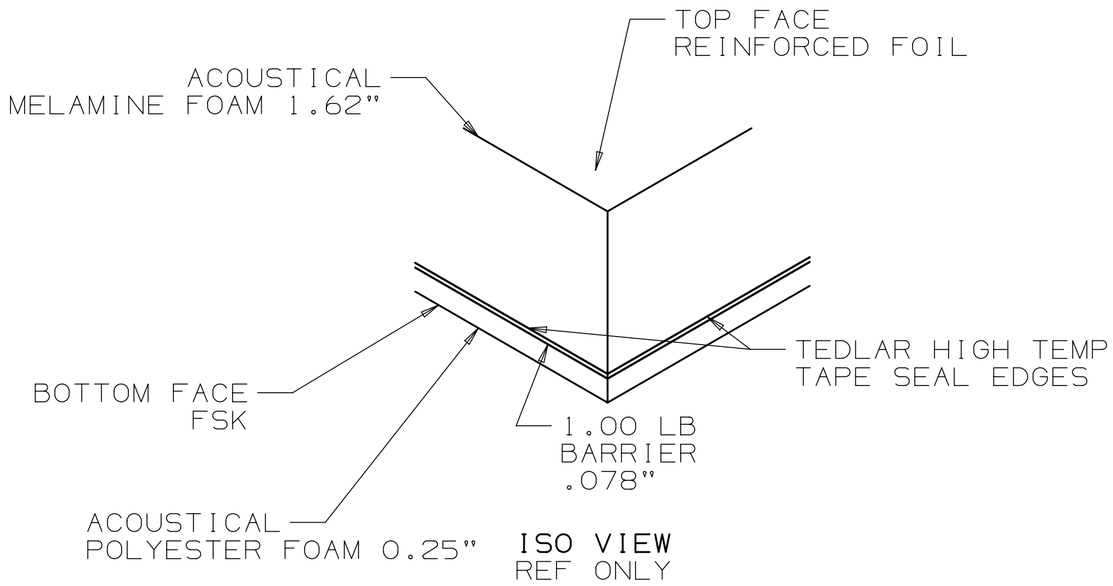
FOIL SKRIM KRAFT

BY ARTIK/OEM INC.

EDGE SEAL

TEDLAR HIGH TEMP TAPE OR
ALPHA TEMP STYLE PPSA-44 TAPE

BY ARTIK/OEM INC.



ISO VIEW
REF ONLY

DO NOT SCALE DRAWING		
DIMENSIONS IN [ ] ARE IN m.m.		
THD ANGLE		
BY	NAME	DD-MMM-YY
DRAWN	N.Y.	07-FEB-11
CHK'D		
APP'D		

REV	DESCRIPTION	ECO
C	1. UPDATED EDGE SEAL INFORMATION TO INCLUDE NEW ALTERNATIVE TAPE.	216501

MATERIAL	UNSPEC'D TOLS.	DEC.IN.
N/A -	.X .XX .XXX HOLE DIA. BEND RADII. ANGLE TOL.	±.12 ±.06 ±.03 ±.015 ±.03 ±1°
WEIGHT -		
TREATMENT NONE -	SIMILAR TO	

TITLE
SPEC-ACOUSTICAL INSULATION

NEW FLYER

PART Nº
298749
(NX)

SCALE 1 = 1 | C | SHEET 1 OF 1

REPORT ALL ERRORS TO ENG. DEPT.

11. BRAKE INTERLOCK CONTROL SYSTEM

11.1. Description

The brake interlock control system consists of a pressure reducing valve, a solenoid valve and a brake valve actuator. See “Fig. GI-14: Brake Interlock Valves” on page 36.

- ❒ The brake interlock pressure reducing valve receives its air supply from the front or rear brake tank via the emergency/parking brake valve system. The pressure reducing valve is set to regulate the interlock pressure to 70 psi. The outlet of the pressure reducing valve regulator is connected to the brake interlock solenoid valve.
- ❒ The brake interlock solenoid valve is normally closed. When energized by the Multiplexing system, it opens and applies pressure from the brake interlock pressure reducing valve to the brake valve actuator on the E-6 brake valve.
- ❒ The brake valve actuator on the E-6 brake valve receives air pressure from the pressure reducing valve and the brake interlock solenoid valve and applies the service brakes. This action will mimic a foot application of the brake treadle and will apply both front and rear service brakes.

☞NOTE:

The treadle will fall away from the operator's foot when the interlocks apply.

Releasing the interlocks will require the vehicle operator to push through the interlock application. Applying sufficient pressure on the treadle to exceed interlock pressure by 10 psi will release the interlocks and the treadle will return to its normal position.

☞NOTE:

Interlock application and release will be accompanied by a text message on the instrument panel LCD screen. Refer to Section 19 in this manual for more information on the instrument panel text messages.

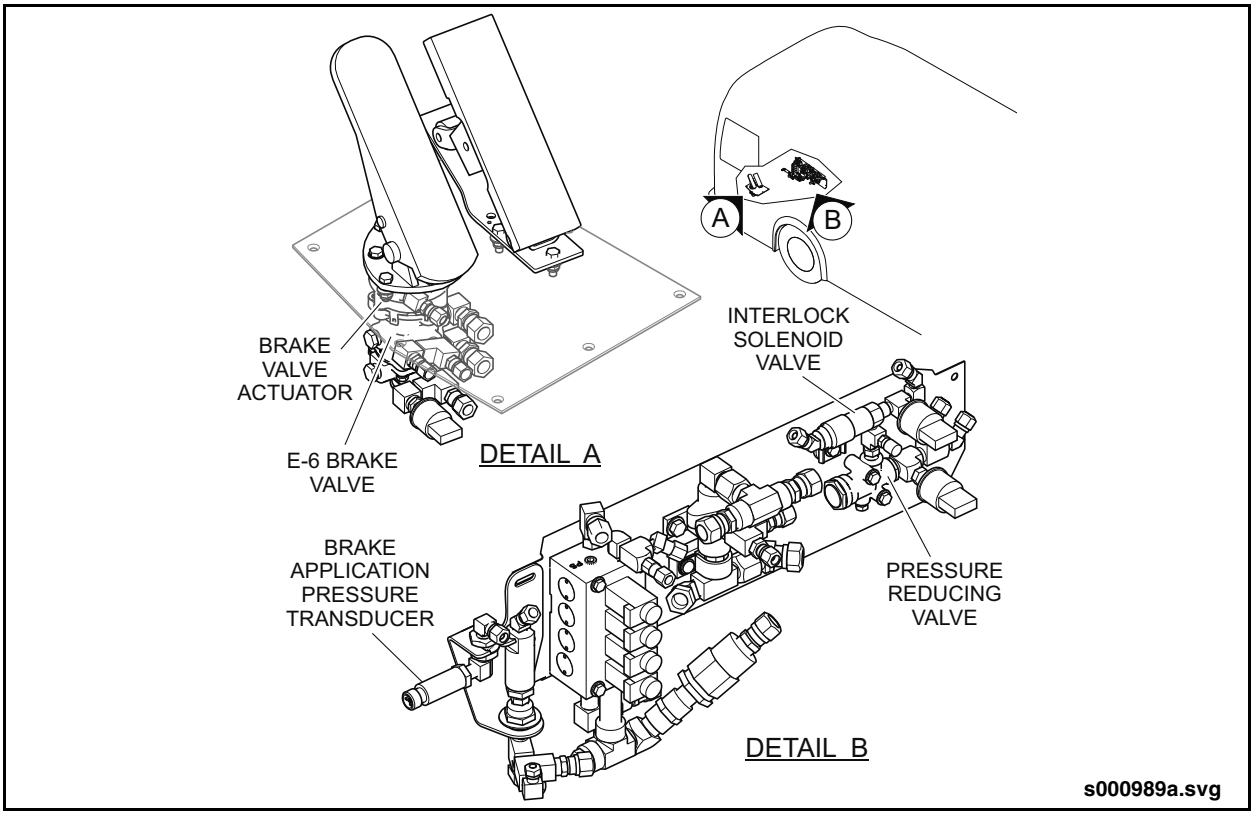


Fig. GI-14: Brake Interlock Valves

NEW FLYER

NEW FLYER Xcelsior®

SALES INFORMATION BULLETIN

#422-001 | **Model:** Xcelsior® | **Lengths:** 35', 40' and 60' | **Propulsion:** All

Secure Diagnostics Station (SDS)

Product Features

The SDS is a standard feature on all Xcelsior® models. Its streamlined design has dual functionality, providing a barrier behind the driver and offering a secure location for unique customer-specific electronics.

In the SDS, sensitive electronic equipment can be mounted to easily accessible slide-out trays. The tray spacing is adjustable to account for a wide variety of custom electronics used in the transit industry. The SDS has capacity for four (4) of these trays which are 19.50" x 15.31" (495 mm x 389 mm) in size and designed to minimize vibration. The customer should speicify the number of trays that are required, the standard offering is zero(0) trays.

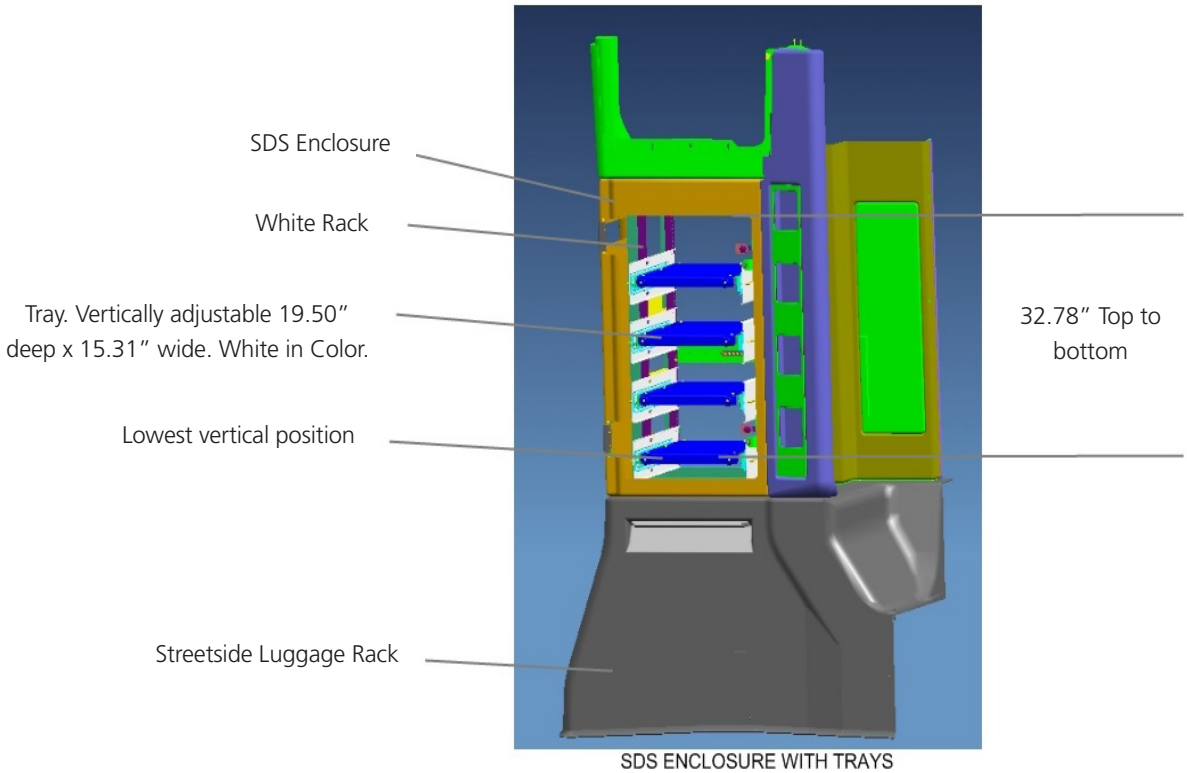
Additional features of the SDS include:

- A four (4) pocket take-one holder installed on the aisle-face-forward side of the SDS box
- A lower 1" x 18" (25 mm x 457 mm) LED strip light conveniently located 30" (762 mm) from the floor to provide aisle lighting at the front of the bus
- Quarter-turn latches to ensure security
- Space behind the driver for an optional tool/driver's storage box
- Space behind the driver for a fire extinguished
- Racks and trays painted white to enhance visibility.

Benefits

Provides a convenient and secure location for a variety of important electronic equipment such as:

- Radio
- DVR (digital video recorder)
- AVA (automatic voice annunciation) module
- AVL (automatic vehicle location) module
- APC (automatic passenger counter) module
- Wireless network devices module
- Brake stroke monitoring module
- Diagnostic ports



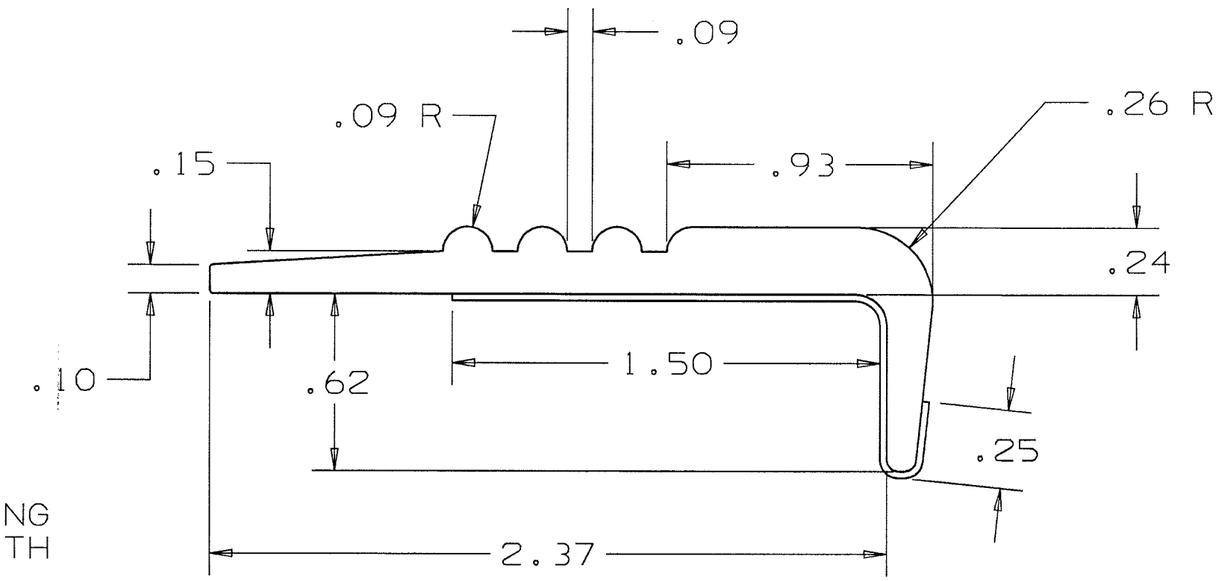
SDS ENCLOSURE WITH TRAYS

Service and repair

The electronic equipment in the SDS can be easily worked on with the slide-out tray design. The egress-type window behind the SDS box also allows repairs from outside the bus. Since the SDS comes with quarter-turn key, the access to the electronic equipment within it can be controlled or restricted by maintenance personnel.

NOTE: FOR INSTALLATION DRAWINGS PLEASE REFER TO ATTACHED MRP BOM SHEET FOR PARTS LISTING

SYM	REVISION	ECO
A	RELEASE TO PRODUCTION.	99457



MATERIAL - YELLOW NITRILE RUBBER/PVC MIX
- 24 GAGE STAINLESS STEEL BACKING
- STAINLESS BONDED TO RUBBER WITH CHEMBOND 1667 OR EQUIVALENT
- USED FOR EXIT DOOR NOSING

VENDOR - ERV PARENT (WESTERN) LTD.
PHONE - 1-204-475-3555
FAX - 1-204-452-5826

NOTICE: THIS DRAWING IS A FACSIMILE OF THE ELECTRONIC MASTER. ALL REVISIONS MUST BE INCORPORATED ELECTRONICALLY. MANUAL REVISION IS NOT ALLOWED.

MATERIAL
SEE NOTES

WEIGHT

TREATMENT
NONE

UNSPEC'D TOLS.	DEC. IN.	METRIC
.X	±.12	3.1
.XX	±.06	1.5
.XXX	±.03	0.8
HOLE DIA.	±.015	0.4
BEND RADII.	±.03	0.8
ANGLE TOL.	±1°	±1°
TUBE BENDS & LENGTH	±.20	5.1
HOSES 0 TO 20 LG.	±.20	5.1
HOSES 20 LG. PLUS	±1%	1%

	BY	NAME	DD-MMM-YY
DRAWN	J.Y.		31-OCT-02
CHK'D			
APP'D			31-OCT-02

DO NOT SCALE DIMENSIONS IN ( ) ARE IN m.m.

THD ANGLE

TITLE
NOSING-ALTRO EXIT YL

NEW FLYER

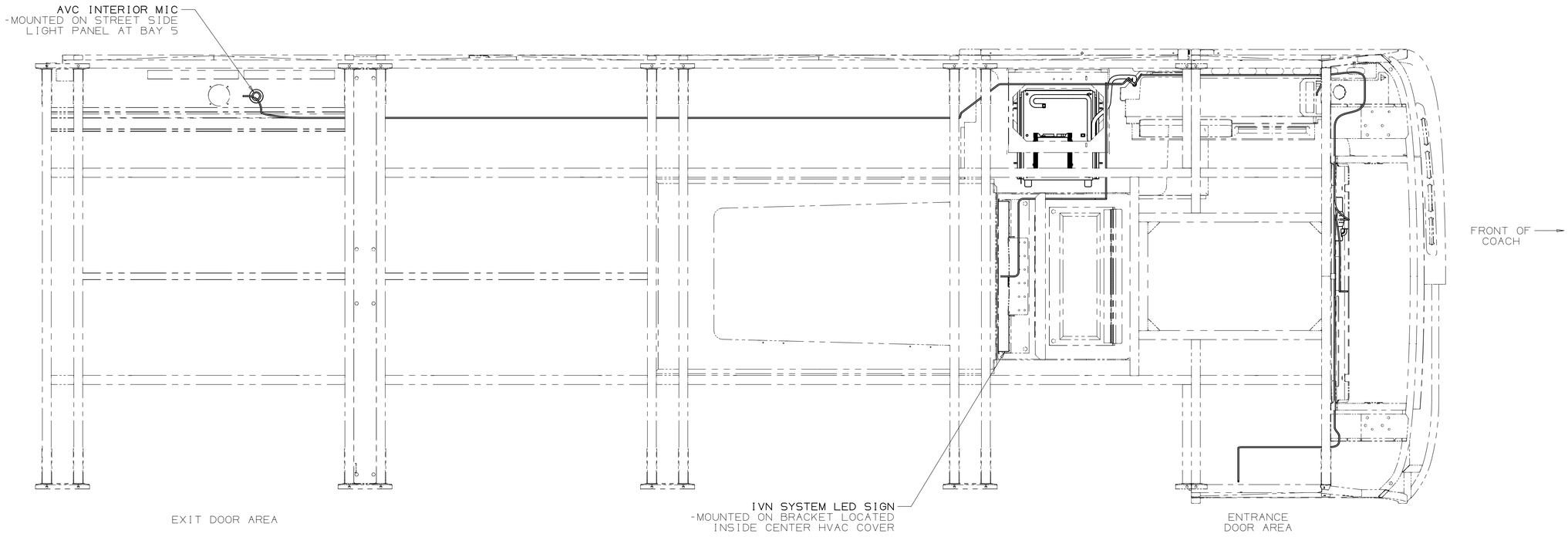
PART N°
227528
(UNIGRAPHICS)

SCALE 2 = 1 | B | SHEET 1 OF 1

REPORT ALL ERRORS TO ENG. DEPT.

NOTE: FOR INSTALLATION DRAWINGS PLEASE REFER TO ATTACHED MRP BOM SHEET FOR PARTS LISTING

DRAWING Nº
441601



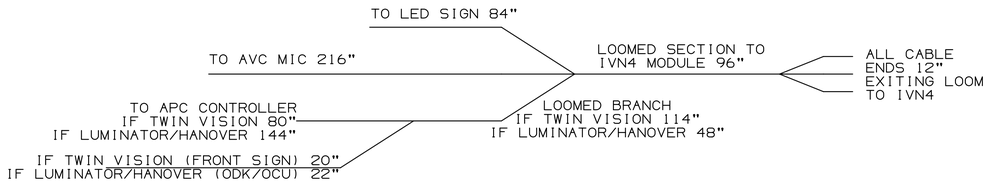
GENERAL SYSTEM NOTES:

1) SYSTEM INTEGRATOR: CLEVER DEVICES IVN4 CONTROLLER UNIT

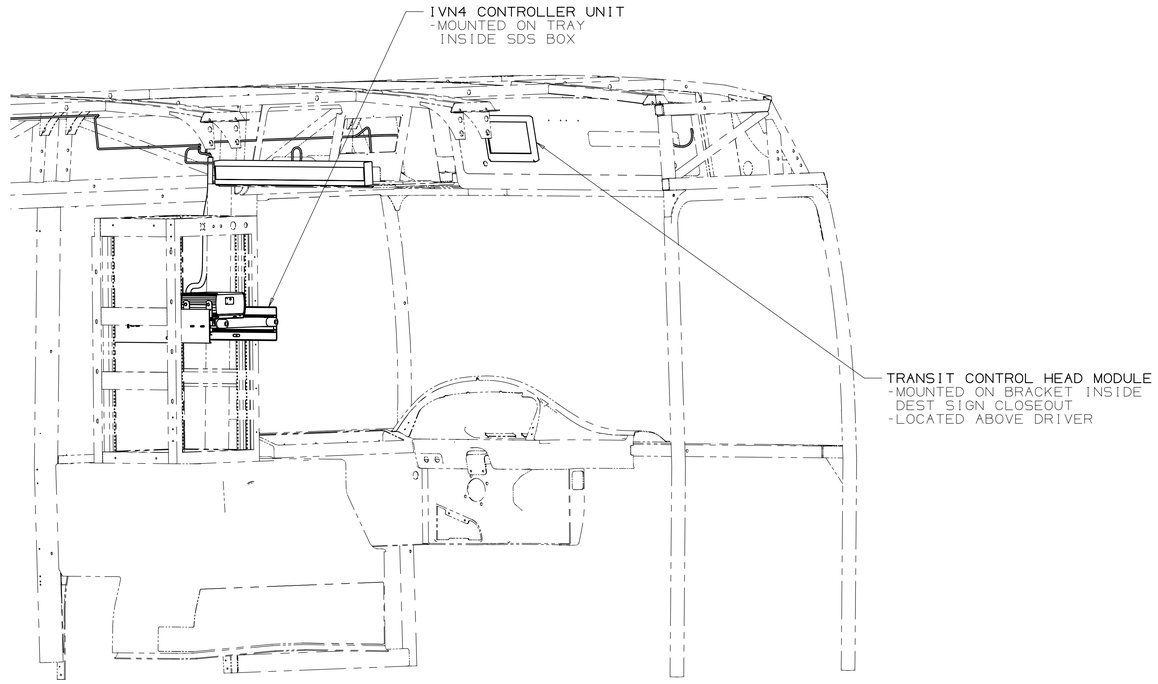
2) POWER REQUIREMENTS PROVIDED: -24V DAY/NIGHT
-24V BATTERY

3) DISCRETE INPUT SIGNALS AVAILABLE: -FRONT DOOR INPUT
-REAR DOOR INPUT
-WHEELCHAIR DEPLOYED
-BACKUP/REVERSE INPUT
-ODOMETER SIGNAL
-STOP REQUEST

4) SYSTEM COMPONENTS: -LED SIGN
-AVC MIC
-TRANSIT CONTROL HEAD (TCH) MODULE
-IVN4 CONTROLLER UNIT
-QUADBAND ANTENNA (NOT PICTORIALLY SHOWN)
ANTENNA CABLE LENGTHS TBD BASED ON CONTRACT



HARNESS LAYOUT
(PN: N/A)



VIEW LOOKING INTO DRIVER'S AREA
HVAC COVER AND LED SIGN REMOVED FOR CLARITY

CABLE LIST

CABLE	FROM	TO	LENGTH	NF PN
TCH VGA CABLE	SDS BOX	TCH MODULE	240"	N/A

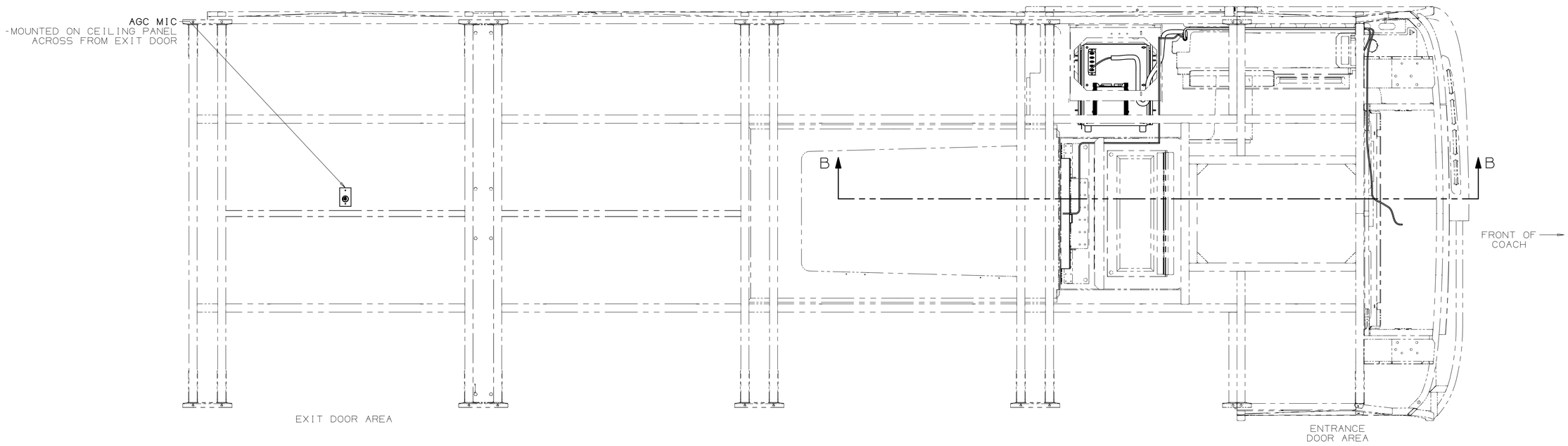
DO NOT SCALE DRAWING			
DIMENSIONS IN [ ] ARE IN m.m.			
THD ANGLE			
DRAWN BY			
CHRIS DOWNEY		SHEETS AFFECTED (ALL) 1) SHEETS 6 & 7 ADDED 2) HARNESS LAYOUT & CABLE LIST ADDED 3) SYSTEM COMPONENTS UPDATED	
DATE (DD-MMM-YY)	B		ECN-041267
01-OCT-14	REV	DESCRIPTION	ECO

MATERIAL N/A -	UNSPEC'D TOLS. .X ±.12 .XX ±.06 .XXX ±.03 HOLE DIA. ±.015 BEND RADII ±.03 ANGLE TOL. ±1°	DEC.IN.	TITLE APPROV-AVA/AVL SYSTEM
WEIGHT -			
TREATMENT NOT REQUIRED	SIMILAR TO -		NEW FLYER
			PART Nº 441601 (NX)
			SCALE 1:10 / E / SHEET 1 OF 7

REPORT ALL ERRORS TO ENG. DEPT.

NOTE: FOR INSTALLATION DRAWINGS PLEASE REFER TO ATTACHED MRP BOM SHEET FOR PARTS LISTING

DRAWING Nº
441601



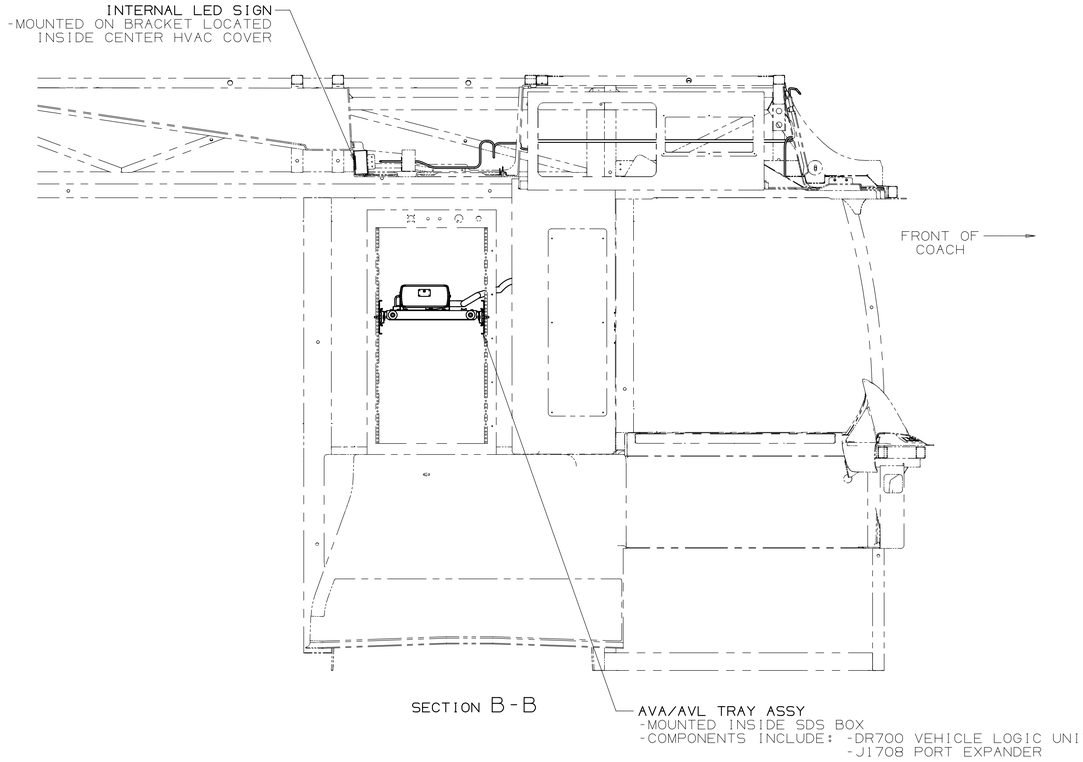
GENERAL SYSTEM NOTES:

1) SYSTEM INTEGRATOR: CLEVER DEVICES DR700 VEHICLE LOGIC UNIT

2) POWER REQUIREMENTS PROVIDED: -24V BATTERY
-12V DAY/NIGHT
-24V DAY/NIGHT

3) DISCRETE INPUT SIGNALS AVAILABLE: -FRONT OR REAR DOOR OPEN
-WHEELCHAIR STOP REQUEST
-BACKUP/REVERSE INPUT
-ODOMETER SIGNAL
-STOP REQUEST

4) SYSTEM COMPONENTS: -INTERNAL LED SIGN
-AGC MIC
-DR700 VEHICLE LOGIC UNIT
-J1708 PORT EXPANDER
-TRIBAND ANTENNA (NOT PICTORIALLY SHOWN)
ANTENNA CABLE LENGTHS TBD BASED ON CONTRACT



SECTION B-B

CABLE LIST

AGC MIC WIRING SUPPLIED BY NEW FLYER HARNESS

CABLE	FROM	TO	LENGTH	NF PN
DR700 CABLE HARNESS	SDS BOX	SDS BOX	-	545738
LED SIGN CABLE	SDS BOX	LED SIGN	204"	N/A

IF TWIN VISION DESTINATION SIGNS CABLE REQUIRED:

CABLE	FROM	TO	LENGTH	NF PN
TWIN VISION FRONT SIGN INTERFACE	SDS BOX	FRONT DESTINATION SIGN	228"	N/A

IF HANOVER DESTINATION SIGNS CABLES REQUIRED:

CABLE	FROM	TO	LENGTH	NF PN
DRI OCU POWER	SDS BOX	OCU IN SAWTOOTH	180"	N/A
DRI OCU INTERFACE	SDS BOX	OCU IN SAWTOOTH	180"	N/A
HANOVER OCU INTERFACE	SDS BOX	OCU IN FRONT DESTINATION SIGN AREA	228"	N/A

IF LUMINATOR DESTINATION SIGNS CABLES REQUIRED:

CABLE	FROM	TO	LENGTH	NF PN
DRI OCU POWER	SDS BOX	ODK IN SAWTOOTH	180"	N/A
DRI OCU INTERFACE	SDS BOX	ODK IN SAWTOOTH	180"	N/A
LUMINATOR ODK INTERFACE	SDS BOX	OCU IN FRONT DESTINATION SIGN AREA	228"	N/A

DO NOT SCALE DRAWING	
DIMENSIONS IN [ ] ARE IN m.m.	
THD ANGLE	
DRAWN BY	CHRIS DOWNEY
DATE (DD-MMM-YY)	01-OCT-14

REV	DESCRIPTION	ECO
B	1) CABLE LIST ADDED 2) SECTION B-B UPDATED 3) SYSTEM INTEGRATOR WAS DIGITAL RECORDERS DR600 4) SYSTEM COMPONENTS UPDATED	ECN-041267

MATERIAL N/A -	UNSPEC'D TOLS. .X .XX .XXX HOLE DIA. BEND RADII. ANGLE TOL.	DEC. IN. ±.12 ±.06 ±.03 ±.015 ±.03 ±1°
WEIGHT -		
TREATMENT NOT REQUIRED -	SIMILAR TO -	

TITLE
APPROV-AVA/AVL SYSTEM

NEW FLYER

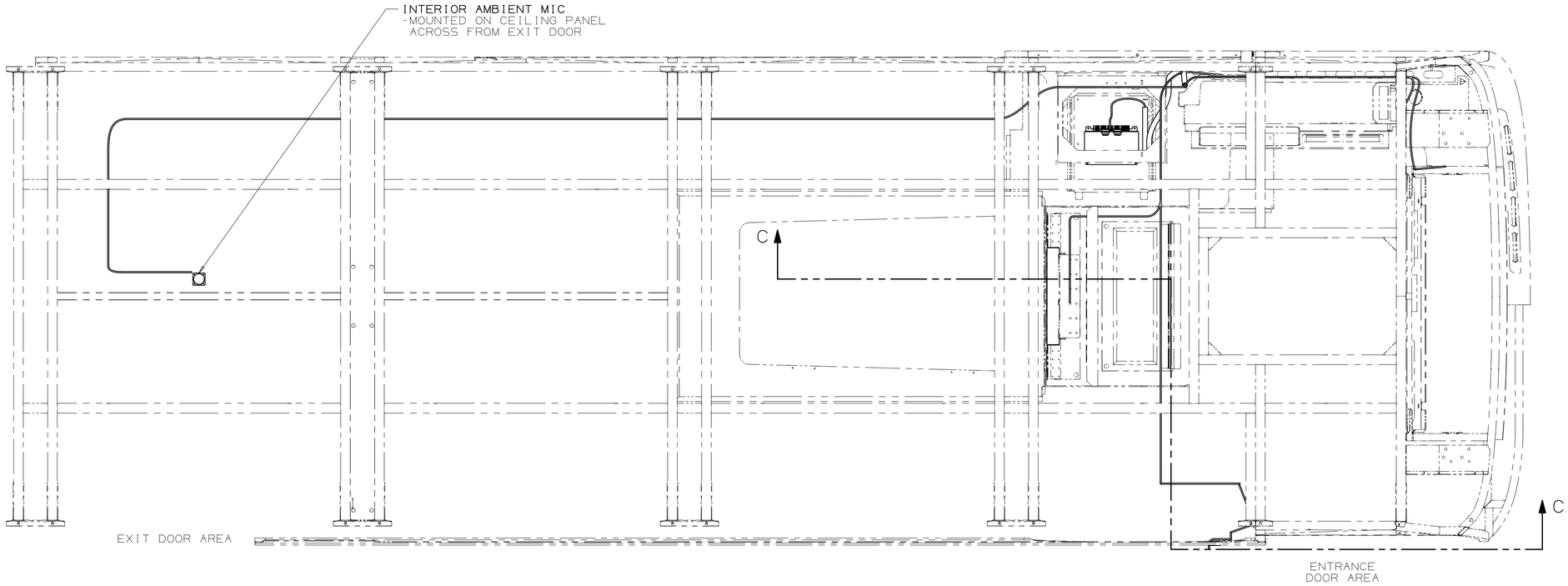
PART Nº
441601
(NX)

SCALE 1:10 | E | SHEET 2 OF 7

REPORT ALL ERRORS TO ENG. DEPT.

NOTE: FOR INSTALLATION DRAWINGS PLEASE REFER TO ATTACHED MRP BOM SHEET FOR PARTS LISTING

DRAWING Nº
441601



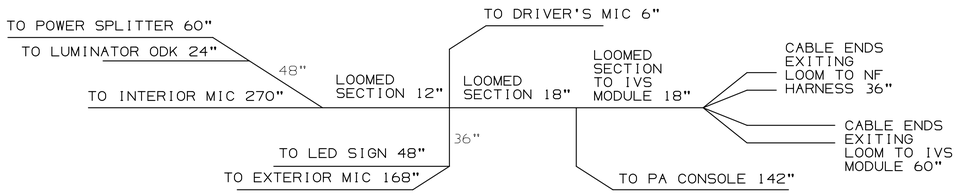
GENERAL SYSTEM NOTES:

1) SYSTEM INTEGRATOR: LUMINATOR

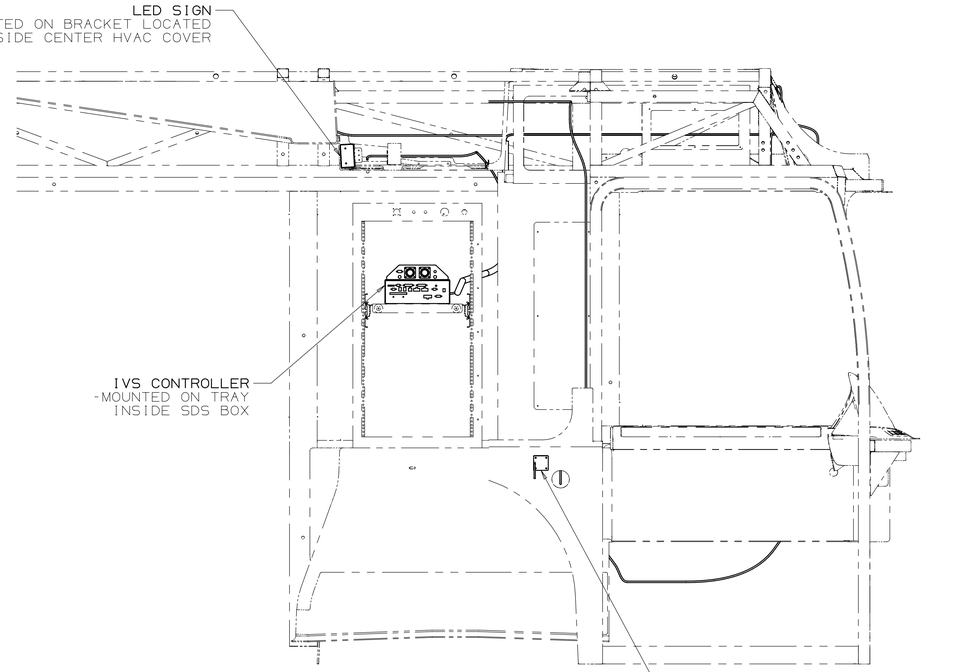
2) POWER REQUIREMENTS PROVIDED: POWERED THROUGH DESTINATION SIGNS

3) DISCRETE INPUT SIGNALS AVAILABLE:
- -FRONT DOOR INPUT
- -REAR DOOR INPUT
- -WHEELCHAIR STOP REQUEST
- -ODOMETER SIGNAL
- -STOP REQUEST

4) SYSTEM COMPONENTS:
- -LED SIGN
- -INTERIOR AMBIENT MIC
- -EXTERIOR AMBIENT MIC
- -IVS CONTROLLER
- -GPS ANTENNA (NOT PICTORIALLY SHOWN)
- *ANTENNA CABLE LENGTHS TBD BASED ON CONTRACT*



HARNESS LAYOUT
(PN:492515)



SECTION C-C

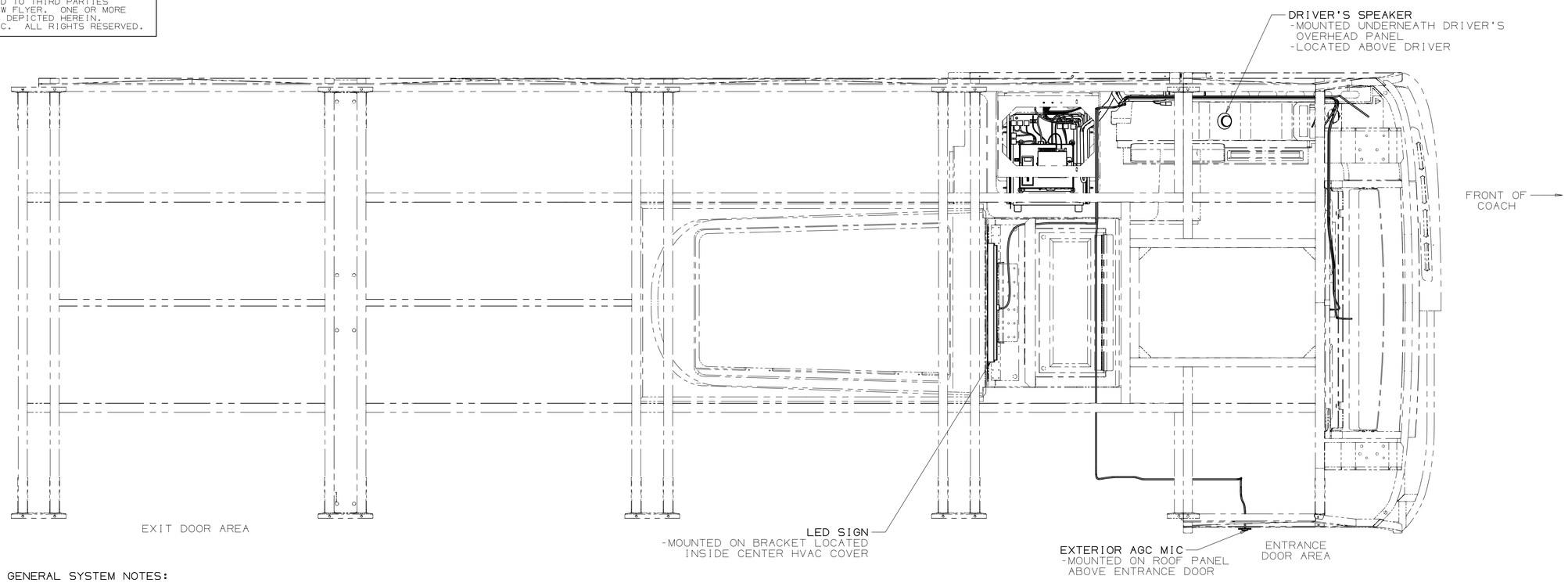
DO NOT SCALE DRAWING			
DIMENSIONS IN ( ) ARE IN m.m.			
THD ANGLE			
DRAWN BY			
CHRIS DOWNEY			
DATE (DD-MMM-YY)	B	1) HARNESS LAYOUT ADDED 2) SECTION C-C UPDATED	ECN-041267
01-OCT-14	REV	DESCRIPTION	ECO

MATERIAL N/A -	UNSPEC'D TOLS.	DEC. IN.	TITLE APPROV-AVA/AVL SYSTEM
WEIGHT -	.X .XX .XXX HOLE DIA. BEND RADII. ANGLE TOL.	±.12 ±.06 ±.03 ±.015 ±.03 ±1°	NEW FLYER (NX)
TREATMENT NOT REQUIRED -	SIMILAR TO -		PART Nº 441601
			SCALE 1:10 / E / SHEET 3 OF 7

REPORT ALL ERRORS TO ENG. DEPT.

NOTE: FOR INSTALLATION DRAWINGS PLEASE REFER TO ATTACHED MRP BOM SHEET FOR PARTS LISTING

DRAWING Nº
441601



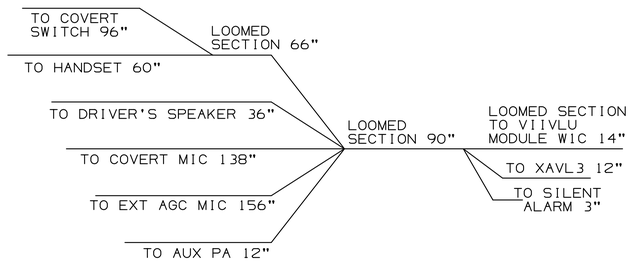
GENERAL SYSTEM NOTES:

1) SYSTEM INTEGRATOR: TRAPEZE SOFTWARE GROUP VIIVLU MODULE

2) POWER REQUIREMENTS PROVIDED: -12V BATTERY
-12V DAY/NIGHT

3) DISCRETE INPUT SIGNALS AVAILABLE: -FRONT DOOR INPUT
-REAR DOOR INPUT
-WHEELCHAIR DEPLOYED
-STOP REQUEST INPUT
-8 ADDITIONAL CUSTOMER SPECIFIC INPUTS AVAILABLE

4) SYSTEM COMPONENTS: -LED SIGN
-COVERT MIC
-VIIVLU MODULE
-RADIO
-DRIVER'S SPEAKER
-RADIO HANDSET
-MDT DISPLAY
-J1708 BOX
-EXTERIOR AGC MIC
-DUAL BAND (GPS/WLAN) & RADIO ANTENNAS (NOT PICTORIALLY SHOWN)
ANTENNA CABLE LENGTHS TBD BASED ON CONTRACT



W1C HARNESS LAYOUT
(PN: N/A)

CABLE LIST

CABLE	FROM	TO	LENGTH	NF PN
W1A CABLE HARNESS	SDS BOX	SDS BOX	-	456798
W2 CABLE HARNESS	SDS BOX	SDS BOX	-	452873
W1D CABLE HARNESS	SDS BOX	SDS BOX	-	468716
MDT CABLE	SDS BOX	MDT	228"	N/A
LED SIGN CABLE	SDS BOX	LED SIGN	180"	240086

IF TWIN VISION DESTINATION SIGNS CABLE REQUIRED:

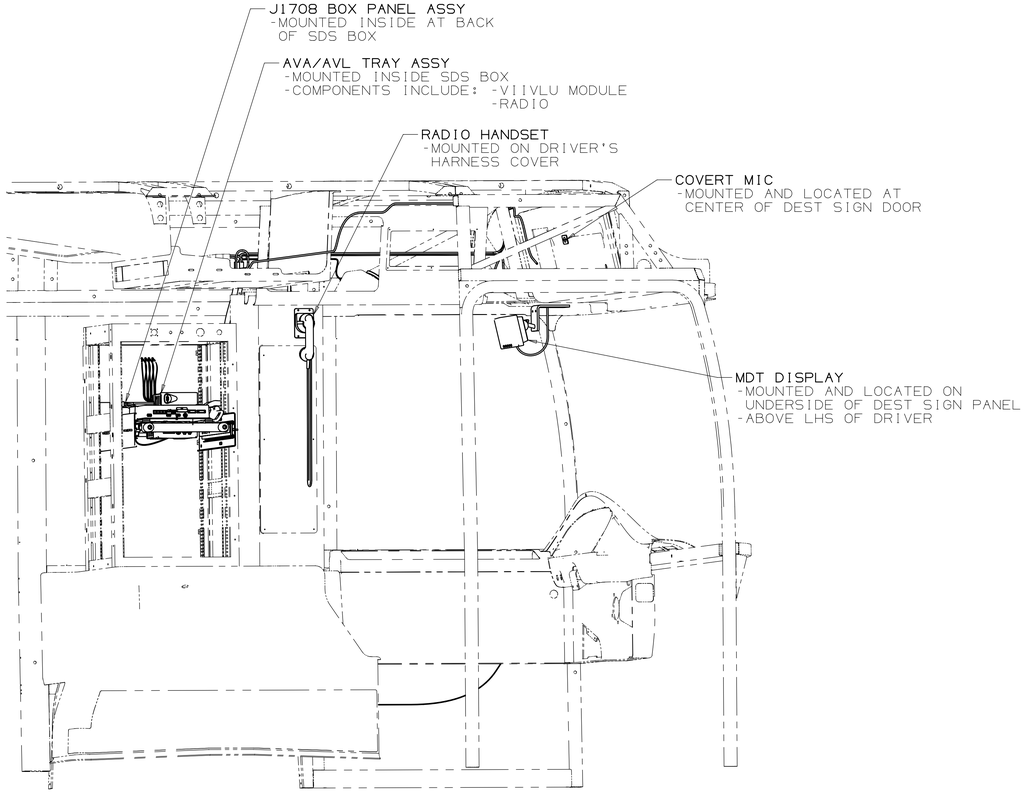
CABLE	FROM	TO	LENGTH	NF PN
TWIN VISION FRONT SIGN INTERFACE	SDS BOX	FRONT DESTINATION SIGN	228"	N/A

IF HANOVER DESTINATION SIGNS CABLE REQUIRED:

CABLE	FROM	TO	LENGTH	NF PN
HANOVER OCU INTERFACE	SDS BOX	OCU IN SAWTOOTH	180"	N/A

IF LUMINATOR DESTINATION SIGNS CABLE REQUIRED:

CABLE	FROM	TO	LENGTH	NF PN
LUMINATOR ODK INTERFACE	SDS BOX	ODK IN SAWTOOTH	180"	N/A



VIEW LOOKING INTO DRIVER'S AREA

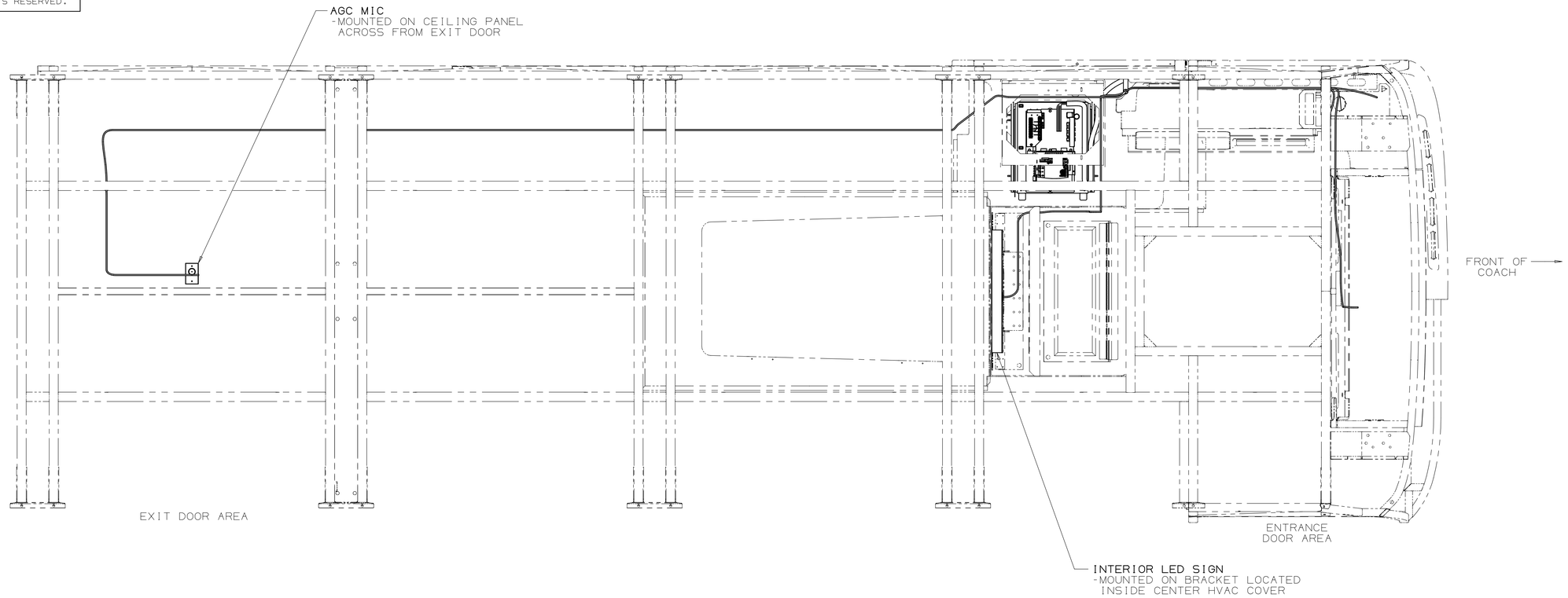
DO NOT SCALE DRAWING			
DIMENSIONS IN [ ] ARE IN m.m.			
THD ANGLE			
DRAWN BY			
CHRIS DOWNEY			
DATE (DD-MMM-YY)	B	1) HARNESS LAYOUT & CABLE LIST ADDED 2) SYSTEM INTEGRATOR WAS VEIVLU 3) SYSTEM COMPONENTS UPDATED	ECN-041267
01-OCT-14	REV	DESCRIPTION	ECO

MATERIAL N/A -	UNSPEC'D TOLS. .X ±.12 .XX ±.06 .XXX ±.03 HOLE DIA. ±.015 BEND RADII ±.03 ANGLE TOL. ±1°	DEC. IN.	TITLE APPROV-AVA/AVL SYSTEM
WEIGHT -			
TREATMENT NOT REQUIRED	SIMILAR TO -		NEW FLYER (NX)
			PART Nº 441601
			SCALE 1:10 / E / SHEET 4 OF 7

REPORT ALL ERRORS TO ENG. DEPT.

NOTE: FOR INSTALLATION DRAWINGS PLEASE REFER TO ATTACHED MRP BOM SHEET FOR PARTS LISTING

DRAWING Nº
441601



GENERAL SYSTEM NOTES:

1) SYSTEM INTEGRATOR: XEROX - AFFILIATED COMPUTER SERVICES (ACS) IVU

2) POWER REQUIREMENTS PROVIDED: -12V BATTERY
-12V DAY/NIGHT
-24V BATTERY

3) DISCRETE INPUT SIGNALS AVAILABLE: -FRONT DOOR INPUT
-REAR DOOR INPUT
-WHEELCHAIR DEPLOYED
-WHEELCHAIR STOP REQUEST
-STOP REQUEST INPUT
-ODOMETER

4) SYSTEM COMPONENTS: -INTERIOR LED SIGN
-AGC MIC
-IVU MODULE
-PA AMP
-ORBGUIDE
-RADIO
-RADIO HANDSET
-GPS, WLAN, RADIO ANTENNAS (NOT PICTORIALLY SHOWN)
ANTENNA CABLE LENGTHS TBD BASED ON CONTRACT

CABLE LIST

LENGTH OF POWER WIRES REQUIRED FROM IVU MODULE 60"

CABLE	FROM	TO	LENGTH	NF PN
AGC MIC CABLE	SDS BOX	AGC MIC	408"	N/A
RADIO HANDSET CABLE	SDS BOX	RADIO HANDSET	156"	N/A
ORBGUIDE CABLE	SDS BOX	ORBGUIDE	192"	N/A
LED SIGN CABLE	SDS BOX	LED SIGN	204"	N/A
AMP INTERFACE CABLE	SDS BOX	SDS BOX	36"	337205
AMP TO IVU INTERFACE CABLE	SDS BOX	SDS BOX	60"	358179

IF TWIN VISION DESTINATION SIGNS CABLE REQUIRED:

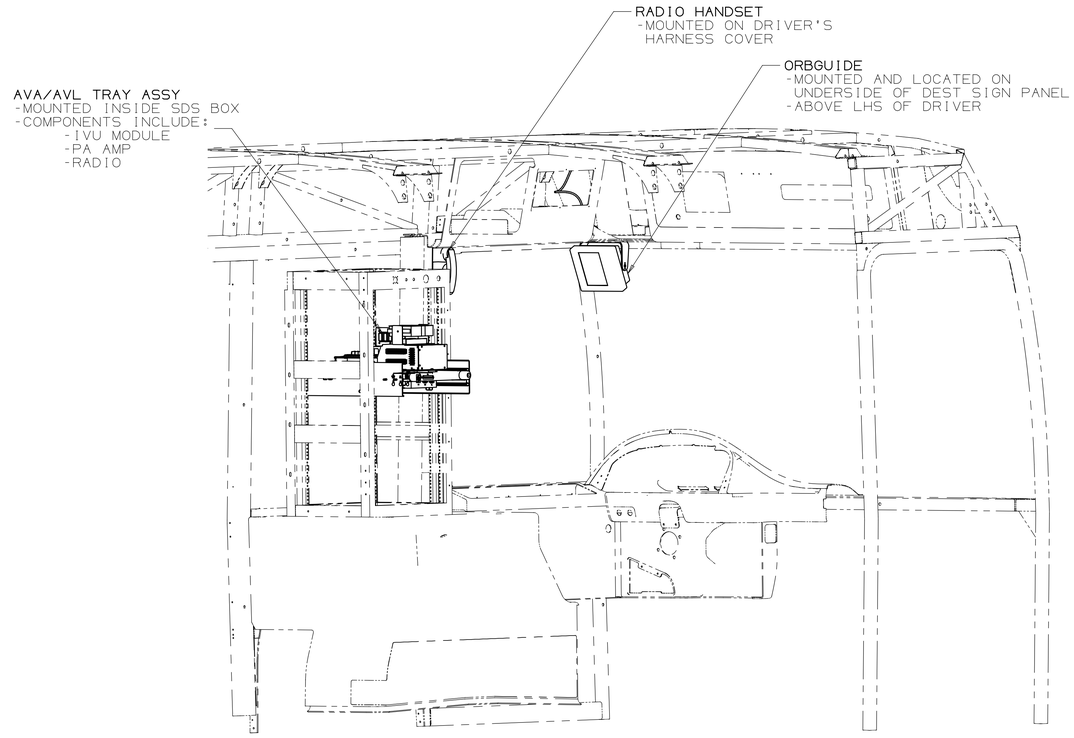
CABLE	FROM	TO	LENGTH	NF PN
TWIN VISION FRONT SIGN INTERFACE	SDS BOX	FRONT DESTINATION SIGN	228"	N/A

IF HANOVER DESTINATION SIGNS CABLE REQUIRED:

CABLE	FROM	TO	LENGTH	NF PN
HANOVER OCU INTERFACE	SDS BOX	OCU IN SAWTOOTH	180"	N/A

IF LUMINATOR DESTINATION SIGNS CABLE REQUIRED:

CABLE	FROM	TO	LENGTH	NF PN
LUMINATOR ODK INTERFACE	SDS BOX	ODK IN SAWTOOTH	180"	N/A



VIEW LOOKING INTO DRIVER'S AREA
HVAC COVER AND LED SIGN
REMOVED FOR CLARITY

REV	DESCRIPTION	ECO
B	1) CABLE LIST ADDED	ECN-041267

DO NOT SCALE DRAWING
DIMENSIONS IN [ ] ARE IN m.m.
THD ANGLE
DRAWN BY
CHRIS DOWNEY
DATE (DD-MMM-YY)
01-OCT-14

MATERIAL
N/A
-
WEIGHT
-
TREATMENT
NOT REQUIRED
-

UNSPEC'D TOLS. DEC. IN.
.X ±.12
.XX ±.06
.XXX ±.03
HOLE DIA. ±.015
BEND RADII. ±.03
ANGLE TOL. ±1°

SIMILAR TO
-

TITLE
APPROV-AVA/AVL SYSTEM

NEW FLYER

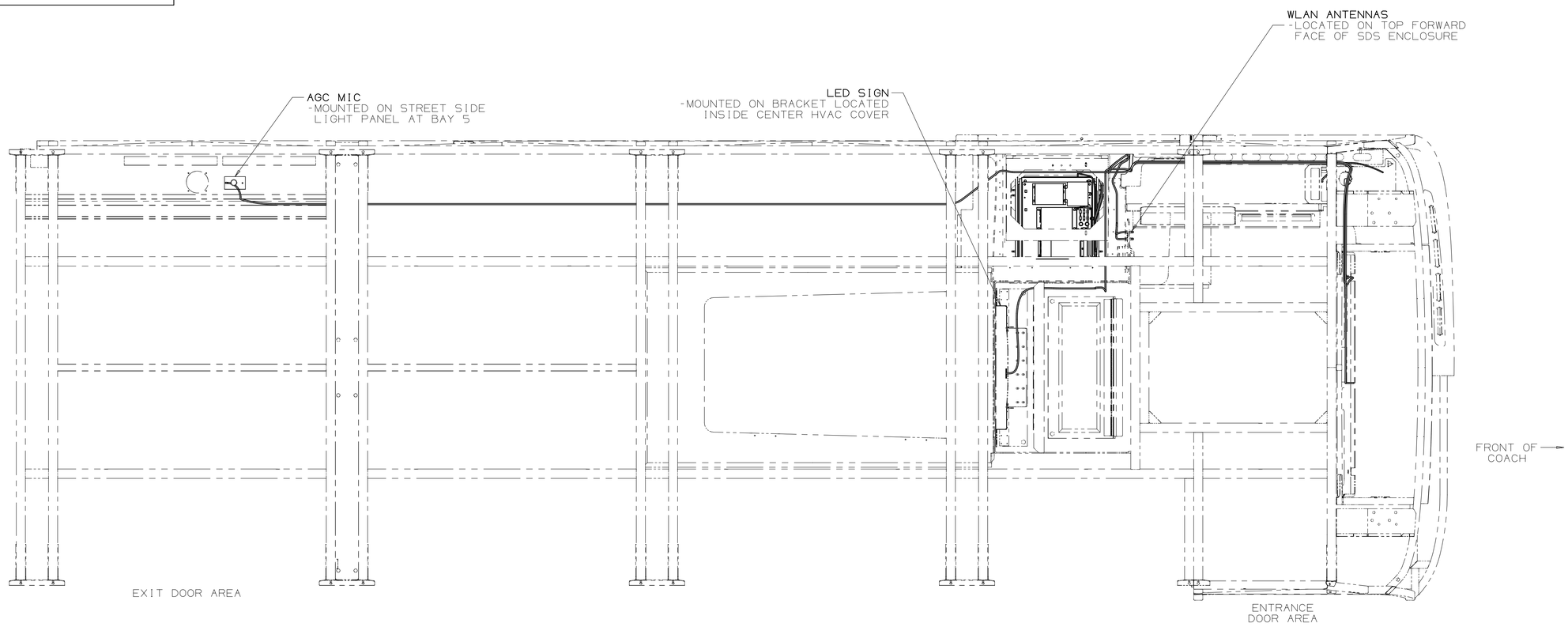
PART Nº
441601
(NX)

SCALE 1:10
E
SHEET 5 OF 7

REPORT ALL ERRORS TO ENG. DEPT.

NOTE: FOR INSTALLATION DRAWINGS PLEASE REFER TO ATTACHED MRP BOM SHEET FOR PARTS LISTING

DRAWING Nº
441601



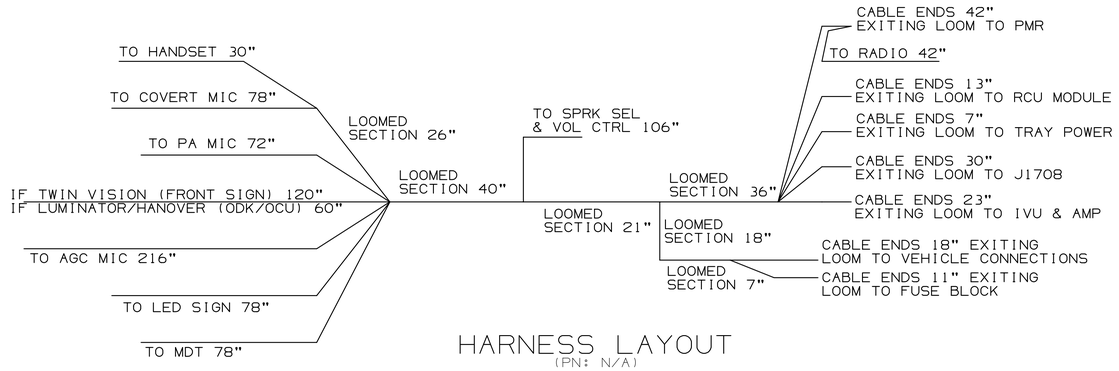
GENERAL SYSTEM NOTES:

1) SYSTEM INTEGRATOR: AVAIL TECHNOLOGIES IVU MODULE

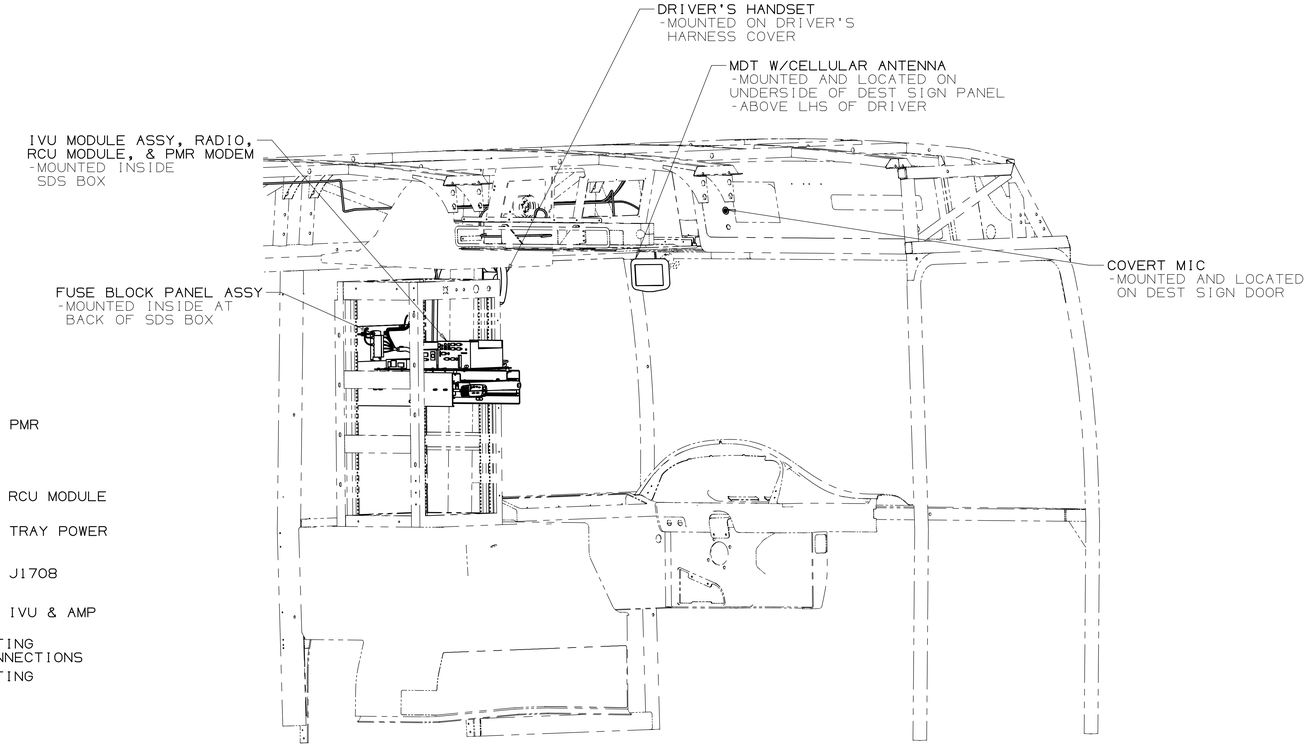
2) POWER REQUIREMENTS PROVIDED: -12V BATTERY
-12V DAY/NIGHT

3) DISCRETE INPUT SIGNALS AVAILABLE: -FRONT DOOR INPUT
-REAR DOOR INPUT
-WHEELCHAIR DEPLOYED INPUT
-WHEELCHAIR STOWED INPUT
-WHEELCHAIR STOP REQUEST
-STOP REQUEST

4) SYSTEM COMPONENTS: -IVU MODULE ASSEMBLY
-FUSE BLOCK
-RADIO W/POWER CABLE
-RCU MODULE
-PMR MODEM
-MDT W/CELLULAR ANTENNA
-DRIVER'S HANDSET
-AGC MIC
-COVERT MIC
-FRONT LED SIGN
-WLAN ANTENNAS (X2)
-GPS & RADIO ANTENNAS (NOT PICTORIALLY SHOWN)
ANTENNA CABLE LENGTHS TBD BASED ON CONTRACT



HARNESS LAYOUT
(PN: N/A)



VIEW LOOKING INTO DRIVER'S AREA

CABLE LIST

CABLE	FROM	TO	LENGTH	NF PN
IVU WLAN CABLE (*2 REQUIRED*)	SDS BOX	SDS BOX	120"	560851

DO NOT SCALE DRAWING	
DIMENSIONS IN ( ) ARE IN m.m.	
THD ANGLE	
DRAWN BY	CHRIS DOWNEY
DATE (DD-MMM-YY)	01-OCT-14

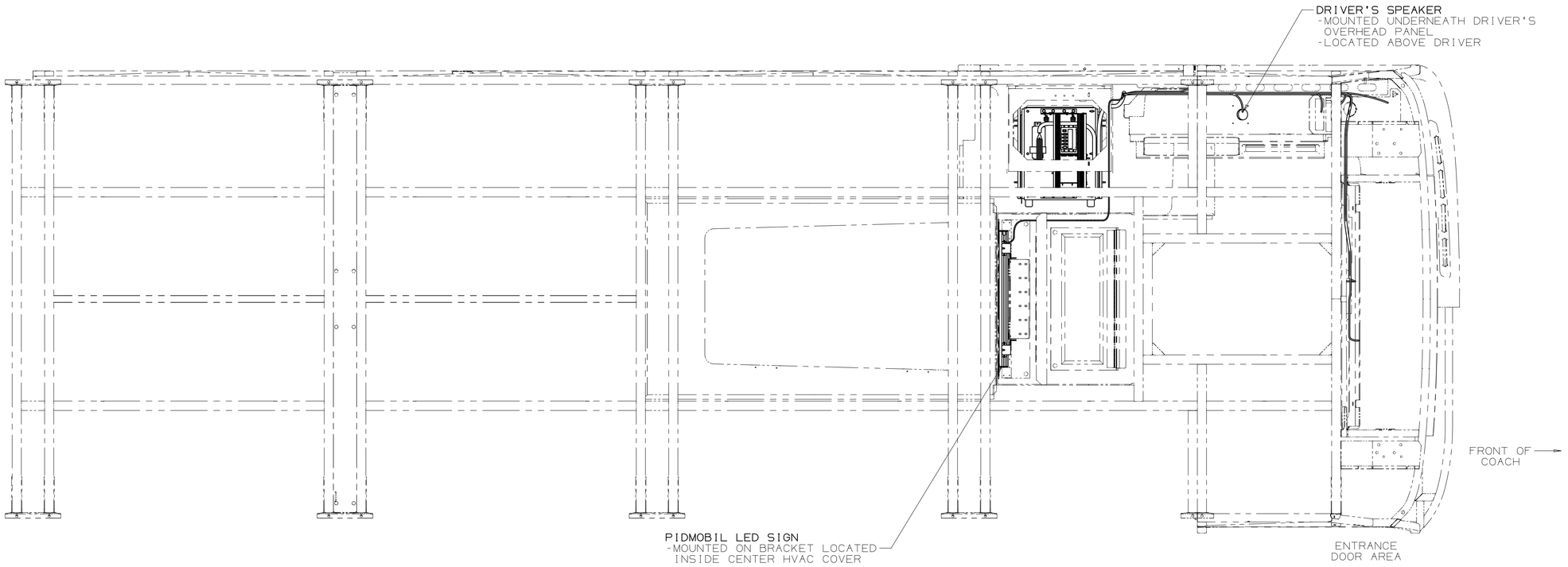
REV	DESCRIPTION	ECO
B	1) SHEET ADDED	ECN-041267

MATERIAL N/A -	UNSPEC'D TOLS. .X ±.12 .XX ±.06 .XXX ±.03 HOLE DIA. ±.015 BEND RADII. ±.03 ANGLE TOL. ±1°	DEC. IN.	TITLE APPROV-AVA/AVL SYSTEM
WEIGHT -			PART Nº 441601 (NX)
TREATMENT NOT REQUIRED -	SIMILAR TO -		NEW FLYER
		SCALE 1:10	E SHEET 6 OF 7

REPORT ALL ERRORS TO ENG. DEPT.

NOTE: FOR INSTALLATION DRAWINGS PLEASE REFER TO ATTACHED MRP BOM SHEET FOR PARTS LISTING

DRAWING Nº
441601



GENERAL SYSTEM NOTES:

1) SYSTEM INTEGRATOR: INIT (INNOVATIONS IN TRANSPORTATION)

2) POWER REQUIREMENTS PROVIDED: -24V BATTERY
-12V BATTERY
-24V DAY/NIGHT

3) DISCRETE INPUT SIGNALS AVAILABLE: -FRONT DOOR INPUT
-REAR DOOR INPUT
-WHEELCHAIR DEPLOYED
-ODOMETER SIGNAL
-STOP REQUEST
-EMERGENCY ALARM
-ANY DOOR OPEN

4) SYSTEM COMPONENTS: -INIT COMPONENT RACK WITH:
-GPSGO MODULE
-PAMOBIL2 AMPLIFIER
-COPILOT MODULE
-WAGO TERMINAL BLOCK
-DRIVER'S HANDSET
-COVERT MIC
-TOUCHMON MDT
-DRIVER'S SPEAKER
-PIDMOBIL FRONT LED SIGN
-TRIBAND ANTENNA (NOT PICTORIALLY SHOWN)
ANTENNA CABLE LENGTHS TBD BASED ON CONTRACT

CABLE LIST

CABLE	FROM	TO	LENGTH	NF PN
PIDMOBIL LED SIGN CABLE	SDS BOX	LED SIGN	196"	483192
HANDSET CABLE	SDS BOX	HANDSET	157"	N/A
COVERT MIC CABLE	SDS BOX	COVERT MIC	236"	545271
DRIVER'S SPEAKER CABLE	SDS BOX	DRIVER'S SPEAKER	157"	540046
TOUCHMON MDT CABLE	SDS BOX	MDT	196"	N/A
PA INPUT CABLE	SDS BOX	PA MIC	157"	540050

IF TWIN VISION DESTINATION SIGNS CABLE REQUIRED:

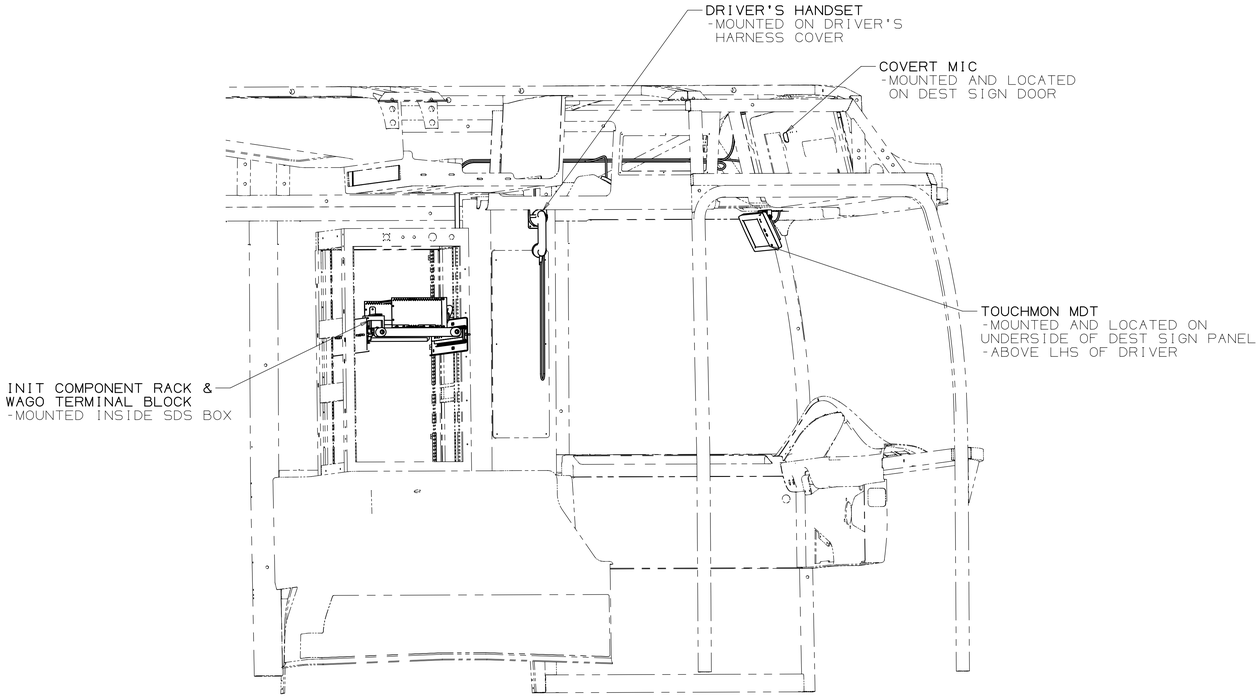
CABLE	FROM	TO	LENGTH	NF PN
TWIN VISION FRONT SIGN INTERFACE	SDS BOX	FRONT DESTINATION SIGN	236"	483191

IF HANOVER DESTINATION SIGNS CABLE REQUIRED:

CABLE	FROM	TO	LENGTH	NF PN
HANOVER OCU INTERFACE	SDS BOX	OCU IN SAWTOOTH	196"	N/A

IF LUMINATOR DESTINATION SIGNS CABLE REQUIRED:

CABLE	FROM	TO	LENGTH	NF PN
LUMINATOR ODK INTERFACE	SDS BOX	ODK IN SAWTOOTH	196"	552462



VIEW LOOKING INTO DRIVER'S AREA

DO NOT SCALE DRAWING			
DIMENSIONS IN [ ] ARE IN m.m.			
THD ANGLE			
DRAWN BY	CHRIS DOWNEY		
DATE (DD-MMM-YY)	B	1) SHEET ADDED	ECN-041267
01-OCT-14	REV	DESCRIPTION	ECO

MATERIAL N/A -	UNSPEC'D TOLS. .X ±.12 .XX ±.06 .XXX ±.03 HOLE DIA. ±.015 BEND RADII ±.03 ANGLE TOL. ±1°	DEC. IN.	TITLE APPROV-AVA/AVL SYSTEM
WEIGHT -			PART Nº 441601 (NX)
TREATMENT NOT REQUIRED -	SIMILAR TO -		NEW FLYER
			SCALE 1:10 E SHEET 7 OF 7

REPORT ALL ERRORS TO ENG. DEPT.

NEW FLYER

NEW FLYER Xcelsior®

SALES INFORMATION BULLETIN

#549-001 | **Model:** Xcelsior® | **Lengths:** 35FT, 40FT | **Type:** Low Floor | **Propulsions:** Diesel, Hybrid

Main HVAC System - Thermo King RLF/X430

Value Proposition

Passenger comfort is of utmost importance, but so is delivering that comfort in a way that is energy efficient and optimized to safeguard vehicle performance and fuel economy. New Flyer believes in providing customers with best-value products and the Thermo King RLF HVAC is exactly that.

Product Features

The Thermo King RLF HVAC unit is rooftop-mounted and coupled with an Thermo King X430 A/C compressor. The unit includes the following features:

- High cooling and heating capacity
- Low power drawn and low noise
- Can use either R134a or R407c
- Micro channel condenser (improves performance)

MAIN UNIT SPECIFICATIONS

Manufacturer	Thermo King
Model	RLF
Cooling Capacity	105,000 btu/hr(R407c)[1], 88,500 btu/hr(R134a)[1]
Heating Capacity	105,000 btu/hr[2]
Air Flow	2400 CFM
Refrigerant	R134a or R407c
Unit Weight	402 lbs
Power Drawn	102 amps @ 27 VDC
Dimensions	(LWH): 102.55" x 52"x 26.09"
Mounting	Rooftop
Evap. Motor/fan	TK Brushless/fans X 2
Cond. Motor/fan	TK Brushless/fans X 4

[1] Ambient: 95°F(35°C). Return air: 80°F(26.6°C) dry bulb, 67°F(19.4°C) wet bulb.
[2] 8 GPM coolant flowrate & 100°F(37.8°C) temperature differential between return air and coolant.

A/C COMPRESSOR SPECIFICATIONS

Manufacturer	Thermo King
Model	X430
Pistons	4 cylinder
Displacement	30 in^3/rev
Speed	3000 rpm max
Dimensions	16.6"X13.8"X17.1"
Weight	115 lbs
Drive Type	Belt Driven
Location	Curbside of Engine

CONTROLLER SPECIFICATIONS

Model	IntelligAIRE III
Networking	Interfaces to multiplexing system (J1939)

Air Flow

Hot or cold air is dispersed into the passenger cabin by diffusers located above the passenger lighting and run the full length of the bus. An air return grill (including filter) is located in the interior roof at the front of the passenger compartment. Additional three-inch round air louvers are positioned in strategic locations to give the operator control over climate conditions in the driver's compartment.

Maintenance Access

Large interior maintenance access panels give technicians access to:

- IntelligAIRE III controller
- Evaporator motors, fans
- Evaporator and heating coils
- Condenser coils
- Power connectors
- Receiver tank
- Liquid line dryer
- Liquid line sight glass
- Expansion valve
- Coolant valve
- Pressure relief valve

Remaining components can be accessed by removing shielding on the roof.

Lower Entrance Door Louver

Infront and Overhead of Driver Louver

Behind and Overhead of Driver Louver

Overtop of Entrance Door Louver

Performance, Testing & Compliance

The Thermo King RLF HVAC system has undergone performance testing and is compliant to the majority of common industry-standard specification requirements.

Compliance Table

Common Industry Standards	Requirement Summary	Compliance
APTA White Book Pull Down	115°F to 95°F in 20 minutes. Engine Test Speed; high idle, full solar load	Yes
Houston Pull Down	110°F to 70°F in 30 minutes. Engine Test Speed: 3/4 max engine speed	Yes
APTA White Book Pull Up	-20 °F to 70 °F ±2 °F within 70 minutes	Yes[3]

[3] Compliance to this specification may require the use of an auxillary diesel heater for certain geographical regions.

Warranty

Standard warranty is 2 years/100,000 miles. Extended warranty is available.

Optional Features

Xcelsior® has a large collection of pre-engineered HVAC equipment options available to taylor a bus's design to a customer's specific needs or geographical region. Additional information is available upon request.

Cummins Extended Coverage Plan

Coverage

Cummins Extended Coverage Plan (Plan) is available to be purchased for all eligible Cummins Engines used in automotive applications marketed for use anywhere in the world under the trademark “Cummins” or “Cummins ReCon®”. This Plan covers any failure of the Engine, under normal use and service, which results from a defect in material or factory workmanship (Covered Failure).

This Plan begins on the expiration of the Cummins Base Engine Warranty applicable to the Engine. Coverage ends at the time, miles (kilometers) or hours specified on the accompanying Certificate, whichever occurs first, **AS MEASURED FROM THE CUMMINS BASE ENGINE WARRANTY START DATE**.

Cummins Responsibilities

Cummins will pay for all parts and labor needed to repair the damage to the Engine resulting from a Covered Failure.

Cummins will pay for the lubricating oil, antifreeze, diesel exhaust fluid, filter elements and other maintenance items that are not reusable due to a Covered Failure.

Cummins will pay reasonable labor costs for Engine removal and reinstallation when necessary to repair a Covered Failure.

Owner Responsibilities

Owner is responsible for operation and maintenance of the Engine as specified in the applicable Cummins Operation and Maintenance Manual. Owner is also responsible for providing proof that all recommended maintenance has been performed.

Before the expiration of this Coverage, Owner must notify a Cummins distributor, authorized dealer or other repair location approved by Cummins of any Covered Failure and make the Engine available for repair by such facility. Owner is also responsible for delivering the Engine to the repair facility. Service locations are listed on the Cummins Worldwide Service Locator at cummins.com.

Owner is responsible for all towing and/or travel expenses incurred as a result of a Covered Failure.

Owner is responsible for the cost of lubricating oil, antifreeze, filter elements, belts, hoses and other maintenance items provided during covered repairs unless such items are not reusable due to the Covered Failure.

Owner is responsible for communication expenses, meals, lodging and similar costs incurred as a result of a Covered Failure.

Owner is responsible for non-Engine repairs, “downtime” expenses, cargo damage, fines, all applicable taxes, all business costs and other losses resulting from a Covered Failure.

Owner is responsible for the cost to investigate complaints, unless the failure is caused by a defect in Cummins material or factory workmanship.

Limitations

Engines with an emissions certification listed below must be operated using only diesel fuel having no more than the corresponding maximum sulfur content. Failure to use the specified fuel (see also Cummins Fuel Bulletin #3379001) can damage the Engine and aftertreatment system within a short period of time. This damage could cause the Engine to become inoperable and failures attributable to the use of incorrect fuels will be denied Warranty Coverage.

Maximum sulfur levels by emissions certification level as listed on the Engine's dataplate are:

EPA 2007/2010/2013	max. 15 parts per million
EPA Tier 4 Interim / Final	max. 15 parts per million
EU Stage IIIB 2011	max. 15 parts per million
Euro 4/5	max. 50 parts per million
Euro 6	max. 15 parts per million

Cummins is not responsible for failures or damage resulting from what Cummins determines to be abuse or neglect, including, but not limited to: operation without adequate coolants or lubricants; overfueling; overspeeding; lack of maintenance of lubricating, cooling or intake systems; improper storage, starting, warm-up, run-in or shutdown practices; unauthorized modifications of the Engine. Cummins is also not responsible for failures caused by incorrect oil or fuel, or by water, diesel exhaust fluid, dirt or other contaminants in the fuel, oil or diesel exhaust fluid.

Aftertreatment components are not covered by this Plan.

This Plan does not apply to accessories supplied by Cummins which bear the name of another company. Such non-warranted accessories include, but are not limited to: alternators, starters, fans, air conditioning compressors, clutches, filters, transmissions, torque converters, steering pumps, non-Cummins fan drives, Engine compression brakes and air compressors.

Cummins branded alternators and starters are not covered by this Plan.

This Plan does not apply to maintenance components, including, but not limited to: fuel injectors, fuel pump, STC hydraulic tappets, STC oil control valve, fuel control valve, low pressure fuel regulator, throttle plate actuator, spark plugs, spark plug boots, ignition coils, ignition control module, turbocharger, air compressor, fan clutch, water pump, fan hub, fan idler pulley assembly, vibration damper, belts, hoses, belt tensioner and thermostat.

Failures resulting in excessive oil consumption are not covered by this Plan.

Parts used to repair a Covered Failure may be new Cummins parts, Cummins approved rebuilt parts or repaired parts. Cummins is not responsible for failures resulting from the use of parts not approved by Cummins.

A new Cummins or Cummins approved rebuilt part used to repair a Covered Failure under this Plan assumes the identity of the part it replaced and is entitled to the remaining Coverage hereunder.

This Plan is transferable to subsequent Owners of the Engine by notifying a Cummins Distributor within 90 days of the transfer of ownership.

This Plan does not duplicate other Coverage applicable to the Engine.

Fees paid for this Plan are not refundable.

CUMMINS DOES NOT COVER WEAR OR WEAROUT OF COVERED PARTS.

CUMMINS IS NOT RESPONSIBLE FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES.

EXCEPT FOR THE PUBLISHED CUMMINS ENGINE WARRANTY APPLICABLE TO THE ENGINE, THERE ARE NO OTHER WARRANTIES, EXPRESS OR IMPLIED, OR OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.

Coverage I.D.: NEC

Coverage I.D.: RNE

Coverage I.D.: CWB

Cummins Inc.
Box 3005
Columbus, IN 47202-3005
U.S.A.

Bulletin 3381312 Printed in U.S.A. Rev. 7/12

MAN Engines & Components

MAN Warranty Process

MAN Engines & Components

Warranty process between New Flyer and MAN

The warranty validation process can be difficult at some times since components from different suppliers work together in a complex system and the root cause is not automatically the failed part. If a failed part is part of MAN‘s content of delivery, then the customer may be eligible for warranty reimbursement from New Flyer, but not necessarily from MAN.

The failure can be caused by another component, the vehicle design, the installation, the lack of maintenance and the use of non MAN approved service products and parts (including lubricants, operating conditions etc.)

There are the 3 possible scenarios:

- Failure is clearly due to MAN‘s content of delivery (Material and/or workmanship)
  - Customer is eligible for warranty covered by MAN (Please see component coverage list for details)
- Failure is MAN‘s content of delivery (Material) but failure is caused by a component not supplied by MAN, design, assembly process or workmanship by others
  - Customer is eligible for warranty covered by New Flyer, IAS or others
- Failed part is MAN‘s or New Flyers content of delivery (material and/or workmanship), but customer did not adhere to recommended maintenance practice and schedule, used unapproved service products, lubricants or tools or operated the bus under other than normal transit bus application conditions
  - Warranty not covered by MAN or New Flyer or others

In any case: Water Contamination of the Axle or Components thereof is not Warrantable through MAN
Please refer to SB024 and SB027

MAN Engines & Components

Warranty process between New Flyer and MAN

When the Customer informs New Flyer about an issue, the RPSM should be informed and work with the property on the root cause analysis. The RPSM can always involve MAN for support, but should also consider seeking technical support from New Flyer‘s engineers and technical support team first. If requested by New Flyer or if MAN does see the need, MAN will contact the property directly (to the extent of MAN‘s competence) in coordination with New Flyer to resolve an issue quickly and to the customers satisfaction.

If a major component is effected or the expected repair cost exceeds $1,000, then New Flyer should inform MAN before a warranty repair is performed in order to avoid cost not covered under MAN‘s warranty. MAN is more than happy to assist with repair recommendations.

All parts for warranty work shall be provided by New Flyer and claimed through the iWarranty system. New Flyer should inform MEC immediately if parts for warranty work are not available in their warehouses. Then, MEC will provide parts upon receipt of a P.O. from New Flyer if MEC has them in stock.

Always choose the least costly warranty repair (e.g. torn caliper boots > replace boots- not caliper> skim rotor > don‘t replace rotor)

NF customers shall never submit a warranty claim directly to MAN nor shall they directly contact MAN. Claims shall always be submitted through New Flyer‘s iWarranty system.

MAN Engines & Components

Wear Items and Consumables

Excluded from material defect liability

- Normal wear and tear and maintenance
- Maintenance work and rectification of normal wear and tear are required at different intervals depending on distances travelled, geographical and climatic conditions, road and traffic conditions, handling behavior, etc. These conditions have a major influence on the service life of the parts concerned.
- Maintenance can be defined as "scheduled" and "unscheduled" maintenance.
- Scheduled maintenance (service/inspection) is carried out on the basis of time intervals and distance driven and involves replacement of specific parts such as oil and filters.
- Unscheduled maintenance involves the replacement of worn parts whose service life is related to the vehicle's operating environment and the type of work it carries out. During a normal service, these parts are inspected but not necessarily replaced. If during the inspection no “material or manufacturer fault” is found, but a component has to be replaced because it is worn, the repair work is considered unscheduled maintenance and is not covered by the liability for material defects/extended warranty.
- To ensure the vehicle's reliability and roadworthiness, all maintenance and inspection work must be carried out in accordance with current MAN and New Flyer guidelines and the maintenance schedule shown in the service manual.
- Examples of excluded parts which are considered maintenance work and normal wear & tear items are :
- Filters and filter cartridges of any kind, Brake Discs, Caliper Boots, Brake Drums, Brake Pads/Linings, Lubricants including Fluids and Greases, Seals and Bearings

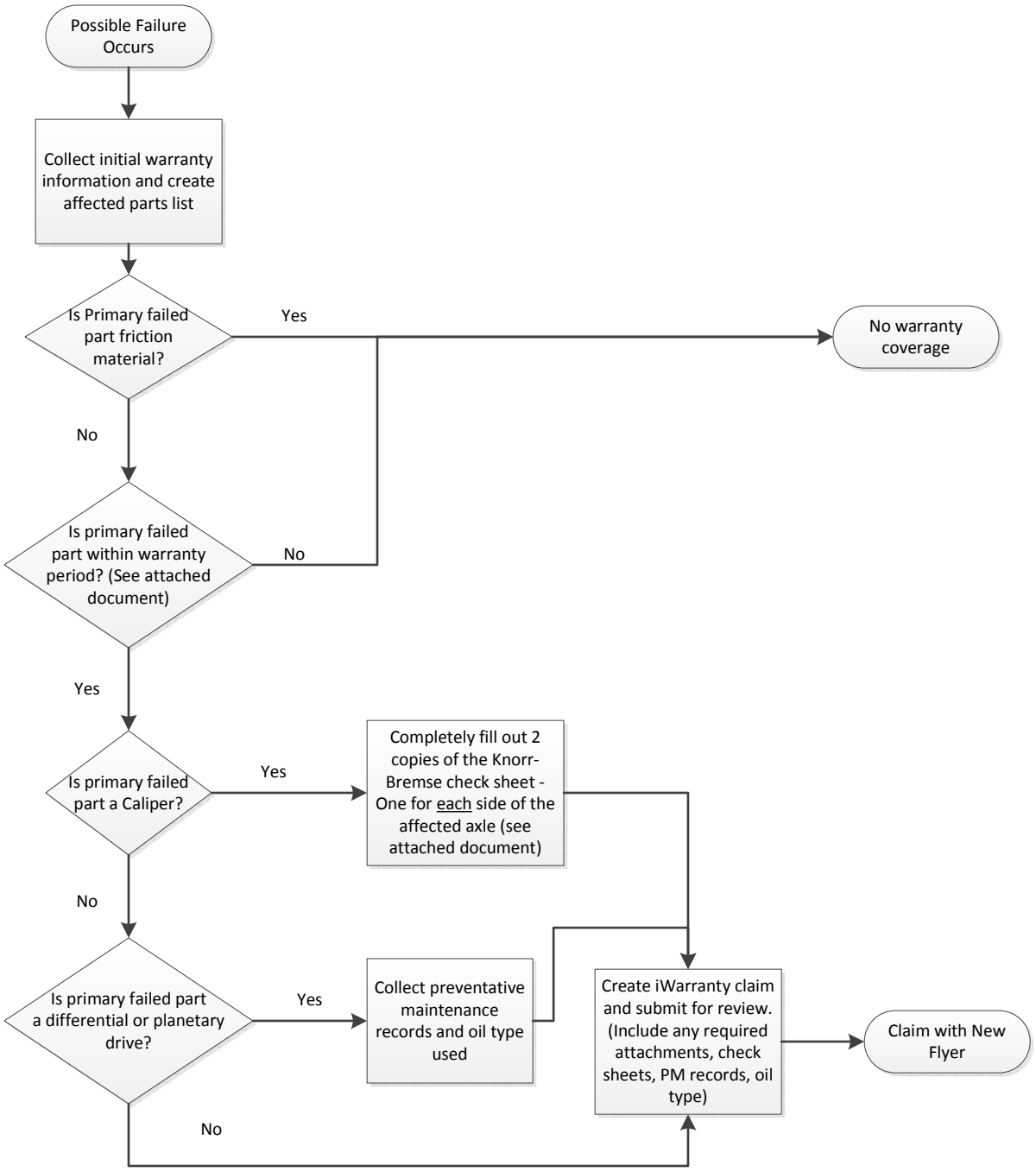
MAN Engines & Components

Required Information for axle failures

When the Customer informs New Flyer about an issue, the following information needs to be provided:

- **SR Number**
- **Property Unit Number**
- **Mileage**
- **VIN #**
- **Axle Serial number (17 digits)**
- **Failure Date**
- **Detailed discription of the failure**
- **Caliper related failures require fully completed check sheet for warranty consideration**
- **High quality Pictures (upon request)**
- **Failure analysis and actions taken to date**
- **Contact information at Property**
- **Maintenance record (upon request)**
- **Information about lubricants or parts used if applicable for failure**

FRONT & REAR AXLE WARRANTY CLAIM PROCESS



Warranty Coverage Periods

Xcelsior Front Axle (VOK-07)		
Part	Category	Warranty Period
Axle beam	Full	5 years / 300,000 miles
Track arm (drag link)	Full	5 years / 300,000 miles
Tie rod	Full	5 years / 300,000 miles
Wheel hub unit	Limited 2	2 years / 100,000 miles
Brake caliper core	Limited 2 **	2 years / 100,000 miles **
Caliper tappets and boots	Limited 1	1 year / 50,000 miles
Upper radius rod	Limited 1	1 year / 50,000 miles
Steering knuckle bearing	Limited 1	1 year / 50,000 miles
Steering knuckle seal	Limited 1	1 year / 50,000 miles
Tie rod boots / ball joint	Wear item	1 year / 50,000 miles
Toric seal (O-ring)	Wear item	1 year / 50,000 miles
Brake pads	Friction material	no coverage
Brake rotor	Friction material	no coverage

Xcelsior Rear Axle (HY-1350)		
Part	Category	Warranty Period
Axle housing	Full	5 years / 300,000 miles
Axle shafts	Full	5 years / 300,000 miles
Differential	Full *	5 years / 300,000 miles *
Wheel hub unit	Limited 2	2 years / 100,000 miles
Brake caliper core	Limited 2 **	2 years / 100,000 miles **
Caliper tappets and boots	Limited 1	1 year / 50,000 miles
Pinion seal	Limited 1	1 year / 50,000 miles
Brake pads	Friction material	no coverage
Brake rotor	Friction material	no coverage

BVA / End of life sensor	Wear item	1 year / 50,000 miles

* Requires supporting documentation of PM records.

** Requires supporting checklist fully completed.

Warranty Coverage Periods

Low Floor Front Axle (V8-65L)		
Part	Category	Warranty Period
Axle beam	Full	5 years / 300,000 miles
Track arm (drag link)	Full	5 years / 300,000 miles
Tie rod	Full	5 years / 300,000 miles
Wheel hub unit	Limited 2*	2 years / 100,000 miles
Brake shoes	Limited 2	2 years / 100,000 miles
S-Cam	Limited 2	2 years / 100,000 miles
S-Cam seals and bushings	Limited 1	1 year / 50,000 miles
Slack adjuster	Limited 1	1 year / 50,000 miles
Radius rod	Limited 1	1 year / 50,000 miles
Steering knuckle bearing	Limited 1	1 year / 50,000 miles
Steering knuckle seal	Limited 1	1 year / 50,000 miles
Tie rod boots / ball joint	Wear item	1 year / 50,000 miles
Toric seal (O-ring)	Wear item	1 year / 50,000 miles
Brake drums and linings	Friction material	no coverage

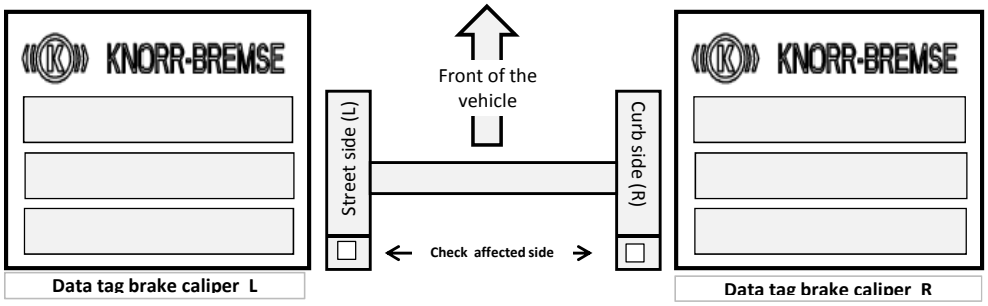
Low Floor Rear Axle (HP-1352)		
Part	Category	Warranty Period
Axle housing	Full	5 years / 300,000 miles
Axle shafts	Full	5 years / 300,000 miles
Differential	Full *	5 years / 300,000 miles *
Planetary drive	Limited 2 *	2 years / 100,000 miles *
Wheel hub unit	Limited 2*	2 years / 100,000 miles
Brake shoes	Limited 2	2 years / 100,000 miles
S-Cam	Limited 2	2 years / 100,000 miles
S-Cam seals and bushings	Limited 1	1 year / 50,000 miles
Slack adjuster	Limited 1	1 year / 50,000 miles
Pinion seal	Limited 1	1 year / 50,000 miles
Brake drums and linings	Friction material	no coverage

* Requires supporting documentation of PM records.

New Flyer — Inspection checklist for disc brakes

Requirements for warranty to be considered - one complete checklist must be completed for each caliper on the affected axle (2 checklists in total)
Take digital photos of marked left (L) and right (R) calipers (different temperature impact should be visible!).

Technician:		**Fail date:**		**Date:**	
Customer:		**Complaint:**			
Vehicle manufacturer:	New Flyer	**Vehicle type:**		**Vehicle number:**	
In service date:		**Chassis no. (VIN):**		**Mileage:**	
Axle manufacturer:		**Axle part number:**			
Axle model:		**Axle serial number:**			
Brake chamber manufacturer:	☐ MGM e-stroke	☐ MGM non e-stroke	☐ Knorr		
Brake manufacturer:	Knorr-Bremse				
Axle position in the vehicle:	☐ Front (steering)	☐ Center (tag)	☐ Rear (drive)		

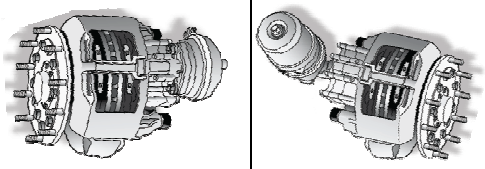


Data tag brake caliper L

Data tag brake caliper R

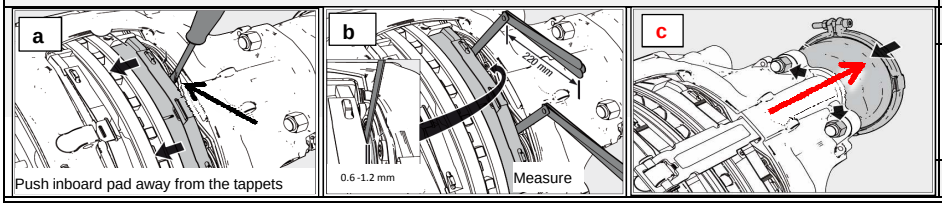
Brake type:

☐ Axial ☐ Radial



Note: Apply service brake one time and slide the caliper back and forth prior beginning of the measurement, after the wheels are removed.

1. Measure running clearance of brake in cool down state (a + b): Nominal: **0.6 -1.2 mm**



Incoming tappet / outcoming tappet	/	mm

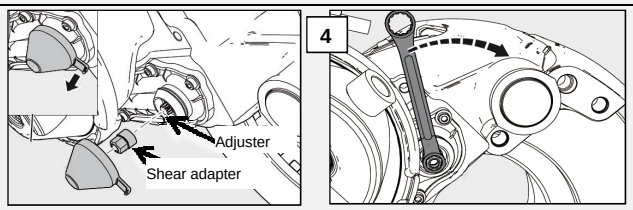
2. If running clearance is less then 0.6 mm

- **remove the brake air chamber (c)**
- **measure running clearance again (a + b)**
- **if clearance OK - go to step 3**

Incoming tappet / outcoming tappet	/	mm

3. Thickness of brake pads including back plate (30mm new)	Inboard pad:	**mm**	Outboard pad:	**mm**

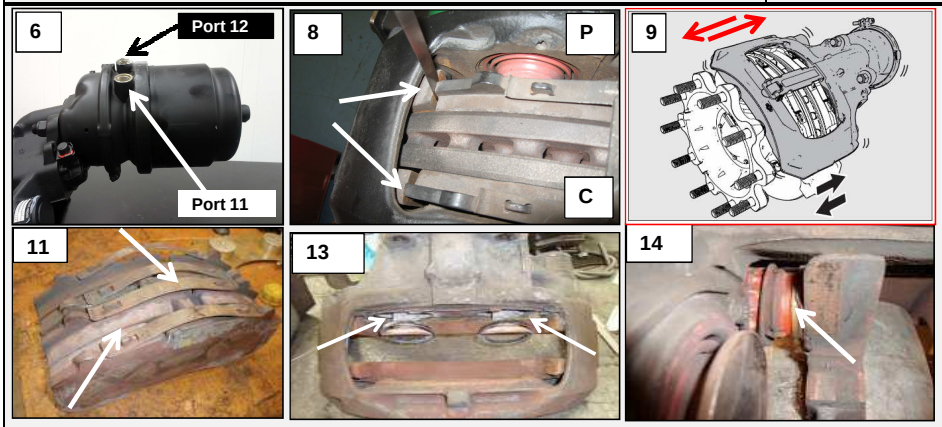
	OK	**not OK**	**Comments**
4. Check brake adjuster function (refer to New Flyer manual)	☐	☐	

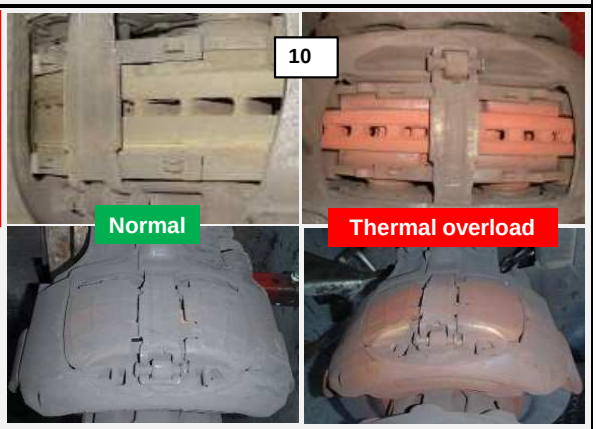


Never turn **adjuster** without **shear adapter** being fitted. If the shear torque of the shear adapter is exceeded, then it is designed to fail. Try again with a new (unused) shear adapter. With a second failure of the shear adapter the caliper must be exchanged since internal damage is present. **Do not** use an open-ended spanner as this may damage the adapter.

Make sure the ring spanner or socket can turn freely clockwise during the following procedure.

Make sure brake pads are installed in the caliper during adjuster check



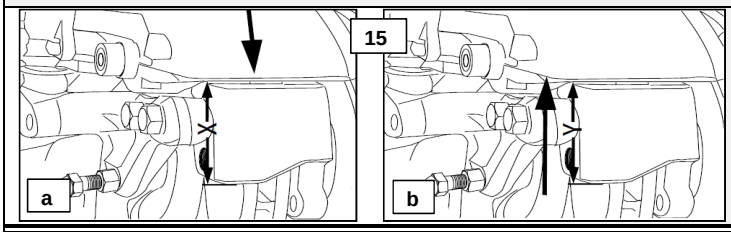


	Yes	No	Comments
5. Residual air pressure in service brake?	☐	☐	
6. Air tightness from port (12) parking brake to (11) service brake?	☐	☐	
7. Brake pads movement in brake carrier?	☐	☐	

8. Gap back plate of pad in brake carrier (mm)	**Caliper side (C)**	**mm**	**Plunger side (P)**	**mm**	

	OK	not OK	Comments
9. Caliper movement along guide pins - mounted on axle (slide caliper fully IN and OUT - brake pads removed)	☐	☐	
10. Thermal load at brake pads visible?	☐ **Yes**	☐ **No**	
11. Brake pad retainer springs connection to the pad back plate?	☐ **Loose**	☐ **Fixed**	
12. Brake pad manufacturer / date of manufacture?	**Jurid**	☑ **Ferodo**	**Textar** **Galfer** **Date:**
13a.Thermal damage of tappets with rubber boots ?	☐ **Yes**	☐ **No**	
13b.Tappets seized ?	☐ **Yes**	☐ **No**	
14. Thermal damage of fixed / loose guide pin boots ?	☐ **Yes**	☐ **No**	

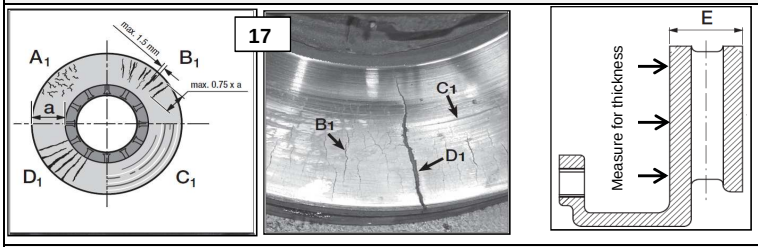
15. Floating guide pin to rubber bushing clearance (SB models only)	☐ **Yes**	☐ **No**	**Nominal: 3.0 mm max**	**Actual:**	**mm**



- Push the caliper in the direction of the arrow (a)
- Note that there is no contact between caliper and carrier (a)
- While maintaining pressure on the caliper, measure distance X (a)
- Pull the caliper away from the carrier and measure distance Y (b)
- If distance **Y - X** is greater than **3.0 mm**, rubber bushing must be replaced

16. Excessive marks from plunger of the brake chamber in the lever cup	☐ **Yes**	☐ **No**
17. Check for presence of grease in the lever cup	☐ **Yes**	☐ **No**

18. Brake disc condition (check appropriate designation) →	☐ **OK**	**Not OK:** ☐ **A1** ☐ **B1** ☐ **C1** ☐ **D1**



A1 = Small cracks spread over the surface are allowed

B1 = Cracks less than 1.5 mm deep or wide, running in a radial direction are allowed

C1 = Unevenness of the disc surface less than 1.5 mm deep is allowed

D1 = Cracks going through to the cooling duct or onto the inner or to the outer edge of the friction ring are not allowed and the disc MUST BE REPLACED.

*In case of surface conditions A1, B1 or C1, the disc can continue to be used until the minimum thickness **E = 37 mm** is reached.*

19. Rotor thickness (based on average of three or more measured values across the run surface of the rotor)**:**	**E(ave)=**	**mm**	

ABS or Air system diagnostic information and fault codes:

Service history of the bus and/or the brake system; previous exchange of brake parts:

Corrective measures:

Comments and remarks:

Heavy Vehicle Technologies & Systems Operations Europe
Dana Corporation
Poligono Landaben Calle E s/n
31012 Pamplona - Spain

Revisions to the Standard Warranty Statement for:

New Flyer Industries

1. For all axles supplied to New Flyer Industies (herein referred to as New Flyer) as original equipment, Dana give a full parts and labour warranty extended up to three (3) years or 320,000 km, which ever occurs first, from the date into service. (Ref Dana Standard Warranty Statement -2)

   The following parts are not covered during the third year of warranty:

   Bearings, oil seals, gaskets, air, electrical and brake components.

2. Warranty claims may be submitted on an Excel spreadsheet provided that they contain all the relevant information as stipulated in the Dana Warranty Statement. (Ref Dana Standard Warranty Statement -10)

3. On accepted claims Dana will make a contribution towards the labour cost involved in removing and replacing the Product or part from the relevant vehicle. The contribution will be in accordance with the current Dana standard repair time schedule at a rate of $50 (fifty US dollars) per hour. (Ref Dana Standard Warranty Statement -5)

4. All defective parts being claimed under warranty are to be held by New Flyer for a period of 30 days from date of claim being received by Dana. (Ref Dana Standard Warranty Statement -11)

For and on behalf of:

DANA:	**BUYER:**
Signature:	Signature:
Name: Title: Date:	Name: Title: Date

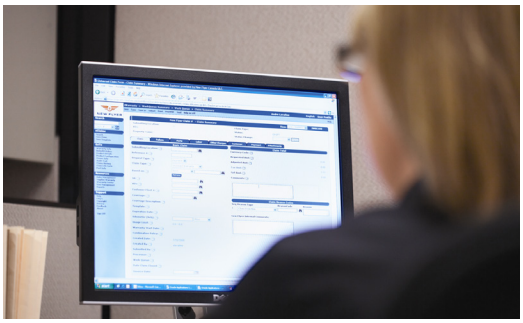
Reviewed August 2013

NEW FLYER iWARRANTY

Streamline your WARRANTY LIFE CYCLE.

New Flyer Industries is the first heavy-duty Transit OEM to offer an internet-based warranty lifecycle management system. This user-friendly tool will enable you to streamline your warranty, claims and parts processing. It will give you total visibility into the claims process from start to finish, increasing ease of management and creating efficiencies across the entire warranty life cycle.

GET COMPLETE VISIBILITY into the claims process from start to finish.
ELIMINATE PAPER WORK by entering claims directly into the system.
IMPROVE EFFICIENCY by responding with corrective action more quickly.
RECEIVE FASTER PAYMENT as a result of reduction in processing time.
SPEED PROBLEM DISCOVERY with early warning of possible product issues.
MANAGE AND TRACK all campaigns in real time, any time.



BENEFITS OF iWARRANTY

The New Flyer Service Organization is always ready to solve your problems and get your bus up and running as soon as possible. iWarranty is just another step to making this happen faster. With iWarranty, you will find that paperwork, follow-up calls, faxes and monthly reconciliations will be greatly reduced, and possibly no longer neccessary. You will have all the information that you need at your fingertips in real time. However, New Flyer Service is just a phone call away and is always here to support you through the warranty claims process and throughout the service life of your bus.

FEATURES

- Instant access to an electronic copy of your warranty
- Self-service reporting capabilities, run standard reports or build your own custom reports
- Tracking of warranty claims on a bus-by-bus basis
- Visibility into the date your claims werep paid along with the check number
- Status updates on parts requests
- Online maintenance of your warranty account information

GET CONNECTED

To obtain your iWarranty login information contact us at 204.224.6722 or iwarranty@newflyer.com.

Manufacturing Facilities
Winnipeg, MB
Crookston, MN
St. Cloud, MN
Anniston, AL

Parts Distribution Centers
Winnipeg, MB
Brampton, ON
Hebron, KY
Fresno, CA

Bus Fabrication
Winnipeg, MB
Elkhart, IN

Service Centers
Arnprior, ON
Ontario, CA

Built to RELY ON.™

Printed 03-15

Quality Management System ISO 9001 certified | **Environmental Management System** ISO 14001 certified | **Occupational Health and Safety Management System** OHSAS 18001 certified

NEW FLYER

WARRANTY CLAIM POLICY

1. The purpose of this instruction is to ensure that warranty claims are properly processed, recorded and actioned in a timely manner through the New Flyer Industries ULC online warranty system.

2. Warranty period is based on the acceptance date of each coach.

3. Claims are to be submitted within thirty (30) calendar days from the date of failure.

4. Claims submitted later than thirty (30) calendar days will not be accepted, acceptance of claims over (30) days will require approval by the Warranty Manager, and the Director of Customer Service

5. All Claim types, (Standard warranty, Coach down and Retrofit), will be submitted to New Flyer Industries using iWarranty. For information on using the online warranty system, please call 204-224-6722 or email iwarranty@newflyer.com.

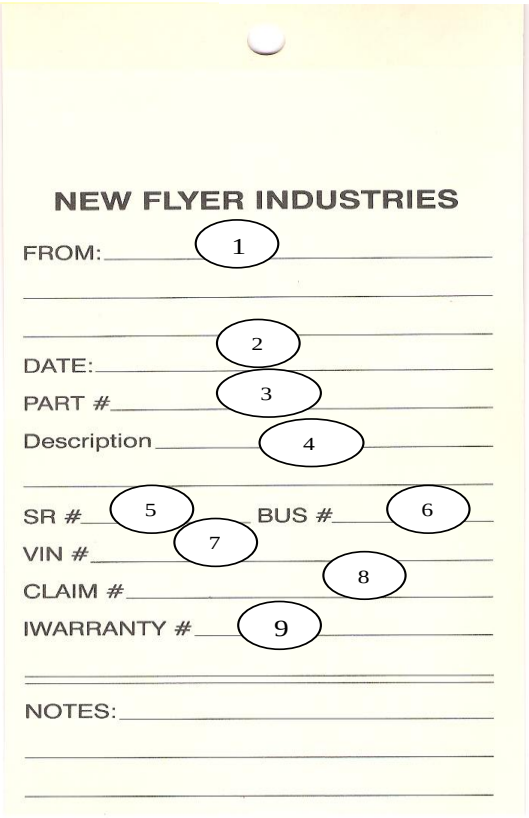
6. The Regional Product Support Manager (RPSM) is responsible for reviewing and approving all claims. New Flyer Industries Warranty Department has the final claim approval authority.

7. The properties must include all applicable supporting documentation when forwarding claims. This documentation will consist of such things as; invoices for service performed by a third party, invoices for parts purchased from third party other than New Flyer Industries ULC parts department.

8. Claim submission to New Flyer Industries Warranty Department is the responsibility of the property.

9. All defective parts claimed on Warranty must be returned to New Flyer Industries for warranty evaluation within forty-five (45) days from the date of failure. In certain circumstances the RPSM at his discretion and or in concurrence with a Warranty Recovery Administrator or Warranty Manager, may determine to dispose of defective parts at the properties location, and this must be indicated on the Warranty Claim.

10. Returned defective parts must be identified with the New Flyer Industries parts tag (see page 3). All information (items 1 through 9) must be completed and the tag must be affixed to the defective part. Defective parts are to be shipped to New Flyer Industries ULC (see Page 4 for United States packing slip, page 5 for Canadian packing slip and page 6 for carriers).


NEW FLYER INDUSTRIES

FROM: 1

DATE: 2

PART # 3

Description 4

SR # 5 BUS # 6

VIN # 7

CLAIM # 8

IWARRANTY # 9

NOTES:

NEW FLYER

WARRANTY PARTS BEING RETURNED FOR CREDIT EVALUATION **PACKING SLIP- USA**

Date of Shipment: ____/____/____

Ship to :

New Flyer Industries Limited
2300 Progress Drive
Hebron, KY
41048

Attention : **Warranty Department**

From :

Part Number	Claim Number	Part Description	Part Quantity	Bus Number

Fax this packing slip to fax # **204-224-0248 Attn: Warranty Recovery Administrator or email to andre_lavallee@newflyer.com**. Also place a copy in the shipment box / crate.

NEW FLYER

WARRANTY PARTS BEING RETURNED FOR CREDIT EVALUATION **PACKING SLIP- CND**

Date of Shipment: ____/____/____

Ship to :

New Flyer Industries Limited
630 Kernaghan Avenue
Doors 7 & 8
Winnipeg, Manitoba
Canada
R2C 5G1

Attention : **Warranty Department**

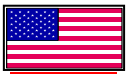
From :

Part Number	Claim Number	Part Description	Part Quantity	Bus Number

Fax this packing slip to fax # **204-224-0248 Attn: Warranty Recovery Administrator or email to andre_lavallee@newflyer.com**. Also place a copy in the shipment box / crate

Shipping Instructions

The following Carriers are to be notified for pick up of Warranty Parts being returned



United States Customers

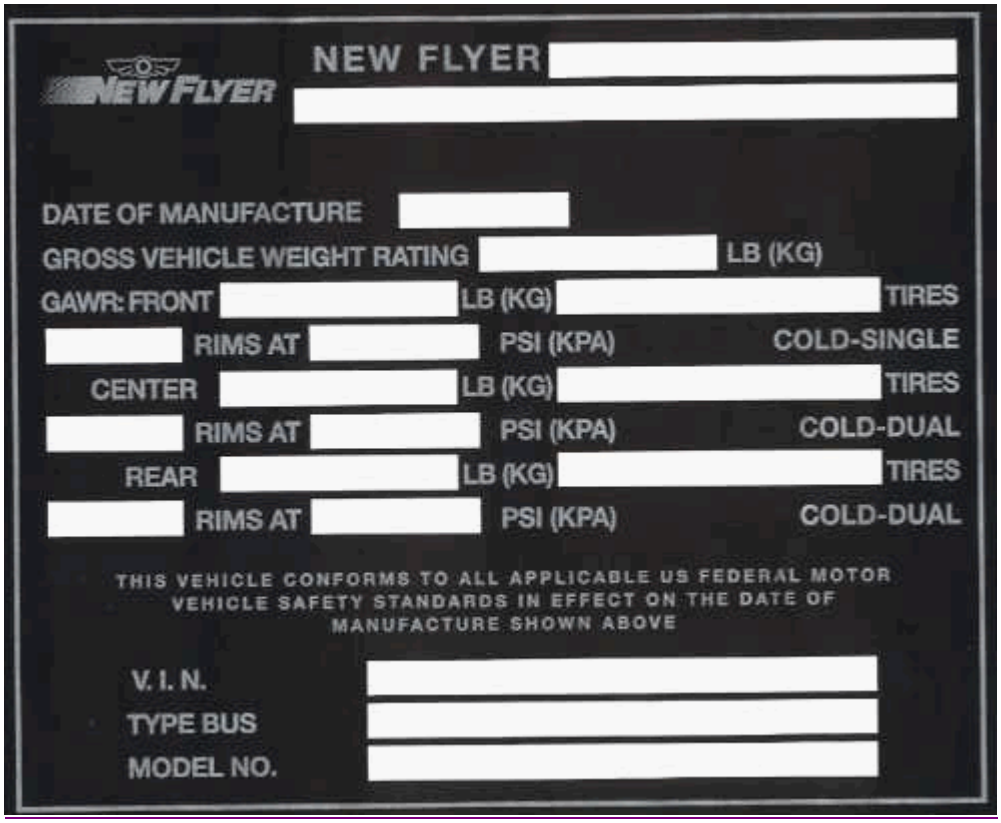
Shipments over 150 pounds	Shipments under 150 pounds
ESTES Express Phone: 1-877-268-4555 Ship collect to New Flyer account 5022165	Federal Express Ground Phone 1-800-463-3339 **NOTE: Please specify to the FedEx operator that you are <u>REQUESTING A CALL TAG</u> going back to New Flyer Operator may need to be prompted to check the exception on the account if they state that New Flyer has to make this call.** **New Flyer Account # 406802787**

Canadian Customers

Shipments over 150 pounds	Shipments under 150 pounds
ATS Phone: 1-888-404-4292 Or 514-733-8539 (Quebec)	Federal Express Ground Phone 1-800-463-3339 **NOTE: Please specify to the FedEx operator that you are <u>REQUESTING A CALL TAG</u> going back to New Flyer Operator may need to be prompted to check the exception on the account if they state that New Flyer has to make this call.** **New Flyer Account # 326474207**

VIN Decal

Located above the driver seat and to the left



VENDOR	TIME	MANUAL SECTION	COMPONENT / TASK DESCRIPTION	TASK
MAN	**1.4**	**1**	**WHEEL STUDS, FRONT AXLE (ONE SIDE)**	
	0.8		TIRE & RIM ASSEMBLY, FRONT	R&R
	0.2		BRAKE DRUM, FRONT	R&R
	0.4		WHEEL STUD (QTY. OF 10)	R&R
MAN	**0.8**	**1**	**TIRE & RIM ASSEMBLY, FRONT AXLE**	
	0.8		TIRE & RIM ASSEMBLY, FRONT	R&R
MAN	**0.7**	**1**	**BRAKE CHAMBER ASSEMBLY, FRONT AXLE (ONE SIDE)**	
	0.5		BRAKE CHAMBER, FRONT	R&R
	0.2		BRAKE ADJUSTMENT (ONE FRONT WHEEL)	ADJUSTMENT
MAN	**0.9**	**1**	**BRAKE DRUM, FRONT AXLE (ONE SIDE)**	
	0.6		TIRE & RIM ASSEMBLY, FRONT	R&R
	0.3		BRAKE DRUM, FRONT	R&R
MAN		**1**	**STAND ALONE ITEMS**	
	0.4		DRAG LINK	R&R
	1.4		WHEEL BEARINGS (INNER & OUTER)	R&R
MAN	**4.5**	**1**	**FRONT AXLE & SUSPENSION (AXLE BUILD)**	**2 Mech. Reqd.**
	0.2		LEVELING LINK BRACKETS	R&R
	0.3		BRAKE CHAMBER AIR LINES	R&R
	0.5		DRAG LINK	R&R
	0.1		SHOCK RETAINING NUTS (LOWER NUTS ONLY)	R&R

VENDOR	TIME	MANUAL SECTION	COMPONENT / TASK DESCRIPTION	TASK
	0.3		STEERING DAMPER	R&R
	0.5		LATERAL ROD	R&R
	0.2		CENTER LINK (OPTIONAL)	R&R
	0.5		RADIUS RODS (AT STRUCTURE)	R&R
	0.1		A B S SENSOR ELECTRICAL CONNECTION	DISCONNECT
	0.3		TORQUE BOLTS	TORQUE
	0.1		FRONT END ALIGNMENT (MINOR)	ALIGN
	0.5		ROAD TEST	OPTIONAL
	1.0		ALIGNMENT & ROAD TEST (not added to total)	OPTIONAL
MAN	**1.8**	**1**	**HUB ASSEMBLY, FRONT AXLE (ONE SIDE)**	
	0.6		WHEEL ASSEMBLY	R&R
	0.1		WHEEL BEARING DUST COVER	R&R
	0.2		SLACK ADJUSTER (ADJUST FOR EASIER DRUM REMOVAL)	R&R
	0.1		BRAKE DRUM	R&R
	0.3		ADJUSTING NUT, THRUST WASHER & WHEEL BEARING	R&R
	0.5		HUB	R&R
MAN	**1.1**	**1**	**BRAKE CAMSHAFT SUPPORT BEARING**	
	0.1		BRAKE SHOE SPRINGS	R&R
	0.1		BRAKE CAMSHAFT	R&R
	0.1		CAMSHAFT BEARING SUPPORT BRACKET	R&R
	0.1		CAMSHAFT SEALS	R&R
	0.1		NEEDLE BEARINGS	R&R
MAN	**4.2**	**1**	**STEERING KNUCKLE (With Hub in Place)**	
	0.5		SLACK ADJUSTER (ADJUST FOR EASIER DRUM REMOVAL)	Adjust
	0.2		BRAKE DRUM	R&R
	0.5		BRAKE SHOE RETURN SPRING	R&R

VENDOR	TIME	MANUAL SECTION	COMPONENT / TASK DESCRIPTION	TASK
	0.5		BRAKE CHAMBER	R&R
	0.2		SLACK ADJUSTER	R&R
	0.3		CAMSHAFT SUPPORT BRACKET	R&R
	0.5		TIE ROD END	R&R
	0.2		LUBRICATION LINE & GREASE NIPPLE	R&R
	0.1		SNAP RINGS	R&R
	0.1		KING PIN COVERS	R&R
	1		KING PINS	R&R
	0.1		THRUST BEARING & SHIMS	R&R
MAN	**1.5**	**1**	**WHEEL STUDS, FRONT AXLE (ONE SIDE)**	
	0.6		WHEEL ASSEMBLY	R&R
	0.2		BRAKE DRUM, FRONT	R&R
	0.1		BRAKE SHOE RETURN SPRING	R&R
	0.6		WHEEL STUD (QTY. OF 10)	R&R
MAN	**2.8**	**1**	**BRAKE SHOES, FRONT AXLE (ONE SIDE)**	
	0.6		WHEEL ASSEMBLY	R&R
	0.1		SLACK ADJUSTER (ADJUST FOR EASIER DRUM REMOVAL)	Adjust
	0.2		BRAKE DRUM	R&R
	0.1		BRAKE RETURN SPRINGS, FRONT	R&R
	0.1		LOCKING WEDGE	R&R
	0.1		BRAKE SHOE ANCHOR BOLTS	R&R
	0.2		BRAKE SHOE ANCHOR BOLT BUSHINGS	R&R
	0.2		BRAKE SHOE ROLLER BUSHINGS	R&R
	0.3		ANCHOR PIN BUSHINGS	R&R
	0.8		BRAKE SHOE LINING RIVETS OR BOLTS	R&R
	0.1		BRAKE ADJUSTMENT	R&R

VENDOR	TIME	MANUAL SECTION	COMPONENT / TASK DESCRIPTION	TASK
MAN	**0.6**	**1**	**SLACK ADJUSTER, FRONT AXLE (ONE SIDE)**	
	0.5		SLACK ADJUSTER ASSEMBLY, FRONT	R&R
	0.1		BRAKE ADJUSTMENT (ONE FRONT WHEEL)	Adjust
MAN	**1.4**	**1**	**A B S SPEED SENSOR**	
	0.6		WHEEL ASSEMBLY	R&R
	0.5		SLACK ADJUSTER (ADJUST FOR EASIER DRUM REMOVAL)	Adjust
	0.2		BRAKE DRUM	R&R
	0.1		SPEED SENSOR	R&R
MAN	**2.0**	**1**	**A B S PULSE GENERATING WHEEL**	
	1.5		HUB ASSEMBLY (Refer to Hub Section)	R&R
	0.5		PULSE WHEEL	R&R
MAN	**2.9**	**1**	**WHEEL BEARINGS & RACE**	
	1.5		HUB ASSEMBLY	R&R
	0.3		OUTER BEARING	R&R
	0.3		INNER BEARING	R&R
	0.2		INNER WHEEL GREASE COLLECTOR	R&R
	0.6		INNER / OUTER BEARING RACE	R&R
MAN	**0.7**	**1**	**BRAKE CHAMBER ASSEMBLY, FRONT AXLE (ONE SIDE)**	
	0.5		BRAKE CHAMBER, FRONT	R&R
	0.2		BRAKE ADJUSTMENT (ONE FRONT WHEEL)	Adjust
MAN	**0.8**	**1**	**BRAKE DRUM, FRONT AXLE (ONE SIDE)**	
	0.6		TIRE & RIM ASSEMBLY, FRONT	R&R
	0.2		BRAKE DRUM, FRONT	R&R

VENDOR	TIME	MANUAL SECTION	COMPONENT / TASK DESCRIPTION	TASK
MAN	**3.1 x 2**	**2**	**REAR AXLE & SUSPENSION**	
	0.6		LOWER RADIUS ROD (AT COACH END)	R&R
	0.6		UPPER RADIUS ROD (AT HOUSING)	R&R
	0.6		DRIVE SHAFT	R&R
	0.6		AIR SPRINGS (LOWER BOLTS ONLY)	R&R
	0.2		SHOCKS (LOWER NUTS ONLY)	R&R
	0.3		BRAKE LINES	R&R
	0.2		LEVELING VALVE LINKS	R&R
MAN	**2.7**	**2**	**AXLE & HUB ASSEMBLY REAR**	
	0.3		DRAIN OIL (From Axle Ends And Housing)	DRAIN/FILL
	0.6		WHEEL ASSEMBLY, REAR	R&R
	0.2		BRAKE CHAMBER	R&R
	0.2		SLACK ADJUSTER	R&R
	0.2		BRAKE DRUM, REAR	R&R
	0.3		PLANETARY BOLTS & HEX NUT	R&R
	0.2		PLANETARY & AXLE SHAFT	R&R
	0.2		AXLE SHAFT & PLANETARY HOUSING SEPARATION	R&R
	0.1		PLANETARY GEAR LOCKING PLATE & WASHER	R&R
	0.1		RING GEAR HUB & BEARINGS	R&R
	0.1		WHEEL HUB	R&R
	0.2		SPINDLE	R&R
MAN		**2**	**STAND ALONE ITEMS**	
	1.0		REAR AIR SPRING (COMPLETE UNIT)	R&R
	0.8		LOWER RADIUS ROD (REAR)	R&R
	0.5		SHOCK ABSORBERS (REPLACEMENT)	R&R

VENDOR	TIME	MANUAL SECTION	COMPONENT / TASK DESCRIPTION	TASK
	0.3		BRAKE CHAMBER, REAR	R&R
	2.0		BRAKE SHOE LINING, (One Side)	R&R
	0.5		LEVELING VALVE	R&R
	1.2		REAR RELAY VALVE	R&R
	1.5		WHEEL, DRUM, HUB, & SEAL	R&R
MAN (LF)	**1.5 per**	**2**	**WHEEL STUDS**	
	0.7		WHEEL ASSEMBLY	R&R
	0.1		DRUM	R&R
	0.1		BRAKE RETURN SPRINGS	R&R
	0.6		WHEEL STUDS	R&R
MAN (LF)	**1.9**	**2**	**PLANETARY GEAR HOUSING**	
	0.2		DRAIN OIL	Drain
	0.1		SLACK ADJUSTER (ADJUST FOR EASIER DRUM REMOVAL)	Adjust
	0.2		PLANETARY GEAR COVER	R&R
	0.2		AXLE SNAP RING & AXLE	R&R
	0.2		BRAKE DRUM	R&R
	1		PLANETARY GEAR HOUSING	R&R
MAN (LF)	**3.1**	**2**	**WHEEL HUB**	
	0.2		OIL	Drain
	0.2		AXLE SHAFT	R&R
	1.5		HUB REDUCTION UNIT	R&R
	0.2		LOCK WASHER & INNER NUT	R&R
	0.2		RING GEAR	R&R
	0.3		OUTER BEARING & HUB	R&R
	0.2		INNER BEARING & OIL CATCH PLATE	R&R
	0.3		AXLE SEAL COLLAR	R&R

VENDOR	TIME	MANUAL SECTION	COMPONENT / TASK DESCRIPTION	TASK
MAN	**0.75**	**2**	**PLANETARY GEARING**	
	0.75		CHECK SERVICE MANUAL	R&R
MAN	**3.8**	**2**	**BRAKE ASSEMBLY, REAR (ONE SIDE)**	
	0.8		WHEEL ASSEMBLY, REAR	R&R
	0.6		SLACK ADJUSTER (ADJUST FOR EASIER DRUM REMOVAL)	Adjust
	0.1		BRAKE SHOE BACKING PLATE	R&R
	0.2		BRAKE DRUM	R&R
	0.1		BRAKE SPRINGS	R&R
	0.1		BRAKE SHOE ANCHOR BOLT (LOCKING BOLT, PLATE & BUSHINGS)	R&R
	0.3		BRAKE SHOE ANCHOR PINS	R&R
	0.3		ANCHOR PIN BUSHINGS	R&R
	0.2		BRAKE SHOE ROLLER BUSHINGSSS	R&R
	0.1		BRAKE SHOE ASSEMBLY	R&R
	0.7		BRAKE SHOE LINING	R&R
	0.3		CLEAN BRAKE SHOE BODY	Clean
MAN (LF)	**3.7**	**2**	**CAMSHAFT SUPPORT BEARING**	
	0.2		OIL	Drain
	0.7		WHEEL ASSEMBLY	R&R
	0.1		SLACK ADJUSTER (ADJUST FOR EASIER DRUM REMOVAL)	Adjust
	0.2		BRAKE DRUM	R&R
	0.1		BRAKE RETURN SPRINGS	R&R
	1.5		HUB	R&R
	0.3		SLACK ADJUSTER	R&R
	0.1		CAMSHAFT	R&R
	0.5		CAMSHAFT SEAL RETAINER, SEAL & BEARING	R&R

VENDOR	TIME	MANUAL SECTION	COMPONENT / TASK DESCRIPTION	TASK
MAN	**4.8**	**2**	**DIFFERENTIAL CARRIER ASSEMBLY**	
	0.5		DIFFERENTIAL OIL	Drain
	1		AXLE SHAFTS	R&R
	1		PROPELLER SHAFT FLANGE & YOKE	R&R
	0.8		CARRIER MOUNTING BOLTS	R&R
	0.5		MUD FLAP	R&R
	1		GEAR SET	R&R
MAN	**3**	**2**	**PINION NUT AND SEAL**	R&R
ZF		**2**	**CENTER AXLE**	
	2.5		REPLACEMENT SEAL RING HUB	R&R
	1.0		REPLACEMENT SEAL RING HUB CARRIER	R&R
	3.5		REPLACEMENT HUB	R&R
	0.8		REPLACEMENT BRAKE LININGS	R&R
	2.0		REPLACEMENT COMPLETE BRAKE CALLIPER	R&R
	3.0		REPLACEMENT BRAKE DISC	R&R
	4.5		REPLACEMENT HUB CARRIER	R&R
	0.3		REPLACEMENT ABS - SENSOR	R&R
	0.5		REPLACEMENT BRAKE CYLINDER	R&R
	1.0		REPLACEMENT BRACKET FOR LONGITUDINAL CONTROL ARMS	R&R
	1.5		REPLACEMENT 10 WHEEL BOLTS	R&R
	12.0		REPLACEMENT AXLE HOUSING	R&R
	35.0		REPAIR AXLE COMPLETE	R&R
SHEPARD	**2.7**	**3**	**STEERING GEAR BOX**	
	0.5		POWER STEERING LINES	DISCONNECT
	0.2		DRAG LINK CASTLE NUT (at pitman arm))	R&R
	0.5		STEERING JOINT ASSEMBLY (at the miter box)	R&R

VENDOR	TIME	MANUAL SECTION	COMPONENT / TASK DESCRIPTION	TASK
	0.6		STEERING BOX MOUNTING BOLTS	R&R
	1.0		PHYSICALLY REMOVE AND INSTALL STEERING BOX	R&R
	0.5		ROAD TEST (OPTIONAL) Time not added to total	TEST
MAN	**2.5**	**3**	**MITER BOX**	
	1.0		STEERING COLUMN " U " JOINT	R&R
	0.5		STEERING JOINT ASSEMBLY (At transfer box)	R&R
	0.5		TRANSFER GEAR BOX RETAINING BOLTS	R&R
	0.5		MITER BOX COMPONENT	R&R
ALL		**3**	**STAND ALONE ITEMS**	
	1.0		STEERING COLUMN " U " JOINT (steering joint assembly)	R&R
	0.5		STEERING WHEEL	R&R
	0.8		DRAG LINK	R&R
	1.5		POWER STEERING PUMP	R&R
	2.5		HYDRAULIC RESERVOIR	R&R
	0.5		FILTER, HYDRAULIC RESERVOIR	R&R
	0.8		SIGHT GLASS	R&R
ALL	5.3	**4**	**ENGINE EXHAUST COMPONENTS**	
	0.5		MUFFLER MOUNT (RUBBER ISOLATOR)	R&R
	0.2		EXHAUST CLAMP	R&R
	1		MUFFLER CLAMP ASSEMBLY (AROUND MAIN BODY)	R&R
	0.2		UPPER "U" CLAMP	R&R
	1.5		UREA TANK	R&R
	0.3		MUFFLER	R&R
	0.1		MUFFLER CLOSE OUT (ON ROOF)	R&R
	0.5		FLEX CONNECTOR & BAND CLAMPS	R&R
	1		Particulate Filter	R&R

VENDOR	TIME	MANUAL SECTION	COMPONENT / TASK DESCRIPTION	TASK
ALL		**4**	**ENGINE COMPONENTS (STAND ALONE ITEMS)**	
	1		ENGINE MOUNTS (2)	R&R
	1		TRANSMISSION MOUNTS	R&R
	0.4		AIR FILTER	R&R
	1.3		STARTER MOTOR	R&R
	1.5		ALTERNATOR	R&R
	1		FILLER TUBE & DIPSTICK	R&R
	0.5		ENGINE OIL & FILTERS	R&R
	0.5		ALTERNATOR BELT	R&R
	0.8		ENGINE COMPARTMENT SWITCH BOX	R&R
ALL		**4**	**STAND ALONE ITEMS**	
	0.5		ENGINE MOUNT FRONT (ONE)	R&R
	0.3		EXHAUST MOUNTING BRACKET	R&R
	1.0		EXHAUST PIPE	R&R
	1.5		MUFFLER	R&R
	0.3		ENGINE BELT GUARD	R&R
	0.2		HINGED BELT GUARD (Swing out & remove)	R&R
CUMMINS	1.5	**4**	**DECOMPOSITION REACTOR**	
	0.3		ROOF GRILL ABOVE EXHAUST COMPONENTS	R&R
	0.2		ELECTRICAL CONNECTIONS	R&R
	0.2		DEF SUPPLY AND COOLANT LINES.	R&R
	0.3		V-CLAMP AT REACTOR INLET TUBE	R&R
	0.2		TAIL PIPE U-CLAMP	R&R
	0.2		EXHAUST SEAL CLAMP	R&R
	0.1		U-CLAMP SECURING DECOMPOSITIION REACTOR	

VENDOR	TIME	MANUAL SECTION	COMPONENT / TASK DESCRIPTION	TASK
CUMMINS	1.5	**4**	**SCR CATALYST**	
	0.2		SCR ELECTRONIC CONTROL MODULE WIRING	R&R
	0.2		NOX SENSOR MOUNTING BOLTS	R&R
	0.2		NOX SENSOR MOUNTING BOLTS	R&R
	0.3		SECURING STRAPS	R&R
	0.4		W-CLAMPS (as required)	R&R
	0.2		CATALYST	R&R
CUMMINS		**4**	**DIESEL EXHAUST FLUID (DEF)**	
	1.0		TANK SENSOR HOSES AND LINES AT SENSOR	R&R
	0.3		TANK SENSOR HOSES AND LINES AT SENSOR	R&R
	0.1		FLOAT SWITCH CONNECTOR	R&R
	0.2		FLOAT SWITCH	R&R
	0.4		TANK MOUNTING BOLTS	R&R
ALLISON	**15.3**	**5**	**B300/400/500 TRANSMISSION (ALLISON SPECIFIC)**	
	6.0		TRANSMISSION	R&R
	0.4		TRANSMISSION ECU	R&R
	1.0		FILLER TUBE & DIPSTICK	R&R
	1.5		TRANSMISSION OIL COOLER	R&R
	0.8		TRANSMISION SUPPORT BRACKET	R&R
	0.5		SUPPORT ENGINE/TRANS REAR	PROCEDURE
	0.4		ATEC ECU (electronic control unit)	R&R
	1.0		B500-R-INSTALL-AUXILIARY FILTER UNIT	INSTALLATION
	0.4		ECU (ELECTRONIC CONTROL UNIT)	R&R
	0.2		ENGINE/INPUT/SPEED SENSOR	R&R
	0.2		OUTPUT SPEED SENSOR	R&R
	1.0		RECALIBRATE ECU	ADJUST

VENDOR	TIME	MANUAL SECTION	COMPONENT / TASK DESCRIPTION	TASK
	0.3		SHIFTER HYD. TRANSMISSION	R&R
	0.5		STEAM CLEAN TRANSMISSION	CLEAN
	0.8		TRANSMISSION REAR SUPPOR BRACKET	R&R
	0.3		TURBINE SPEED SENSOR	R&R
ALLISON	**21.2**	**5**	**EV40/50 HYBRID TRANSMISSION (ALLISON SPECIFIC)**	
	9.1		EV 50 DRIVE UNIT OR TRACTION MOTOR	R&R
	3.5		ESS (ENEREGY DTORAGE SYSTEM,BATTERY PACKS)	R&R
	3.0		DPIM (DUEL POWER INVERTER MODULE)	R&R
	0.2		EXTERNAL OIL FILTER	R&R
	0.8		TRANSMISSION REAR SUPPORT (MOUNTS)	R&R
	0.5		TRANSMISSION COOLER OIL BACK FLUSH	PROCEDURE
	0.5		OIL PAN	R&R
	O.3		SPIN ON FILTER	R&R
	0.1		INTERNAL FILTER	R&R
	0.5		ECU-ECM	R&R
	0.5		CONTROLVALVE BODY(control module does not include pan or int. filter	R&R
	2.1		OUTPUT SHAFT SEAL	R&R
	0.1		SOLENOID	R&R
	1.0		RE-CALIBRATE ECU	CALIBRATE
ZF		**5**	**TRANSMISSION SYSTEM COMPONENTS**	
	10		REPLACE & REMOVE TRANSMISSION	R&R
	3		EXCHANGE HYDRAULIC CONTROL UNIT	R&R
	3.5		REPLACE HYDRAULIC CONTROL SOLENOID VALVES	R&R
	3.5		REPLACE HYDRAULIC CONTROL SPRING	R&R
	3.5		REPLACE HYDRAULIC CONTROL MODULATION VALVE	R&R
	1		REPLACE ELECTRONIC SHIFT CONTROL	R&R
	1		REPLACE ECU	R&R
	2.5		REPLACE INDUCTIVE SPEED / TURBINE SENSOR	R&R

VENDOR	TIME	MANUAL SECTION	COMPONENT / TASK DESCRIPTION	TASK
	0.5		REPLACE TEMPERATURE SWITCH	R&R
	0.5		REPLACE RETARDER PERIPHERY PARTS	R&R
	1		REPLACE LOAD SENSOR	R&R
	2.5		REPLACE OIL COOLER	R&R
	2		REPLACE OIL PAN	R&R
	1		REPLACE PTO	R&R
	1		RETARDER ACCUMULATOR REBUILD	R&R
	2		TORQUE CONVERTER ASSEMBLY / DISASSEMBLY (Not including R & R)	PROCEDURE
	2.5		OUTPUT SEAL	R&R
	2		INPUT SEAL	R&R
	1		FILTER EXAM	R&R
	1.5		CONTINUITY CHECKS, PRESSURE READINGS, ROAD TEST	TEST
	2.5		BENCH TEST	TEST
VOITH		**5**	**TRANSMISSION SYSTEM COMPONENTS**	
	8.0		Transm. repl. without spring coupling/HZMS incl. test drive	R&R
	8.5		Transmission repl. with spring coupling including test drive	R&R
	3.0		Replacement of spring coupling in case of remote installation	R&R
	10.0		Repl. of interm./susp. flange with trans. removal and inst.	R&R
	1.5		Test drive incl. connection of pressure gauges and diagnosis	TEST
	2.5		Replacement of E 200 including diagnosis and test drive	R&R
	1.0		Replacement of push button switch	R&R
	1.0		Repl. of manual switch for converter brake incl. test drive	R&R
	2.0		Replacement of VDO-load transmitter, checking of adjustment	R&R
	1.5		Adj. of load transm. and checking of engine rev's in stages	PROCEDURE
	2.0		Replacement of micro switches on brake valve	R&R
	1.5		Adjustment of micro switch on brake valve	PROCEDURE
	4.0		Repl. of input cover/inp. flange (only in case of remote i.)	R&R
	4.5		Replacement of output cover / change of output flange	R&R
	0.5		Oil level check (incl. topping up)	PROCEDURE
	1.5		Replacement of inductiv pick up n2 and diagnosis	R&R

VENDOR	TIME	MANUAL SECTION	COMPONENT / TASK DESCRIPTION	TASK
	2.5		Replacement of heat exchanger	R&R
	2.0		Replacement of heat exchanger hoses	R&R
	2.0		Replacement of oil sump with oil level check	R&R
	2.5		Replacement of output shaft seal	R&R
	3.5		Repl. of input shaft seal (only in case of remote install.)	R&R
	1.5		Replacement of valve block	R&R
	2.0		Replacement of solenoid coil	R&R
	2.5		Repl. of cable harness in the transmission incl. test drive	R&R
	2.5		Seal of cable connection at transmission	PROCEDURE
	3.0		Replacement of converter drain valve	R&R
	3.0		Replacement of operating pressure valve	R&R
	2.5		Replacement of gear pump	R&R
	2.0		Replacement of oil filter (mounted)	R&R
	2.0		Replacement of oil filter (remote)	R&R
	0.5		Replacement of oil filter (USA variant)	R&R
	0.5		Replacement of oil filter gasket	R&R
	1.5		Checking and adj. of operating pressure (without test cover)	PROCEDURE
	0.5		Re-program ECU	PROCEDURE
	1.0		Replacement of oil level sensor include diagnostics	R&R
	22.0		Repair 851.3/863.3 mechanic	PROCEDURE
	23.5		Repair 854.3/864.3	PROCEDURE
	3.5		Test run on test bench	TEST
	2.5		Test run on vehicle	TEST
	1.0		Function check with diagnosis incl. test dr.	TEST
	2.5		Advanced fault finding	PROCEDURE
COOLING	**4.3**	**6**	**RADIATOR & CHARGE AIR COOLER**	
	0.1		HEATER LINES	R&R
	0.6		DRAIN/FILL COOLANT	Drain / fill

VENDOR	TIME	MANUAL SECTION	COMPONENT / TASK DESCRIPTION	TASK
	0.3		BELT GUARDS	R&R
	0.4		CHARGE AIR COOLER TUBES	R&R
	0.4		RAD TUBES UPPER/LOWER	R&R
	0.3		BUMPER EXTENSION	R&R
	0.2		SURGE TANK LINES	Disconnect
	0.5		HYDRAULIC OIL LINES	Disconnect
	0.2		RADIATOR SUPPORT ROD	Disconnect
	0.5		LOWER SUPPORT CHANNEL, RADIATOR	R&R
	0.8		RADIATOR SUPPORT ROD	
ALL	**Misc times**	**6**	**STAND ALONE ITEMS**	
	0.8		HYDRAULIC RESERVOIR SIGHT GLASS	R&R
	0.3		LOW COOLANT SENSOR	R&R
	2		SURGE TANK	R&R
	0.2		FAN CONTROLLER	R&R
	0.8		FAN DRIVE PUMP BELT	R&R
FUEL	**3**	**7**	**FUEL SYSTEM**	
	0.4		FUEL	Drain/Fill
	0.3		PASSENGER SEAT	R&R
	0.1		COVER PLATE	R&R
	0.2		SUPPLY LINE	Disconnect
	0.2		RETURN LINE	Disconnect
	0.2		FUEL LEVEL VENT LINE	Disconnect
	0.2		FUEL LEVEL SENDER LINE	Disconnect
	0.3		FILLER TUBE CLAMPS	Disconnect
	0.5		TANK MOUNTING HARDWARE	R&R
	0.6		FUEL TANK	R&R

VENDOR	TIME	MANUAL SECTION	COMPONENT / TASK DESCRIPTION	TASK
CNG	**Misc times**	**7**	**C N G FUEL (stand alone items)**	
	2.5		C N G FUEL TANK (LINCOLN COMPOSITES)	R&R
	0.2		REFUELING CONNECTOR	R&R
	0.8		FUEL TANK SOLENOID VALVE	R&R
	1.5		I TT REGULATOR	R&R
	2.0		ZERO PRESSURE REGULATOR	R&R
	0.2		P R D VALVE	R&R
	0.5		C N G RECOVERY	EVACUATE
	0.2		FUEL DOOR SENSOR	R&R
	0.5		FUEL "LOW PRESSURE INDICATOR"	R&R
	0.5		FUEL "HIGH PRESSURE INDICATOR"	R&R
LNG	**Misc. times**	**7**	**L N G FUEL (stand alone items)**	
	2.5		L N G FUEL TANK	R&R
	2.5		HEAT EXCHANGER	R&R
	0.2		FUEL FILTER	R&R
	0.2		REFUELING CONNECTOR	R&R
	0.8		FUEL TANK SOLENOID VALVE	R&R
	2		PRESSURE REGULATOR	R&R
	0.5		L N G RECOVERY (per tank)	EVACUATE
	0.2		FUEL DOOR PROXIMITY SWITCH	R&R
	2		TANK MANIFOLD ASSEMBLY	R&R
	2		PRESSURE CONTROL MANIFOLD	R&R
AMEREX	**Misc. times**	**7**	**FIRE SUPPRESSION**	
	0.3		Agent Cylinder	R & R
	0.3		Electrical / Manual Actuator	R & R
	0.3		Pneumatic Control Head	R & R

VENDOR	TIME	MANUAL SECTION	COMPONENT / TASK DESCRIPTION	TASK
	0.2		Squib Cartridge	R & R
	0.3		Discharge Nozzle	R & R
	0.6		Distributor	R & R
	0.3		Discharge Fitting	R & R
	0.4		Heat Detection Thermostats	R & R
	0.3		Nitrogen Cylinder	R & R
ALL	**Misc. times**	**8**	**AIR SYSTEM COMPONENTS (stand alone items)**	
	1.2		AIR DRYER	R&R
	0.2		AIR DRYER FILTER	R&R
	0.5		MUFFLER (Ping) TANK	R&R
	0.2		AIR TANK DRAIN VALVE	R&R
	0.5		GOVERNOR	R&R
	0.6		AIR PRESSURE REGULATOR (BRAKE INTERLOCK)	R&R
	1.5		APPLICATION VALVE (BRAKE TREADLE)	R&R
	1		SPRING BRAKE CONTROL VALVE	R&R
	0.6		SOLENOID VALVE	R&R
	0.2		Q. R. VALVE	R&R
	0.2		TRANSDUCER	R&R
	0.3		BRAKE INTERLOCK MAGNETIC VALVE	R&R
	0.5		OIL SEPARATOR	R&R
	0.3		OIL SEPARATOR FILTERS	R&R
	0.3		CHECK VALVE	R&R
	1		AIR BRAKE RELAY VALVE	R&R
	0.2		PRESSURE PROTECTION VALVE	R&R
ALL	**Misc Times**	**9**	**ELECTRICAL**	
	0.2		MARKER LIGHT	R&R
	0.2		FLUORESCENT LIGHT	R&R

VENDOR	TIME	MANUAL SECTION	COMPONENT / TASK DESCRIPTION	TASK
	0.3		BACK UP LAMPS	R&R
	0.2		STEPWELL (HEADER) LIGHT	R&R
	0.3		SEALED BEAM HEADLIGHT	R&R
	1.5		BATTERIES & LEADS	R&R
	1.3		STARTER MOTOR	R&R
	0.5		BATTERY CUT OFF SWITCH	R&R
	0.3		LOW AIR PRESSURE SWITCH	R&R
	0.7		VOLTAGE EQUALIZER	R&R
	1		BATTERY TRAY	R&R
	0.5		P.A. SPEAKER	R&R
	0.3		DIMMER SWITCH	R&R
	0.5		TURN SIGNAL SWITCH	R&R
	0.2		PLC MODULES (Add access time)	R&R
	1.5		PROCESSOR	R&R
	0.4		TOUCH TAPE (Less then 2ft.)	R&R
	1		TOUCH TAPE (Coach length)	R&R
	Misc. Times	**10**	**HVAC SYSTEM**	
	1.5		DRIVERS HEATER / DEFROSTER UNIT	R&R
	0.5		HEATER / DEFROSTER MOTOR	R&R
	0.5		HEATER / DEFROSTER COIL	R&R
	0.5		HEATER VALVE	R&R
	0.2		AIR FILTER	R&R
	0.5		FAN / MOTOR ASSEMBLY	R&R
	1		BOOSTER PUMP	R&R
	0.5		FLOOR HEATER	R&R
	1		HEATER COIL (FLOOR HEATER)	R&R
	0.2		AIR FILTER (FLOOR HEATER)	R&R
	0.5		DEFROSTER MOTOR	R&R

VENDOR	TIME	MANUAL SECTION	COMPONENT / TASK DESCRIPTION	TASK
	0.2		AIR FILTER (REAR HEATER UNIT)	R&R
	2		AUXILIARY COOLANT HEATER	R&R
	4		ENGINE AIR COMPRESSOR	R&R
Thermo King	**Misc. Times**	**10**	**HVAC SYSTEM**	
	0.8		A C CLUTCH ASSEMBLY	R&R
	2.5		A C COMPRESSOR	Rebuild
	4		CONDENSER	R&R
	1		CONDENSER MOTOR	R&R
	1		TUBE ASSEMBLY , DISCHARGE	R&R
	0.5		A C DRIER	R&R
	3		EVAPORATOR	R&R
	1.5		EVAPORATOR MOTOR	R&R
	1		SIGHT GLASS	R&R
	1		TUBE ASSEMBLY, SUCTION	R&R
	0.8		CLUTCH ASSY (THERMO KING)	R&R
	2		CONDENSER	R&R
	1		DISCHARGE HOSE (A/C)	R&R
	0.5		DRYER	R&R
	3		EVAPORATOR	R&R
	1.5		EVAPORATOR MOTOR	R&R
	0.7		INCORRECT CHARGE: EVAC/RECHARGE	Operation
	1.5		LEAK CHECK: EVAC-CHARGE R&R	Operation
	1		LIQUID LINE DRY EYE	R&R
	0.7		LOW REFRIG-LEAK CHECK: ADD TO FULL CHARGE	Operation
	1		REPAIR LEAK EVAC-CHARGE R&R DRIER	Operation
	0.6		REPAIR LEAK CHECK: EVAC-CHARGE W/O DRYER	Operation
	1		SUCTION HOSE	R&R
	0.5		THERMOSTAT-AMBIENT	Test

VENDOR	TIME	MANUAL SECTION	COMPONENT / TASK DESCRIPTION	TASK
	0.5		THERMOSTAT-ANTIFREEZE	Test
	0.5		THERMOSTAT-RET AIR	Test
	1.1		UNIT LEAK CHECK: EVAC-CHARGE W/O DRYER	Operation
	1		TUBE ASSEMBLY, SUCTION	R&R
ALL	**Misc. Times**	**12**	**INTERIOR PANELS & APPLIED PARTS**	
	1		SIDEWALL PANEL	R&R
	2		CEILING PANEL	R&R
	0.3		REAR VIEW MIRROR	R&R
	0.3		EXIT DOOR MIRROR	R&R
	0.3		SUN VISOR	R&R
ALL	**Misc. Times**	**13**	**EXTERIOR PANELS & APPLIED PARTS**	
	0.5		CURBSIDE MIRROR	R&R
	0.5		DRIVERS MIRROR	R&R
	0.8		REAR BUMPER ASSEMBLY	R&R
	1		POLYURETHANE MODULE (Section of Bumper)	R&R
	0.3		WIPER ARM	R&R
	0.8		WIPER MOTOR	R&R
	0.8		WINDSHIELD WASHER RESERVOIR	R&R
	1.25		SPLASH GUARDS / MUD FLAPS (Front or Rear)	R&R
	1.25		FRONT BUMPER	R&R
	0.3		EXIT DOOR MIRRORS	R&R
	0.3		REAR VIEW MIRROR	R&R
			Exterior body panel replcement times depend on severity of damage, no definate time is assigned to this particular task	
ALL	**Misc. Times**	**14**	**WINDOWS**	
	3		WINDSHIELD (Left or Right)	R&R
	1		DRIVERS SIDE WINDOW	R&R

VENDOR	TIME	MANUAL SECTION	COMPONENT / TASK DESCRIPTION	TASK
	1		PICTURE WINDOW	R&R
	1		PASSENGER WINDOW	R&R
	0.5		WINDOW TRIM RING	R&R
	0.5		WINDOW GLASS	R&R
	0.2		RAPID REPLACEMENT WINDOW (Tip in window)	R&R
	0.5		VANDAL SHIELD	INSTALL
ALL	**Misc. Times**	**15**	**ACCESS DOORS**	
	1.5		REAR EXTERIOR HVAC DOOR	R&R
	0.5		TRANSMISSION ACCESS DOOR (Exterior)	R&R
	1.5		ENGINE ACCESS DOOR (Exterior)	R&R
	0.7		RADIATOR DOOR	R&R
	0.5		FUEL FILLER DOOR	R&R
	0.8		ROOF VENT	R&R
	0.7		SIDE CONSOLE EXTERIOR DOOR	R&R
	0.5		SURGE TANK ACCESS DOOR	R&R
ALL	**Misc. Times**	**16**	**ENTRANCE & EXIT DOOR SYSTEMS**	
	0.8		DOOR PANELS	R&R
	2.2		DOOR ASSEMBLY	R&R
	0.6		BASE PLATE ASSEMBLY(Welded)	R&R
	0.5		DOOR MOTOR	R&R
	1.5		DOOR MOTOR OVERHAUL	Overhaul
	0.2		ADJUSTING RODS	R&R
	0.5		EMERGENCY RELEASE VALVE (Dump Valve)	R&R
	1.2		DOOR SHAFT & ARM ASSEMBLY	R&R
	0.3		TOUCH TAPE	R&R
	0.1		MICRO SWITCH	R&R
	0.3		SEALS & TRIM	R&R

VENDOR	TIME	MANUAL SECTION	COMPONENT / TASK DESCRIPTION	TASK
	0.2		GRAB HANDLE	R&R
	0.5		CHIME	R&R
	0.8		DOOR CONTROLLER	R&R
	0.5		DOOR GLASS	R&R
	1		HALL EFFECT LOCK PAWL SWITCH	R&R
	1		REAR DOOR BEARINGS	R&R
	1		REAR DOOR SOLENOID (MAG VALVE)	R&R
	0.5		ANNUNCIATE PANEL	R&R
	1		SONIC SENSOR	R&R
VAPOR	**4.6**		SWING EXIT DOORS	
	1		EXIT DOOR PANELS (BOTH)	R&R
	3		EXIT DOOR ASSEMBLY	R&R
	0.6		ELECTRO-PNEUMATIC EXIT DOOR ENGINE	R&R
VAPOR	**0.8**		**EXIT DOOR PANELS (BOTH)**	R&R
	0.5		DOOR GLASS	R&R
	0.3		DOOR SHAFT LEVERS	R&R
VAOOR	**1.6**		**EXIT DOOR ASSEMBLY (ONE)**	R&R
	0.4		RUBBER BUMPERS	R&R
	0.3		SEALS & TRIM	R&R
	0.3		DOOR BRUSHES	R&R
	0.3		HANDLE	R&R
	0.3		TOUCH TAPE	R&R
VAPOR	**4**		**EXIT DOOR BASEPLATE OVERHAUL**	OVERHAUL
	2		BASE PLATE ASSEMBLY	R&R
	0.2		EXIT DOOR AIR CYLINDER	R&R
	0.2		DOOR SOLENOID & BRACKET ASSEMBLY	R&R
	0.2		HALL EFFECT LOCK PRAWL SWITCH	R&R
	0.1		CAM ASSEMBLY	R&R

VENDOR	TIME	MANUAL SECTION	COMPONENT / TASK DESCRIPTION	TASK
	0.2		MICRO / LIMIT SWITCHES	R&R
	0.5		SKINNER VALVE	R&R
	0.1		BASEPLATE BUSHINGS	R&R
	0.2		ELECTRIC SOLENOID	R&R
	0.1		RETURN SPRING	R&R
	0.2		CONNECTING RODS	R&R
VAPOR	**1.4**		**EXIT DOOR SOLENOID AND BRACKET ASSEMBLY**	R&R
	0.2		BRACKET ASSEMBLY	R&R
	0.3		EXTENSION SPRING	R&R
	0.2		LEVER ASSEMBLY	R&R
	0.1		END PLAY SPACER AND BUSHING	R&R
	0.1		CAM ASSEMBLY	R&R
	0.2		EMERGENCY CONNECTING ROD ASSEMBLY	R&R
	0.2		LOCK PRAWL ASSEMBLY	R&R
	0.1		SENSOR ASSEMBLY	R&R
VAPOR	5.9	**16**	**SLIDE GLIDE ENTRANCE DOORS**	
	3		SLIDE GLIDE ENTRANCE DOOR ASSEMBLY	R&R
	0.6		CONNECTING RODS, ENTRANCE DOOR	R&R
	1.5		DOOR SHAFT LEVER ASSEMBLY	R&R
	0.3		DOOR SHAFT & ARM ASSEMBLY	R&R
	0.3		DOOR PANELS (PER PANEL)	R&R
	0.2		PIVOT ASSEMBLY, ENTRANCE DOOR TOP	R&R
Vapor	**2**		**ENTRANCE DOOR SHAFT LEVER ASSEMBLY**	**R&R**
	1.5		LEVER ASSEMBLY, ENTRANCE DOOR	R&R
	0.5		SPACER & BALL BEARING	R&R
Vapor	**2.3**		**ENTRANCE DOOR SHAFT & ARM ASSEMBLY**	R&R
	0.3		DOOR PANELS (PER PANEL)	R&R
	1		DOOR GLASS (UPPER AND LOWER)	R&R

VENDOR	TIME	MANUAL SECTION	COMPONENT / TASK DESCRIPTION	TASK
	0.4		PIVOT ASSEMBLY, ENTRANCE DOOR TOP	R&R
	0.3		SEALS AND TRIM, ENTRANCE DOOR	R&R
	0.3		BRUSHES, ENTRANCE DOOR	R&R
Vapor	**3**		**ENTRANCE DOOR MECHANISM OVERHAUL**	R&R
	1.5		DOOR CYLINDER ASSEMBLY	R&R
	0.4		DOOR MAG VALVE	R&R
	0.5		LIMIT SWITCHES	R&R
	0.6		CONNECTING RODS, ENTRANCE DOOR	R&R
VAPOR	**Misc. times**	**16**	**EXIT & ENTRANCE DOOR STAND ALONE ITEMS**	
	0.5		AIR FILTER, BASEPLATE	R&R
	1		EXIT DOOR ADJUSTMENT (FIT & ALIGNMENT, CHECK & ADJUST)	ADJUSTMENT
	0.3		EXIT DOOR SPEED ADJUSTMENT	ADJUSTMENT
	0.3		EXIT DOOR HALL SENSOR VANE ADJUSTMENT	ADJUSTMENT
	0.2		EXIT DOOR EMERGENCY LINKAGE ADJUSTMENT	ADJUSTMENT
	0.2		EXIT DOOR LS3 SENSOR ADJUSTMENT	ADJUSTMENT
	0.2		EXIT DOOR LOCK SOLENOID ADJUSTMENT	ADJUSTMENT
	0.2		EXIT DOOR LOCK PRAWL TO CAM CLEARANCE ADJUSTMENT	ADJUSTMENT
	0.2		EXIT DOOR PANEL SENSOR ADJUSTMENT	ADJUSTMENT
	2		EXIT DOOR COMPLETE FUNCTIONAL TEST	ADJUSTMENT
	1		ENTRANCE DOOR ADJUSTMENT FOR FIT, CHECK & ADJUST	ADJUSTMENT
	0.3		ENTRANCE DOOR SPEED ADJUSTMENT	ADJUSTMENT
	2		ENTRANCE DOOR COMPLETE FUNCTIONAL TEST	TEST
	1.2		EXIT DOOR EMERGENCY RELEASE VALVE	TEST
	1		ENTRANCE DOOR EMERGENCY RELEASE VALVE	R&R
	1		DOOR CONTROLLER	R&R
	0.5		DOOR CONTROLLER MODULE	R&R
	0.5		ENUNCIATOR PANEL	R&R
				R&R

VENDOR	TIME	MANUAL SECTION	COMPONENT / TASK DESCRIPTION	TASK
ALL	**Misc times**	**17**	**SEATING**	
	1		DRIVERS SEAT	R&R
	0.5		DRIVERS SEAT BELT	R&R
	0.8		PASSENGER SEAT (Double)	R&R
	0.1		SEAT INSERTS	R&R
	1		WHEELCHAIR FLIP SEAT	R&R
ALL	**Misc. times**	**18**	**DESTINATION SIGNS**	
	1.2		DESTINATION SIGN ASSEMBLY (Front)	R&R
	1		DESTINATION SIGN ASSEMBLY (Side)	R&R
	0.5		REAR ROUTE SIGN	R&R
	0.5		DECODER BOARD	R&R
	0.8		DESTINATION SIGN CONTROL BOARD	R&R
	0.8		PROCESSOR BOARD	R&R
	1		DESTINATION SIGN GLASS (On coach)	R&R
ALL	**Misc. Times**	**19**	**DRIVERS CONTROLS**	
	0.5		DASH GAUGE	R&R
	0.5		DASH INDICATOR STRIP	R&R
	0.5		DEFROSTER SWITCH	R&R
	0.3		TURN SIGNAL SWITCH	R&R
	0.2		HORN BUTTON	R&R
	0.5		PARKING BRAKE KNOB	R&R
	0.5		DIMMER SWITCH	R&R
	0.4		DASH FAN	R&R
	1.5		DRIVERS SEAT	R&R
	0.5		INTERIOR SPEAKER	R&R
	1		ACCELERATOR TREADLE (Complete)	R&R
	0.5		DRIVERS SEAT BELT	R&R

VENDOR	TIME	MANUAL SECTION	COMPONENT / TASK DESCRIPTION	TASK
	0.4		DRIVERS BOOSTER FAN	R&R
	0.5		DOME LIGHT	R&R
	0.5		THROTTLE POSITION SENSOR	R&R
NF	**3.9**	**20**	**WHEELCHAIR RAMP**	
	0.8		HYD.PUMP/RESERVOIR ASSEMBLY	R&R
	0.6		MANIFOLD BLOCK	R&R
	0.6		LIFT MECHANISM ASSEMBLY	R&R
	0.5		MICRO SWITCHES/LIMIT SWITCHES	R&R
	1		RAMP PLATE	R&R
	1.5		RAMP ASSEMBLY COMPLETE	R&R
	0.5		DASH SWITCH	R&R
	0.2		RAMP COVER PLATE	R&R
	1.5		DRIVE CHAIN	R&R
Lift-U		**20**	**WHEELCHAIR RAMP COMPONENTS**	
	4		FRAME WELDMENT	R&R
	2		LATCH ASSEMBLY	R&R
	1.33		RELEASE LEVER	R&R
	1		RELEASE COVER ASSEMBLY	R&R
	1		COUNTERBALANCE ASSEMBLY FORWARD	R&R
	1		COUNTERBALANCE ASSEMBLY REAR	R&R
	1		GEAR MOTOR ASSEMBLY	R&R
	1		DRIVE CHAIN	R&R
	1		DRIVE SPROCKET - 15 TOOTH - COUNTER BALANCE	R&R
	1.5		DRIVE SHAFT - COUNTER BALANCE (INCL. BEARING BLOCK X4)	R&R
	1.5		CURBSIDE SPROCKET ASSEMBLY	R&R
	1		ISOLATION ROLLER ASSEMBLY	R&R
	1		SOLENOID ASSEMBLY	R&R
	1		JUNCTION BOX	R&R
	1		RAMP INPUT CABLE	R&R

VENDOR	TIME	MANUAL SECTION	COMPONENT / TASK DESCRIPTION	TASK
	1		RAMP OUTPUT CABLE	R&R
	1		PROXIMITY SWITCH	R&R
	1		DECELERATION PROX BRACKET	R&R
	1		STOW PROX BRACKET	R&R
	1		LATCH STRIKER - BOTH	R&R
	1		DRIVE SHAFT - GEAR MOTOR (INCL. BEARING BLOCK, COUPLING HALF & 9-TOOTH SPROCKET)	R&R
	1		RISING FLOOR ASSEMBLY	R&R
	1		SAFETY WALK - RISING FLOOR ASSEMBLY	R&R
	1.5		RAMP PLATE ASSEMBLY	R&R
	1.5		STEP TREAD	R&R
	1		SAFETY WALK - RAMP PLATE ASSEMBLY	R&R
	1		STEP EDGE CLOSEOUT ASSEMBLY	R&R
	1		HINGE LEAVES - BOTH	R&R
	1		TRIM PIECE	R&R
ATG	**7.8**	**21**	**JOINT BELLOWS**	
	1		PASSENGER SEATS	R&R
	0.8		HIP BOOT COVER	R&R
	0.7		EXTERIOR BELLOW EXTRUSION (Rubber strip)	R&R
	1		UNDERSIDE HARDWARE & CLOSURE	R&R
	0.8		CABLES	R&R
	3.5		BELLOWS (Front coach, hoop assembly & rear of coach)	R&R
				R&R
ATG	**1**	**21**	**FLOOR PLATE ACCESS**	
	0.8		JOINT PASSENGER SEATS	R&R
	0.2		FLOOR PLATES (LIFT / SECURE)	ACCESS
ATG	**1.7**	**21**	**OPEN BELLOWS (underside)**	
	0.8		HIP BOOT FLANGE PLATES (2)	R&R

VENDOR	TIME	MANUAL SECTION	COMPONENT / TASK DESCRIPTION	TASK
	0.2		BUCKLE STRAPS (underside bellow fasteners)	DISCONNECT
	0.2		RETAINING STRIP	R&R
	0.3		TURNBUCKLE ASSEMBLY	R&R
	0.2		SHOCK CORD ASSEMBLY	DISCONNECT
ATG	**4**	**21**	**BELLOWS ASSEMBLY - ONE SIDE**	
	0.4		HIP BOOT FLANGE (2)	R&R
	0.3		BUCKLE STRAPS	DISCONNECT
	0.3		RETAINING STRIP	R&R
	0.5		TURNBUCKLE ASSEMBLY	DISCONNECT
	0.2		SHOCK CORD ASSEMBLY	DISCONNECT
	0.3		ROOF STRUTT ASSEMBLY	DISCONNECT
	2		BELLOWS SECTION	R&R
S	**7.9**	**21**	**CENTER HOOP ASSEMBLY (without the center hoop beam)**	**R&R**
	1		HIP BOOT COVER	R&R
	0.8		LOWER HOOP MOUNTING BOLTS	DISCONNECT
	1		REMOVE ENTER SEATS	R&R
	0.8		CABLE TURNBUCKLES	R&R
	0.6		UPPER BEARING,CENTER HOOP	R&R
	1.5		CENTER HOOP	R&R
	0.4		CENTER MOUNTING BRACKET OF ROOF STRUT ASSEMBLY	R&R
	1		HOSE CLAMP ASSEMBLY	R&R
	0.8		OPEN BELLOWS AT UNDERSIDE	OPEN/CLOSE
ATG	**3.5**	**21**	**WRIST JOINT ASSEMBLY**	R&R
	1		OPEN FLOOR PLATES FOR SERVICE	ACCESS
	1.3		OPEN BELLOWS FOR SERVICE	ACCESS
	0.3		BOLT, 20M x80 X 2	R&R

VENDOR	TIME	MANUAL SECTION	COMPONENT / TASK DESCRIPTION	TASK
	0.3		BOLT, 5 / 8" X 4 (quantity 8)	R&R
	0.6		WRIST JOINT	R&R
ATG	**3.5**	**21**	**HYDRAULIC CYLINDER ASSEMBLY**	**R&R**
	1		OPEN FLOOR PLATES FOR SERVICE	ACCESS
	1.5		HYDRAULIC SYSTEM, COMPLETE BLEED / FILL / ADJUST	CHK / ADJ.
	0.2		CYLINDER HOSE X 2	DISCONNECT
	0.3		CYLINDER PIN	DISCONNECT
	0.3		CYLINDER YOKE PIN	DISCONNECT
	0.2		CYLINDER	R&R
ATG(HF)	**8.8**	**21**	**YOKE PLATE**	**R&R**
	1		OPEN FLOOR PLATES FOR SERVICE	ACCESS
	5.3		CENTER HOOP ASSEMBLY	R&R
	0.3		CYLINDER PIN	DISCONNECT
	0.3		CYLINDER YOKE PIN	DISCONNECT
	0.2		CYLINDER	R&R
	0.5		BOLT, M16 X 8	DISCONNECT
	0.3		BOLT, 20MM X 2	DISCONNECT
	0.3		BOLT, YOKE PLATE 5 / 8" X 6	DISCONNECT
	0.6		WRIST JOINT	R&R
ATG	**3.3**	**21**	**HYDRAULIC BLOCK ASSEMBLY**	**S**
	1		OPEN FLOOR PLATES FOR SERVICE	ACCESS
	1.5		HYD. SYSTEM COMPLETE BLEED, FILL, CHECK & ADJUST	CHK. / ADJ.
	0.2		CYLINDER HOSE X 2	DISCONNECT
	0.3		ELECTRICAL HARNESS CONNECTIONS	DISCONNECT
	0.1		PRESSURE GAUGE	DISCONNECT
	0.2		BOLT, M8 X 4	DISCONNECT

VENDOR	TIME	MANUAL SECTION	COMPONENT / TASK DESCRIPTION	TASK
ATG	**3**	**21**	**ACCUMULATOR ASSEMBLY**	**R&R**
	1		OPEN FLOOR PLATES FOR SERVICE	ACCESS
	1.5		HYDRAULIC SYSTEM, COMPLETE BLEED / FILL / ADJUST	CHK. / ADJ.
	0.1		BLEED SCREW	CHK. / ADJ.
	0.4		ACCUMULATOR ASSEMBLY	R&R
ATG	**Misc. times**	**21**	**A T G STAND ALONE ITEMS**	
	3		HIGH PRESSURE SWITCH	R&R
	0.3		LOW PRESSURE SWITCH	R&R
	1		POSITION SENSOR	R&R
	0.5		HYD. SYSTEM PRESSURE TEST	TEST

NEW FLYER

NEW FLYER MiDi®

SALES INFORMATION BULLETIN

284-001 | **Model:** MiDi® | **Lengths:** 30' & 35' | **Propulsions:** Diesel

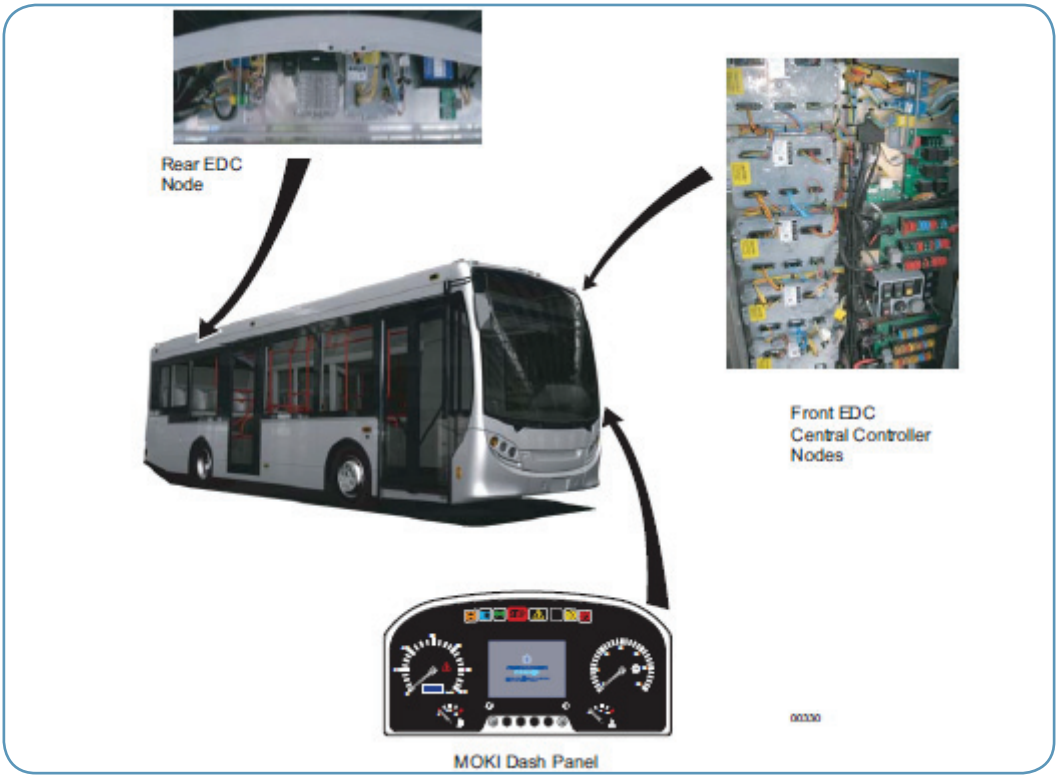
Multiplexing System

Value Proposition

New Flyer believes customers should be given the best tools to perform efficient and effective maintenance. That's why Midi® comes standard with a Siemens VDO multiplexing system. Multiplexing systems have numerous advantages over traditional circuit-board type control systems such as advanced diagnostic capabilities and fault code generation. Also, multiplexing systems are very flexible and allow for changes to how the bus operates addressing any concerns that may have not been recognized until the bus is in service

Overview

The Midi® multiplexing system is constructed from an array of PLCs, with a central(or master) PLC being supported by multiple slave PLCs. Each PLC has many input and output pins that are connected to various sensors, switches, indicators, LCDs and to other PLCs around the bus. A communication protocol (common language) called CAN bus is used for PLCs in the multiplexing network to talk to each other and relay information. Furthermore, the central PLC contains the operating system of the bus and is written in ladder logic, which gives New Flyer the ability to modify the programming throughout the life of the bus and the ability to address any changes in operational preferences.



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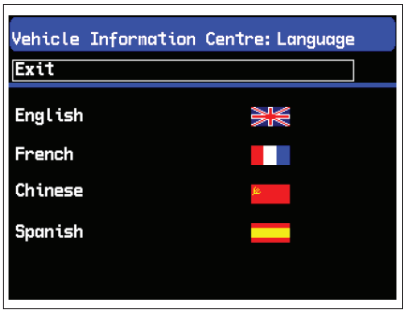
NEW FLYER MiDi®

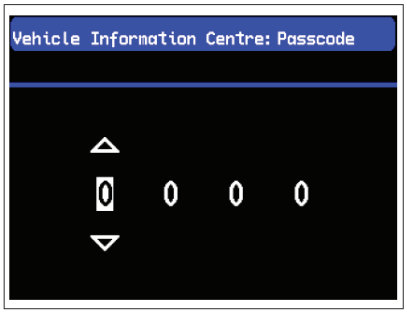
SALES INFORMATION BULLETIN

Diagnostic Access

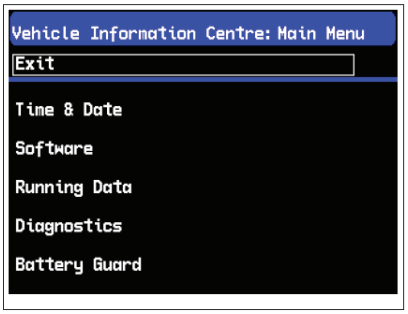
The on-board diagnostic system can be accessed in three ways: through a 9 pin connector located in the engine compartment, through a 9 pin connector located behind the driver's seat in a flip door, through the LCD on the instrument panel (MOKI). The Diagnostic mode of the LCD is accessed by holding Switch "A" for two seconds. Below are a few samples of screens that can be accessed in diagnostic mode via the LCD.



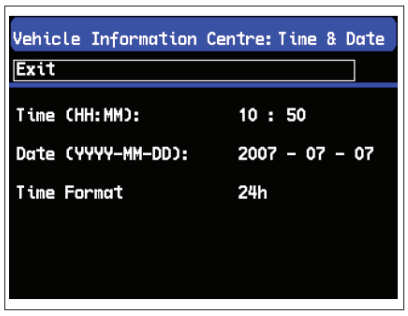
Language Selection



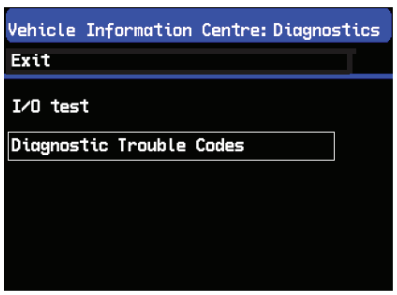
Passcode

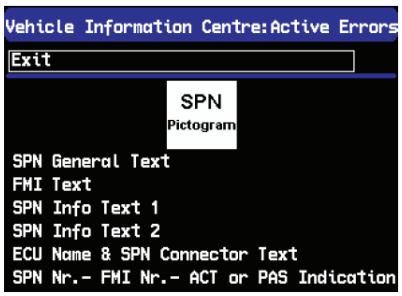


Menu Screen



Time & Date





Diagnostic Trouble Codes - Chassis & Body

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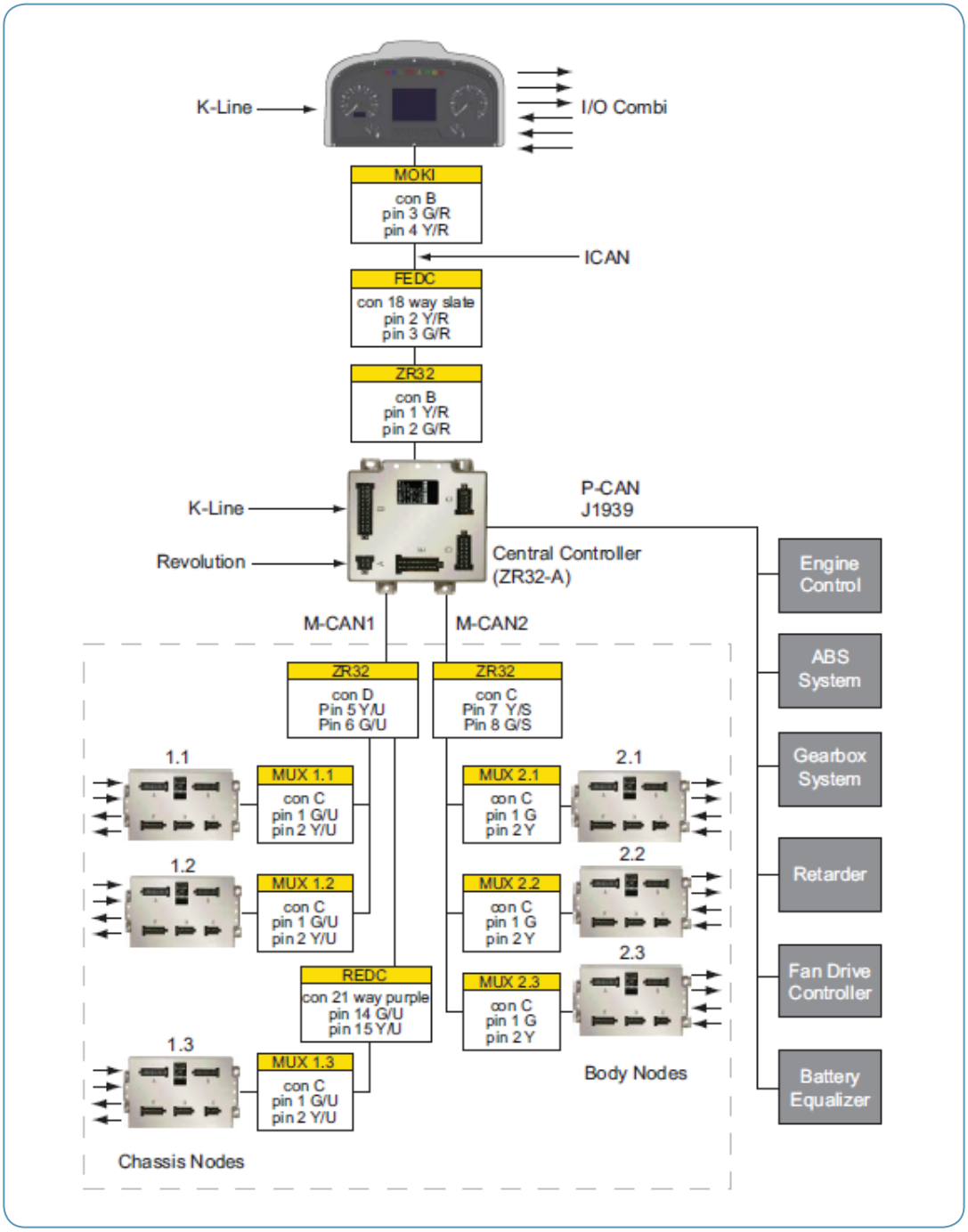
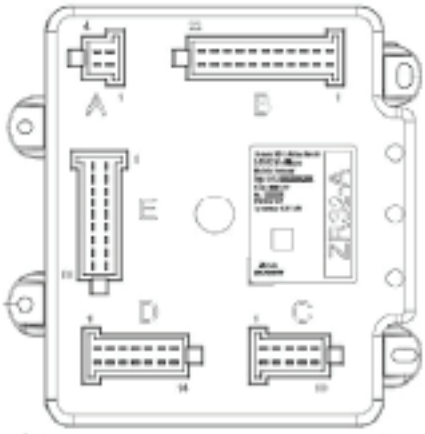
SALES INFORMATION BULLETIN



ZR32-A Central Computer



- master node, free programmable
- generic central computer for general purpose
- complex (CAN) gateway functionality
- central gateway for EOL programming & diagnosis
- installation in the cab (IP40)
- one version for 12V & 24V
- 6 CAN interfaces
  - PCAN (Powertrain)
  - ICAN (Instrumentation)
  - M1CAN (Multiplex 1)
  - M2CAN (Multiplex 2)
  - KCAN (Karosserie)
  - XCAN (Extra)

MUX2-B multiplex node

- slave node, not programmable
- generic multiplex node for general purpose
- built-in diagnostic & protection capabilities
- multiple input & output capabilities
- installation in the cab (IP40)
- one version for 12V & 24V
- 24 HS outputs 78A (30A**)
- 8 LS outputs (8A**) (3 PWM)
- 24 (quasi analog) digital inputs
- 6 analog inputs
- 1 CAN interface

**Permanent current

Nominal voltage		12V and 24V	
Operating voltage		8 - 32V	
INPUT	digital	24	
	analog	6	
	wake up	-	
OUTPUT			
High Side Switch	10A	2	
	5A	4	
	3A	10	
	1A(3A*)	8	
Low Side Switch	1A(3A*)	8	3 PWM capable
Max. current at same time		30A	
Nr. of supply groups		5	

*max constant current = 1A, max 3A for short time

NEW FLYER

NEW FLYER MiDi®

SALES INFORMATION BULLETIN

#400-001 | **Model:** MiDi® | **Lengths:** 30' & 35' | **Propulsion:** Diesel

Structure

Value Proposition

The New Flyer MiDi® structure is a winning combination of a robust steel chassis and a purpose-built aluminum body structure, integrated to provide a light-weight yet rigid durable structure. The entire chassis and body structure have been developed in unison, using advanced virtual engineering techniques based on computer modelling derived from real-life operator experiences. Thus, the structure has been weight-optimized, but preserves immense strength to allow the New Flyer MiDi® to gain significant economic advantages, using less fuel and requiring less maintenance.

Benefits

- Robust, reliable design carrying no unnecessary weight
- The structure's design is the same as the Alexander Dennis E200, a proven design with over 16,000 buses of this type delivered world-wide
- Corrosion-protection undercoating applied using New Flyer's proven procedures, methodology and application process for heavy-duty buses

Warranty

The New Flyer MiDi® structure is warranted for 12 years or 500,000 miles.

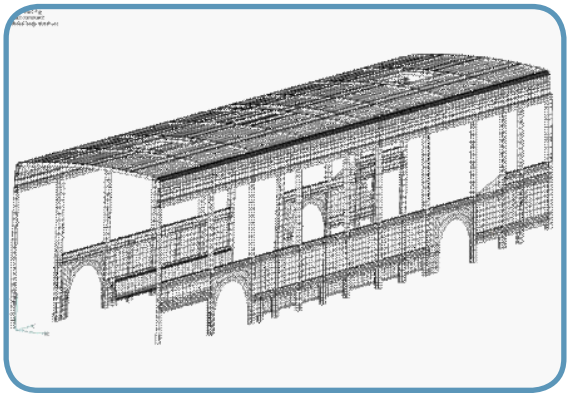
Welding

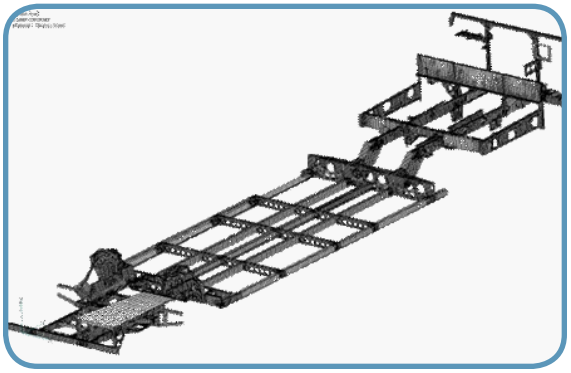
All welding operations for New Flyer facilities, as well as vendors, comply with CSA (Canadian Standards Association) standard W47.1 and welding personnel comply with CSA W59. These codes are audited regularly by a third party, the Canadian Welding Bureau (CWB). Welding personnel are tested by the CWB every two years.

Visual weld inspection occurs by trained and certified weld inspectors on each frame, while NDT (Non-Destructive Testing) is performed on critical welds using dye penetrant and/or magnetic particle inspection, depending on the material.

STRUCTURE FEATURES

Construction	Mild-steel chassis integrated with an aluminum body structure. Some stainless steel used in select places
Body Structure	Lightweight Aluminum
Chassis	Mild-Steel
Front Wheelhouse	Aluminium exterior liners. Matt GRP interior liners.
Rear Wheelhouse	Mild steel liner covered with vinyl flooring on interior
Window Piers	Extruded Aluminum
Corrosion Protection	Corashield undercoating





NEW FLYER

NEW FLYER MiDi®

SALES INFORMATION BULLETIN

#490-001 | **Model:** MiDi® | **Lengths:** 30' & 35' | **Propulsions:** Diesel

Passenger Doors

Value Proposition

New Flyer believes that passenger doors should be robust and rugged to endure the high-cyclic fatigue imposed onto them by riders while also being ergonomic and stylish. Furthermore, passenger doors should create a consistent seal when closed to aid in heat and air conditioning retention. This is accomplished on MiDi though careful consideration and design as well as working closely with the door OEM.

Benefits

- Vapor is a trusted industry name, with proven reliability
- Full glass provides enhanced visability

Warranty

Two years/100,000 miles

Front Entrance/Exit Door

Manufacturer	Vapor
Type	Double leaf infold entrance/exit door
Clear Opening	32"
Power	Pneumatic(air operated)
Passenger assists	Mounted on leaf to aid passenger ingress and egress
Glazing	Full glass
Air Dump Valve	Located above door
Step height	10.4" on kneel. (13.4" ride height)

Optional 2nd Curbside Door (shown in above picture)

Manufacturer	Vapor
Type	Single leaf "plug-style" exit door
Clear Opening	32"
Power	Pneumatic(air operated)
Glazing	Full glass
Air Dump Valve	Located above door
Step hieght	13.4" ride hieght

Revision Level A
Revision Date 10.25.13