

JEFFREY	MINING PRODUCTS	JEFFREY MINING PRODUCTS 274 EAST 1ST AVE. COLUMBUS. OHIO 43201		THIS DRAWING CONTAINS CONFIDENTIAL INFORMATION AND IS THE EXCLUSIVE PROPERTY OF JEFFREY MINING PRODUCTS. NEITHER THE DRAWING OR ITS CONTENTS ARE TO BE USED, REPRODUCED, OR DISCLOSED IN WHOLE OR PART, WITHOUT PRIOR WRITTEN CONSENT FROM JEFFREY MINING PRODUCTS.															
		DRAWING NO. 561A860		SHEET NO. 1	PART 36 MACHINE APPROVAL NUMBERS THAT USE THIS CHECKLIST: 36c-001														
DRAWN K.R. TURNER		DATE 02/02/98		R E V															
CHECKED J.W. SMITH		DATE 02/06/98																	

THIS BLOCK FOR MSHA USE ONLY
PS# _____
REV LEVEL _____

POWER SYSTEM CHECKLIST

SAFETY COMPONENTS SYSTEM FOR THE CATERPILLAR 3306 ENGINE

LISTED BELOW ARE THE ITEMS AND FUNCTIONS THAT MUST BE MAINTAINED IN ORDER FOR THE POWER SYSTEM TO BE CONSIDERED PERMISSIBLE. FOR A COMPLETE EQUIPMENT PERMISSIBILITY EVALUATION, THIS CHECKLIST MUST BE USED IN CONJUNCTION WITH A MACHINE CHECKLIST AND, IF SO EQUIPPED, AN ELECTRICAL SYSTEM CHECKLIST.

ALL INSPECTIONS AND TESTS SHALL BE PERFORMED IN FRESH AIR

1. () IT HAS BEEN DETERMINED THAT THE AREA IN WHICH THE TESTS ARE TO BE PERFORMED IS FRESH AIR.
2. () THIS MACHINE UTILIZES A CATERPILLAR 3306 ENGINE.

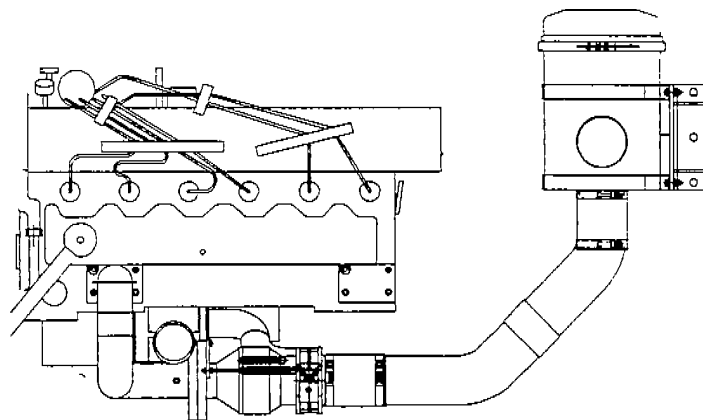
TEST SHEET TITLE: POWER SYSTEM CHECKLIST					MINE SAFETY & HEALTH ADMINISTRATION APPROVED PRINT. NO DEVIATION OR REVISION IS LEGAL UNTIL APPROVED BY MSHA			
DISTR. CODE SEE DRG.	STD: B	SPECIAL:	ENG. SEC L.	PRINT LOCATION:	DRAWING NUMBER 561A860	SHEET NO. 1	OF 18	SHEETS

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DRAWING NO. 561A860			SHEET NO. 2	PART 36 MACHINE APPROVAL NUMBERS THAT USE THIS CHECKLIST: 36C-001										
DRAWN K.R. TURNER		DATE 02/02/98		R E V										
CHECKED J.W. SMITH		DATE 02/06/98												

INTAKE SYSTEM

SKETCH 1 DEPICTS THE ASSEMBLED INTAKE SYSTEM.

- *3. () ALL COMPONENTS APPEAR TO BE THE SAME AS SHOWN IN THE SKETCH.
- *4. () VISUALLY INSPECT THE ENTIRE INTAKE SYSTEM FOR DAMAGE. VERIFY THAT THERE ARE NO LOOSE CONNECTIONS. CRACKS, MISSING PLUGS ON PORTS, OR MISSING COMPONENTS.



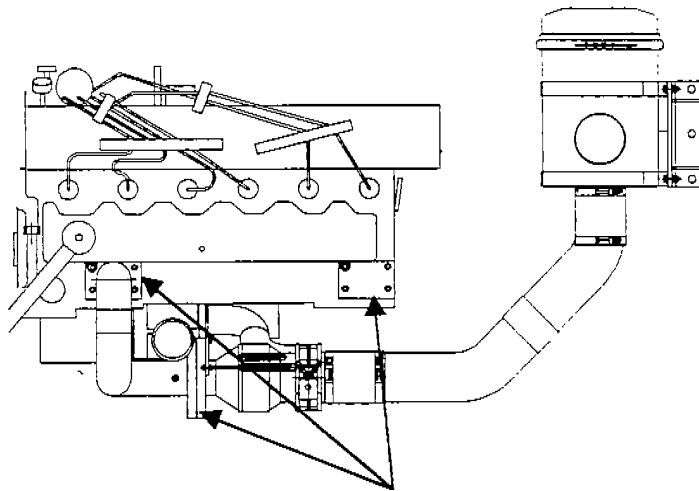
SKETCH NO. 1 ASSEMBLED AIR INTAKE SYSTEM

*(WEEKLY) DESIGNATES THOSE INSPECTION CHECKS THAT MUST BE PERFORMED DURING THE WEEKLY MAINTENANCE EXAMINATION IN ACCORDANCE WITH 30 CFR, SECTION 75.1914.

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- *5. () REINFORCED FIBER GASKETS ARE INSTALLED BETWEEN THE INTAKE SYSTEM JOINTS IDENTIFIED IN SKETCH 2.
- *6. () THE BOLTS, LOCKWASHERS, AND/OR NUTS SECURING THE JOINTS SPECIFIED IN ITEM 5 ARE IN PLACE AND TIGHT.



SKETCH 2 INTAKE GASKETS

*(WEEKLY) DESIGNATES THOSE INSPECTION CHECKS THAT MUST BE PERFORMED DURING THE WEEKLY EXAMINATION IN ACCORDANCE WITH 30 CFR, SECTION 75.1914

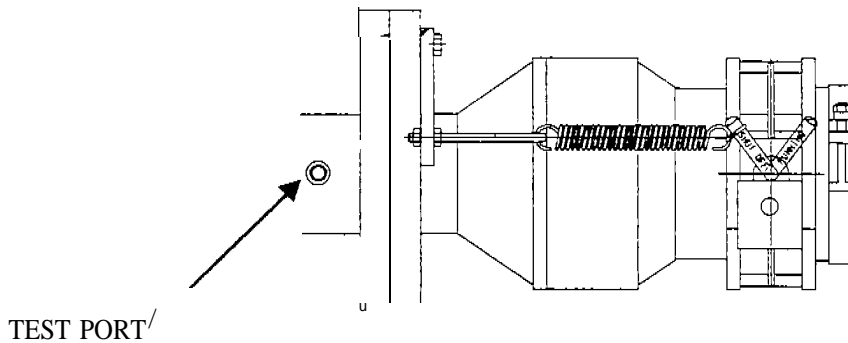
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DRAWN K. R. TURNER		DATE 02/02/98		REV			
CHECKED J.W. SMITH		DATE 02/06/98					

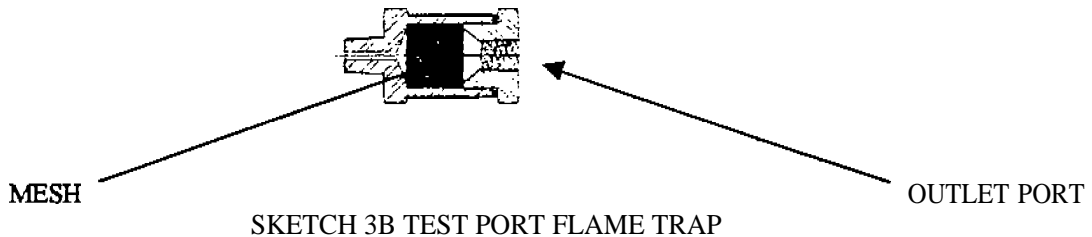
6. () REMOVE AND CHECK THE INTAKE FLAME ARRESTOR, SKETCH: 3A, FOR INTERNAL DAMAGE. CHECK THE FLAME ARRESTOR CORE WITH A PIN GAUGE. REFER TO ATTACHMENT 1 FOR COMPLETE CHECK PROCEDURE.

7.*A () VERIFY THAT THE INTAKE SYSTEM TEST PORT FLAME ARRESTOR IS INSTALLED IN THE LOCATION SHOWN IN SKETCH 3A

B . () REMOVE THE TEST PORT OUTLET HOSE AND VERIFY THAT THE MESH IS INSIDE AND IN PLACE PER SKETCH 3B.



SKETCH 3A: INTAKE FLAME ARRESTOR W/ INTAKE AIR SHUTDOWN VALVE



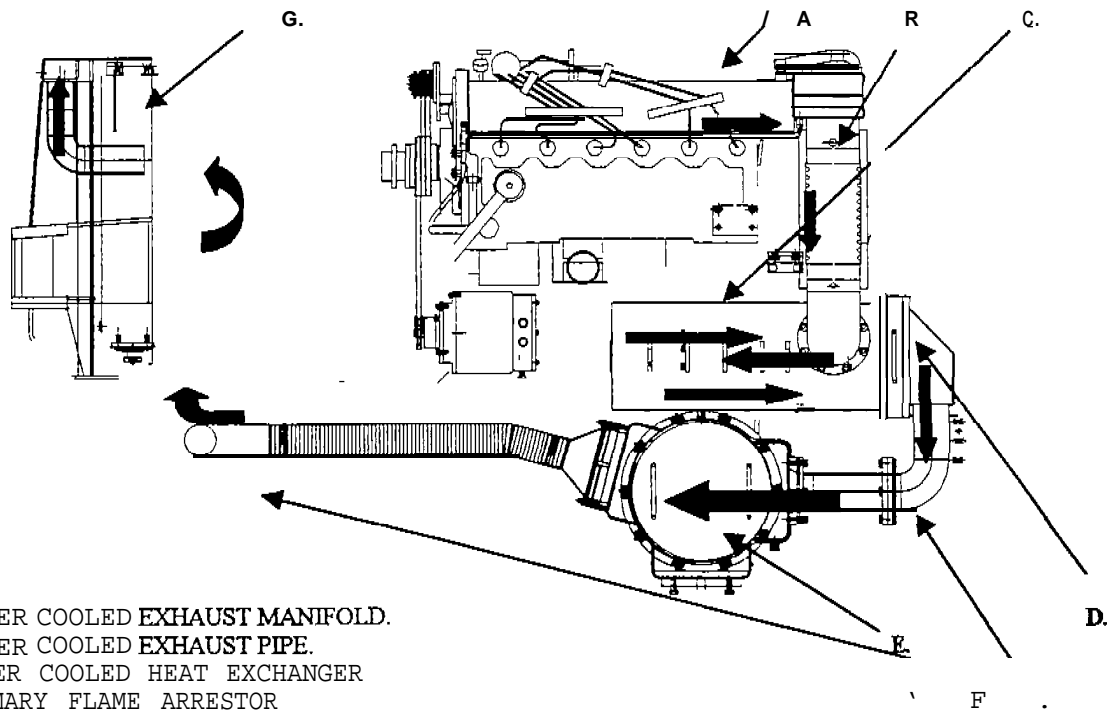
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	PRODUCTS							
DRAWING NO. 561A860		SHEET NO. 5	PART 36 MACHINE APPROVAL NUMBERS THAT USE THIS CHECKLIST: 36C-001					
DRAWN K.R. TURNER	DATE 02/02/98		R					
CHECKED J.W. SMITH	DATE 02/06/98		E					

EXHAUST SYSTEM

THE EXHAUST SYSTEM OF THE ENGINE INCLUDES A WATER-COOLED EXHAUST MANIFOLD, A WATERCOOLED EXHAUST PIPE, A WATER COOLED HEAT EXCHANGER A PRIMARY FLAME ARRESTOR A SERIES OF EXHAUST PIPES, A DRY PARTICULATE FILTER HOUSING WITH FLAME ARRESTOR AT THE OUTLET, A DISPOSABLE PARTICULATE FILTER ELEMENT, AND A DIFFUSER ASSEMBLY. SKETCH: 4 DEPICTS THIS SYSTEM.



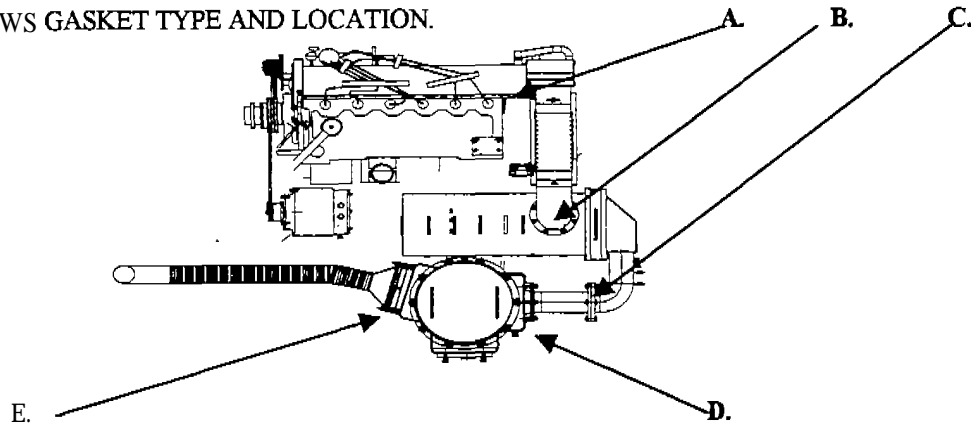
- A. WATER COOLED EXHAUST MANIFOLD.
- B. WATER COOLED EXHAUST PIPE.
- C. WATER COOLED HEAT EXCHANGER
- D. PRIMARY FLAME ARRESTOR
- E. FILTER HOUSING W/FLAME ARRESTOR.
- F. EXHAUST PIPES.
- G. DIFFUSER ASSEMBLY.

SKETCH: 4 EXHAUST SYSTEM

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DRAWN K.R. TURNER		DATE 02/02/98		R E V									
CHECKED J.W. SMITH		DATE 02/06/98											

- *1. () CHECK TO INSURE THAT ALL THE HARDWARE CONNECTING THE COMPONENTS SHOWN IN SKETCH 5 ARE TIGHT, AND THAT ALL METAL, OR METAL REINFORCED GASKETS ARE IN PLACE.
- *2. () ALL FASTENERS USED IN THE EXHAUST SYSTEM INCLUDE LOCKWASHERS WITH THE EXCEPTION OF THE BOLTS THAT SECURE THE WATER COOLED EXHAUST MANIFOLD TO THE ENGINE HEAD. WHICH USE FLAT WASHERS!
- *3 () THE LID OF THE FILETER HOUSING IS SECURED WITH WING NUTS. FLAT AND LOCKWASHERS ARE USED WITH THESE FASTENINGS.
- 4. () VERIFY THAT THE FILTER ELEMENT CONTAINS P/N 518404.
- 5 SKETCH 5 SHOWS GASKET TYPE AND LOCATION.



- A. MANIFOLD TO PIPE – METAL REINFORCED GASKET.
- B. PIPE TO HEAT EXCHANGER INLET – METAL REINFORCED GASKET.
- C. BETWEEN 1ST AND 2ND PIPE – METAL REINFORCED GASKET, OR METAL GASKET.
- D. PIPE AND FILTER HOUSING INLET. - METAL GASKET.
- E. FILTER HOUSING OUTLET AND FINAL FLAME ARRESTOR - METAL GASKET.

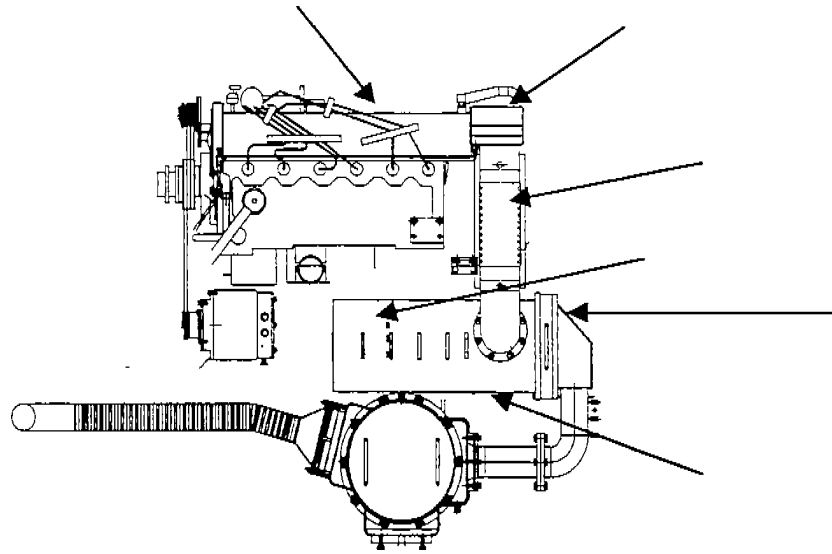
SKETCH: 5

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DRAWING NO. 561A860			SHEET NO. 7	PART 36 MACHINE APPROVAL NUMBERS THAT USE THIS CHECKLIST: 36C-001															
DRAWN K.R. TURNER		DATE 02102198		R E V															
CHECKED J.W. SMITH		DATE 02/06/98																	

*6. () VISUALLY INSPECT THE ENTIRE EXHAUST SYSTEM TO INSURE THAT THERE ARE NO OPEN HOLES OR CRACKS DUE TO CORROSION. ACCIDENTS. OR MISSING PLUGS. CHECK THE WATER JACKETED EXHAUST COMPONENTS AND COOLING SYSTEM HOSE CONNECTIONS TO INSURE THAT THERE ARE NOT ANY LEAKS. (REF) SKETCH: 6



SKETCH: 6

*7. () ALL GASKETED JOINTS ARE TIGHT. TO VERIFY TIGHTNESS, IT SHOULD NOT BE POSSIBLE TO INSERT A .0015" FEELER GAGE TO A DEPTH EXCEEDING 1/8" ON GASKETED JOINTS.

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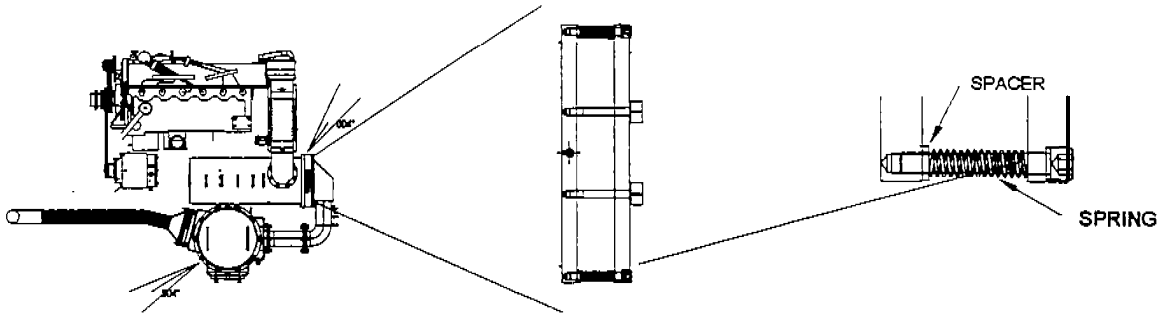
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DRAWN K.R. TURNER	DATE 02/02/98		R E V													
CHECKED J.W. SMITH	DATE 02/06/198															

- * 8. () REMOVE THE INBY FLAME ARRESTOR, VERIFY THAT THE CORE IS PRESENT AND NOT DAMAGED. REINSTALL.
- *9. () THE GAP ON EITHER SIDE OF THE INBY EXHAUST FLAME ARRESTOR DOES NOT EXCEED .004".
- *10. () VISUALLY INSPECT THE HARDWARE ON THE INBY FLAME ARRESTOR VERIFYING THAT THE (9) SPRINGS AND SPACERS ARE INSTALLED AS SHOWN IN SKETCH: 7 (NOTE) CENTER TOP TWO BOLTS DO NOT INCLUDE THESE ITEMS.
- 11. () THE GAP FOR THE TOP COVER OF THE PARTICULATE FILTER HOUSING DOES NOT EXCEED .004".
- 12. () REMOVE AND INSPECT THE CORE OF THE OUTBY FLAME ARRESTOR WITH A PIN GAUGE. FOLLOW CHECK PROCEDURES LISTED ON ATTACHMENT 1.

INBY FLAME ARRESTOR



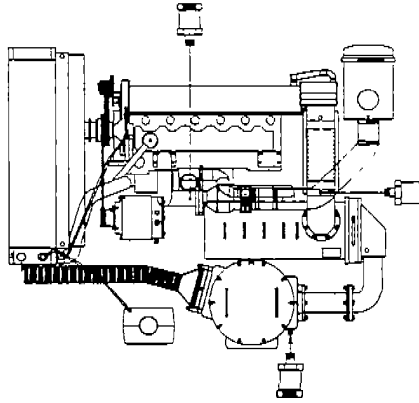
SKETCH: 7 LOCATION OF PERMISSIBLE OPENINGS

*(WEEKLY) DESIGNATES THOSE INSPECTIONS THAT MUST BE PERFORMED DURING THE WEEKLY MAINTENANCE EXAMINATION IN ACCORDANCE WITH 30 CFR SECTION 75.1914

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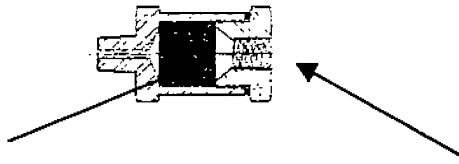
JEFFREY		MINING PRODUCTS	JEFFERY MINING PRODUCTS 274 EAST 1ST AVE. COLUMBUS, OHIO 43201		SEE DISCLAIMER ON PAGE 1							
DRAWING NO. 561A860			SHEET NO 9	PART 36 MACHINE APPROVAL NUMBERS THAT USE THIS CHECKLIST: .36C-001								
DRAWN K. R. TURNER		DATE 02/02/98		REV								
CHECKED J.W. SMITH		DATE 02/06/98										

*13. () VERIFY THAT THE TEST PORT FLAME ARRESTORS LOCATED AS SHOWN IN SKETCH: 8A.



SKETCH: 8A EXHAUST SYSTEM TEST PORT FLAME ARRESTOR LOCATIONS

14. () REMOVE THE OUTLET PORT HOSE AND VERIFY THAT THE MESH IS INSIDE AND IN PLACE. SKETCH: 8B



MESH

SKETCH 8B

OUTLET PORT

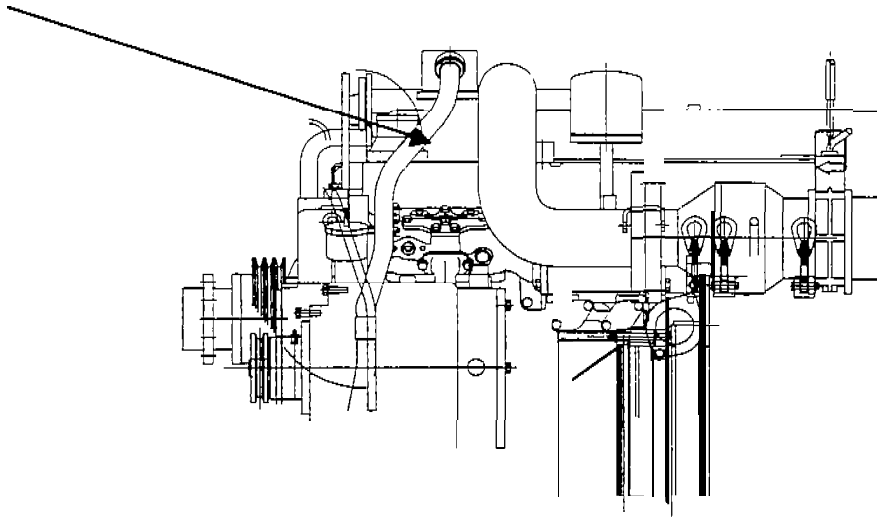
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		274 EAST 1ST AVE. COLUMBUS. OHIO 43201	

DRAWING NO. 561A860		SHEET NO. 10	PART 36 MACHINE APPROVAL NUMBERS THAT USE THIS CHECKLIST: 36C-001											
DRAWN K.R.TURNER	DATE 02/02/98	R E V												
CHECKED J.W. SMITH	DATE 02/02/98													

SHUTDOWN CIRCUIT TESTING



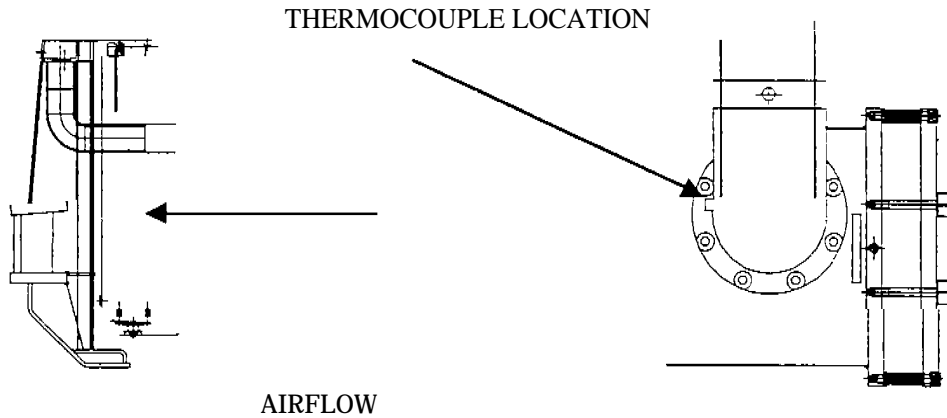
SKETCH: 9 LOCATION OF ENGINE COOLANT TEMPERATURE SENSOR

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DRAWN K.R. TURNER		DATE 02/02/98	R E V				
CHECKED J.W. SMITH		DATE 02/02/98					

1. () AT LEAST EVERY SIX MONTHS, TEST THE ENGINE COOLANT HIGH TEMPERATURE SENSOR. PLACE A PIECE OF PRECUT MATERIAL AT THE EXHAUST OF THE ENGINE RADIATOR BLOCKING THE AIRFLOW. (SKETCH: 10) INSTALL A THERMOCOUPLE IN THE OUTLET FLANGE OF THE WATER COOLED EXHAUST PIPE. SHUT DOWN MUST OCCUR BEFORE TEMPERATURE EXCEEDS 212 DEGREES F. AT THAT LOCATION.

(NOTE:) THE TEMPERATURE GAUGE ON THE INSTRUMENT PANEL IN THE OPERATORS COMPARTMENT WILL READ



SKETCH: 10 RADIATOR EXHAUST AND THERMOCOUPLE LOCATION

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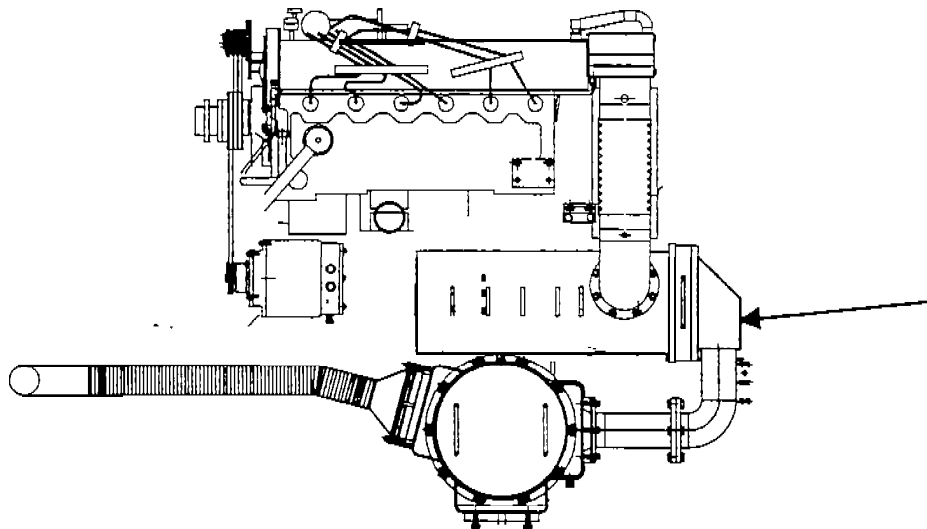
2A. () REMOVE THE EXHAUST TEMPERATURE SENSOR FROM THE MANIFOLD AND PLUG THE HOLE THAT THE SENSOR CAME OUT OF. START THE ENGINE. AND SUBMERGE THE SENSOR INTO A CONTAINER OF HOT OIL. RECORD THE TEMPERATURE OF THE OIL. THE ENGINE SHOULD SHUT DOWN BEFORE THE OIL EXCEEDS 296 DEGREES F.

OPTIONAL PROCEDURE

2B. () REPLACE THE EXHAUST TEMPERATURE SENSOR WITH A JEFFREY FACTORY CALIBRATED UNIT.

(NOTE:) PERFORM EITHER 2A OR 2B AT LEAST EVERY SIX (6) MONTHS.

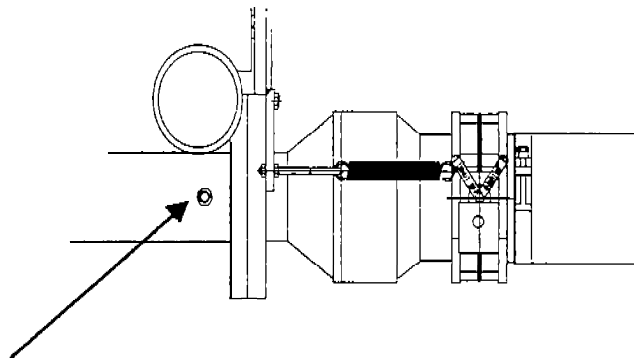
SKETCH: 11 LOCATION OF EXHAUST TEMPERATURE SENSOR



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SKETCH: 12 AIR EMERGENCY SHUT-DOWN DAMPER



1/4 TURN BALL VALVE LOCATION FOR MANIFOLD AIR RESTRICTION GAGE.

*3 () WITH THE ENGINE RUNNING AT MEDIUM SPEED CLOSE THE 1/4 TURNBALL VALVE TO ISOLATE AND PROTECT THE MANIFOLD AIR RESTRICTION GAGE. PULL THE EMERGENCY ENGINE STOP CABLE HANDLE IN THE OPERATORS COMPARTMENT. (SEE SKETCH: 15) THE BUTTERFLYVALVE IN THE AIR SHUTDOWN DAMPER SHOULD CLOSE AND THE ENGINE SHOULD STOP COMPLETELY WITHIN 15 SECONDS.

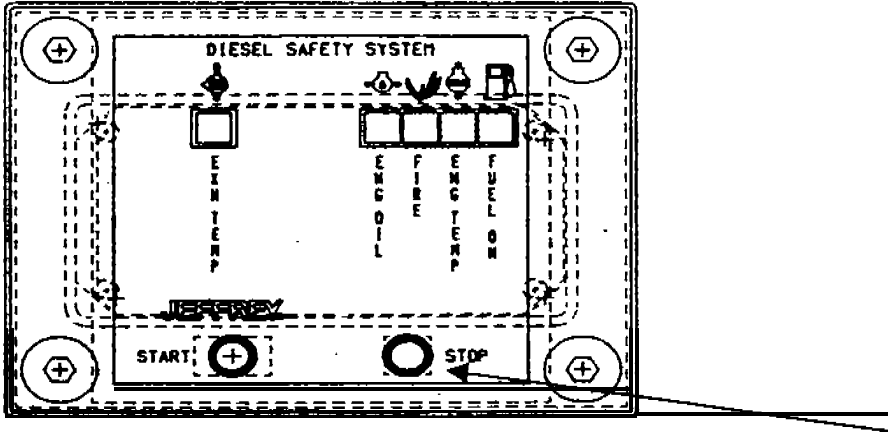
RESET DAMPER WITH THE MANUAL LEVER, CABLE RETRACTED, ON THE AIR SHUT OFF ASSEMBLY AT THE ENGINE AIR INTAKE. OPEN THE ¼ TURN VALVE TO THE AIR RESTRICTOR GUAGE.

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DRAWING NO. 561A860				SHEET NO. 14		PART 36 MACHINE APPROVAL NUMBERS THAT USE THIS CHECKLIST: 36C-001														
DRAWN K.R. TURNER		DATE 02/02/98			R															
CHECKED J.W. SMITH		DATE 02/06/98			E															

*4 () WITH THE ENGINE RUNNING AT IDLE SPEED, DEPRESS THE ENGINE STOP BUTTON LOCATED ON THE OPERATORS STATUS PANEL. (SKETCH: 13) ENGINE SHOULD STOP COMPLETELY ALMOST IMMEDIATELY.



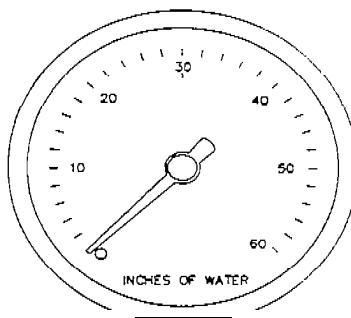
SKETCH: 13

*(WEEKLY) DESIGNATES THOSE INSPECTION CHECKS THAT MUST BE PERFORMED DURING THE WEEKLY MAINTENANCE EXAMINATION IN ACCORDANCE WITH 30 CFR SECTION 75.1914.

TEST SHEET TITLE: POWER SYSTEM CHECKLIST					MINE SAFETY & HEALTH ADMINISTRATION APPROVED PRINT. NO DEVIATION OR REVISION IS LEGAL UNTIL APPROVED BY MSHA			
DISTR. CODE SEE DRG.	STD: B	SPECIAL	ENG. SEC L	PRINT LOCATION:	DRAWING NUMBER 561A860	SHEET NO. 14	OF 18	SHEETS

JEFFREY	MINING PRODUCTS	JEFFREY MINING PRODUCTS 274 EAST 1ST AVE. COLUMBUS, OHIO 43201	THIS DRAWING CONTAINS CONFIDENTIAL INFORMATION AND IS THE EXCLUSIVE PROPERTY OF JEFFREY MINING PRODUCTS. NEITHER THE DRAWING OR ITS CONTENTS ARE TO BE USED, REPRODUCED, OR DISCLOSED IN WHOLE OR PART, WITHOUT PRIOR WRITTEN CONSENT FROM JEFFREY MINING PRODUCTS.												
DRAWING NO. 561A860		SHEET NO. 15	PART 36 MACHINE APPROVAL NUMBERS THAT USE THIS CHECKLIST: 36c-001												
DRAWN J.R. TURNER		DATE 02/02/98	R E V												
CHECKED J.W. SMITH		DATE 02/06/98													

*5 () WITH ENGINE RUNNING AT FULL SPEED, (2275 RPM) OBSERVE TOTAL EXHAUST BACK PRESSURE GAGE. THE PRESSURE MAY NOT EXCEED 34 INCHES OF WATER



TOTAL EXHAUST
BACK PRESSURE
MAX. 34" H2O

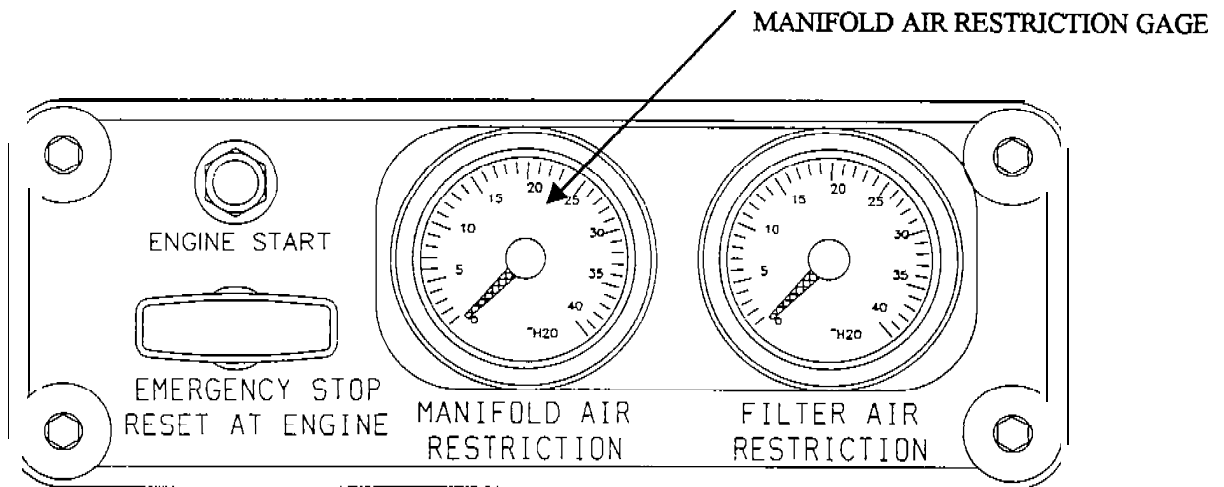
SKETCH: 14

*(WEEKLY) DESIGNATES THOSE INSPECTION CHECKS THAT MUST BE PERFORMED DURING THE WEEKLY MAINTENANCE EXAMINATION IN ACCORDANCE WITH 30 CFR SECTION 75.1914.

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DISTR. CODE SEE DRG.	STD: B	SPECIAL	ENG. SEC L	PRINT LOCATION:	DRAWING NUMBER 561A860	SHEET NO. 15	OF 18 SHEETS

JEFFREY		MINING PRODUCTS	JEFFREY MINING PRODUCTS 274 EAST 1ST AVE. COLUMBUS, OHIO 43201		THIS DRAWING CONTAINS CONFIDENTIAL INFORMATION AND IS THE EXCLUSIVE PROPERTY OF JEFFREY MINING PRODUCTS. NEITHER THE DRAWING OR ITS CONTENTS ARE TO BE USED, REPRODUCED, OR DISCLOSED IN WHOLE OR PART, WITHOUT PRIOR WRITTEN CONSENT FROM JEFFREY MINING PRODUCTS.														
DRAWING NO. 561A860			SHEET NO. 16	PART 36 MACHINE APPROVAL NUMBERS THAT USE THIS CHECKLIST: 36C-001															
DRAWN K.R. TURNER		DATE 02/02/98		R E V															
CHECKED J.W. SMITH		DATE 02/06/98																	

*6. () WITH THE ENGIN RUNNING AT FULL SPEED, (2275 RPM) OBSERVE THE MANIFOLD AIR RESTRICTION GAGE LOCATED ON THE INSTRUMENT PANEL IN THE OPERATORS DECK THE RESTRICTION MUST NOT EXCEED THIRTY (30) INCHES OF WATER



SKETCH: 15

*(WEEKLY) DESIGNATES THOSE INSPECTION CHECKS THAT MUST BE PERFORMED DURING THE WEEKLY EXAMINATION IN ACCORDANCE WITH 30 CFR SECTION 75.1914.

TEST SHEET TITLE: POWER SYSTEM CHECKLIST					MINE SAFETY & HEALTH ADMINISTRATION APPROVED PRINT. NO DEVIATION OR REVISION IS LEGAL UNTIL APPROVED BY MSHA			
DISTR. CODE SEE DRG.	STD: B	SPECIAL	ENG. SEC L	PRINT LOCATION:	DRAWING NUMBER 561A860	SHEET NO. 16	OF 18	SHEETS

JEFFREY		MINING PRODUCTS	JEFFREY MINING PRODUCTS 274 EAST 1ST AVE. COLUMBUS, OHIO 43201		SEE DISCLAIMER ON PAGE 1														
DRAWING NO. 561A860			SHEET NO. 17	PART 36 MACHINE APPROVAL NUMBERS THAT USE THIS CHECKLIST: 36C-001															
DRAWN K.R. TURNER		DATE 02/02/98	R E V																
CHECKED J.W. SMITH		DATE 02/06/98																	

ATTACHMENT

**EVALUATION PROCEDURES FOR INSPECTING CRIMPED-RIBBON TYPE
INTAKE FLAME ARRESTERS ON DIESEL-POWERED EQUIPMENT
(AUGUST 5, 1985)**

1. Remove flame arrestor assembly from housing.
2. Place on flat surface with a contrasting background under the flame arrestor such as, brattice cloth or a clean white cloth.
3. Adequate lighting is required; cap lamp lighting is not sufficient.
5. Visually inspect each side of flame arrestor for openings or spaces, obviously greater than the triangular spaces of the core. - These kinds of openings may have been caused by prying a screwdriver or other such objects against or through the flame arrestor core during manufacturing or in mine maintenance. Flame arrestor cores with such damage must not be permitted to be used on permissible equipment.
5. Visually inspect each side of the core for places where the windings of the flame arrestor core appear to be separating such that gaps can be seen. If such gaps exist they must be checked as follows:
 - a. The only measuring tool considered acceptable for performing this evaluation is an 0.018 inch calibrated plug gauge. (Sometimes called a wire gauge.) The plug gauge is to be mounted in a gauge holder, (figure 1), weighing 1 to 1.5 ounce and projecting at least on inch out of the end.



FIGURE 1

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DRAWING 561A860		SHEET NO 18	PART 36 MACHINE APPROVAL NUMBERS THAT USE THIS CHECKLIST: 36C-001														
DRAWN K.R. TURNER	DATE 02/02/98		R E V														
CHECKED J.W. SMITH	DATE 02/06/98																

- b. Grasp the gauge holder lightly between the index finger and thumb. Place the wire tip at the point in question; making sure the plug gauge is vertical. Using only the weight of the gauge and holder see if it w-ill enter the apparent gap. 130 not attempt to force or wiggle the gauge through the opening
 - c. If the plug gauge enters the opening, the flame arrestor core must not be used on permissible equipment.
6. Visually inspect the triangles in the flame arrestor core (both sides) for triangles that appear to be larger than the rest. If such conditions exist, these openings must be checked as previously described in Section 5 a,b, c.
7. Finally, if the flame arrestor core passes all of the above evaluations, a final check should be performed on at least 5 triangles on each side of the core with the procedure described In Section 5 a, b,c. In performing this check the tip of the plug gauge must be placed against a specific triangular opening. If this special care is not taken the evaluation will be invalid.

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							SHEETS	