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# FUEL LEVEL SENSOR ASSEMBLY AND INSTALLATION INSTRUCTIONS

PART NO.	MODEL DESCRIPTION
98-02678-00	FUEL LEVEL SENSOR (22" DIAMETER TANK)
98-02678-01	FUEL LEVEL SENSOR (18" DIAMETER TANK)

INSTALLATION PROCEDURE FOR CARRIER eSOLUTIONS TELEMATICS OPTION FUEL LEVEL SENSOR.

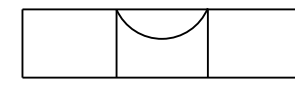
**NOTE:** MAY BE USED ON APX AND ADVANCE UNITS WITH OR WITHOUT THE eSOLUTIONS OPTION.

**NOTE:** THIS PROCEDURE DOES NOT REQUIRE THE FUEL TANK TO BE REMOVED FROM THE TRAILER SINCE THE SENSOR'S FOCUS TUBE AND CONDUIT ARE FLEXIBLE.

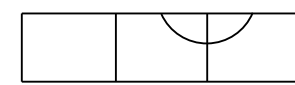
1.0 INSTALL FUEL LEVEL SENSOR INTO TOP OF FUEL TANK. ASSEMBLE THE FUEL LEVEL SENSOR ADAPTER KIT (ITEM 5) (5-BOLT FLANGE) TO THE FUEL TANK. TORQUE ITS 10-32 SCREWS TO 15IN-LB. APPLY THREAD SEALER TO THE FUEL LEVEL SENSOR (ITEM 1) PIPE THREADS, ASSEMBLE IT TO THE 5-BOLT FLANGE (ITEM 5), AND TIGHTEN IT 2 - 3 TURNS PAST FINGER TIGHT.

2.0 FOR NEW INSTALLATIONS, MOUNT THE FUEL TANK. USE THE INSTALLATION INSTRUCTIONS AND HARDWARE PROVIDED WITH THE FUEL TANK. WHEN MOUNTING THE TANK, IT SHOULD BE MOUNTED WITH THE SENSOR FLANGE LEVEL AT THE TOP TO WITHIN A HALF BUBBLE OF LEVEL USING A 24 INCH LEVEL (SEE IMAGES BELOW). THE TRAILER SHOULD BE LEVEL DURING THIS PROCEDURE.

**NOTE:** DO NOT USE THE FILL TUBE AS A GUIDE. THE SENSOR FLANGE MAY NOT BE ALIGNED TO THE FILL TUBE.



LEVEL



HALF BUBBLE

3.0 SECURE THE EXPOSED PORTION OF THE FUEL LEVEL SENSOR TO THE TRAILER. USING THE PROVIDED CUSHION CLAMP (ITEM 90) AND HARDWARE (ITEMS 91 - 93), ATTACH THE EXPOSED PORTION OF THE FUEL LEVEL SENSOR TO A CROSS MEMBER OF THE TRAILER TO PREVENT IT FROM MOVING AND CAUSING UNDUE STRAIN ON THE FLEX SECTION OF THE SENSOR.

4.0 ROUTE AND SECURE THE EXTENSION CABLE. CONNECT THE EXTENSION CABLE (SUPPLIED WITH ITEM 1) TO THE FUEL SENSOR (ITEM 1). PROVIDE ADEQUATE STRAIN RELIEF BETWEEN THE SENSOR LEAD AND THE EXTENSION CABLE. THEN ROUTE THE EXTENSION CABLE FROM THE FUEL LEVEL SENSOR TO THE eSOLUTIONS OR UNIT ENGINE HARNESS CONNECTION (BOTH LOCATED BEHIND THE UNIT DISPLAY AT THE "OPTIONS BUNDLE" AREA). SECURE IT WITH FIELD-SUPPLIED HARDWARE. SPACING BETWEEN CLAMPING LOCATIONS SHALL BE 10 INCHES MAXIMUM. ADD ADDITIONAL CLAMPING TO PREVENT CHAFFING AS NEEDED.

**NOTE:** DO NOT TY-WRAP THE EXPOSED PORTION OF THE FUEL LEVEL SENSOR, THE SENSOR LEAD, OR THE EXTENSION CABLE TO THE FUEL LINES. THESE SHALL BE ROUTED AND SECURED SEPARATELY FROM THE FUEL LINES.

**NOTE:** SECURE CONNECTOR IN THE HORIZONTAL POSITION. ENSURE THAT WIRES COMING INTO THE CONNECTOR ARE NOT SIDE LOADED OR UNDER ANY TENSION.

**NOTE:** SECURE THE CABLE AWAY FROM HEAT SOURCES, HIGH VOLTAGE CIRCUITS AND MOVING PARTS.

5.0 ASSEMBLE THE CONNECTOR TO THE UNIT END OF THE EXTENSION CABLE. FIRST, NOTING THAT THE DRAIN WIRE MAY NEED TO BE LONGER THAN THE SENSOR WIRES A, B & C. DETERMINE THE LENGTH OF DRAIN WIRE THAT WILL BE NEEDED TO GROUND THE SHIELDING OF THE CABLE TO THE TRAILER OR UNIT CHASSIS. THEN CUT THE EXTENSION CABLE TO THE REQUIRED LENGTH. TAKING CARE NOT TO CUT OR DAMAGE THE DRAIN WIRE, STRIP THE JACKET BACK 2 INCHES BEYOND THE LENGTH NEEDED FOR THE SENSOR WIRES A, B & C.

SLIDE WIRE SEALS (ITEM 46 PURPLE) ONTO THE EXTENSION CABLE WIRES AND INSTALL MALE TERMINALS (ITEM 49) ONTO THE WIRES. INSERT THE RED WIRE INTO CAVITY A, THE BLACK WIRE INTO CAVITY B, AND THE WHITE WIRE INTO CAVITY C OF THE CONNECTOR (ITEM 42) TO ALIGN THE CIRCUITS WITH CTD FLS CONVENTION OF POWER ON CAVITY A, GROUND ON CAVITY B, AND SIGNAL ON CAVITY C.

INSTALL THE RING TERMINAL (ITEM 35) TO THE DRAIN WIRE OF THE EXTENSION CABLE.

6.0 ASSEMBLE THE CONNECTOR TO THE eSOLUTIONS HARNESS OR TO THE UNIT ENGINE HARNESS.

**CONNECTING TO THE eSOLUTIONS TELEMATICS OPTION:**

LOCATE THE eSOLUTIONS HARNESS WIRES LABELED "FLS-A(+)", "FLS-B(-)" AND "FLS-C(SIG)" FOUND BEHIND AND BELOW THE UNIT DISPLAY IN THE "OPTIONS BUNDLE" AREA. SLIDE THE WIRE SEALS (ITEM 45 GREEN) ONTO THE THREE WIRES AND INSTALL THE FEMALE TERMINALS (ITEM 47) ONTO THEM. INSERT FLS-A(+) INTO CAVITY A, FLS-B(-) INTO CAVITY B, AND FLS-C(SIG) INTO CAVITY C OF CONNECTOR (ITEM 40).

**CONNECTING TO UNITS WITH AN APX MICROPROCESSOR:**

LOCATE THE UNIT ENGINE HARNESS WIRES LABELED "FLS-A", "FLS-B" AND "FLS-C" FOUND BEHIND AND BELOW THE UNIT'S DISPLAY IN THE "OPTIONS BUNDLE" AREA. SLIDE THE WIRE SEALS (ITEM 46 PURPLE) ONTO THE THREE WIRES AND INSTALL THE FEMALE TERMINALS (ITEM 47) ONTO THEM. INSERT FLS-A INTO CAVITY A, FLS-B INTO CAVITY B, AND FLS-C INTO CAVITY C OF CONNECTOR (ITEM 40).

INSTALL THE 5A FUSE (ITEM 59) IN THE UNIT'S POWER CONTROL MODULE (PCM) SLOT F8 (FLS PWR).

**NOTE:** FOR UNITS EQUIPPED WITH THE ENGINE EMISSIONS SYSTEM EXHAUST OPTION, THE 10 AMP FUSE ALREADY INSTALLED IN PCM SLOT F8 WILL BE USED.

6.0 (CONTINUED)

**CONNECTING TO UNITS WITH AN ADVANCE MICROPROCESSOR:**

LOCATE THE UNIT ENGINE HARNESS WIRES LABELED "FLS-A", "FLS-B" AND "FLS-C" FOUND BEHIND AND BELOW THE UNIT DISPLAY IN THE "OPTIONS BUNDLE" AREA. SLIDE THE WIRE SEALS (ITEM 45 GREEN) ONTO THE TWO WIRES FLS-B AND FLS-C AND INSTALL THE FEMALE TERMINALS (ITEM 47) ONTO THEM. INSERT FLS-B INTO CAVITY B AND FLS-C INTO CAVITY C OF CONNECTOR (ITEM 40).

TAKE WIRE FLS-A FROM THE ENGINE HARNESS, CUT 4 INCHES OFF, AND SET THAT PIECE ASIDE FOR USE IN THE NEXT STEP. PASS THE END OF FLS-A THAT IS STILL CONNECTED TO THE ENGINE HARNESS THROUGH CAVITY A OF THE FUSE HOLDER (ITEM 55) AND INSTALL TERMINAL (ITEM 65) TO IT. THEN PULL THE WIRE BACK TO SEAT THE TERMINAL IN THE FUSE HOLDER.

SLIDE WIRE SEAL (ITEM 45 GREEN) ONTO THE 4 INCH PIECE OF WIRE SET ASIDE IN THE PREVIOUS STEP. INSTALL FEMALE TERMINAL (ITEM 47) TO IT AND INSERT IT INTO CAVITY A OF CONNECTOR (ITEM 40). PASS THE OPPOSITE END THROUGH CAVITY B OF FUSE HOLDER (ITEM 55) AND INSTALL TERMINAL (ITEM 65) TO IT. THEN PULL THE WIRE BACK TO SEAT THE TERMINAL IN THE FUSE HOLDER.

INSTALL FUSE (ITEM 60) AND FUSE HOLDER CAP (ITEM 56) TO THE FUSE HOLDER.

**7.0 MAKE THE FINAL CONNECTIONS.**

APPLY CONTACT LUBRICANT (ITEM 95) TO THE EXPOSED TERMINALS OF THE FLS CONNECTORS.

CONNECT THE SENSOR AND EXTENSION HARNESS CONNECTOR. CONNECT THE EXTENSION CABLE CONNECTOR (ITEM 42) TO THE CONNECTOR (ITEM 40) PREVIOUSLY INSTALLED TO THE eSOLUTIONS TELEMATICS OPTION HARNESS OR THE UNIT ENGINE HARNESS. ATTACH THE SHIELD GROUND RING TERMINAL (ITEM 35) PREVIOUSLY INSTALLED TO THE EXTENSION HARNESS TO THE TRAILER OR UNIT CHASSIS, MAKING SURE IT IS A GOOD ELECTRICAL CONNECTION.

**NOTE:** SECURE CONNECTORS IN THE HORIZONTAL POSITION. ENSURE THAT WIRES COMING INTO THE CONNECTORS ARE NOT SIDE LOADED OR UNDER ANY TENSION.

**UNITS WITH AN ADVANCE MICROPROCESSOR ONLY:** SECURE THE FUSE HOLDER COVER (ITEM 56) SO THAT THE FUSE HOLDER (ITEM 55) IS POSITIONED WITH WIRES DOWN.

8.0 CONFIGURING THE FUEL LEVEL SENSOR:

**eSOLUTIONS TELEMATICS:**

REFER TO THE eSOLUTIONS INSTALLATION AND COMMISSIONING MANUAL 62-11877 TO CONFIGURE THE DEVICE AND COMPLETE THE INSTALLATION.

**APX MICROPROCESSOR:**

FUEL LEVEL SENSOR MUST BE ENABLED IN THE MICRO CONFIGURATION LIST. (SEE UNIT SERVICE MANUAL). FOR ALARM ONLY, LEAVE LOW FUEL TO "ALARM ONLY". FOR LOW FUEL SHUTDOWN, SELECT "ALARM ONLY". TURN SENSOR ON IN THE DATA RECORDER EITHER VIA LAPTOP OR CONFIGURATION CARD. THE FUEL SENSOR SHOULD BE SET TO "SNAPSHOT" IN THE DATA LOGGER.

**ADVANCE MICROPROCESSOR:**

FUEL LEVEL SENSOR MUST BE ENABLED IN THE MICRO CONFIGURATION LIST. (SEE UNIT SERVICE MANUAL). SELECT 0.25V - 4.75V SENSOR. FOR ALARM ONLY, LEAVE FUEL TANK SIZE "OFF". FOR LOW FUEL SHUTDOWN, SELECT TANK SIZE. (IF ACTUAL TANK SIZE IS NOT LISTED, CHOOSE CLOSEST VALUE). TURN SENSOR ON IN THE DATA RECORDER EITHER VIA LAPTOP OR CONFIGURATION CARD. THE FUEL SENSOR SHOULD BE SET TO "SNAPSHOT" IN THE DATA LOGGER.

**9.0 ADDITIONAL NOTICES:** MAKE CERTAIN TO RESPECT FUEL SENSOR POLARITY -- ESPECIALLY AS INSTRUCTED IN NOTE 5.0. FAILURE TO DO SO WILL CAUSE INCORRECT READINGS OF THE FUEL LEVEL AND PROBABLE DAMAGE TO THE SENSOR OR THE UNIT MICROPROCESSOR.

**10.0 ADDITIONAL NOTES:**

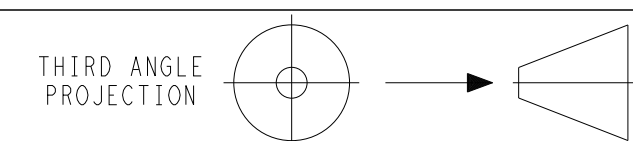
THERE IS A 90 TO 240 SECOND DELAY IN THE SENSOR'S RESPONSE TO THE FUEL LEVEL TO AVOID THE EFFECTS OF FUEL SLOSHING. WHEN APPROXIMATELY 15% OF THE FUEL IS REMAINING, THE APPROPRIATE LOW FUEL ALARM WILL ACTIVATE ON THE UNIT MESSAGE CENTER. WHEN THE TANK IS LESS 10% FULL, THE ALARM AND SHUT DOWN WILL ACTIVATE IF SO CONFIGURED.

BE SURE TO TURN THE SENSOR ON TO "SNAPSHOT LOGGING" USING REEFER MANAGER'S DATA RECORDER SETUP.

ADVANCE MICROPROCESSOR SETUP - CONFIGURATIONS	
FUEL SENSOR	0.25 - 4.75 VDC
FUEL TANK SIZE	OFF (ALARM ONLY) 30, 50, 75, 100, 120 GAL. (ALARM & SHUTDOWN)
ADVANCE DATA RECORDER SETUP - SENSORS	
FUEL LEVEL SENSOR	SNAPSHOT LOGGING

APX MICROPROCESSOR SETUP - CONFIGURATIONS	
FUEL SENSOR	YES
LOW FUEL	ALARM ONLY UNIT SHUTDOWN
APX DATA RECORDER SETUP - SENSORS	
FUEL LEVEL SENSOR	SNAPSHOT LOGGING

SYM	REVISION RECORD	DATE	BY	ENGR.	M.E.	NPCA NO.
A	UPDATED NOTE 7.0; IN THE NOTES (5) PLCS "NOTICE" WAS "CAUTION"; UPDATED SHT INDEX; SEE SHEETS 2 & 3	03FEB2017	KFV	DMM		72N0002P17
-	INITIAL RELEASE	26AUG2016	KFV	DMM		72N0030P16



IMPERIAL INCH FORMAT:  
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TITLE  
**INSTALLATION INSTRUCTIONS**  
FUEL LEVEL SENSOR

SHEET INDEX	REV	A	A	A
	SHEET	1	2	3

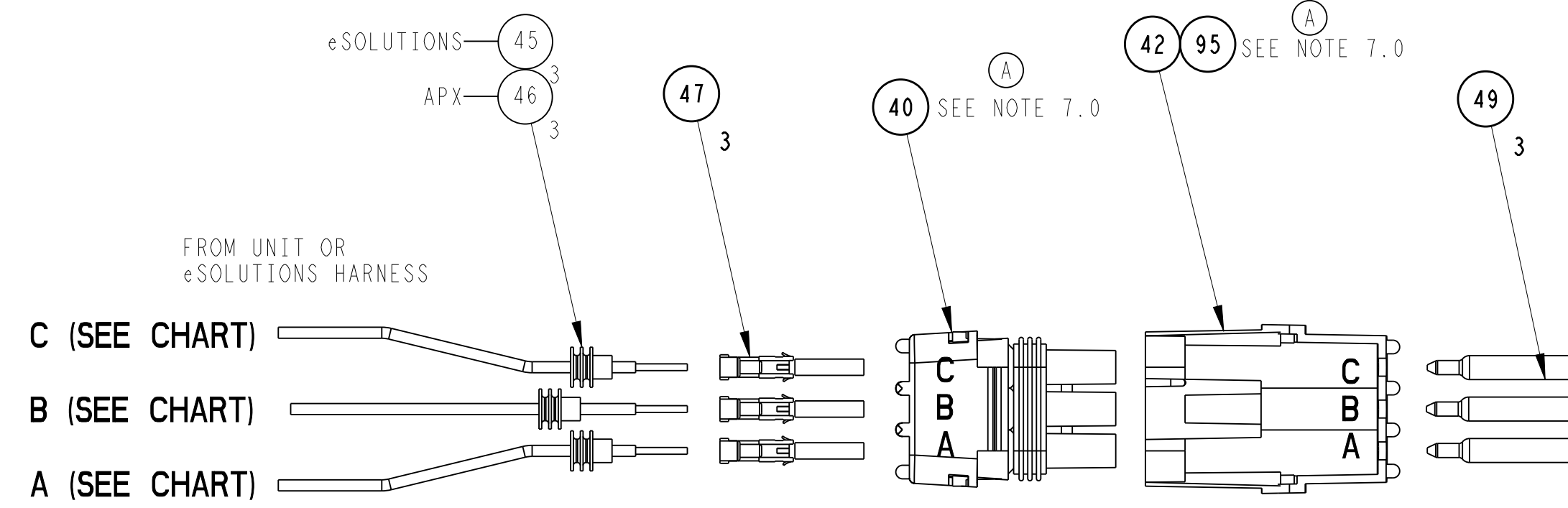
DRAWING NO.	REV
98-02678	A
SHEET 1 of 3	

SUPERSEDES: \_\_\_\_\_

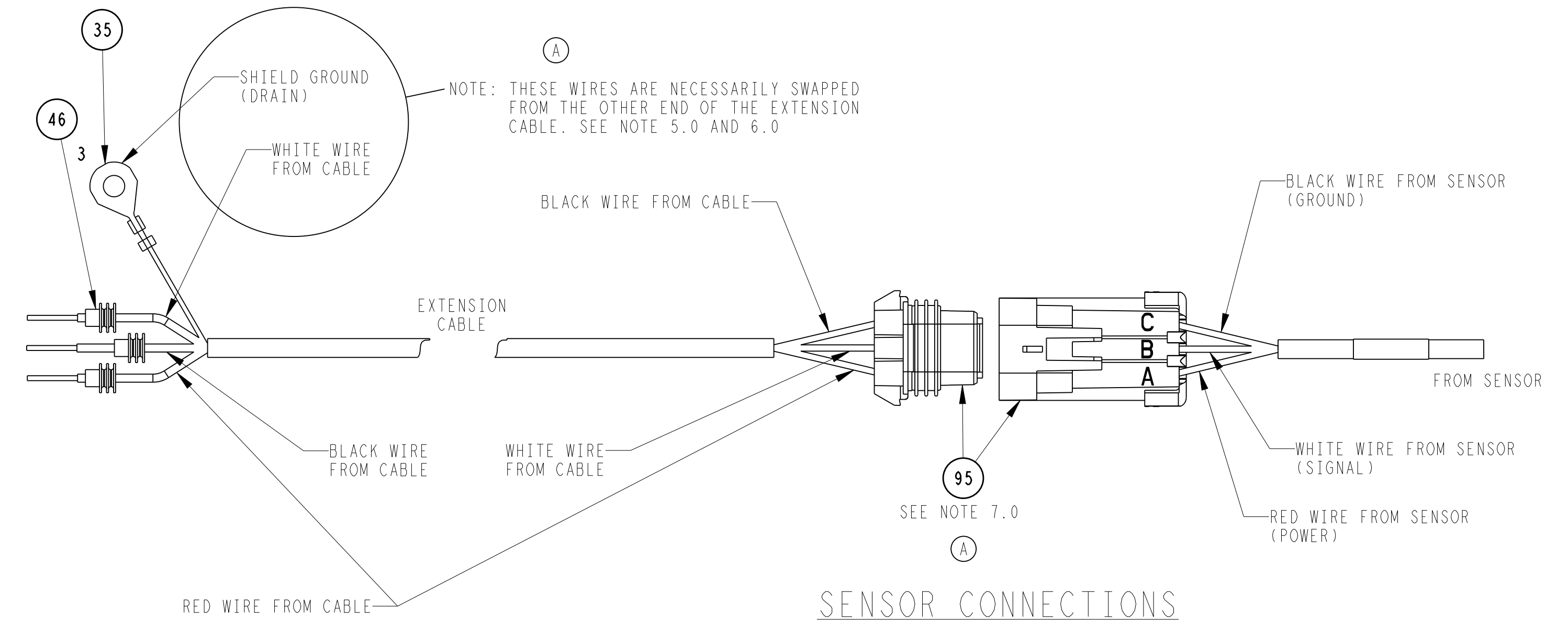
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DRAWING CLASSIFICATION: US EAR99

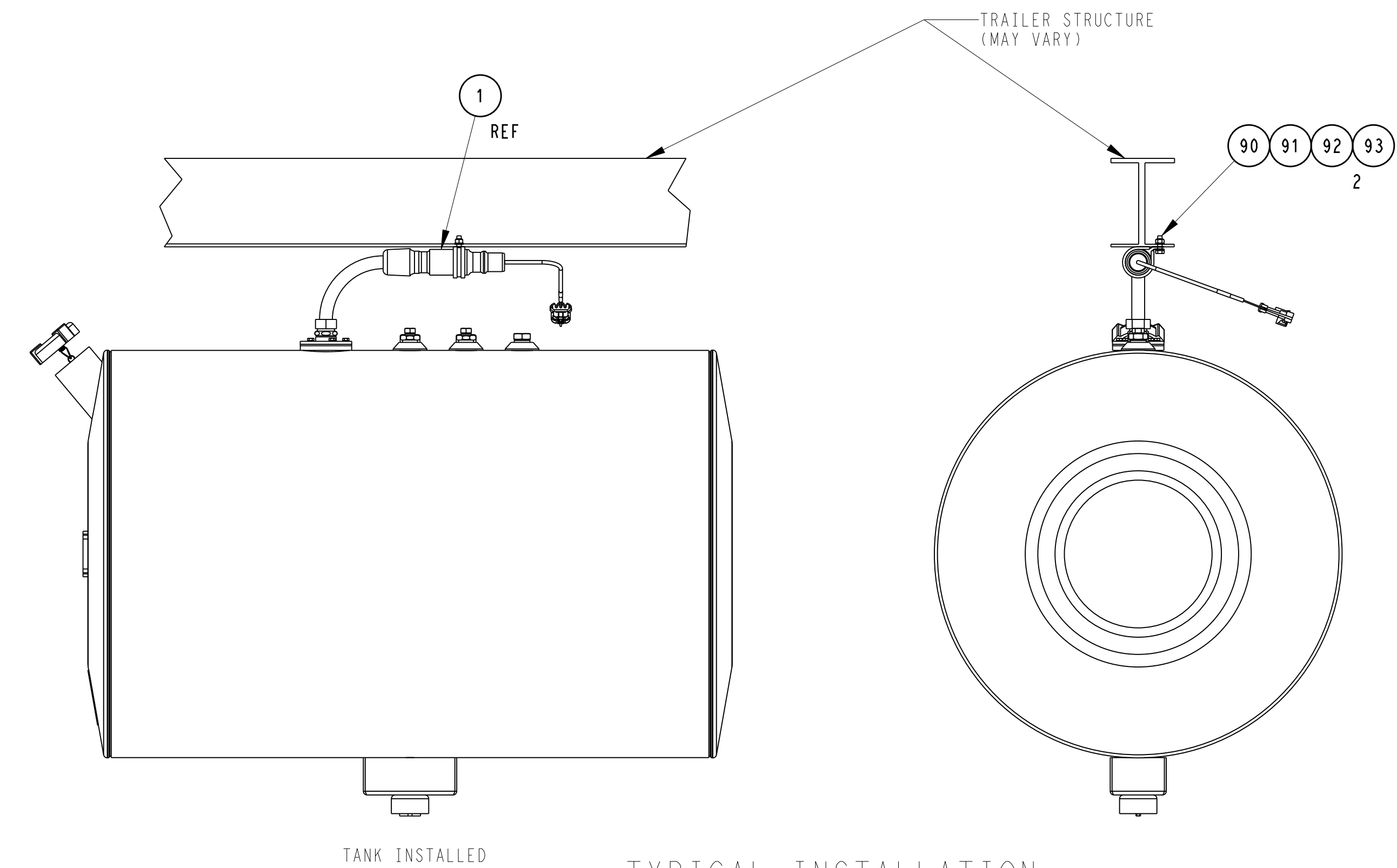
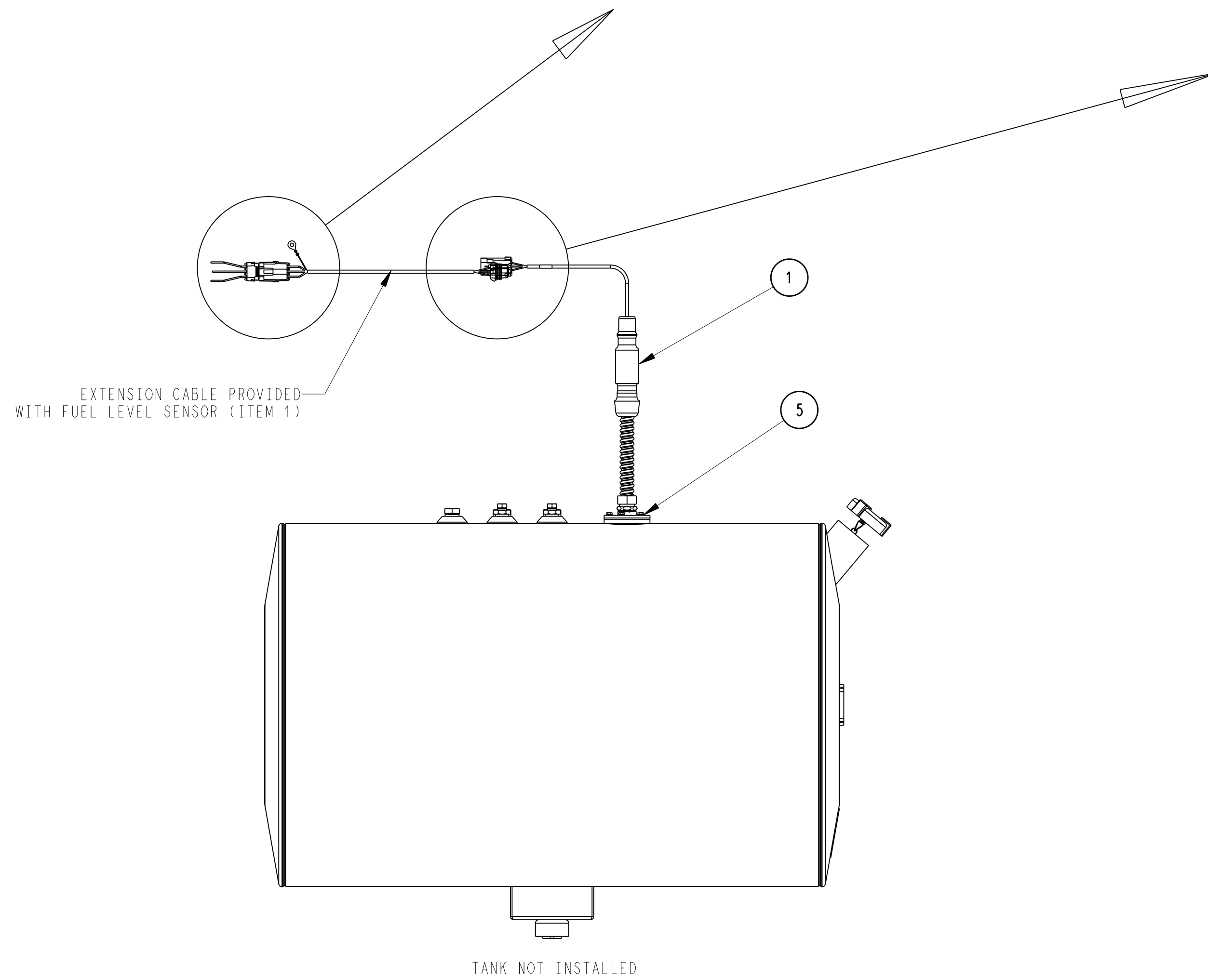
CABLE CONNECTIONS		
PIN	LABEL	COLOR
APX: VECTOR, VECTOR ADE, X-SERIES		
A	PCM-22/FLS-A	WHT
B	2MM-24/FLS-B	BLK
C	2MM-13/FLS-C	WHT
eSOLUTIONS		
A	DP24-14/FLS-A(+)	WHT
B	DP24-19/FLS-B(-)	BLK
C	DP24-16/FLS-C(SIG)	WHT



eSOLUTIONS & APX CABLE CONNECTIONS

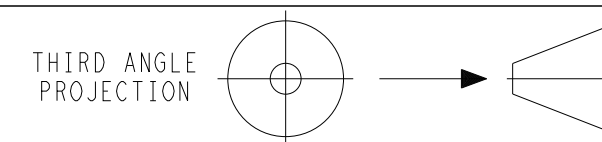


SENSOR CONNECTIONS



TYPICAL INSTALLATION  
APX/ADVANCE

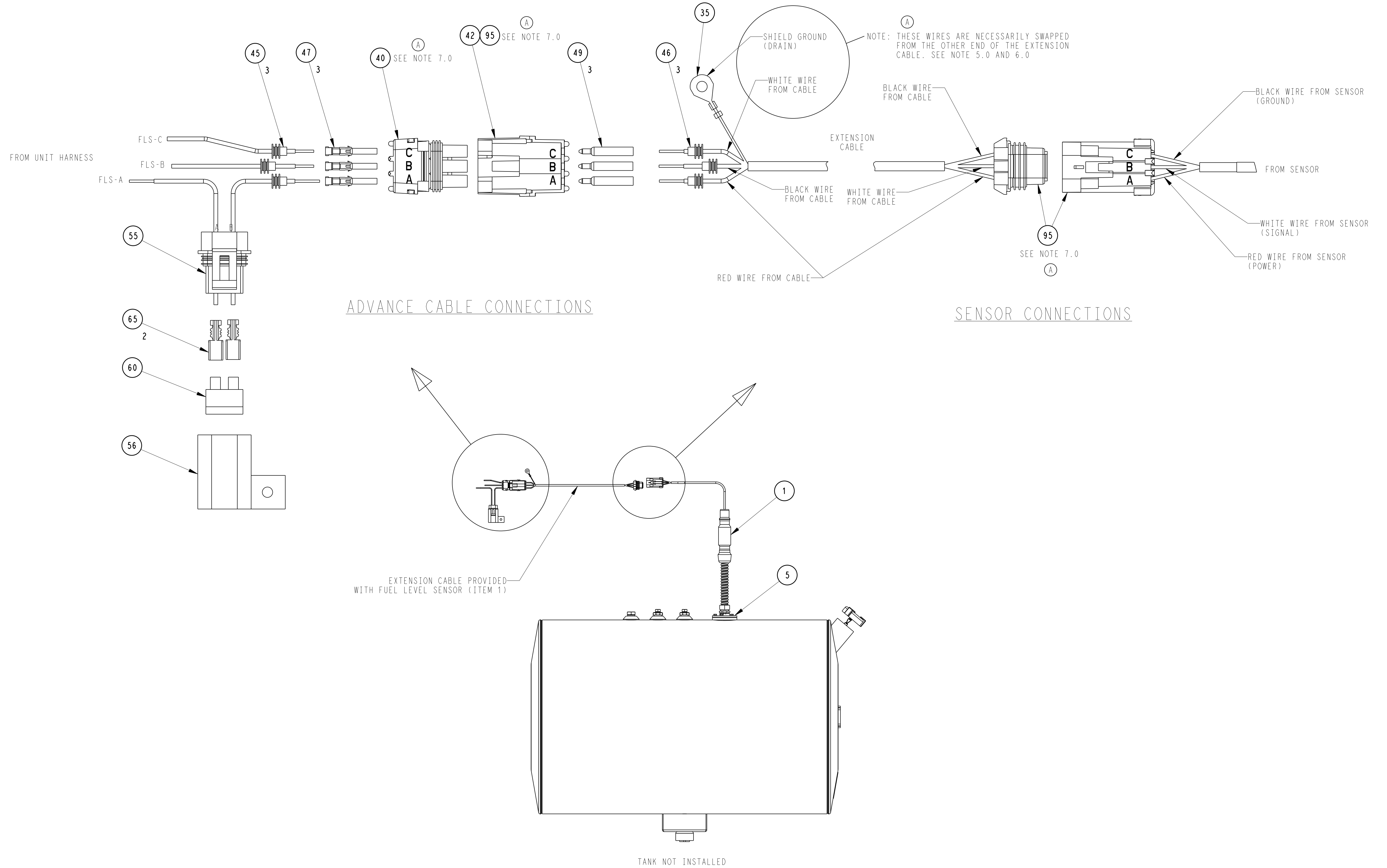
A	ADDED "SEE NOTE 7.0" TO IT.40 & 42; ADDED IT. 95; ADDED "NOTE: THESE WIRES..."	03FEB2017	KFV	DMM		72N0002P17
-	INITIAL RELEASE	26AUG2016	KFV	DMM		72N0030P16
SYM	REVISION RECORD	DATE	BY	ENGR.	M.E.	NPCA NO.



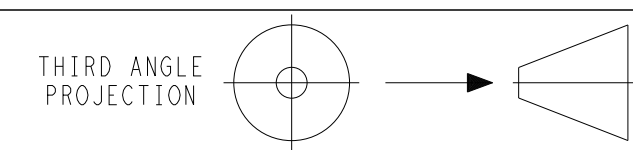
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TITLE  
**INSTALLATION INSTRUCTIONS**  
FUEL LEVEL SENSOR

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A	ADDED "SEE NOTE 7.0" TO IT.40 & 42; ADDED IT. 95; ADDED "NOTE: THESE WIRES..."	03FEB2017	KFV	DMM		72N0002P17
-	INITIAL RELEASE	26AUG2016	KFV	DMM		72N0030P16
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**INSTALLATION INSTRUCTIONS**  
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SUPERSEDES:

PART CLASSIFICATION: US EAR99

DRAWING CLASSIFICATION: US EAR99