NORMAL

MWO effective date 12 June 1984 and completion date 31 March 1988

MWO 9-2300-378-34-2

DEPARTMENT OF THE ARMY MODIFICATION WORK ORDER

TANK, COMBAT FULL-TRACKED: 105-MM GUN, M60A3
TANK, COMBAT FULL-TRACKED: 105MM GUN, M60A1 (RISE)
TANK, COMBAT FULL TRACKED 105MM GUN, M80A1
TANK, COMBAT FULL TRACKED: 105 MM GUN, M48A5
VEHICLE COMBAT ENGINEER, FULL TRACKED, M728
ARMORED VEHICLE, BRIDGE LAUNCHER M60A1 AVLB
ARMORED VEHICLE, BRIDGE LAUNCHER M46A5 AVLB

TO ACCEPT

ENGINE SMOKE GENERATING SYSTEM

HEADQUARTERS, DEPARTMENT OF THE ARMY WASHINGTON, DC
12 JUNE 1984

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REPORTING OR ERRORS AND RECOMMENDING IMPROVEMENTS

You can help improve this manual. If you find any mistakes or if you know of a way to improve the procedures, please let us know. Mail your letter, DA Form 2028 (Recommended changes to publications and blank forms) located in the back of this manual or DA Form 2028-2 direct to: Commander, US Army Tank Automotive Command, Attn: DRSTA-MB, Warren, Ml 48090. A reply will be furnished directly to you.

1. PURPOSE OF MODIFICATION.

The purpose of this modification is to provide vehicles with smoke screen capabilities for tactical purpose, and to improve combat survivability.

2. PRIORITY CLASSIFICATION.

This modification is classified as NORMAL.

a. Equipment in Use (Including Equipment in Supply or Maintenance Activities Below Depot Level and Equipment in Administrative Storage). Equipment in use will be modified as soon as practicable but no later than the scheduled completion date. Equipment not modified after expiration of MWO completion date will be reported as NORM/NOT READY in accordance with applicable Army Regulations.

a. Equipment in use. Equipment in use will be modified as soon as practicable but no later than the scheduled completion date. Equipment not modified after expiration of MWO completion date will be reported as NORM/NOT READY in accordance with applicable Army Regulations.

b. Equipment in wholesale depot *supply or* maintenance activities. All MWO'S, to include MWO'S which have been incorporated into DMWR, will be accomplished on serviceable material prior to issue and/or subsequent to scheduled completion date. Operational Project Stock stored at the depots will be modified concurrently with Depot Stock. Issue of unmodified materiel is prohibited. The MWO will be applied to unserviceable materiel during scheduled Depot Maintenance.

c.. *Prepositioned* stock. Equipment which is prepositioned will be modifed during cyclic . maintenance and will be consistent with TM 38-750.

3. END ITEM OR SYSTEM TO BE MODIFIED. See table 1.

TABLE 1. END lTEM TO BE MODIFIED

Nomenclature	NSN	Model
Tank, Combat, Full Tracked: 105 MM Gun	2350-00-148-6548	M60A3
Tank, Combat, Full Tracked: 105 MM Gun	2350-00-116-9765	M160Al (RISE)
Tank, Combat, Full Tracked: 105 MM Gun	2350-00-756-8497	M60A1
Tank, Combat, Full Tracked: 105 MM Gun	2350-00-582-5595	M48A5
Vehicle, Combat Engineering, Full Tracked	2350-00-795-1797	M728
Armored Vehicle, Bridge Launcher	5420-00-889-2020	M60A1 AVLB
Armored Vehicle, Bridge Launcher	5420-01-076-6096	M48A5 AVLB

4. MODULES (COMPONENTS, ASSEMBLIES, Subassembly, BOARDS, AND CARDS) TO BE MODIFIED.

The following items, whether installed or in stock, will be modified. (See table 2)

TABLE 2. COMPONENTS TO BE MODIFIED

Nomenclature	NSN	Part. No.	Model
Engine, Diesel	2815-00-410-1205	11682700	AVDS-1790-2C
Engine, Diesel	2815-00-410-1209	11684000	AVDS-1790-2D

5. PART(S) TO BE MODIFIED

The following items, whether installed or in depot stock shall be modified. Items in stock shall be modified before issuing and so marked that it can be easily determined if modification has been accomplished, (See table 3).

TABLE 3. PARTS TO BE MODIFIED

Nomenclature	NSN	Part No.
Shroud, Diesel Engine: XMSN, L Bank, Upper (All Vehicles)	2815-00-397-3325	11683980
Wiring Harness (All Vehicles)	2590-00-410-1152	11655450
Wiring Harness (M60A3, M60A1-RISE)	2590-00-606-2395	11673827
Wiring Harness (M60A1, M728)	2590-01-054-0325	12252021
Wiring Harness (M48A5)	2590-01-026-4527	11655660
Wiring Harness (M60A1 AVLB)	2590-01-052-9464	12252079
Wiring Harness (M48A5 AVALB)	2590-01-003-5546	12257278
Support, Master Control Panel, (M60A1 AVLB, M48A5 AVLB)	No NSN	10934246
Clamp Assy, Fire Ext. (M48A5)	5340-01-051-5366	11615403
Bracket, Hyd. Pump Control	5340-01-037-5251	10951613
Panel (M60A1, M60A1-RISE and M60A3 with Dozer Kit)		

6. APPLICATION

Q. Time compliance schedule MWO effective date 12 June 1984 and completion date 31 March 1988.

b. Level of maintenance. Direct support.

c. Applied *by.* Track Vehicle Mechanic (MOS-63H): 9.7 manhours, fuel and electrical system repairman (MOS-63 G): 0.5 manhours.

d Time *required.*

(1) Time for completion of MWO application to one end item.
(a) Total of 20 manhours using two men.

(b) Total of 10 hours downtime for one end item.

(2) Time for completion of one assembly or component. Not applicable.

(3) *Time* for completion of one part. Not applicable.

e. MWO to *be applied prior to or concurrently with this* MWO. Not applicable

f. Publications Which Have Been Changed as a Result of this MWO.

7. TECHNICAL PUBLICATIONS AFFECTED/CHANGED AS A RESULT OF THIS MWO.

Publications	Date
TM 9-2350-253-20P-1	23 February 1984
TM 9-2350-253-34P-1	23 February 1984
TM 9-2350-257-20P-1	10 August 1983

g. *Additional Information.*

(1) Kits - There are two basic kits used in the installation of the Vehicle Engine Exhaust Smoke System (VEESS). Teledyne Continental Motors Kit P/N 12275734 (figure l) is used for the engine portion and General Dynamics Kit p/N 12290438 (figure 2) is used for the hull wiring portion of the modification.

(2) Powerpack Removal - The powerpack must be removed to perform this modification.

(3) General Description of operation - The vehicle engine exhaust smoke system (VEESS) (refer to figures 3 and 4) operates by tapping fuel from the outlet of the engine driven fuel pump on the front of the engine downstream from the fuel/water separator. The fuel is then routed through a manual shut-off valve and through two solenoid valves at the rear of the engine. Fuel is then injected into the left and right exhaust pipes upstream of the turbochargers at a rate of approximately 1 gal/rein. Raw fuel injected into each hot turbo is instantly vaporized and a dense white cloud of smoke is emitted from the exhaust stacks.

Two solenoid valves are used as a safety feature in the event one of the solenoid valves should stick open. Voltage is supplied to the solenoid valves from the air cleaner blower motor relay. Since this relay does not close until the generator comes up to operating voltage (28 vdc), the solenoid valves will not actuate until the engine is ruining and the smoke switch is on.

The manual shut-off valve is used as a troubleshooting aid only and must normally be left in the open position (see figure 16).

8. SUPPLY KITS/PARTS AND DISPOSITION.

a. Kits/Parts Required to Accomplish Modification. The following engine kit 12275734 (figure 1) and hull wiring kit 12290438 (figure 2) are required to accomplish the modification. Check kits for completeness before starting the job.

TABLE 4. COMPONENTS OF ENGINE MODIFICATION KIT 12275734

NSN	Item Name and Part Number	Quantity Required Per: End Item	Figure 1 Item No.
2815-01-066-8224	Modification Kit, Engine Smoke Generating: 12275734	1	
	Composed of:		
4730-00-279-0454	Tee AN825-8	1	1
4720-00-115-0170	Hose Assy. MS28741-8-0194	1	2
5305-00-019-2417	Screw & Washer Assy. 192417 (BCYX6)	2	3
2920-01-070-5962	Solenoid Bracket 12275712	1	4
No NSN	Tube Assy. 12275811	1	5
5306-00-225-9094	Screw MS90726-39	2	6
5340-01-017-6947	Retainer-Clamp 11684156	4	7
5340-01-015-9789	Clamp l1684157	4	8
4730-00-450-6484	Elbow -40° MS51855-10	1	9
5310-00-809-3079	Washer MS27183-19	1	10
5310-00-616-6354	Washer MS35335-38	1	11
4730-00-375-6403	Nut MS51860-55	1	12
No NSN	Tube Assy. L.B. 12275808	1	13
5310-00-982-4912	Nut, Lock MS21045-5	2	14
2590-01-082-2673	Wiring Harness 12275718	1	15
4710-01-109-8031	Tube Assy. 12275780	1	16
5305-00-068-0506	Screw MS90726-6	1	17
5310-00-061-7325	Nut, Lock MS21045-4	3	18
4730-00-127-4461	Elbow -90° MS51815-36	2	19
4810-01-082-2634	Solenoid Valve l1688627-2	2	20
4730-00-186-7798	Nipple AN911-2	1	21
No NSN	Bracket-Shut-Off Valve 12275809	1	22
5306-00-042-5828	Screw& Washer Assy. 425828 (BCYX6.1)	4	23
5310-00-167-0818	Washer AN960-10	4	24
4710-01-109-8033	Tube Assy. 12275782	1	25
No NSN	Tube Assy. R.B. 12275807	1	26
5340-00-057-3037	Clamp MS21333-111	5	27
5340-00-057-3025	Clamp MS21333-108	6	28
5305-00-068-0507	Screw MS90726-7	2	29
No NSN	Valve-Shut-Off l1669749	1	30
4730-01-036-5064	Elbow -45° MS51817-25	2	31
5306-00-225-9087	Screw MS90726-32	1	32
5310-00-514-6674	Lockwasher MS35335-34	1	33
4730-01-109-7971	Tee l1669685	1	34

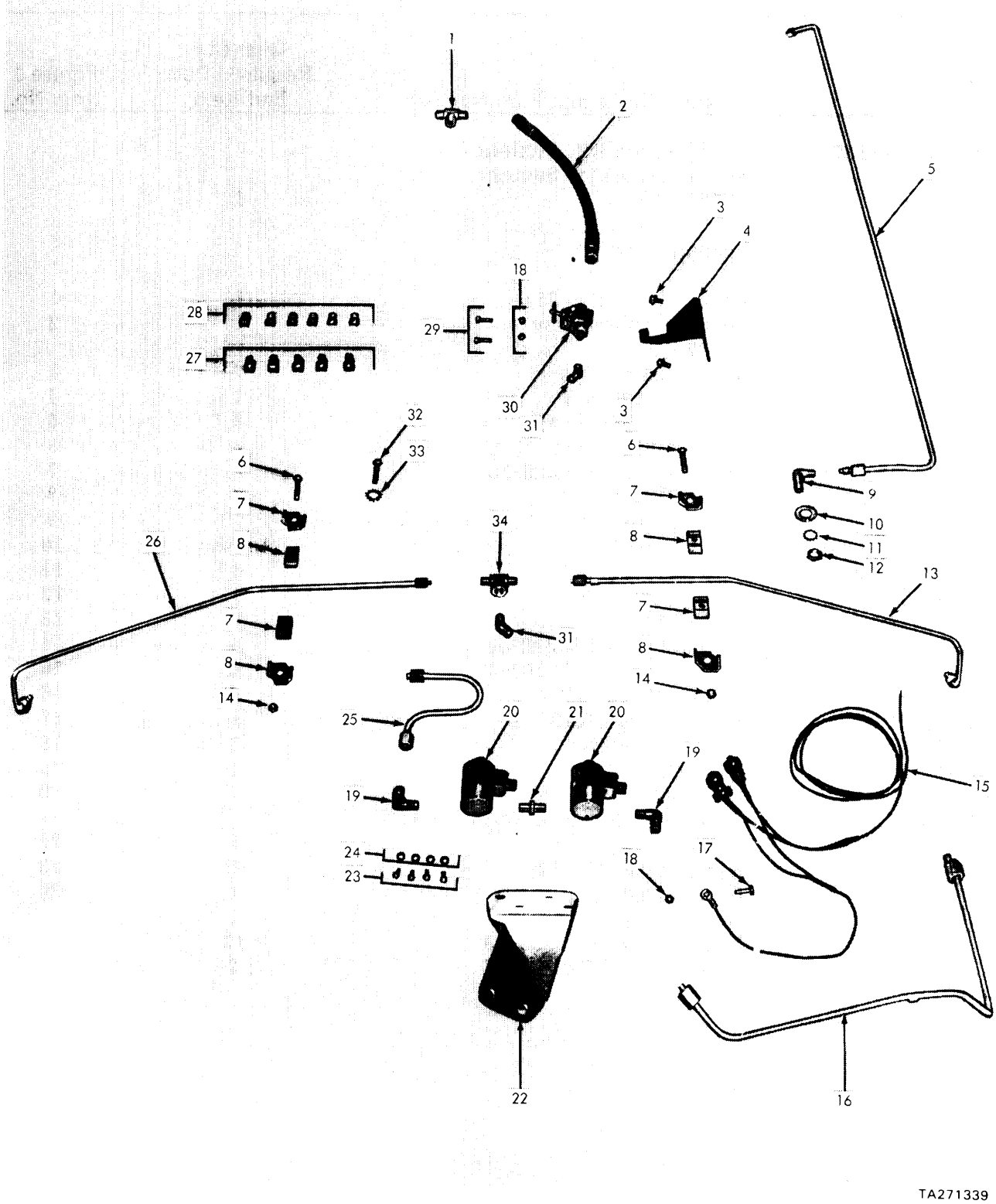


Figure 1. Engine Modification Kit 12275734

TABLE 5. COMPONENTS 0F VEHICLE MODIFICATION KIT 12290438

NSN	Item Name and Part Number	Quantity Required Per: End Item	Figure 1 Item No.
2815-01-076-9371	Modification Kit, Vehicle Smoke Generator Switch: 12290438	1	
	Composed of:		
	Lead Assy 12290435	1	1
2920-01-076-9375	Wiring Harness Assy 12270526	1	2
5975-00-133-8696	Strap MS3367-6-9	2	3
5305-00-225-3840	Screw MS90725-7	1	4
5305-00-984-6193	Screw MS35206-245	8	5
5310-00-809-4058	Washer, Flat MS27183-10	4	6
5310-00-599-0070	Lockwasher MS35333-38	8	7
5310-00-934-9757	Nut MS35649-282	4	8
5340-00-809-1492	Clamp, Loop MS21333-100	1	9
5975-00-345-8055	Strap 10905840	As Req	10
9905-00-893-3570	Band M43436/1-3	1	11
2590-01-076-9296	Cover 12270517	1	12
5310-00-768-0319	Nut MS51968-2	4	13
5310-00-550-1130	Lockwasher MS35333-40	4	14
5310-00-765-3197	Washer, Flat MS27183-41	4	15
5305-00-267-8975	Screw MS90726-9	4	16
5930-01-076-9327	Switch Assy 12270522	1	17
2590-01-076-9335	Guard l1669488	1	18
2590-01-076-9295	Bracket 12270525	1	19
6220-01-076-9372	Lens 10933574-1	1	20
5330-00-752-7534	Packing, Preformed MS28775-119	1	21
6220-00-078-4715	Adapter 10924435	1	22
6240-00-266-9940	Lamp MS25231-1829	1	23
2540-00-978-7337	Base 10933573	1	24
	Screw MS90726-7	1	
	Lockwasher MS35335-33	12	
	Lockwasher MS459 04-57	2	

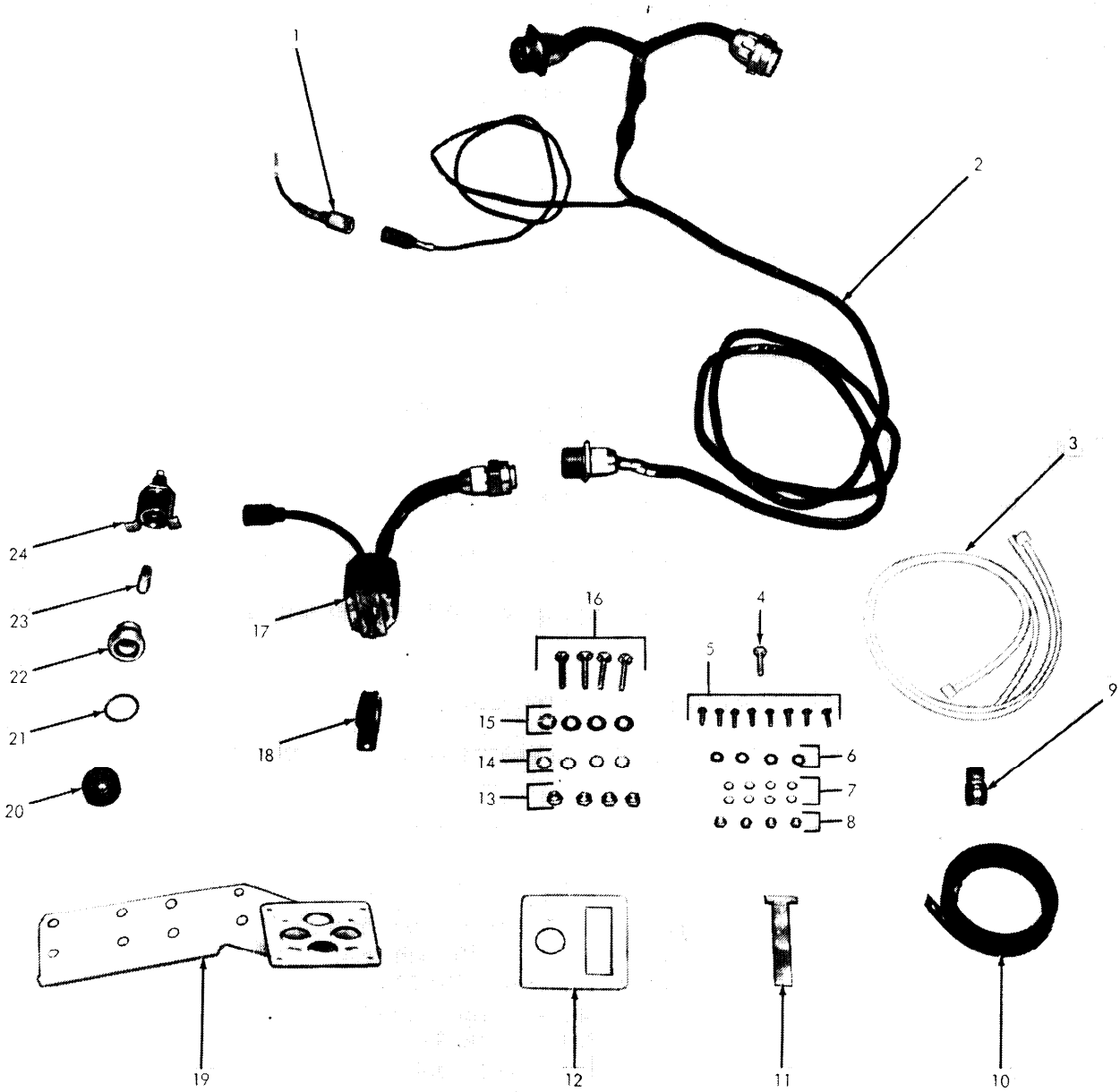


Figure 2. Vehicle Smoke Generator Switch Modification Kit 12290438

b. *Kit.*

(1) Engine Modification Kit, 12275734

a. Weight 12.5 lbs.
b. Dimensions 4.75 ft. X .86 ft. X .42 ft.
c. Cubage 1.72 cu. ft.

(2) Hull Wiring Modification Kit, 12290438

a. Weight 4.5 lbs.
b. Dimensions l.08 ft. X l.00 ft. X.58 ft.
c. Cubage .63 cu. ft.

(3) Weight and Balance Data.
Weight and balance are not significantly affected.

c. *Distribution and issue instructions.*

(1) U.S. Forces. Do not requisition kits. They will be shipped automatically as detailed in the Memorandum of Understanding (MOU).

(2) U.S. Army Depots. Requisition required kits through supply channels.

(3) Multiservice. Special instructions will be included for multiservice DAMWO's.

(4) MAP/MAS Countries. Special shipping instructions will be provided for MAP/MAS Countries.

d. Bulk and consumable materials. (See table 6).

TABLE 6. BULK AND CONSUMABLE MATERIALS

NSN	Nomenclature	Quantities
8030-00-889-3434	Tape, Antiseizing (pipe thread) 1.4 inch wide x 260 inch long Roll: (81349) MIL-T-27730	1 roll
8030-00-664-6146	Antiseize Compound, 1500^{0}F Temp. Rating (87889)	1 lb. can
9150-00-250-0926	Petrolatum, Technical (81348) VV-P-236	1 lb. can
6850-00-880-7616	Silicone Compound (81349) MIL-S-866O	8 oz. ‘tube
6850-00-664-5685	Dry Cleaning Solvent PD-680	1 qt.

e. *Parts Disposition. See* Table 7

(1) Dispose of excess parts listed in table 7 in accordance with AR 755-2 or as directed by local authority.

(2) Table 7 lists the item name, part number, and how many are in each of the vehicles or tanks affected.

TABLE 7. EXCESS PARTS

ITEM NAME	PART NUMBER	M728	M48A5	M48A5 AVLB	M60A1	M60A1 AVLB	M60A1 RISE	M60
Screw	MS35292-7				4		4	4
Lockwasher	MS35333-23				4		4	4
Screw	MS90726-6				4		4	4
Lockwasher	MS35338-44			2		2	4	4
Strap	10905840	7	5	7	7	7	8	8
Band	MS39020-3	1	1		1	1	1	1
Nut	MS51968-2	4		3	4	3	4	4
Clamp, Loop	MS21333-100						1	1
Washer, Flat	MS27183-10	4		4	4	4	4	4
Screw	MS90725-7		1	1		1	1	1
Screw	MS90726-7	5	1		1		1	1
Lock washer	MS35335-33	12	12	12	12		12	12
Screw	MS35297-6	1			1			
Lock washer	MS35333-40	4		3		3		
Screw	MS90726-5			2				
Band	M4343615-1			1				
Screw	MS90726-9			2		2		
screw	MS90726-10					2		
Lock washer	MS35333-33					12		
Bolt	7414584	2	2	2	2	2	2	2
Plug	8761594	2	2	2	2	2	2	2

9. SPECIAL TOOLS: JIGS; TEST. MEASUREMENT AND DIAGNOSTIC EQUIPMENT (TMDE); AND FIXTURES REQUIRED:

None required.

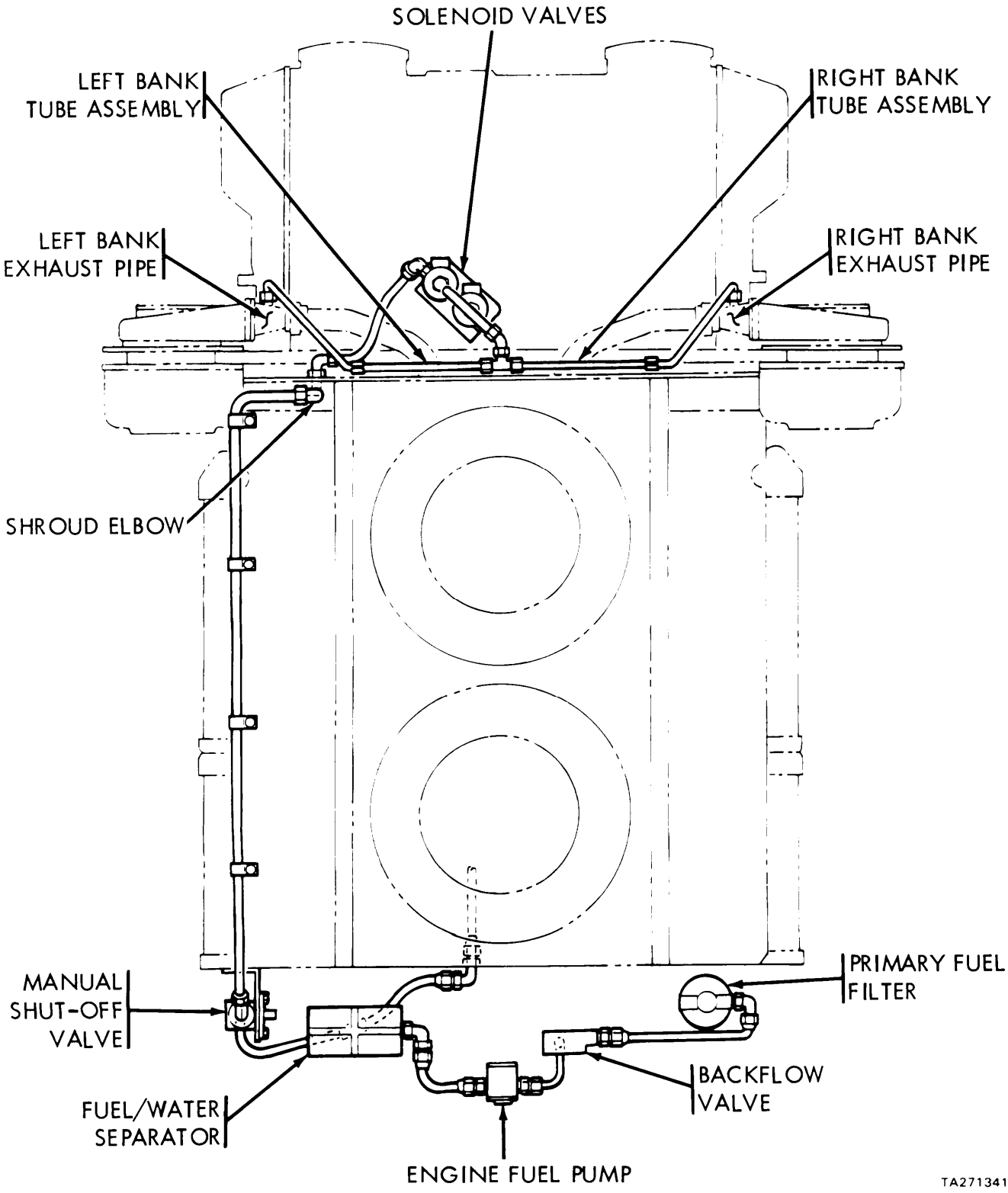


Figure 3. Engine Smoke General Fuel System Diagram

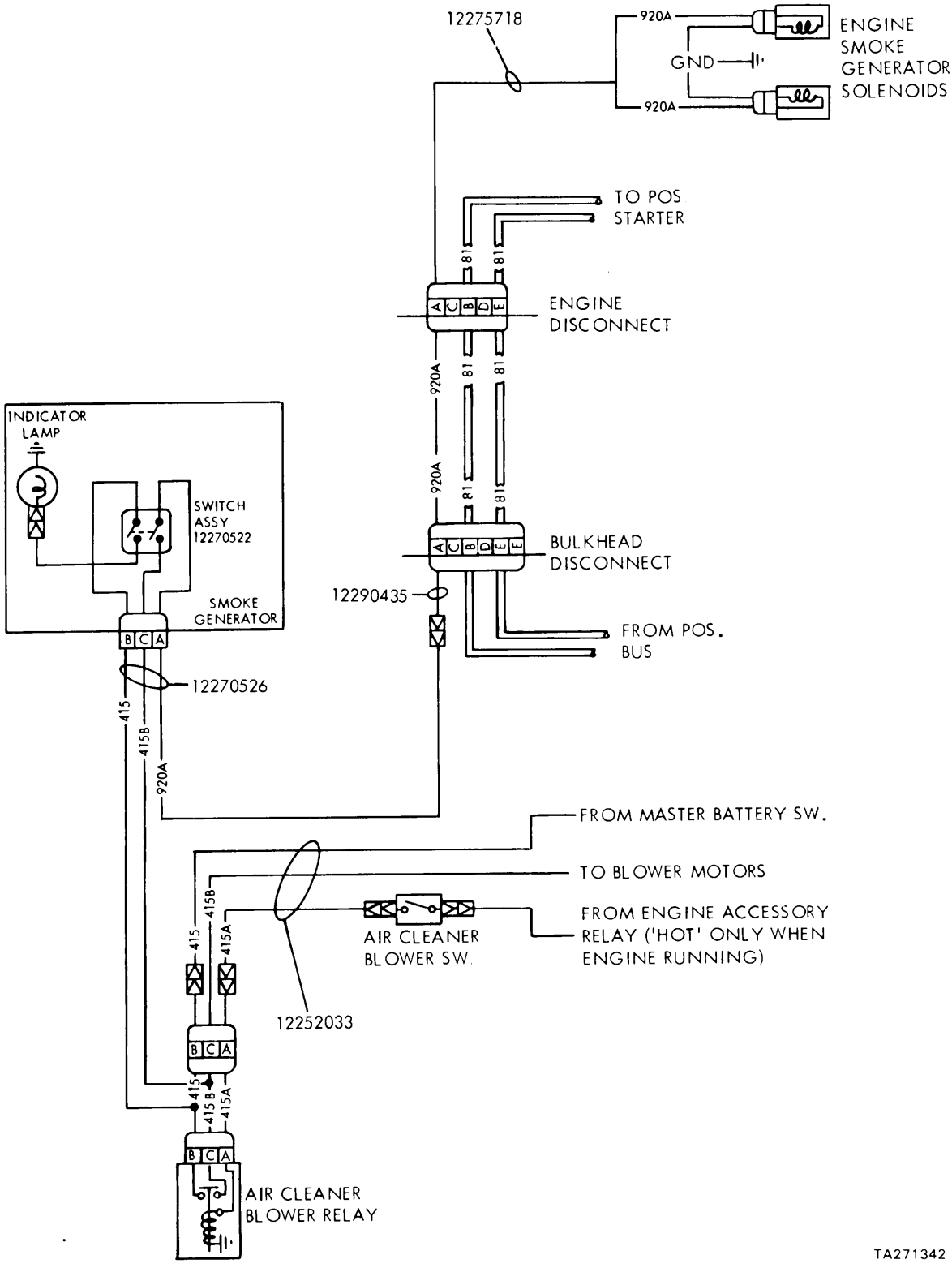


Figure 4. Engine Smoke System General Wiring Diagram

10. MODIFICATION PROCEDURES

The smoke generating system is only intended to be used on vehicles with AVDS-1790-2C and AVDS-1790-2D engines which have electrical disconnection top of the engine. The installation instructions for the engine portion of the system will be the same for all the vehicles intended to be modified. However, there are different installation instructions for the hull wiring portion of the various vehicles. These instructions will be divided into eight sections as follows:

Section I	Engine Modification Instructions
Section II	Assembly of Smoke Generator Switch Bracket
Section III	Hull Wiring Instructions for M60A3 and M60A1 (RISE) Vehicles
Section IV	Hull Wiring Instructions for M60A1 and M728 Vehicles
Section V	Hull Wiring Instructions for the M48A5 Vehicle
Section VI	Hull Wiring Instructions for the M60A1 AVLB and the M48A5 AVLB
Section VII	System Operation and Leak Check
Section VIII	Troubleshooting

Section I - Engine Modification

a. *Preliminary Procedures.*

(1) Disconnect the three ground straps from the battery negative terminals (refer to appropriate vehicle TM).

(2) Remove powerplant (refer to appropriate vehicle TM).

(3) Remove engine shroud and rear engine shroud support (refer to appropriate vehicle TM).

b. Installation of Solenoid Valve Assembly.

NOTE

The damper end (accessory end) or the engine will be called the front and the transmission end the rear. As viewed from the front of the engine toward the rear, the side to the right will be called the right bank and the side to the left will be called the left bank.

NOTE

- During the following modification, clean all pipe threads (both male and female) with dry cleaning solvent PD-680 and apply teflon tape (antiseize tape MIL-T-27730).
- Lube threads of all tube fittings with technical petrolatum VV-P-2 36.

(1) Remove protective plugs and felt filtering discs (if present) from inlet and outlet ports of the solenoid valves.

NOTE

It may be necessary to reposition receptacle connector to install nipple AN911-2. If connector must be repositioned, secure valve in a soft-jawed vise (or wrap a rag around valve and secure in vise) and loosen acorn nut on top of valve and reposition connector.

(2) Apply teflon tape to threads of pipe nipple AN911-2 and install nipple between outlet port of one solenoid valve and inlet port of the other (figure 5, view A). The bottom surfaces of the valves must be parallel.

(3) Place solenoid valve in soft-jawed vise or in vise with rag. Apply teflon tape to threads of 90 elbow, MS518 15-36 and install in solenoid valve inlet port. Tighten to five o'clock position (figure 5, view B).

(4) Place the second solenoid valve in soft-jawed vise or in vise with rag. Apply teflon tape to threads of 90 elbow MS51815-36 and install in solenoid valve outlet port. Tighten to twelve o'clock position (figure 5, view C).

(5) Check position of receptacle connector on each solenoid valve 11668627-2. Connector should be positioned 45° from inlet port as shown in figure 5, view D. If connector must be repositioned, secure valve in a soft-jawed vise (or wrap a rag around valve and secure in vise) and loosen acorn nut on top of valve. Reposition connector and torque nut to 50 lb.-in. (5.6 n.m).

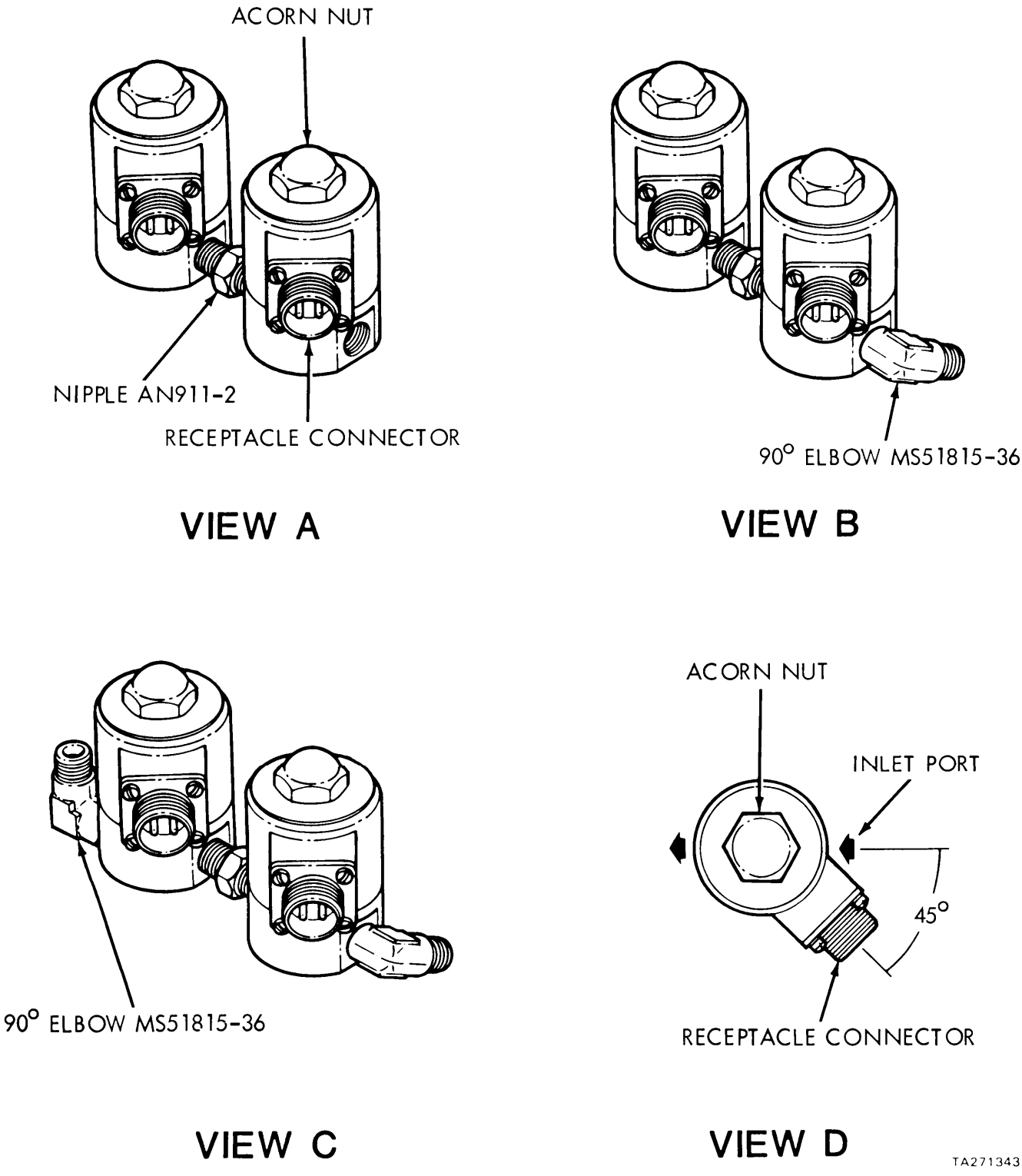


Figure 5. Solenoid Valve Receptacle Connector and Fuel Fitting Positioning

(6) Install assembled solenoid valves on solenoid bracket 12275712 as shown in figure 6 with four assembled washer screws 425828 and four flat washers AN96O-10.

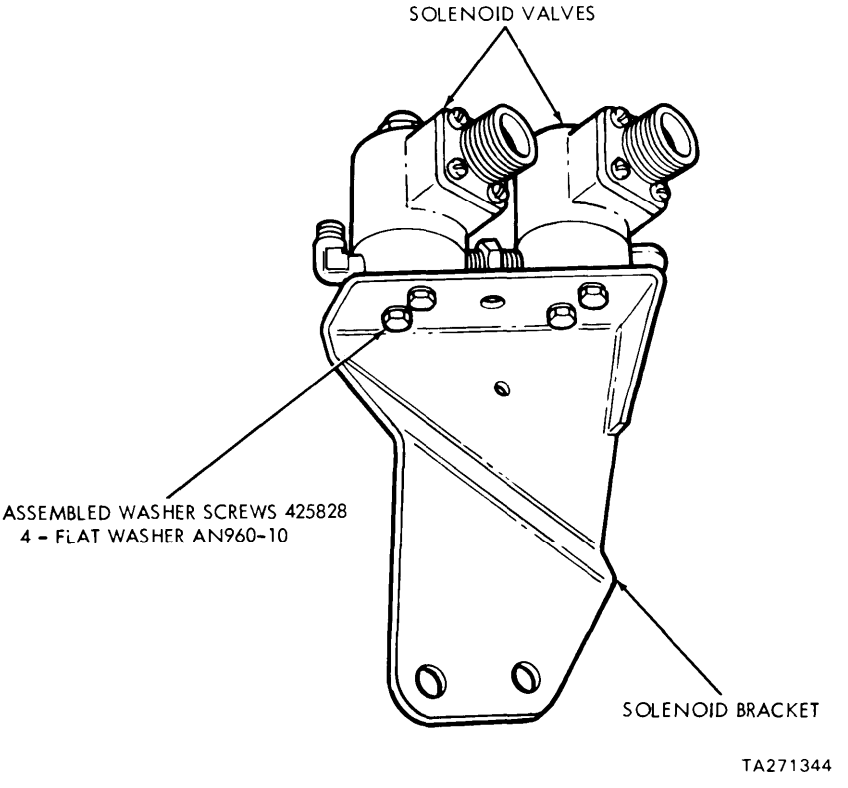


Figure 6. Solenoid Valve Assembly

(7) At rear of engine, cut safety wire from two transmission Iifting eye bolts. Remove and retain the two bolts (figure 7).

NOTE

During next step, insure there is adequate clearance between solenoid assembly and crankcase breather tube (figure 7). If solenoid assembly is going to contact breather tube, the breather tube rubber hose may be trimmed and tube pushed back into rubber hose to gain sufficient clearance. The solenoid bracket may also be bent back slightly to gain clearance.

(8) Attach solenoid bracket to transmission lifting eye bracket with the two bolts previously removed and torque bolts 50-60 lb-in. (5.6 -6.8 N.m) (figure 7).

(9) put safety wire on transmission lifting eye bolts (figure 7).

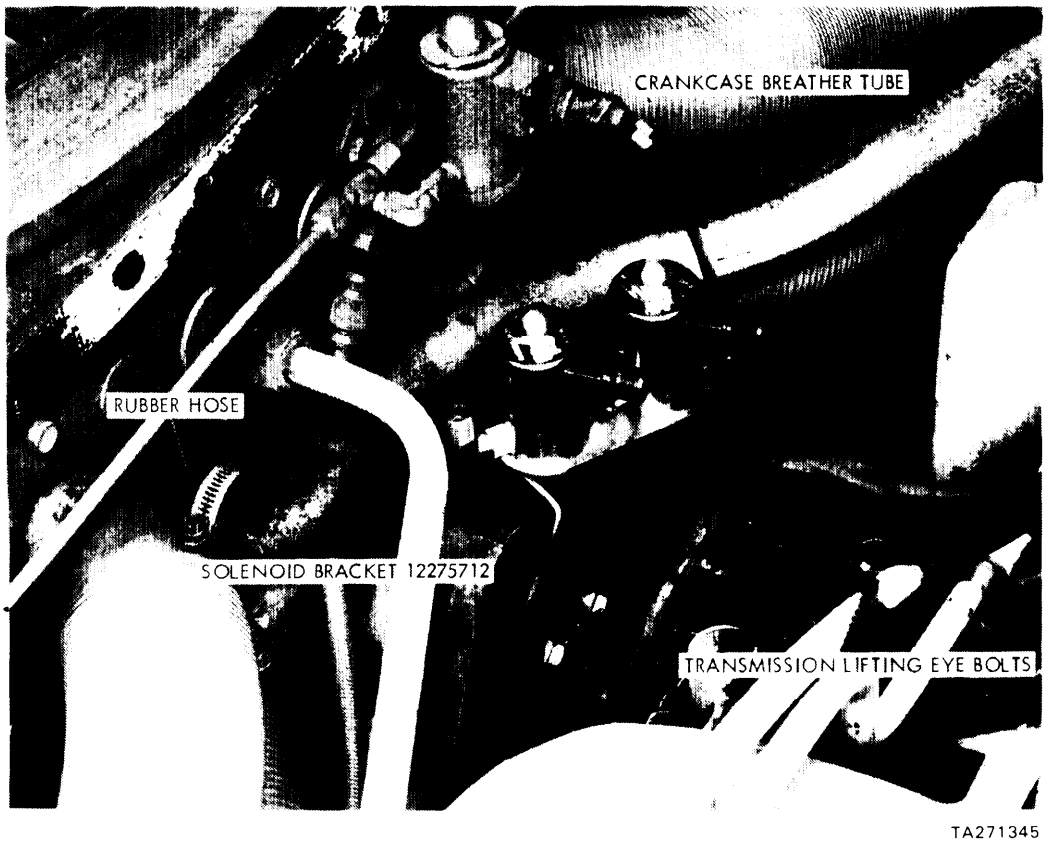


Figure 7. Installation of Solenoid Valve Assembly

c. Installation of Right and Left Bank Tube Assemblies.

(1) Obtain tee 11669685 and 45° elbow MS51817-25 from kit. Secure tee in vise, apply teflon tape on 45 elbow and install elbow in tee (figure 8).

(2) Connect tube assembly 12275782 to solenoid outlet elbow and 45° elbow MS 51817-25 (figure 8). Do not tighten tube nuts at this time.

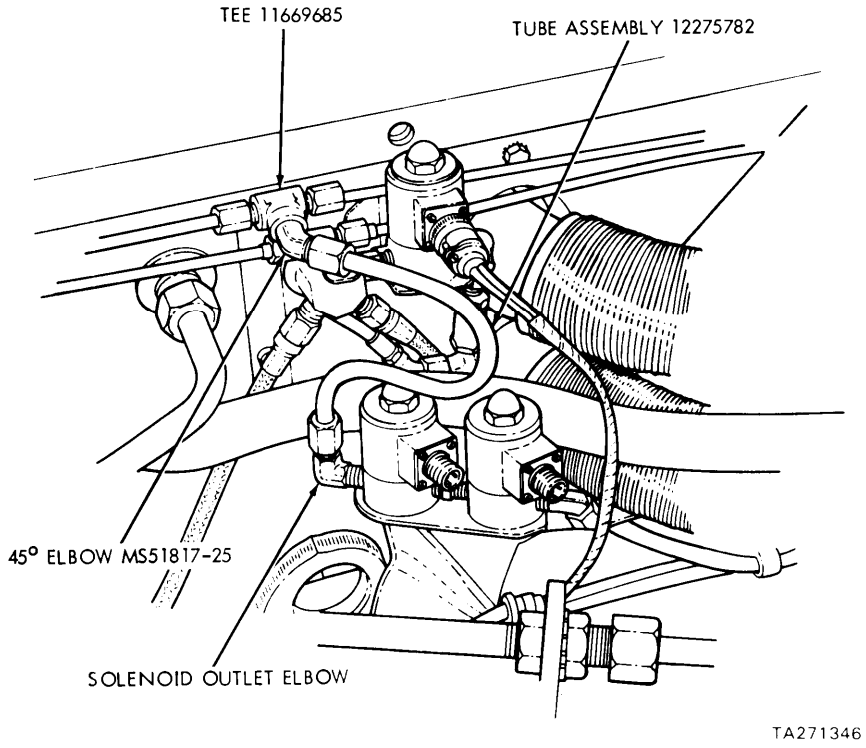


Figure 8. Installation of Solenoid Valve Outlet Tube

(3) Remove and discard pipe plugs from upper right and left bank exhaust pipe bosses (figure 9). It may be necessary to apply heat to the bosses to aid in plug removal.

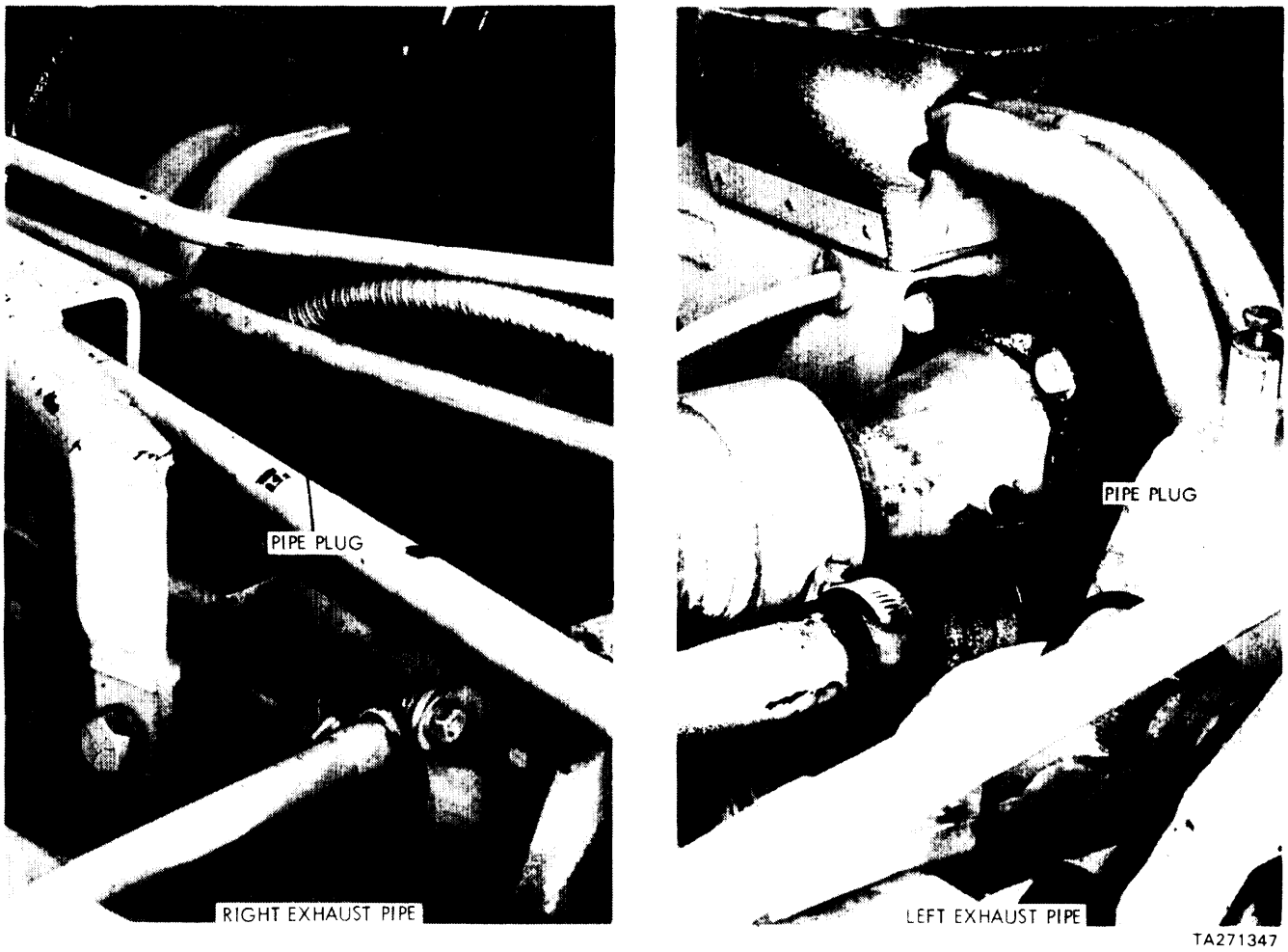


Figure 9. Removal of Exhaust Pipe Plugs

NOTE

- While performing next two steps, a clearance problem may exist between right tube and parking brake cable bracket, and also between left tube and engine crankcase breather tube clamp (figures 10 and 11). Carefully bend back parking brake cabIe bracket to obtain sufficient clearance on the right bank and reposition crankcase breather tube clamp to obtain sufficient clearance on the left bank.

- Tube adapters on exhaust pipe ends of right and left bank tube assemblies 12275807 and 12275808 are preset and are integral parts of the tubes.

(4) Apply antiseize compound (1500°F temp rating) on threads of right bank tube assembly 12275807 adapter and install it into right bank exhaust pipe boss (figure 10). Connect other end of tube assembly to tee 11669685. Do not tighten tube nuts at this time.

(5) Apply antiseize compound (1500°F temp rating) on threads of left bank tube assembly 12275808 adapter and install it into left bank exhause pipe boss (figure 10). Connect other end of tube assembly to tee 11669685. Do not tighten tube nuts at this time.

NOTE

Be careful not to bend or deform tubes while tightening tube nuts.

(6) Tighten solenoid outlet tube (figure 8) nuts and left and right bank tube nuts (figure 8).

(7) Secure right bank tube assembly 12275807 to right bank manifold heater tube with two retainer clamps 11684156, two clamps 11684157, screw MS90726-39 and nut MS21045-5 (figure 10).

d. Upper Left Bank Engine/Transmission Shroud Rework Instructions.

(1) Remove upper left bank engine/transmission shroud 11683980 (figure 11).

(2) Drill a 9/16-inch diameter hole in shroud as shown in figure 12.

(3) Insert 90° elbow MS51855-10 in shroud and secure with flat washer MS27183-19, lockwasher MS35355-38, and nut MS5 1860-55 (figure 12).

(4) Install reworked shroud assembly on engine (figure 11).

(5) Connect tube assembly 12275780 first to shroud elbow and then to solenoid inlet elbow (figure 13).

(6) Secure tube assembly 12275780 to cam gear cover with clamp MS21333-111, existing screw MS90727-34, and flat washer 907241K1 (figure 13).

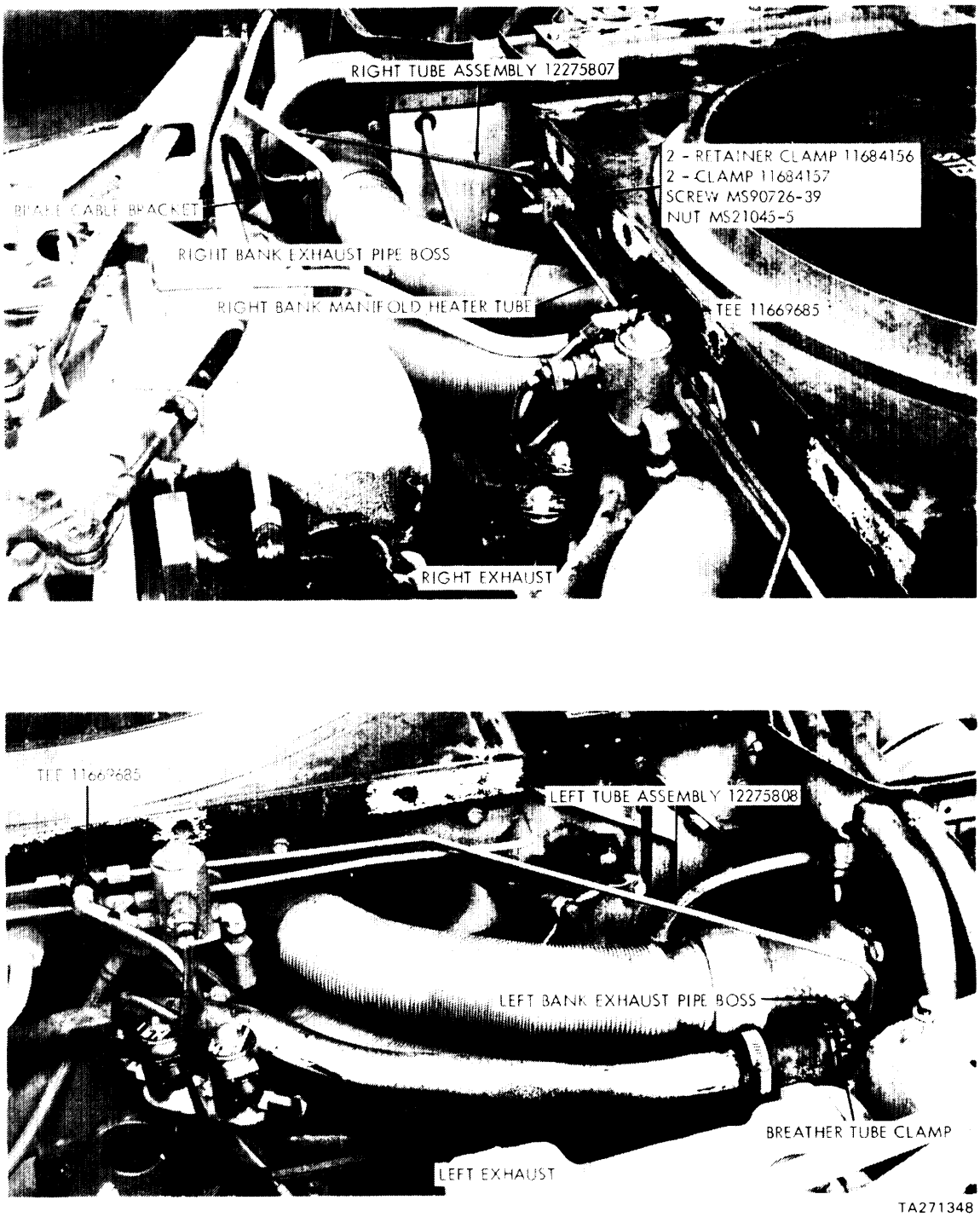


Figure 10. Installation of Right and Left Tube Assemblies

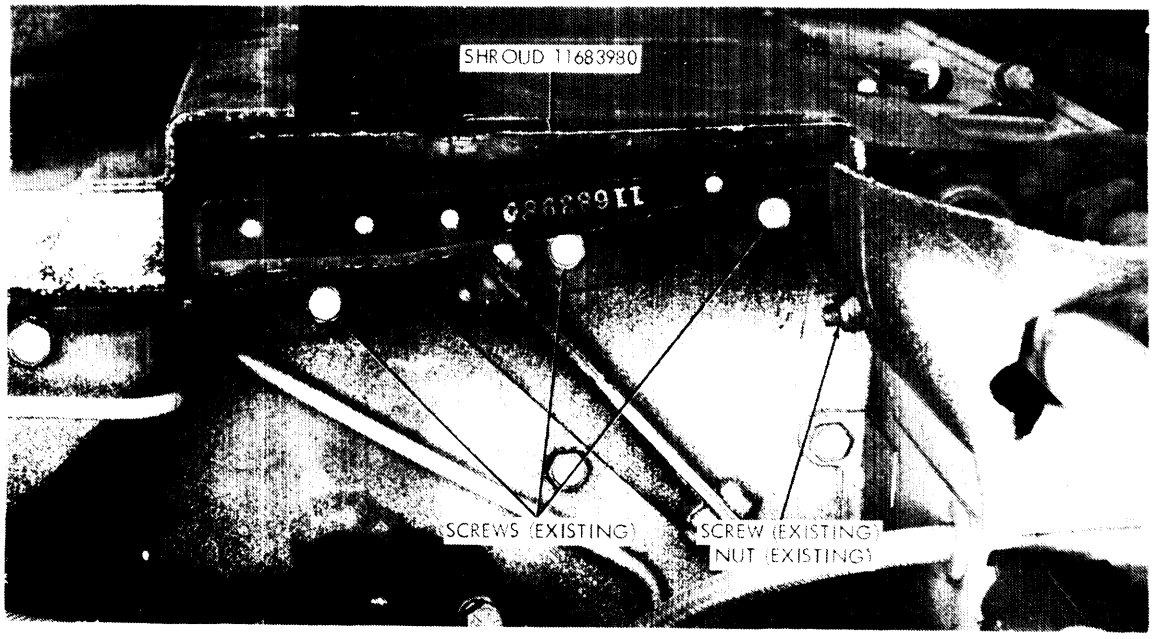
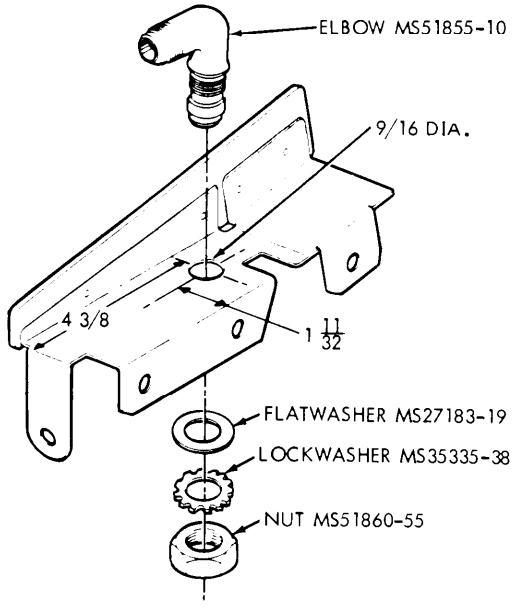


Figure 11. Upper Left Bank Engine/Transmission Shroud



NOTE
(1) ALL DIMENSIONS SHOWN ARE IN INCHES.
(2) SHROUD P/N BEFORE REWORK 11683980
SHROUD P/N AFTER REWORK 12275727

TA271350

Figure 12. Engine/Transmission Shroud Rework

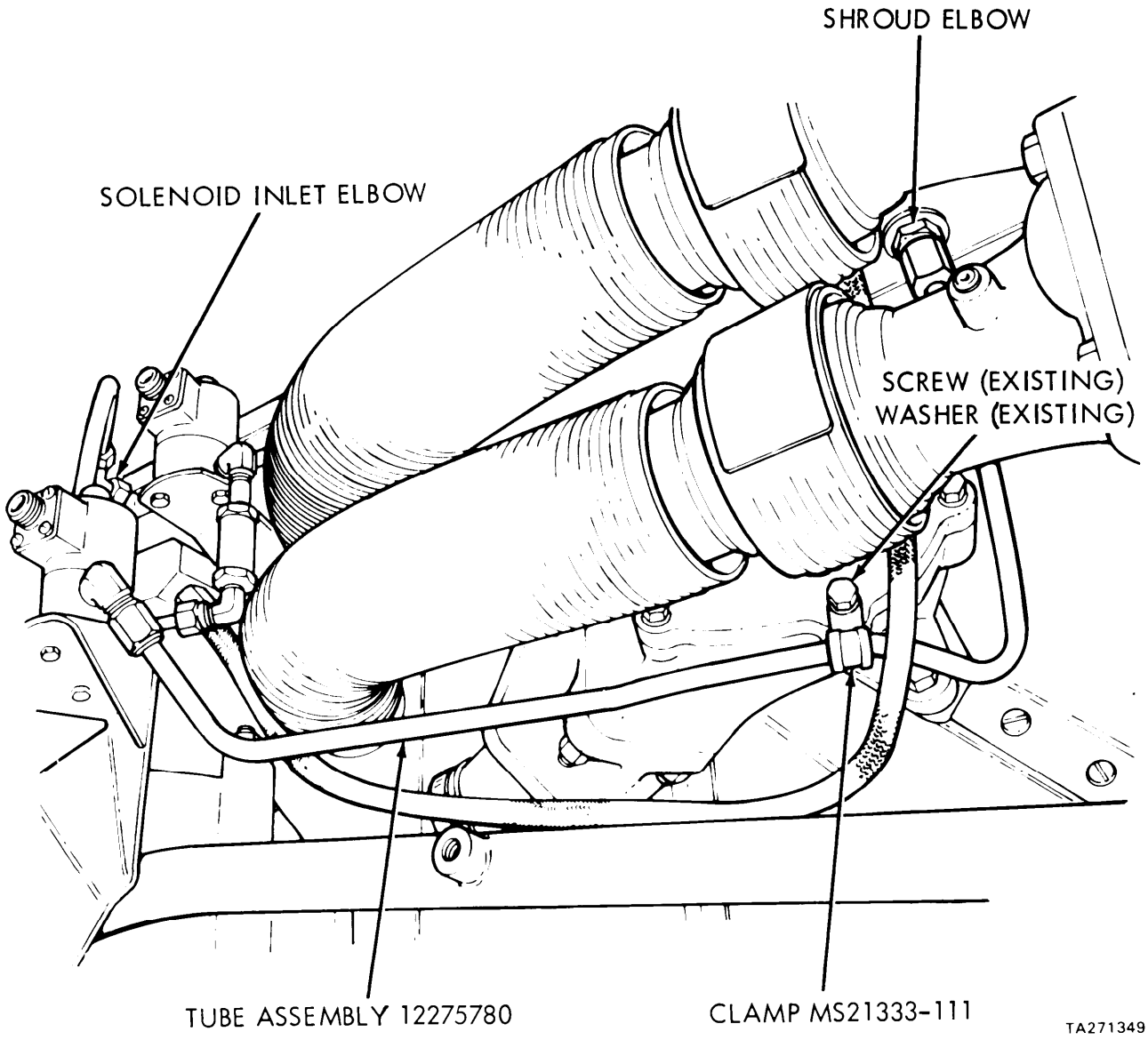


Figure 13. Installation of Solenoid Inlet Tube

e. Installation of Manual Shut-off Valve.

(1) Secure valve l1669749 in soft-jawed vise.

(2) Apply teflon tape on 45° elbow MS51817-25, install elbow in valve, and position as shown in figure 14.

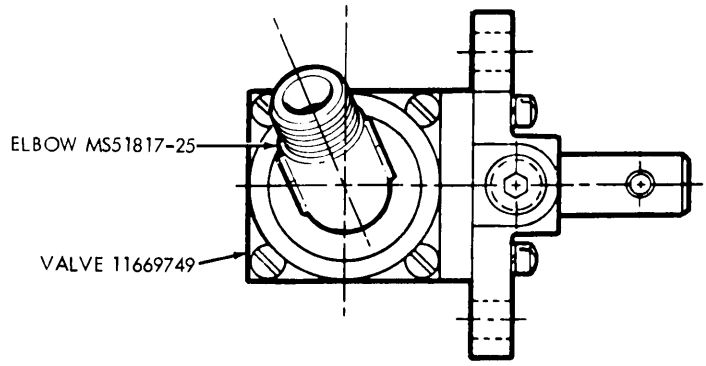


Figure 14. Installation of 45° Elbow in Manual Shut-Off Valve

(3) Loosen oil cooler vent line elbow and bolts securing oil cooler vent line clamps (figure 15).

(4) Remove and discard existing shroud screws (figure 15).

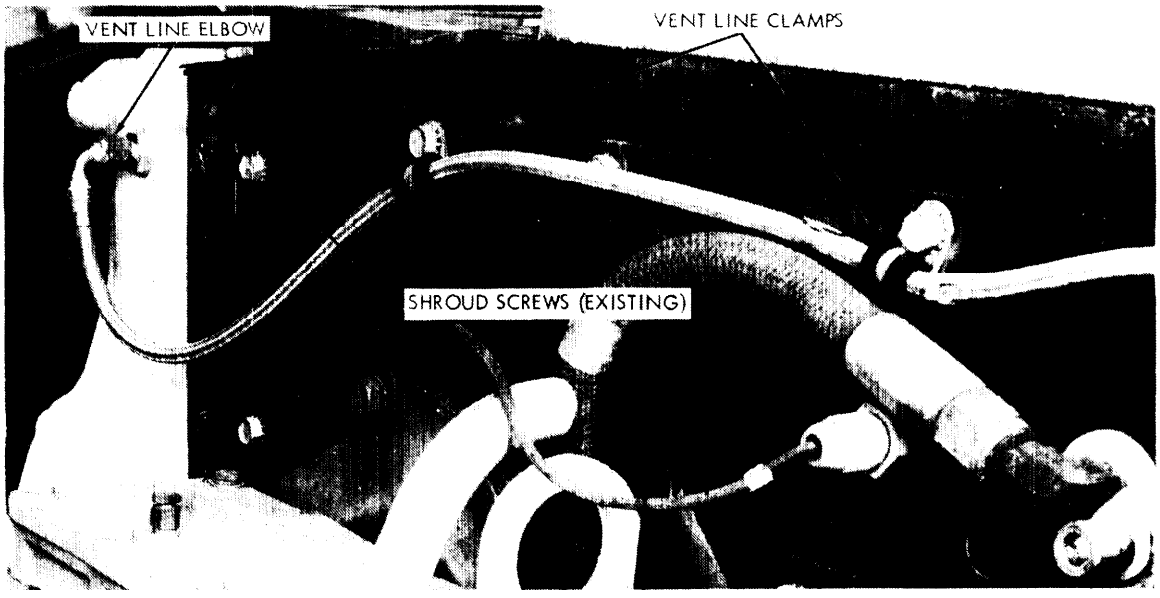


Figure 15. Oil Cooler Vent Line

(5) Position shut-off valve bracket 12275809 to shroud and secure with two screws 192417 (figure 16).

CAUTION

To prevent damage to vent line, due to rubbing, be sure vent line does not contact top of bracket.

(6) Reposition oil cooler vent line elbow and oil cooler vent line so vent fine will clear top of bracket 12275809. Tighten oil cooler vent line elbow and screws securing clamps (figure 16).

(7) Install manual shut-off valve 11669749 on bracket 12275809 with two screws MS90726-7 and two nuts MS21045-4 (figure 16).

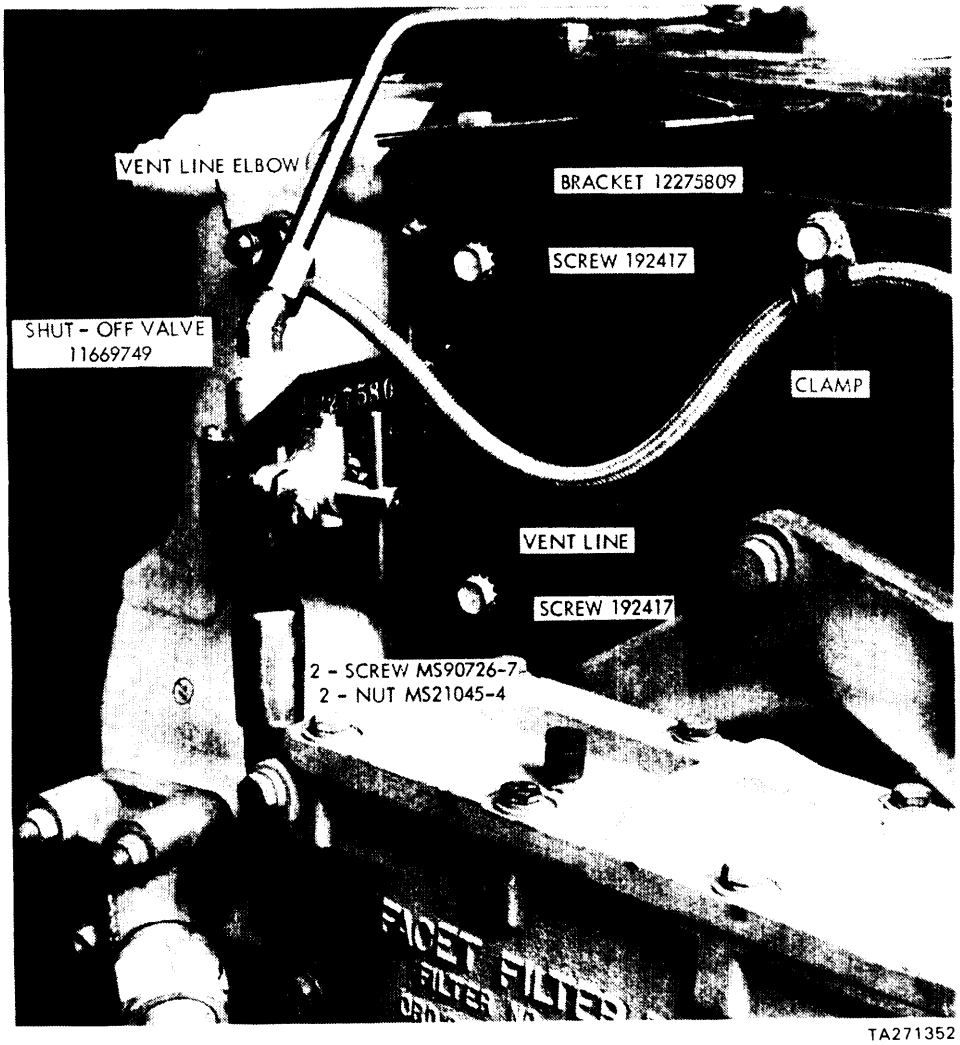


Figure 16. Manual Shut-off Valve Installation

(8) Drain fuel/water separator (refer to appropriate vehicle TM)

(9) Disconnect fuel outlet hose from bottom of fuel/water separator existing outlet elbow 10935536 (figure 17, view A).

(10) Remove and discard fuel/water separator existing outlet elbow 10935536 (figure 17, view A).

(11) Apply teflon tape on tee AN825-8 and install tee in fuel/water separator outlet port (figure 17, view B).

(12) Connect fuel outlet hose to tee AN825-8 (figure 17, view B).

(13) Connect hose assembly MS28741-8-0194 to tee AN825-8 and to manual shut-off valve (figure 17, view B).

(14) position tube assembly 12275811 under electrical harnesses and along left engine access covers (figure 18).

(15) connect tube assembly 12275811 to manual shut-off valve 45° elbow and to shroud elbow (figure 18). A 11/16-inch open-end box wrench will be required to tighten tube assembly to shroud elbow.

(16) Remove and retain screws and lockwashers (from positions, 2 and 6, figure 18) securing engine access covers.

(17) Install clamps MS21333-111 on tube assembly at positions 2 and 6 (figure 18). Secure clamps and engine access cover with screws and lockwashers removed in step 16.

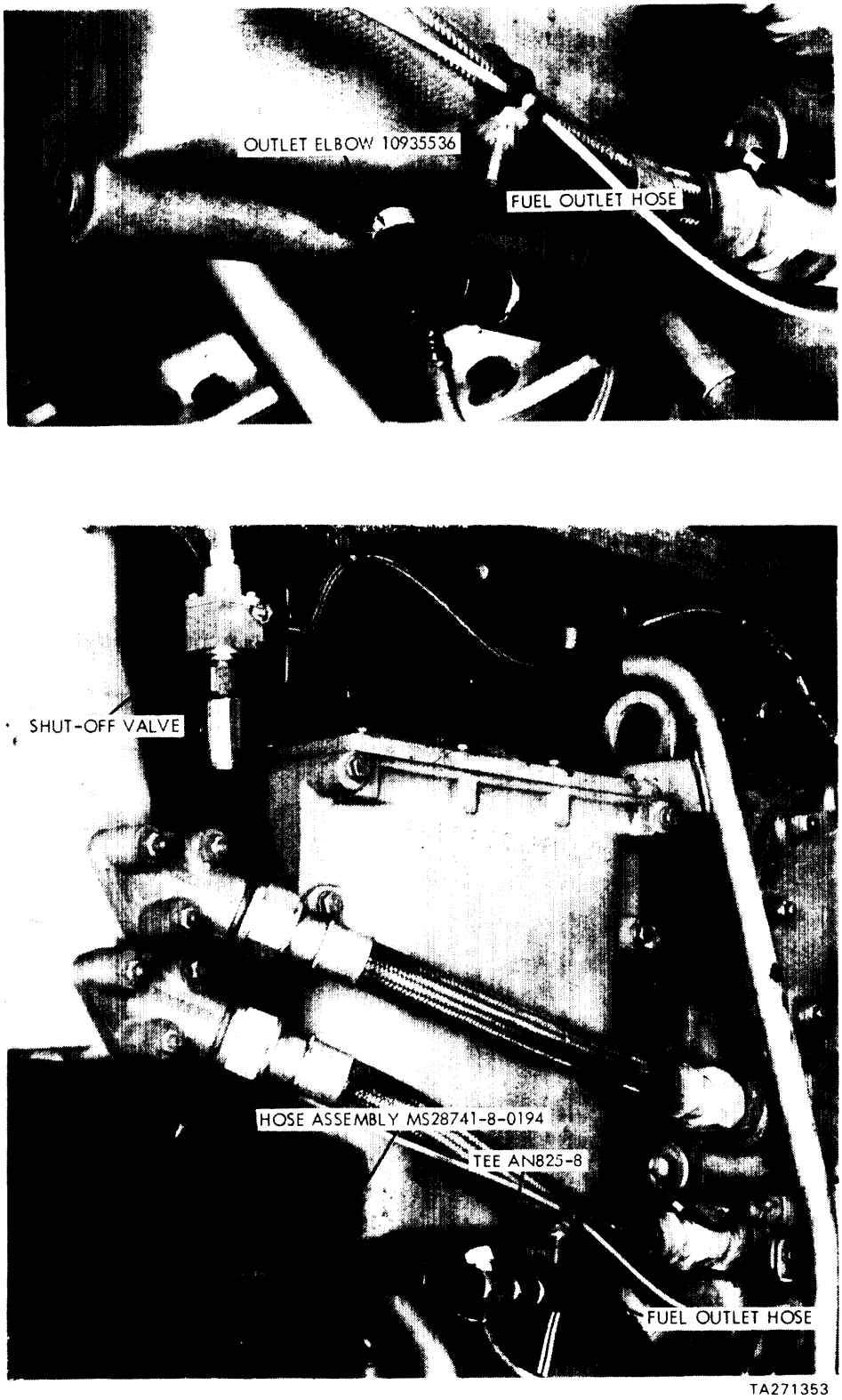


Figure 17. Installing Smoke System Fuel Supply Hose

Figure 18. Installation of Tube Assembly 12275811

e. *Installation of Solenoid Electrical Harness 12275718.*

(1) Connect harness 12275718 plug connectors to solenoid valve receptacle connectors (figure 19).

(2) Connect harness 12275718 ground lead to bracket 12275712 with screw MS90726-6 and nut MS21045-4 (figure 19). Lead should be secured behind bracket.

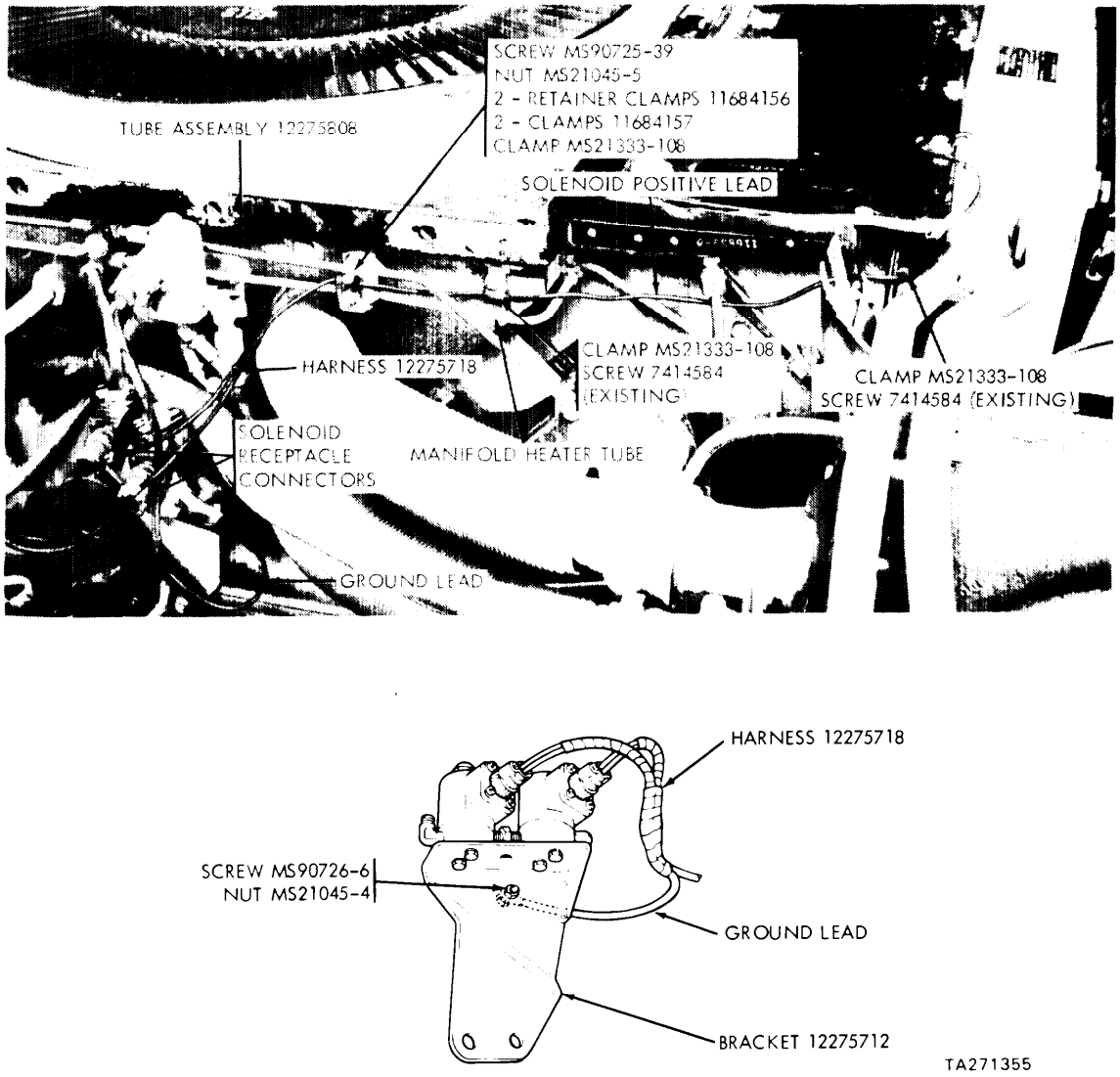


Figure 19. Installation of Solenoid Positive Leads to Solenoid Valves

NOTE

When installing lead loop clamps, insure lead remains in rubber of loop clamp and has not been pinched. Clamps should not be twisted when tightened down.

(3) Secure left bank tube assembly 12275808 and solenoid positive lead to left bank manifold heater tube with two retainer clamps 1168156, two clamps 11684157, lead clamp MS21333-108, screw MS90726-39, and nut MS21045-5 (figure 19).

(4) Secure solenoid positive lead to intermediate left bank transmission shroud with clamp MS21333-108 and existing screw 7414584 (figure 19).

(5) Secure positive lead to engine oil cooler support frame with clamp MS21333-108 and existing screw 7414584 (figure 19).

(6) Remove and discard existing screw (apposition 9, figures l8 and 20).

(7) Position clamp MS21333-111 on tube assembly 12275811 and clamp MS21333-108 on solenoid positive lead and secure clamps to engine access cover with screw MS90726-32 and lockwasher MS35335-34 (figure 20).

(8) Remove and retain existing screw at position 7, figures 18 and 20.

(9) position clamp MS21333-lo8 on solenoid positive lead and secure clamp at posit ion 7 (figure 20) with screw removed in step 8.

(10) Remove and retain securing hardware and remove starter harness retaining strap 11684276-2 and low voltage protection module harness clamp MS21333-125 (figure 21).

(11) Disconnect cable connector from low voltage protection module (figure 20.

(12) Remove five screws and lock washers securing bracket 12254374 to engine access cover (figure 21). Position bracket and cables aside.

(13) Place clamp MS21333-111 on tube assembly 12275811 at position 4 (figure 18 and 22). It may be necessary to loosen clamps at position 2 and 6 (figure 18) and install clamp at position 4.

NOTE

Be sure tabs of clamp MS21333-111 at position 4 are under bracket 12254374 when installing securing hardware.

(14) Replace bracket 12254374 onto engine access cover and secure with four of the screws and washer removed in step 12, (figure 22). Do not install screw and washer at positon 5 at this time, (figures 18 and 22).

(15) ,Remove four screws, nuts, and lockwashers securing positive starter harness receptacle to bracket 12254374 (figure 22).

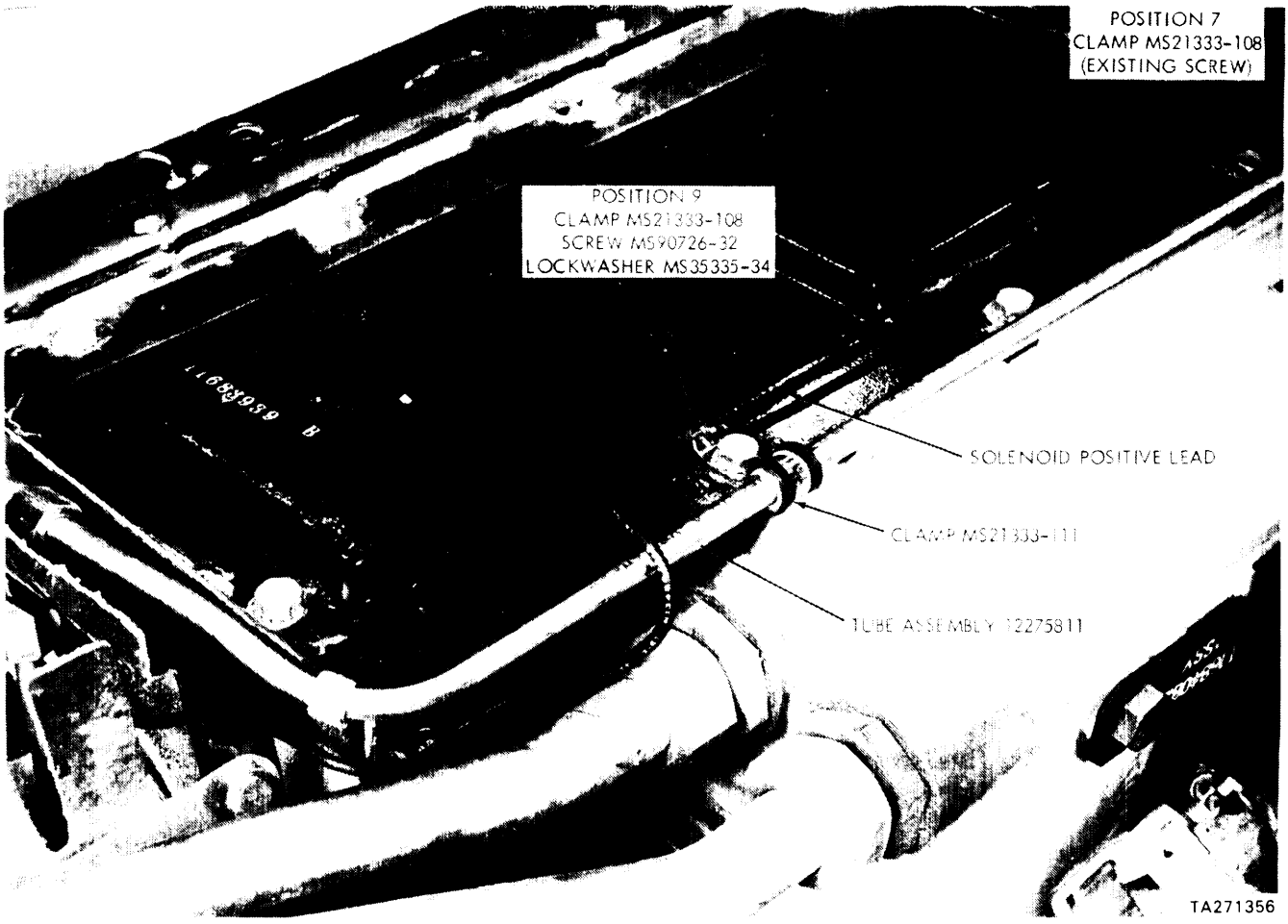


Figure 20. Routing of Solenoid Positive Lead

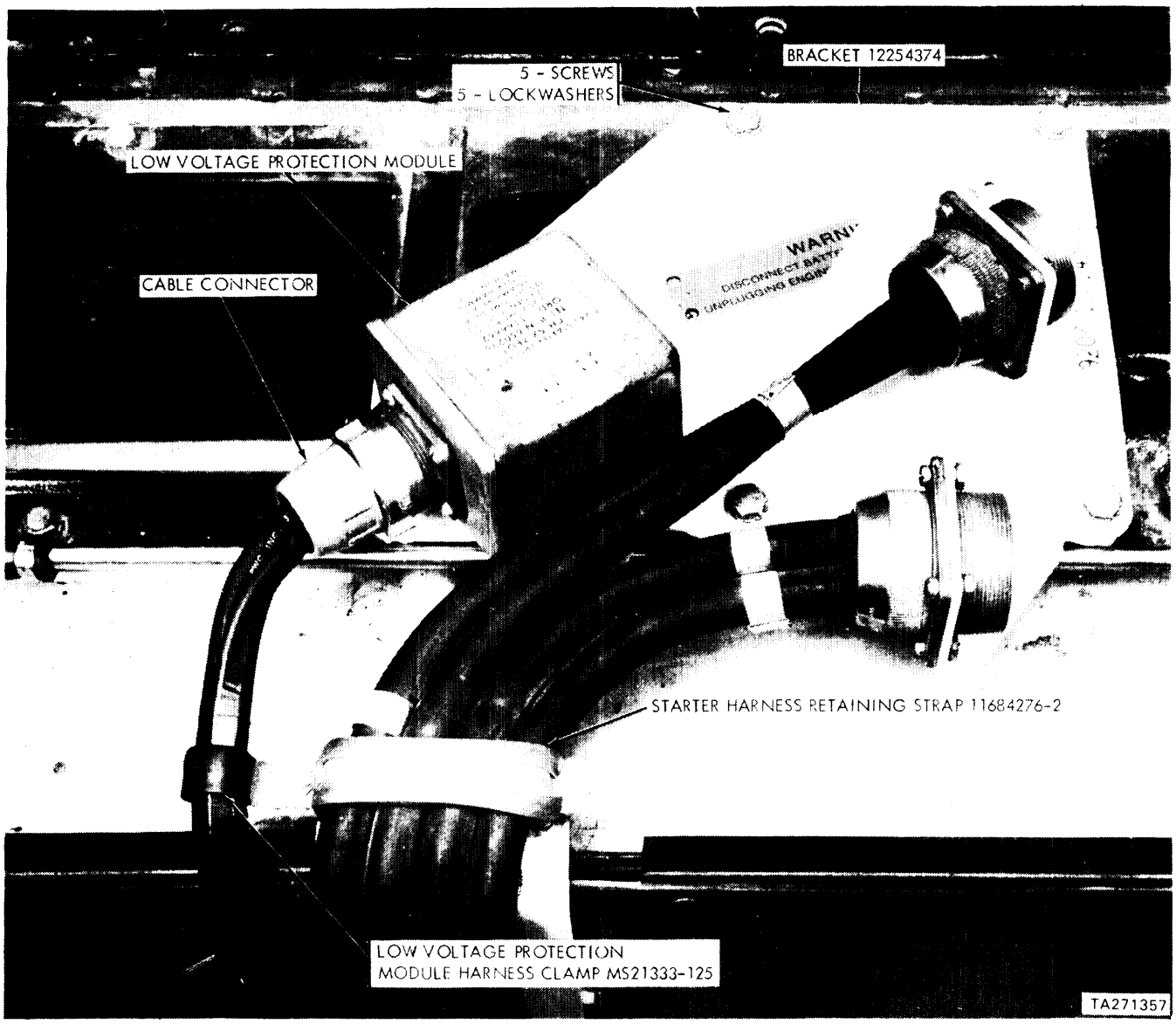


Figure 21. Starter Harness Disconnects and Low Voltage Protection Module

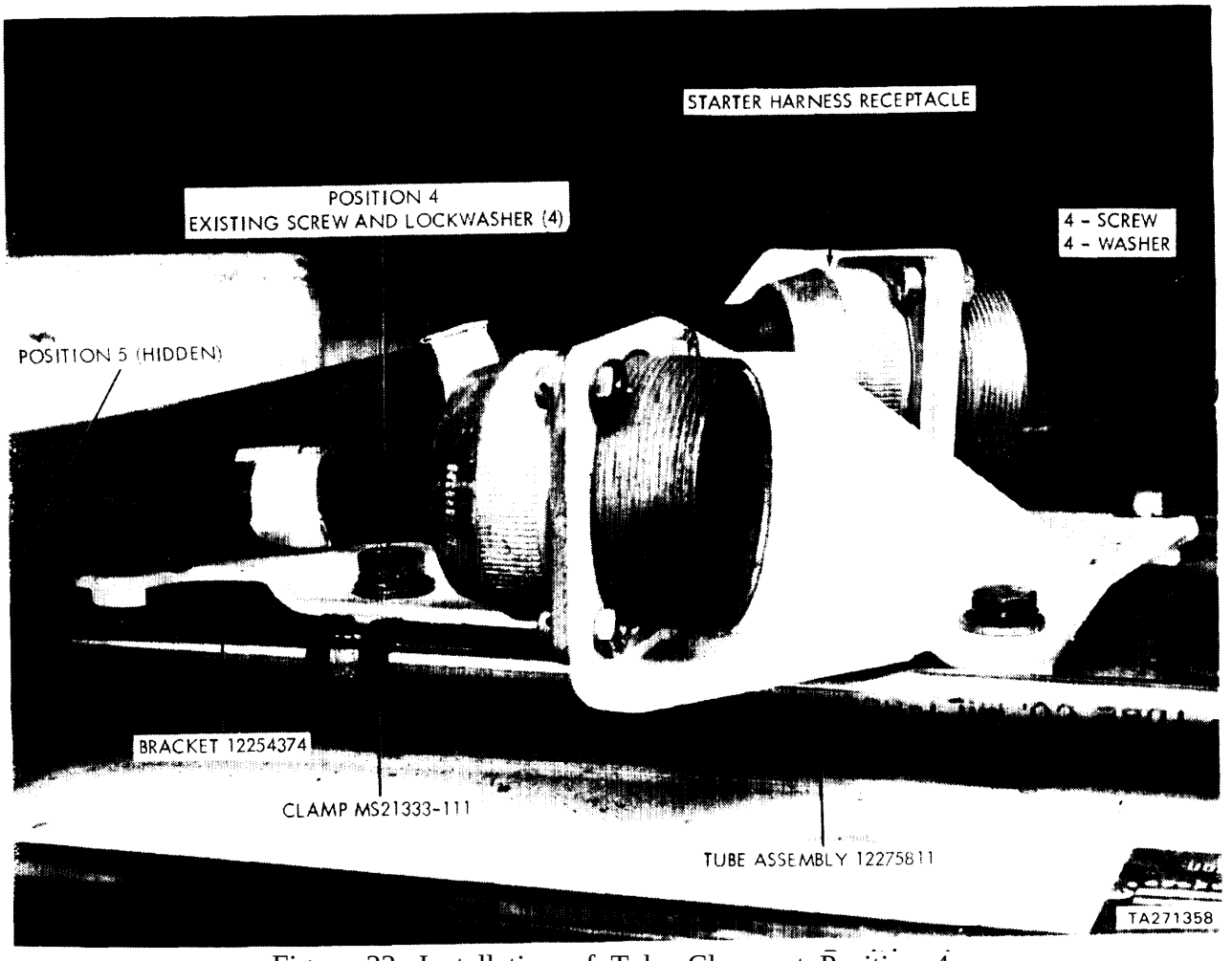


Figure 22. Installation of Tube Clamp at Position 4

(16) Unscrew retaining nut from positive starter harness receptacle connector and slide rubber bushing back over cables (figure 23). Silicone compound (MIL-S-8660) may be applied to cables to help bushing slide.

(17) Remove existing rubber plug and pin (male contact) from hole position 'A' (CKT 920A) of receptacle shell (figure 23).

(18) Apply silicone compound to solenoid positive lead and pin and thread through retaining nut and bushing and insert pin into shell position 'A' (Figure 23).

(19) Slide rubber bushing up against shell and install retaining nut (figure 23).

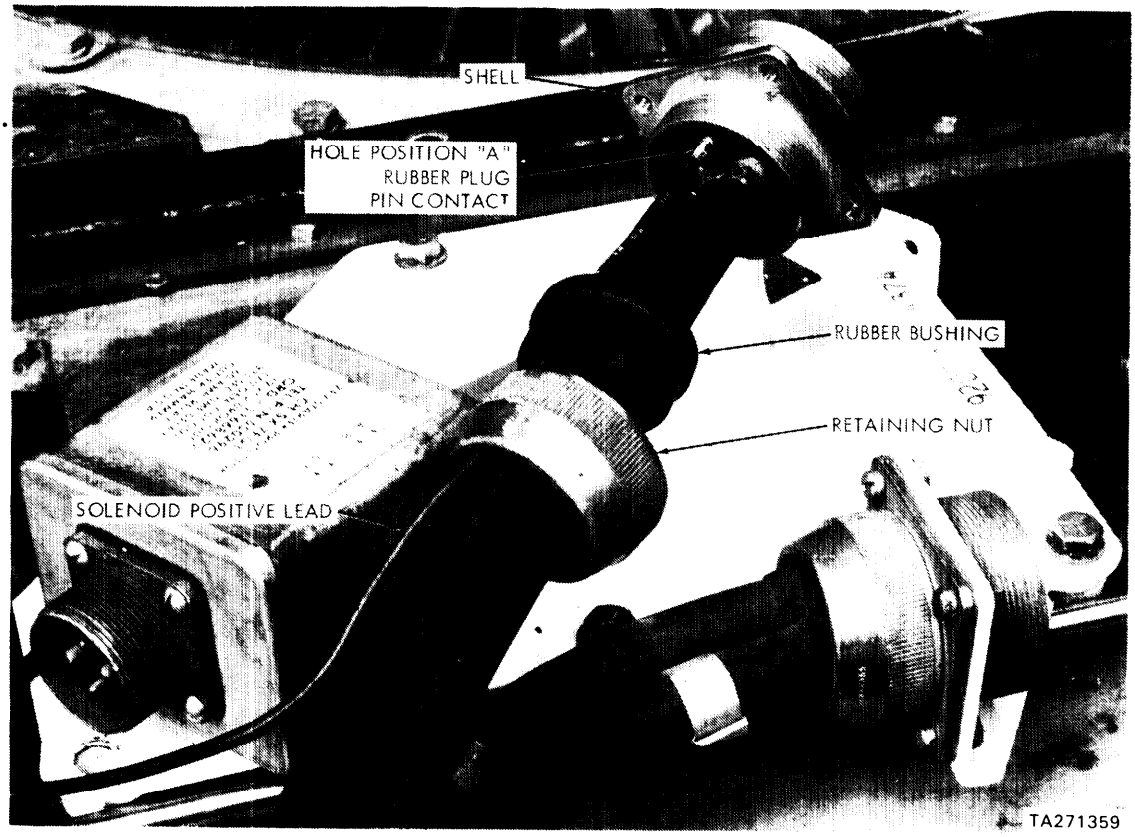


Figure 23. Installing Solenoid Positive Lead in Starter Harness/Receptacle

(20) Secure positive starter harness receptacle to bracket 12254374 with four screws MS35265-63, lockwashers MS35338-43, and nuts MS35649-202 (figure 24).

(21) Install clamp MS21333-108 on solenoid positive lead and secure with one screw and lockwasher removed instep 13 (figure 24). This screw also secures bracket 12254374.

(22) Connect cable connector to low voltage protection module (figure 25).

(23) Secure starter cables and low voltage module harness to engine oil cooler with strap 11684276-2, clamp MS21333-125, screw MS90726-4, screw MS90726-3, and two lockwashers MS35338-44 (figure 25).

NOTE

Check all fuel line connections to insure they are tight. Inspect wiring for neat and secure routing. Insure solenoid lead has not been damaged in any way during installation.

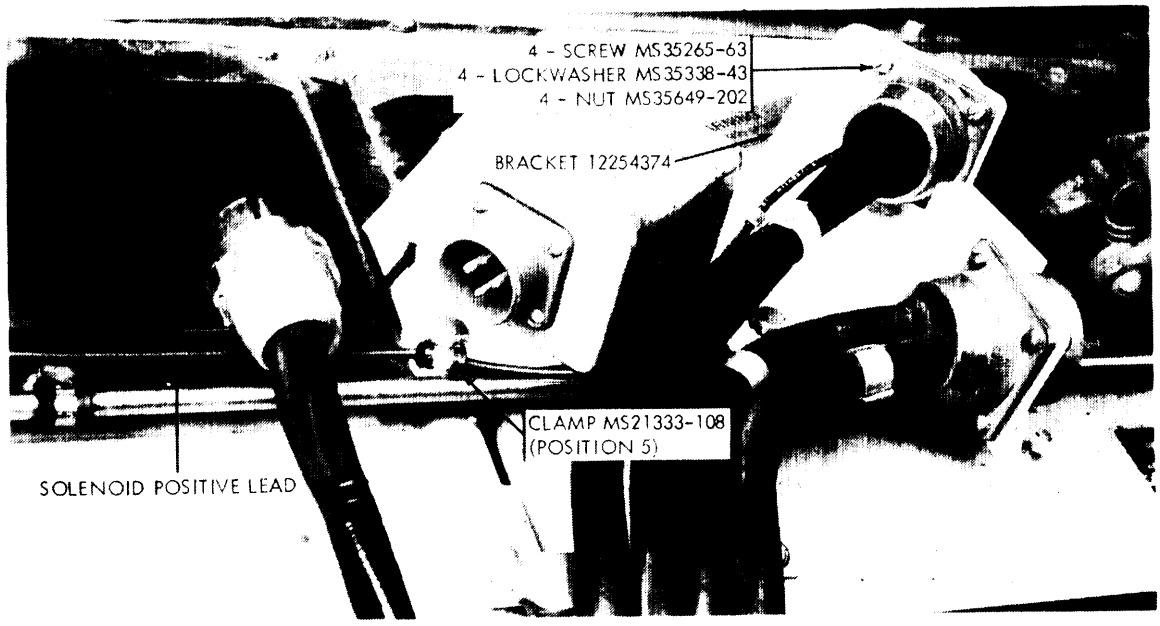


Figure 24. Installation of Solenoid Positive Lead Clamp at Position 5

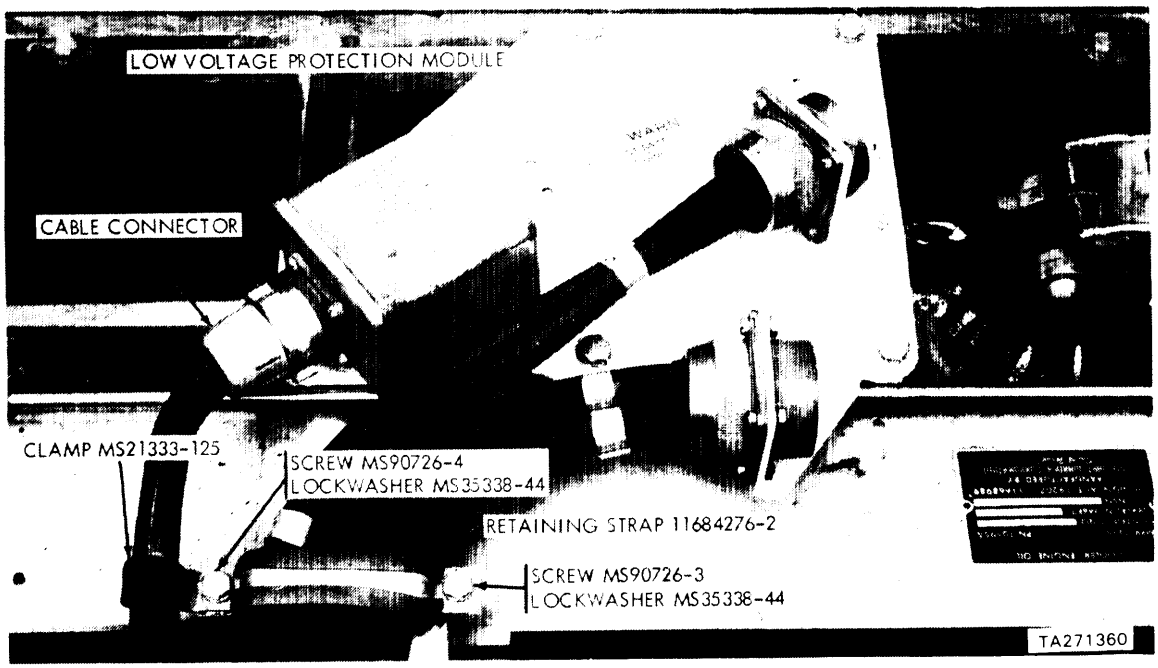


Figure 25. Securing of Harnesses

Section II. Assembly of Smoke Generator Switch Bracket

NOTE

These instructions apply for all vehicles.

(1) Using two Screws MS35206-245 and lockwashers MS35333-38, attach switch 12270522 and switch guard l1669488 to bracket 12270525 with switch at ON position at top and guard positioned to shut OFF when closed (figure 26).

(2) Attach cover plate 12250517 to switch bracket with four screws MS35206-245, flat washers MS27183-41, lockwashers MS35333-38, and nuts MS35649-282 (figure 26).

NOTE

- Be sure rubber gasket (which is part of base) is installed inside of indicator light base.
- Be sure to install lockwashers MS45904-57 between light base and switch bracket.

(3) Attach indicator light base 10933573 to back side of switch bracket with two screws MS35206-245, lockwashers MS45904-57, and lockwashers MS35333-38 (figure 26). Position two lockwashers MS45904-57 between light base and switch bracket.

(4) Install lamp MS25231-1829 into base (figure 26).

(5) Screw indicator light adapter 10924435 into indicator light base (figure 26).

(6) Install preformed packing (O-Ring) MS28775-119 and lens 10933574-1 on adapter (figure 26).

(7) Connect lead from switch to indicator light (figure 26).

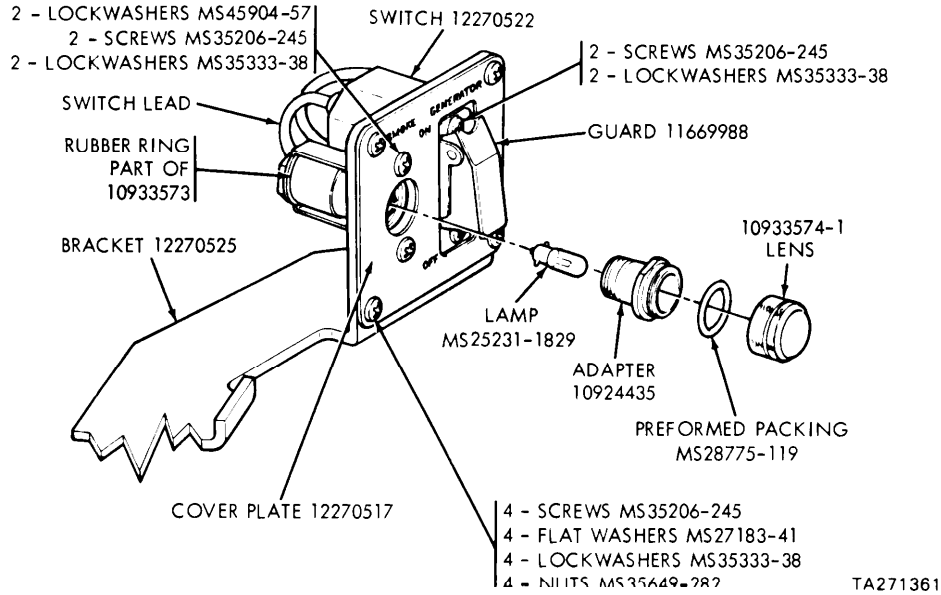


Figure 26. Assembly of Smoke Generator Switch Bracket

Section III. Hull Wiring Instructions for M60A3 and M60A1 (RSE) Vehicles

NOTE

Figures 33, 34, 35, 36 and 37 shown for reference and clarity.

(1) Inside driver's compartment, remove and discard four screws MS90726-6 and lockwashers MS35338-44 securing gage indicator panel to its mounting bracket (figure 27).

(2) Route switch plug connector end of harries assembly 12270526 along existing harness behind gage indicator panel and secure with existing clamps MS90350-23, as shown in figure 28, view A.

(3) Connect harness 12270526 plug connector to smoke generator switch assembly receptacle connector and attach switch bracket along with gage indicator panel-to-panel mounting bracket with four screws MS90726-9 and lockwashers MS35333-40 (figure 29).

NOTE

For vehicles without M-9 bulldozer, perform steps 1, 2, and 3, then steps 14 thru 25. For vehicles with M-9 bulldozer, perform steps 4 thru 25.

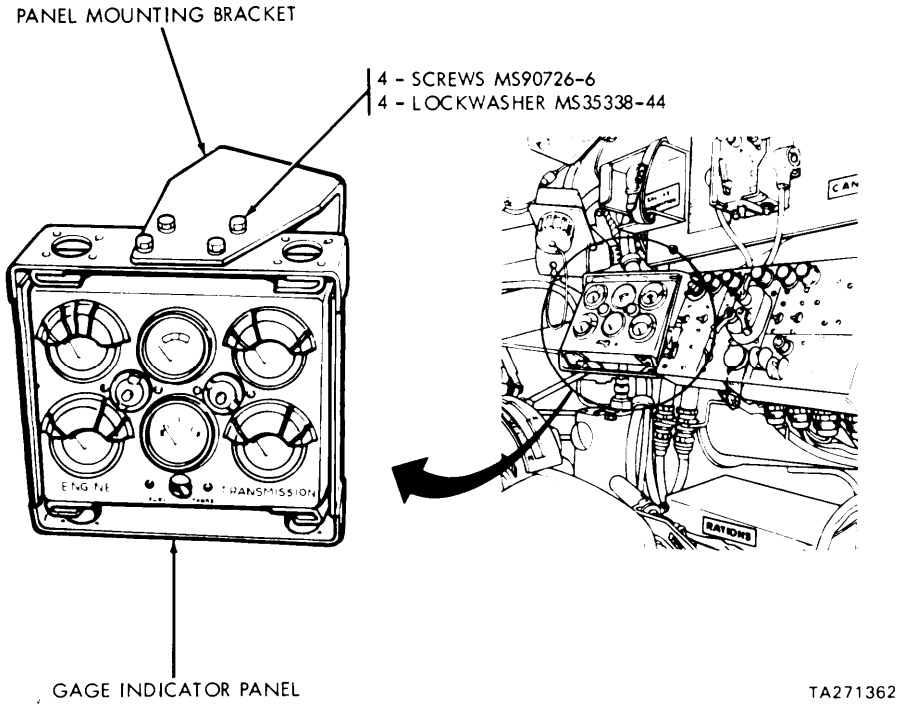


Figure 27. Removing Gage Indicator Panel

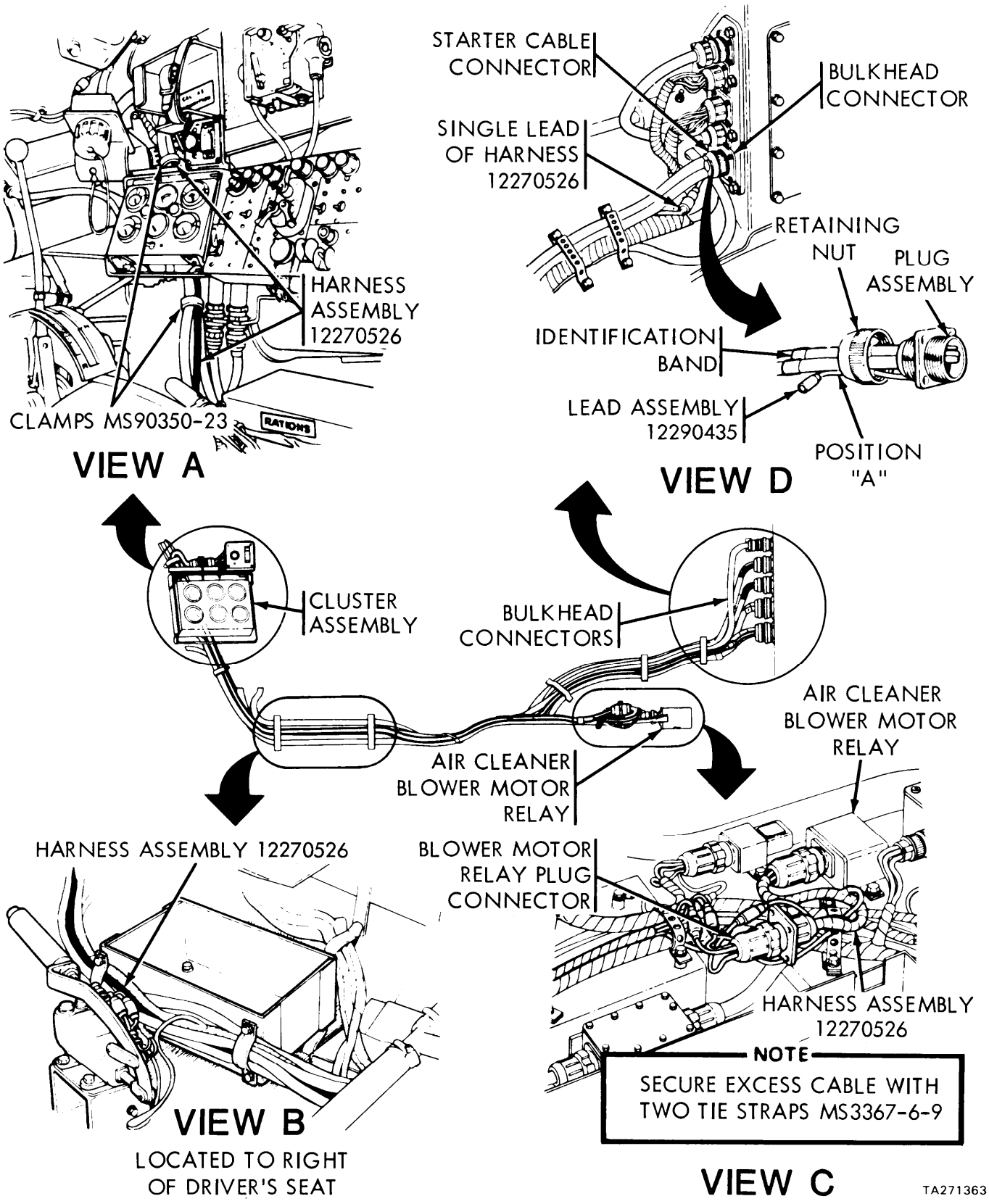


Figure 28. Installation of Hull Smoke Generator Harness

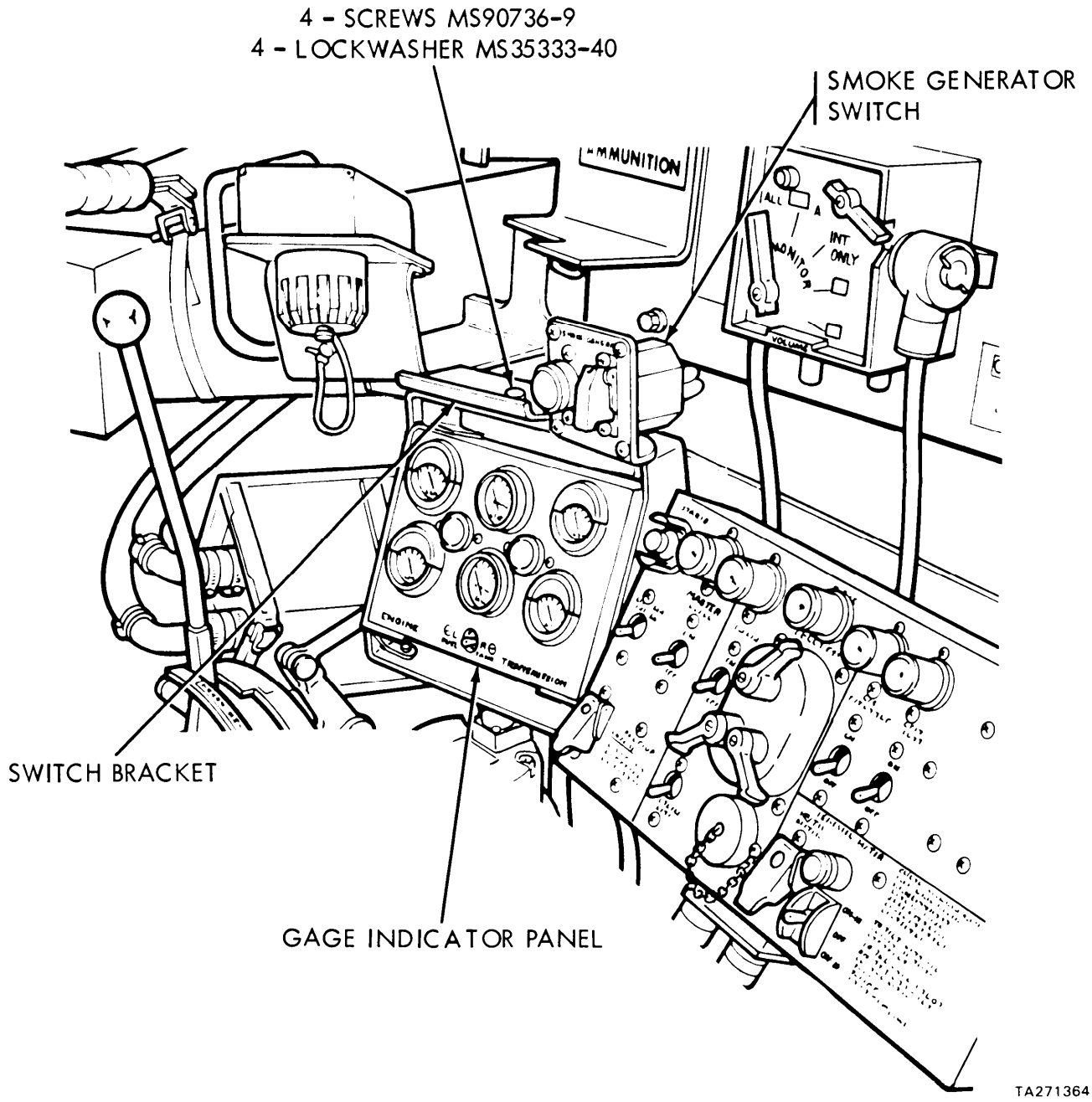


Figure 29. Smoke Switch Bracket Attached to Gage Indicator Panel

NOTE

For vehicles equipped with the M-9 bulldozer, the smoke generator switch assembly will be installed along with the hydraulic pump control panel on top of the gage indicator panel. In order to do this, the hydraulic pump bracket must be reworked. The following steps 4 thru 13 will detail this procedure.

(4) Inside driver's compartment, remove and discard four screws MS907 27-7 and lockwashers MS35333-40 securing hydraulic pump control panel and gage indicator panel to their mounting bracket (figure 30).

(5) Remove and retain hardware securing circuit breaker to hydraulic pump control bracket. Leave electrical leads connected and remove circuit breaker (figure 3O).

(6) Remove hydraulic pump indicator light lens (figure 30). Remove and retain hardware securing indicator light assembly to hydraulic pump control bracket. Leave electrical lead connected and remove indicator light assembly (figure 30).

(7) Remove and retain hardware securing hydraul.ic switch to hydraulic pump control bracket. Leave electrical leads connected and remove switch (figure 30).

(8) Rework hydraulic pump bracket as shown in figure 31.

(9) Reinstall hydraulic pump switch on reworked bracket with two screws MS35206-245 and lockwashers MS35333-38 (figure 30).

(10) Reinstall indicator light on reworked bracket with two screws MS35206-245 and lockwashers MS35333-38 and screw lens back on (figure 30).

(11) Reinstall circuit breaker on reworked bracket with two screws MS35206-245 and lockwashers MS35333-38 (figure 30).

(12) Route engine smoke harness 12270526 (switch plug connector end) along existing harness behind gage indicator panel and secure with existing clamps MS90350-23 as shown in figure 28, view A.

(13) Connect harness 12270526 plug connector to smoke generator switch assembly receptacle connector and attach smoke switch bracket and hydraulic pump switch bracket along with gage indicator panel-to-panel mounting bracket with four screws MS90726-9 and lockwashers MS35333-40 (figure 32).

(14) Route smoke harness 12270526 back along existing harnesses to the air cleaner blower motor relay (figure 28, view B and C) and route single lead Of smoke harness Positive lead up to bulkhead disconnects (figure 28, view D). Do not secure harness at this time.

(15) Disconnect blower motor relay plug connector and connect one end of smoke harness 12270526 to the relay and the other end to the connector as shown in figure 28, view C.

(16) Secure smoke harries along existing harness from the switch to the relay and secure with the existing retaining straps as shown in figure 28. Additional harness retaining strap 10905840 is supplied in kit if needed.

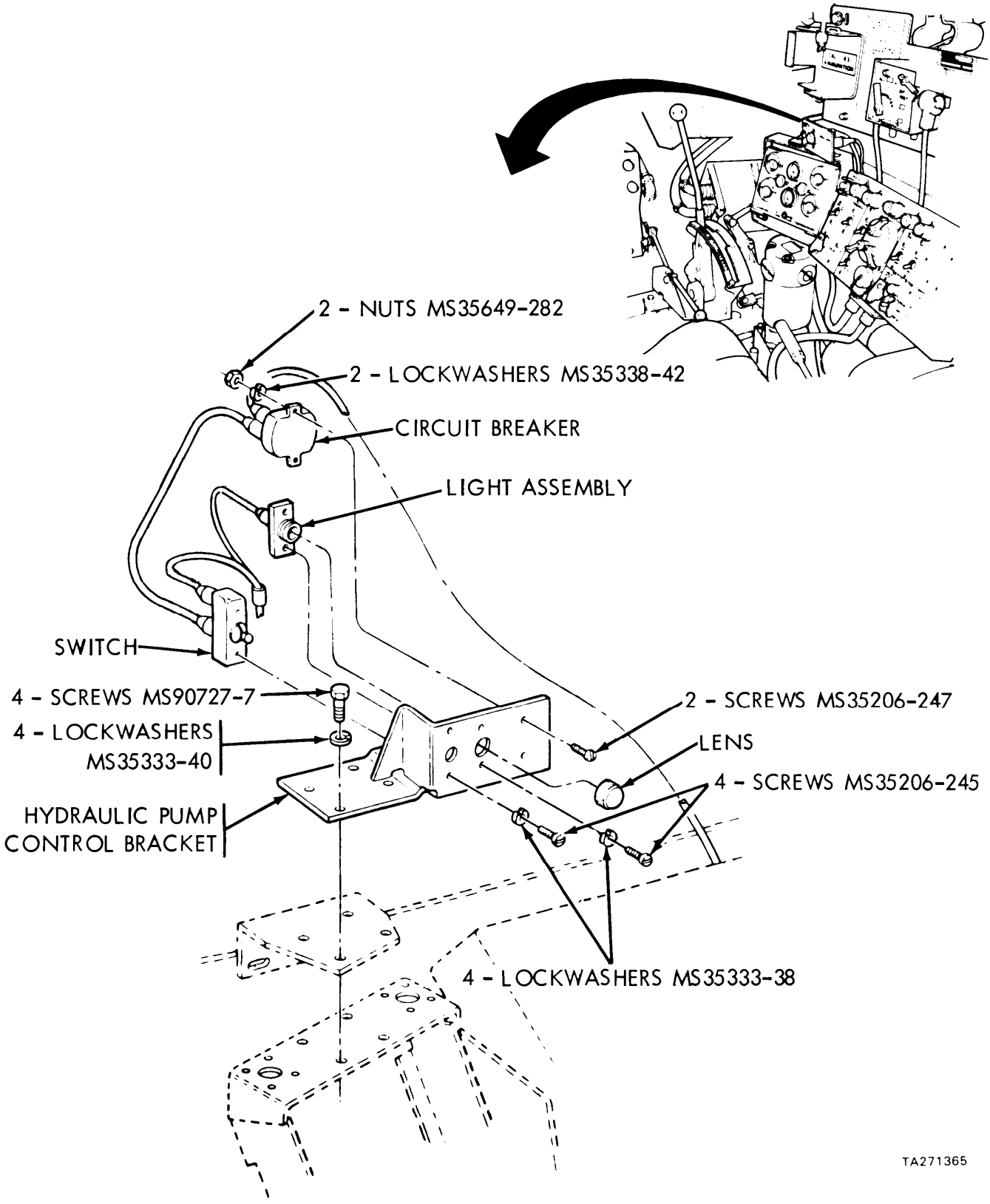


Figure 30. Exploded View of Hydraulic Pump Control Bracket

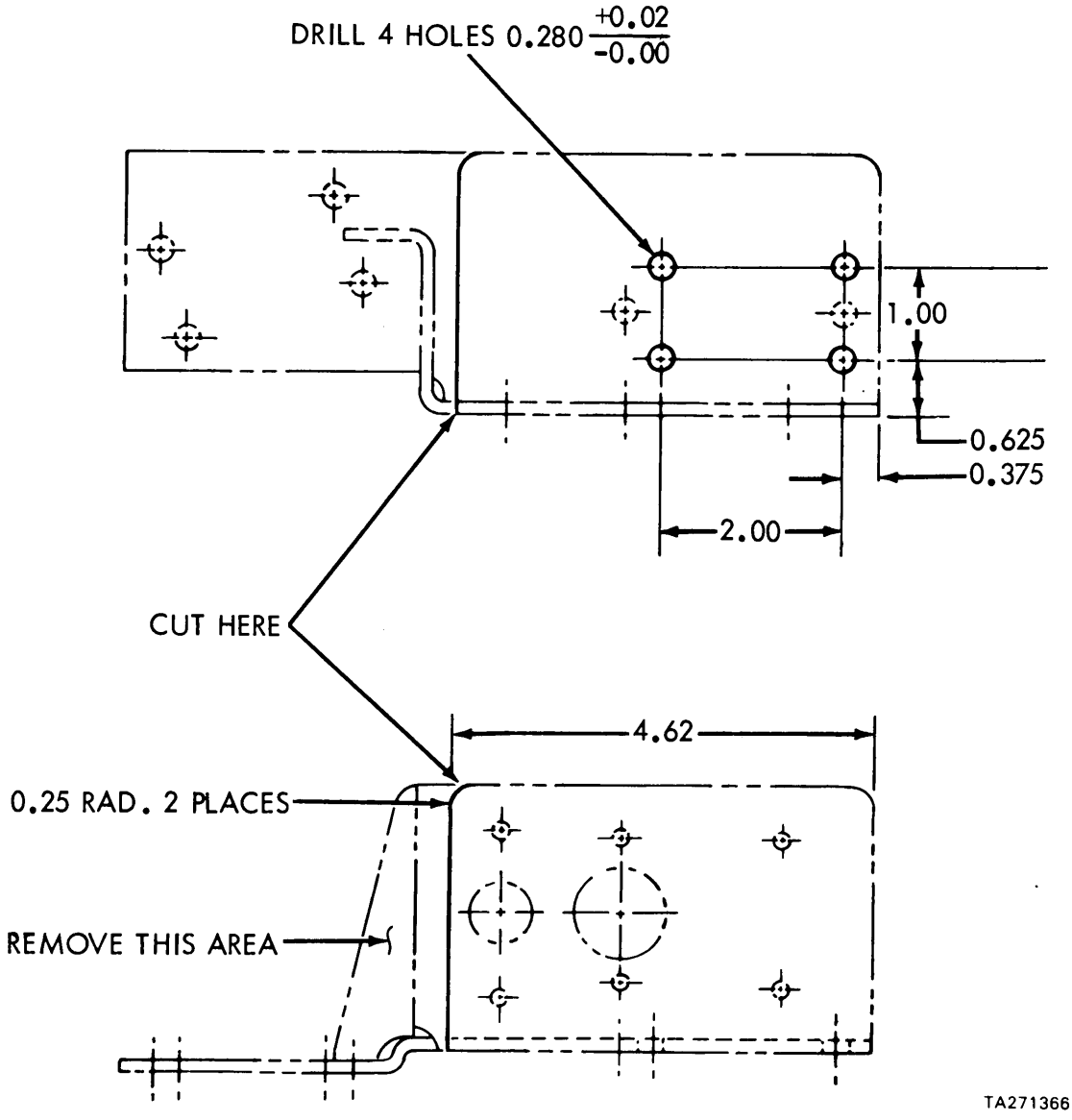


Figure 31. Hydraulic Pump Bracket Rework Drawings

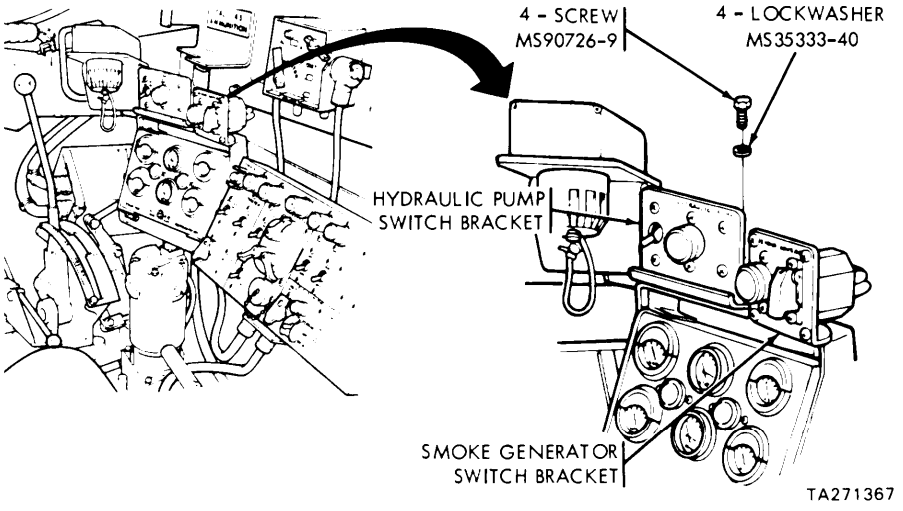


Figure 32. Hydraulic Pump and Smoke Generator Switch Brackets Mounted to Gage Indicator Panel (used on vehicles equipped with M-9 Bulldozer)

(17) Secure harness receptacle connectors and excess cable at the relay with two tie straps MS3367-6-9 (figure 28, view C).

(18) Disconnect the three harness securing straps back from bulkhead disconnects.

(19) Disconnect starter cable connector at the bulkhead (figure 28, view D).

(20) Back off retaining nut from plug assembly and remove existing rubber filler plug and contact from location "A" (figure 28, view D).

(21) Install socket contact end of lead assembly 12290435 through retaining nut and into hold position "A" (figure 28, view D). To aid in installation, lube socket and grommet hole with silicone compound MIL-S-8660. Assemble retaining nut to plug assembly.

(22) Remove and discard existing identification band (harness part. no. 11673827) from starter harness (figure 28, view D).

(23) Stamp harness part number 12290437 into new identification band MS43436/1-3 and apply to starter harness (figure 28, view D).

(24) Reconnect starter cable connector to bulkhead and connect single lead of harness 112270526 to lead assembly 12290435 (figure 28, view D). Use silicone compound if needed.

(25) Secure single lead of smoke harness with the **existing** securing straps.

NOTE

Check harness routing and connections to insure a neat and secure installation.

Section IV. Hull Wiring Instruction for M60A1 and M728 Vehicles

(1) Assembly smoke generator switch bracket (refer to section II).

(2) Remove and discard the four screws MS90726-6 and lockwashers MS35338-44 that secure the gage indicator panel to its mount (refer to figure 27).

NOTE

For vehicles equipped with the M-9 bulldozer, the smoke generator switch assembly will be installed along with the hydraulic pump control panel on top of the gage indicator panel. In order to do this, the hydraulic pump bracket must be reworked. The following steps 3 thru 13 will detail this procedure.

(3) Inside driver's compartment, remove and discard four screws MS90727-7 and lockwashers MS35333-40 securing hydraulic pump control panel and gage indicator panel to their mounting bracket (figure 30).

(4) Remove and retain hardware securing circuit breaker to hydraulic pump control bracket. Leave electrical leads connected and remove circuit breaker (figure 30).

(5) Remove hydraulic pump indicator light lens (figure 30). Remove and retain hardware securing indicator light assembly to' hydraulic pump control bracket. Leave electrical lead connected and remove indicator light assembly (figure 30).

(6) Remove and retain hardware securing hydraulic switch to hydraulic pump control bracket. Leave electrical leads connected and remove switch (figure 30).

(7) Rework hydraulic pump bracket as shown in figure 31.

(8) Reinstall hydraulic pump switch on reworked bracket with two screws MS35206-245 and lockwashers MS35333-38 (figure 30).

(9) Reinstall indicator light on reworked bracket with two screws MS35206-245 and lockwashers MS35333-38 and screw lens back on (figure 30).

(10) Reinstall circuit breaker on reworked bracket with two screws MS35206-245 and lockwashers MS35333-38 (figure 30).

(11) Install previously assembled switch bracket assembly to the gage indicator panel in position shown with four screws MS90726-9 and four lockwashers MS35333-40 (refer to figures 38, 39, 40 and 41).

NOTE

(a) For M728 vehicles the existing hydraulic pump control panel bracket 10951574 must be installed along with the switch bracket 12270525 (refer to figures 39 and 40).

NOTE

(b) For M60A1 vehicles equipped with a dozer kit, the existing hydraulic pump control panel bracket 10951613 must be reworked as shown and installed along with the switch bracket 12270525 (refer to figures 39 and 40).

(12) Remove and retain one screw, lockwasher, and flat washer from each of the wiring harness securing straps 10905840 as shown (refer to figures 38 and 39).

(13) Connect the kit wiring harness switch receptacle to the switch connector and secure the wiring harness with clamp MS21333-100, screw MS90725-7, lockwasher MS35337-25, flat washer MS27183-11, and nut MS35690-402 to personnel heater fuel pump as shown. Discard existing screw MS90725-6 (refer to figures 38, 39, 40 and 41).

(14) Route the kit harness 12270526 along the existing harness to the air cleaner blower motor relay. Disconnect the relay receptacle and connect the kit harness spliced jumper into the relay circuit (refer to figures 38, 39, 40, 41, 42 and 43).

(15) Secure the receptacle and excess cable with two straps MS3367-6-9 as shown (refer to figures 40 and 41).

(16) Route the single lead of the kit wiring harness, along the existing harness, up to the starter harness receptacle (refer to figures 40 and 41).

(17) Remove electrical disconnect plate and disconnect starter cable connector at the bulkhead (figure 28, view D).

(18) Back off retaining nut from plug assembly and remove existing filler rod and ‘ contact from location “A” (figure 28, view D).

(19) Install socket contact end of lead assembly 12290435 through retaining nut and into hold positon “A” (figure 28, view D). To aid in installation, lube socket and groin met hole with silicone compound MIL-S-8660. Assemble retaining nut to plug assembly.

(20) Remove and discard existing identification band from starter harness (figure 28, view D).

(21) Stamp harness part no. 12290436 into new identification band MS43436/1-3 for the M60A1 and M728 vehicles (refer to figures 40, 41, 42 and 43).

(22) Reconnect starter cable connector to bulkhead and connect single lead of harness 12270526 to lead assembly 12290435 (figure 28, view D). Use silicone Compound if needed.

(23) Secure single lead of smoke harness with the existing securing straps.

NOTE

Check harness routing and connections to insure a neat and secure installation.

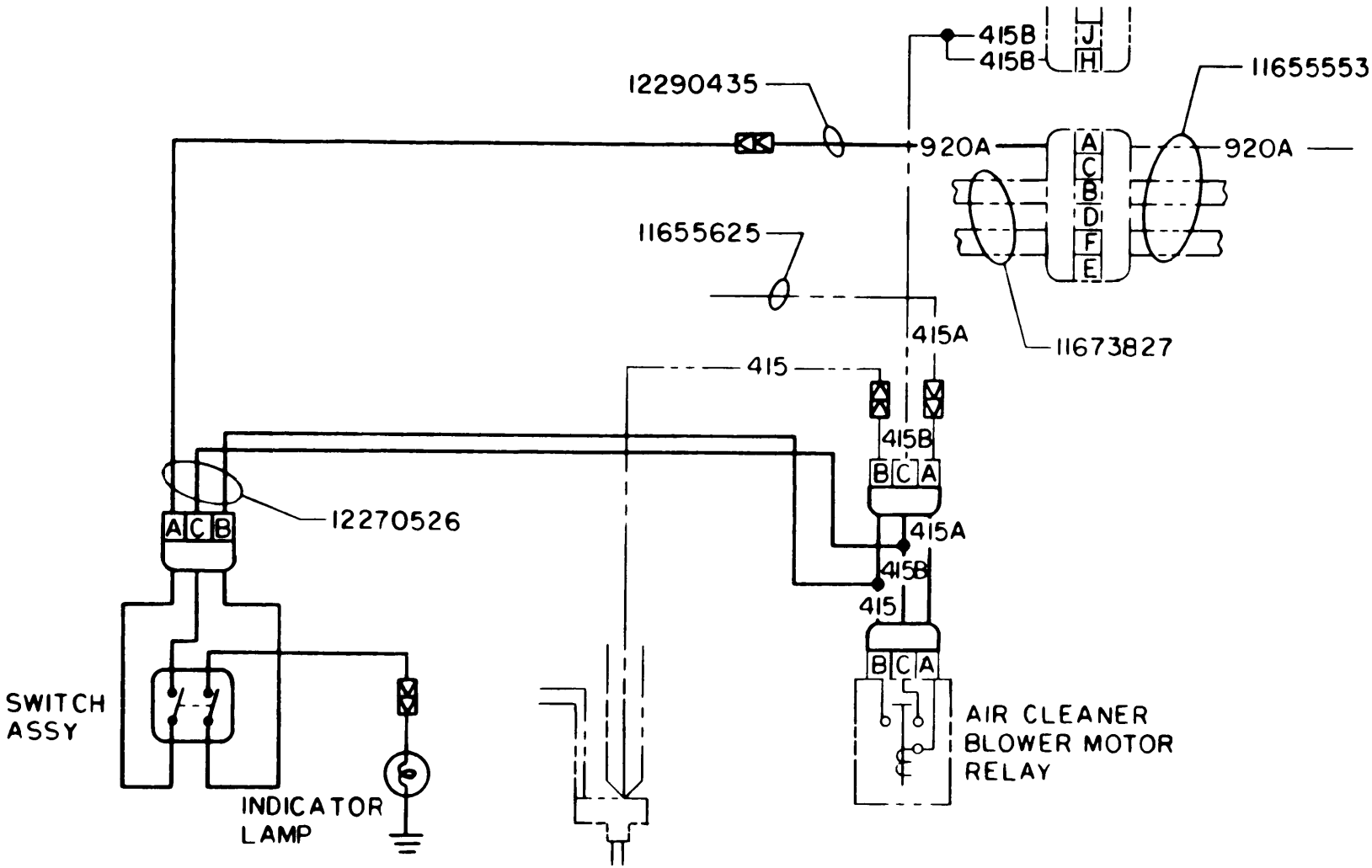


Figure 33. Hull Wiring Diagram for M60A3 and M60A1 RISE

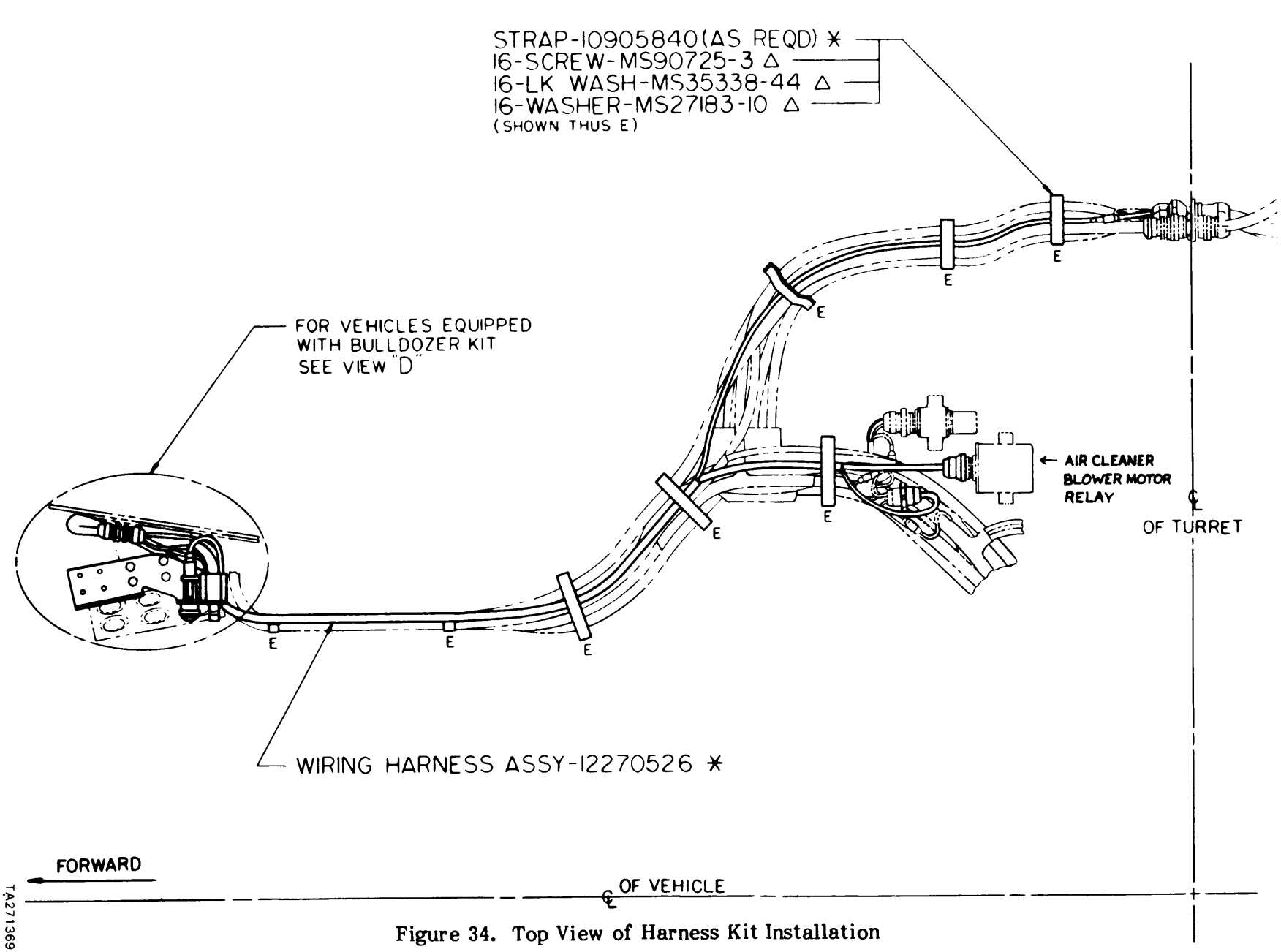


Figure 34. Top View of Harness Kit Installation

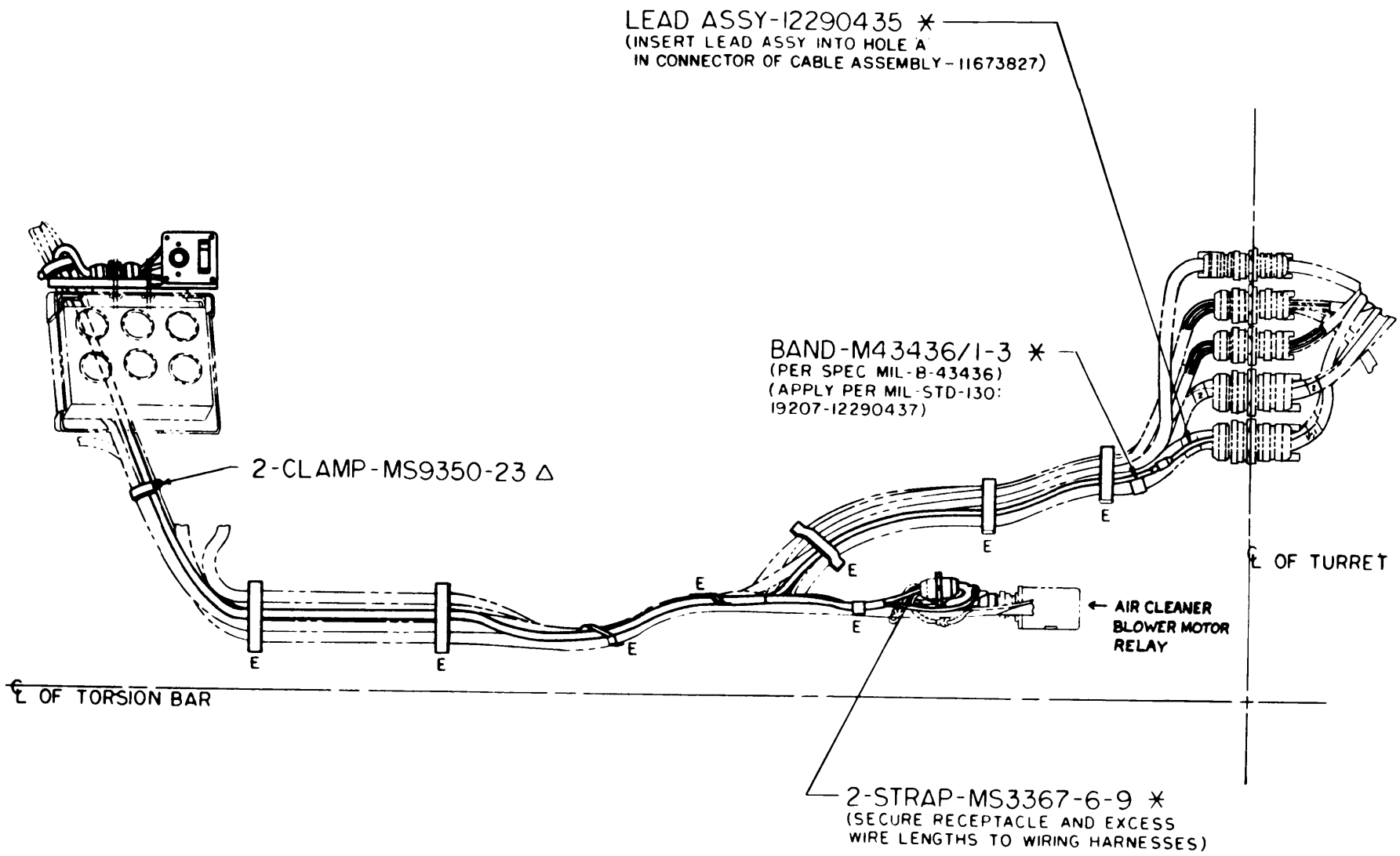


Figure 35. Installation of Lead Assembly and Harness Clamps and Straps

TA271371

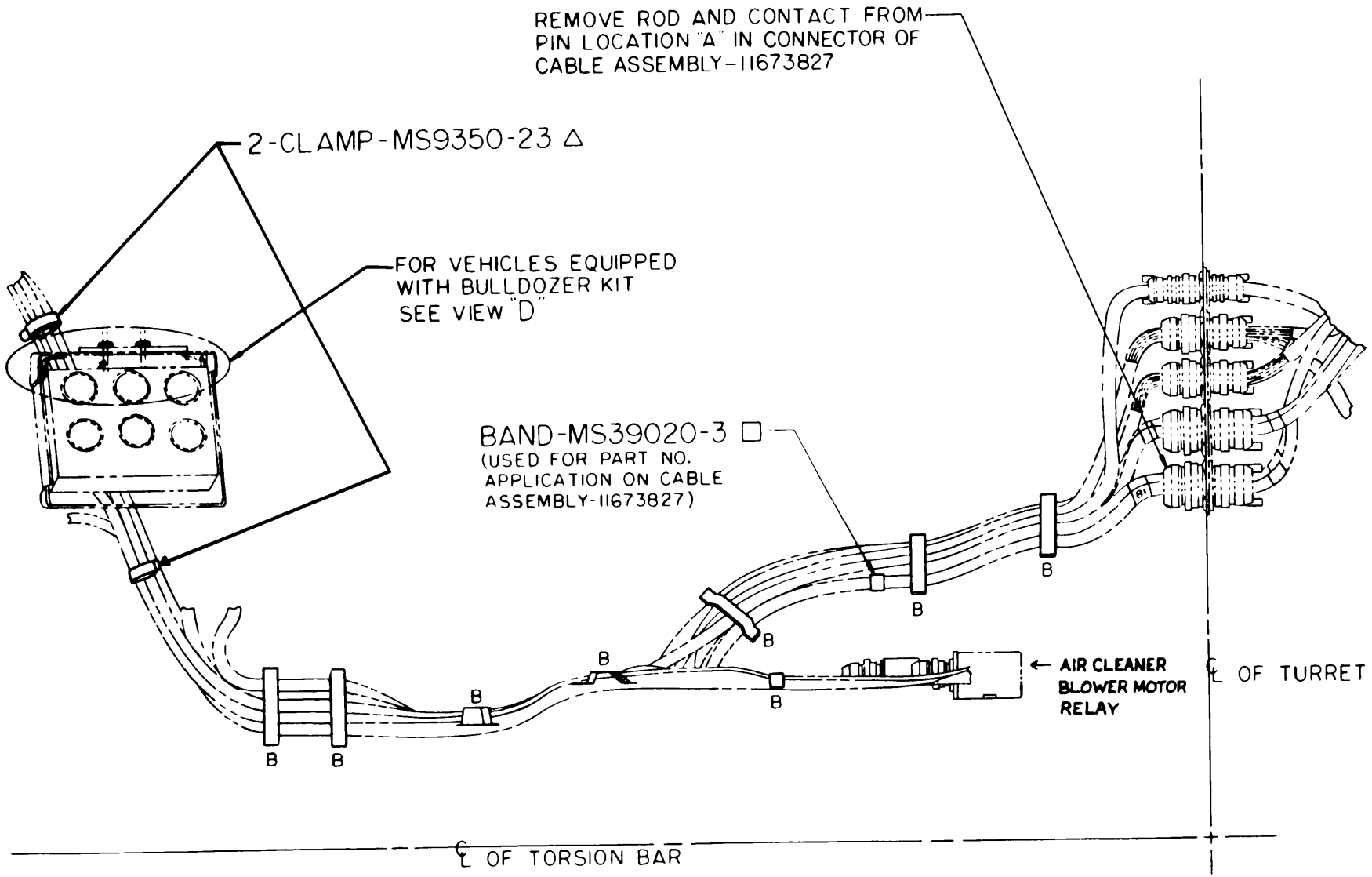


Figure 36. Removal of Filler Rod and Contact from Pin Location "A"

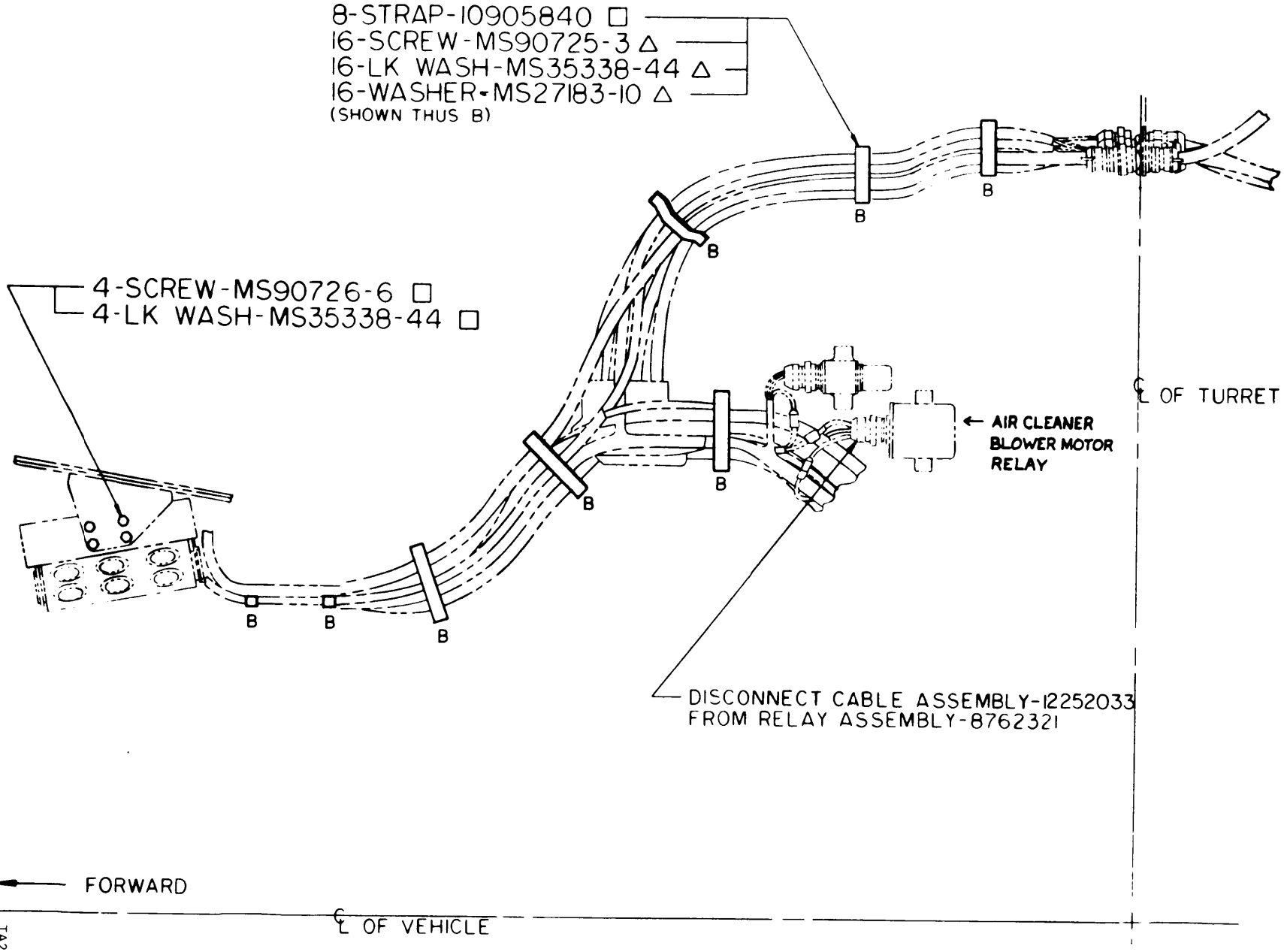


Figure 37. Removal of Harness Straps and Gage Panel

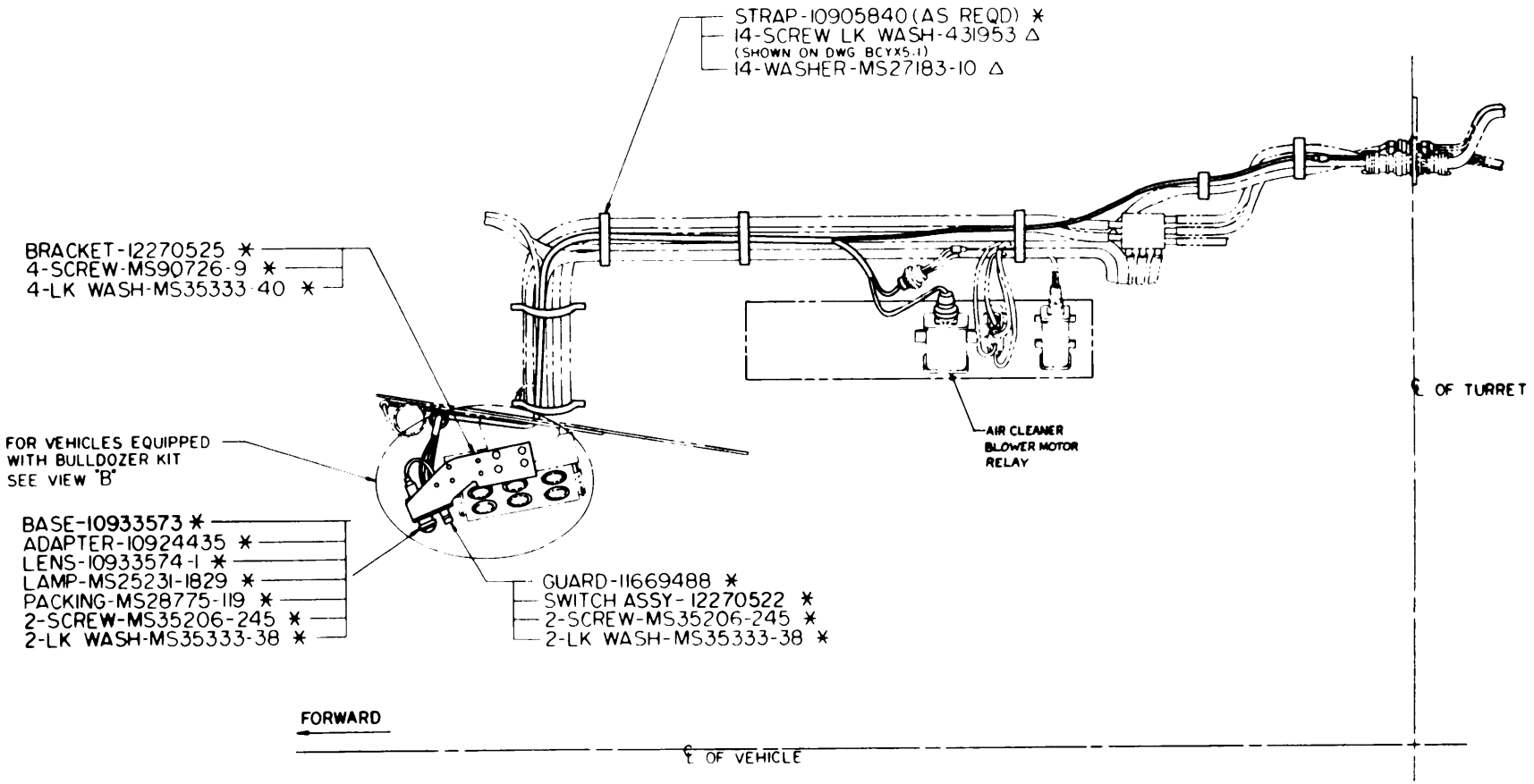


Figure 38. Top View of Harness Kit Installation for M60A1

TA271373

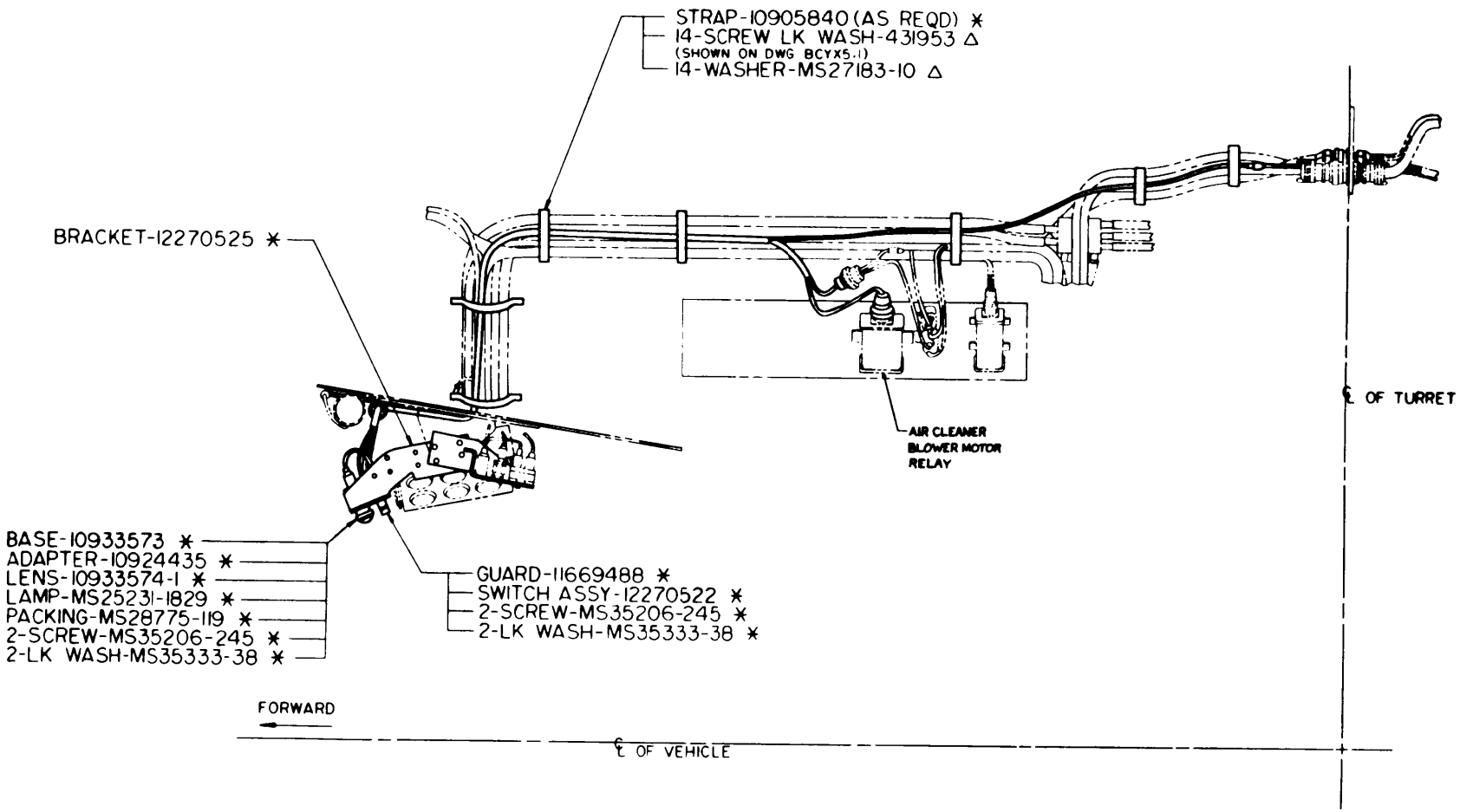


Figure 39. Top View of Harness Kit Installation for M728

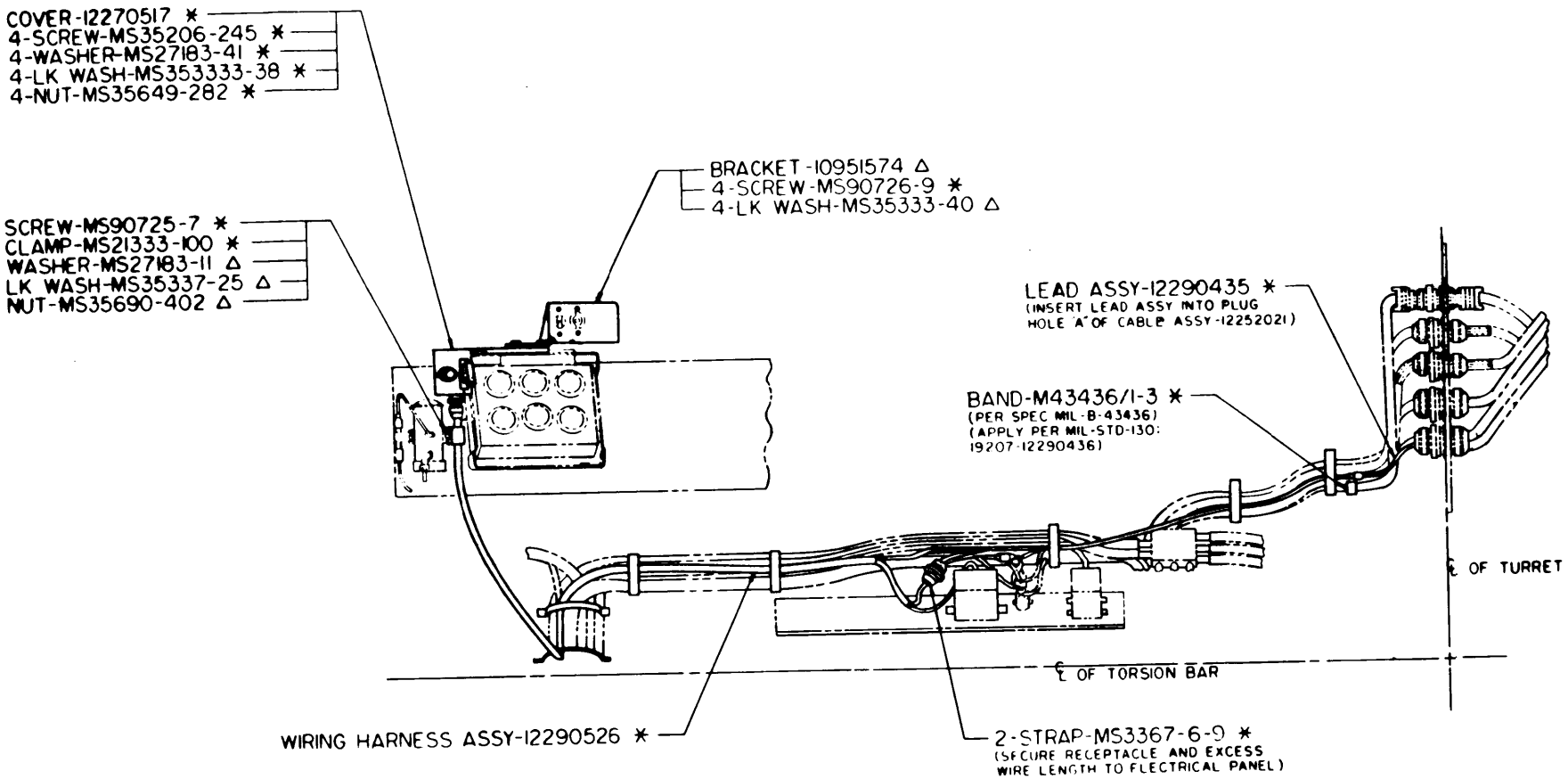


Figure 40. Front View of Harness Kit Installation for M728

TA271375

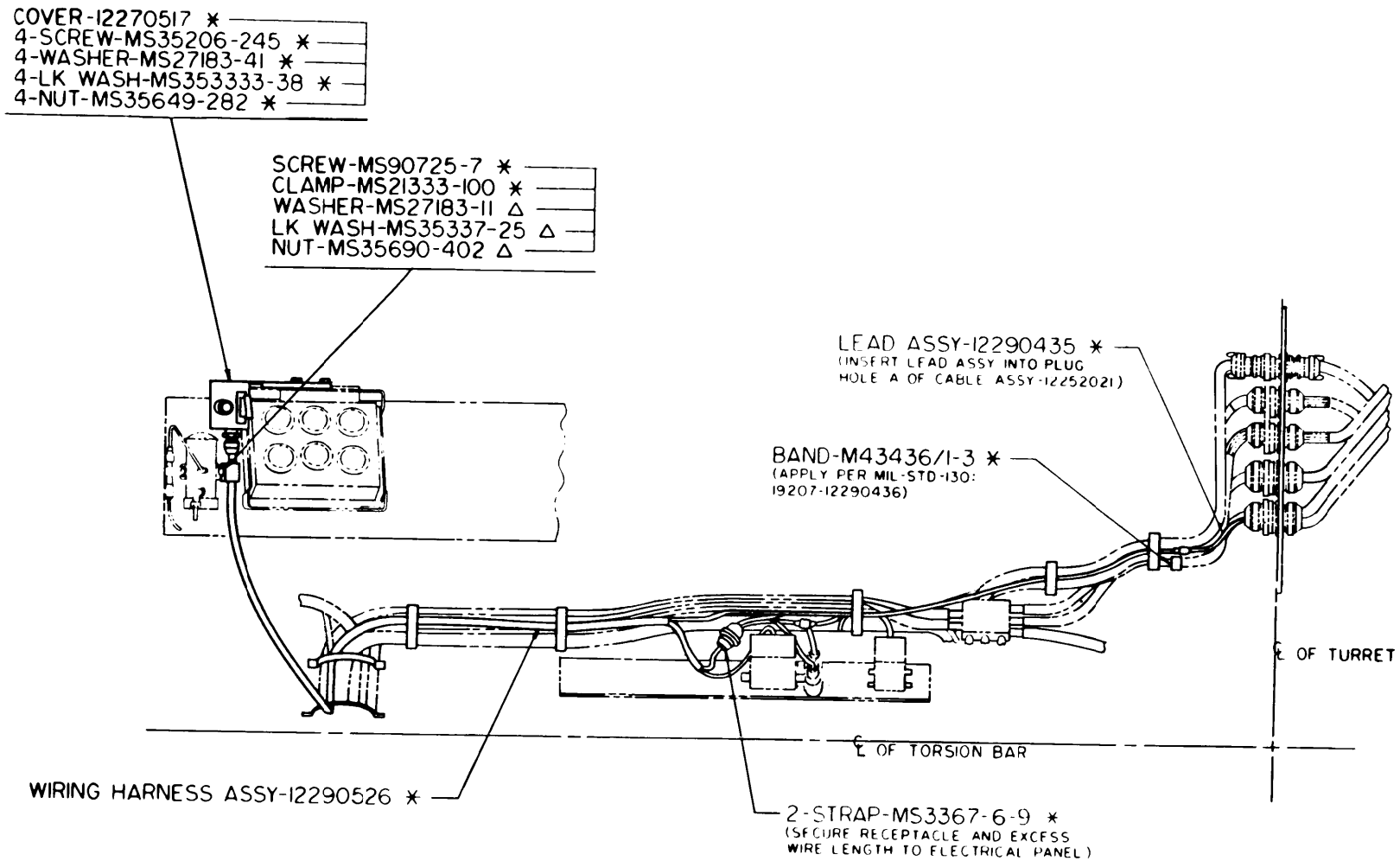


Figure 41. Front View of Harness Kit Installation for M60A1

TA271376

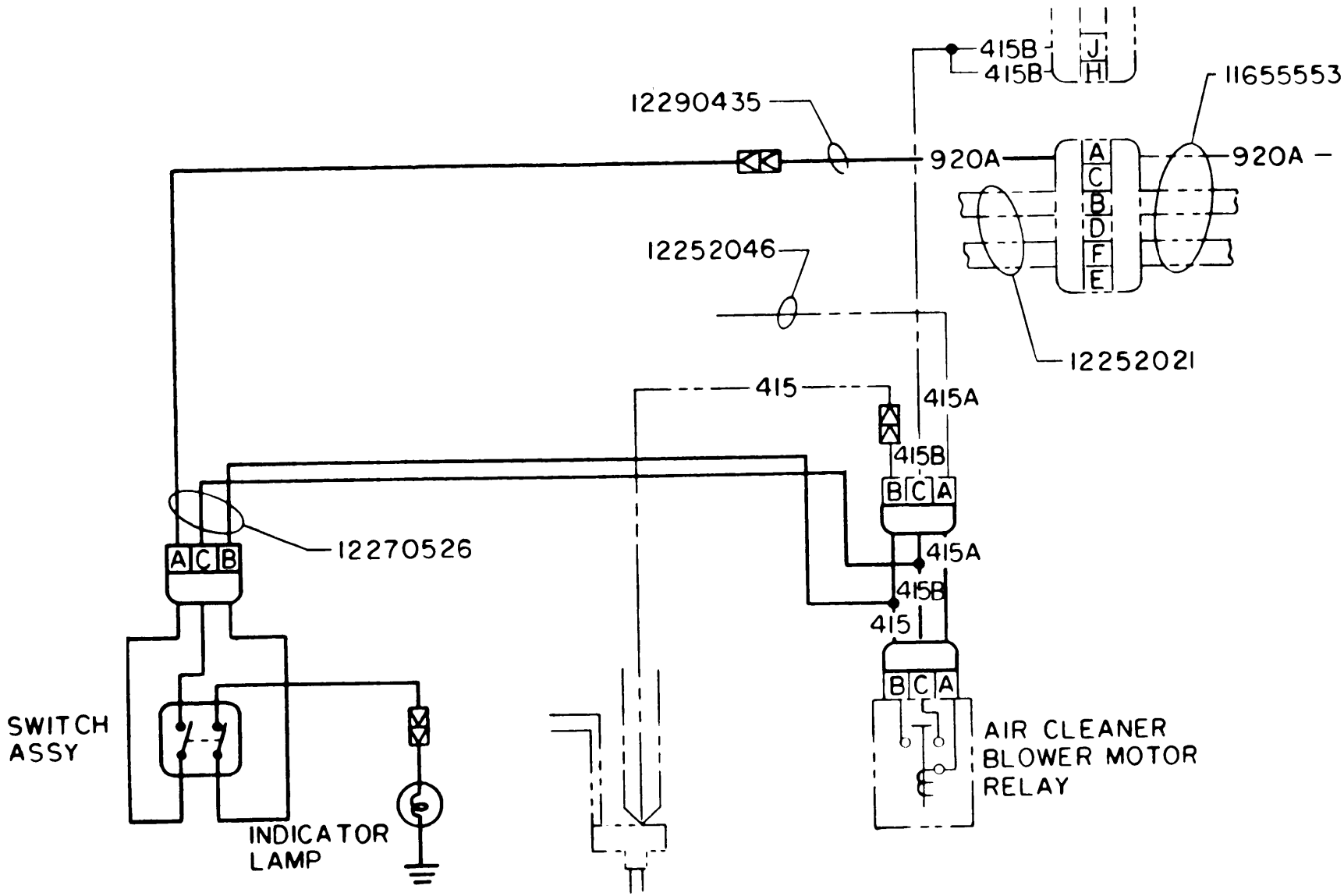


Figure 42. Hull Wiring Diagram for M60A1

TA271377

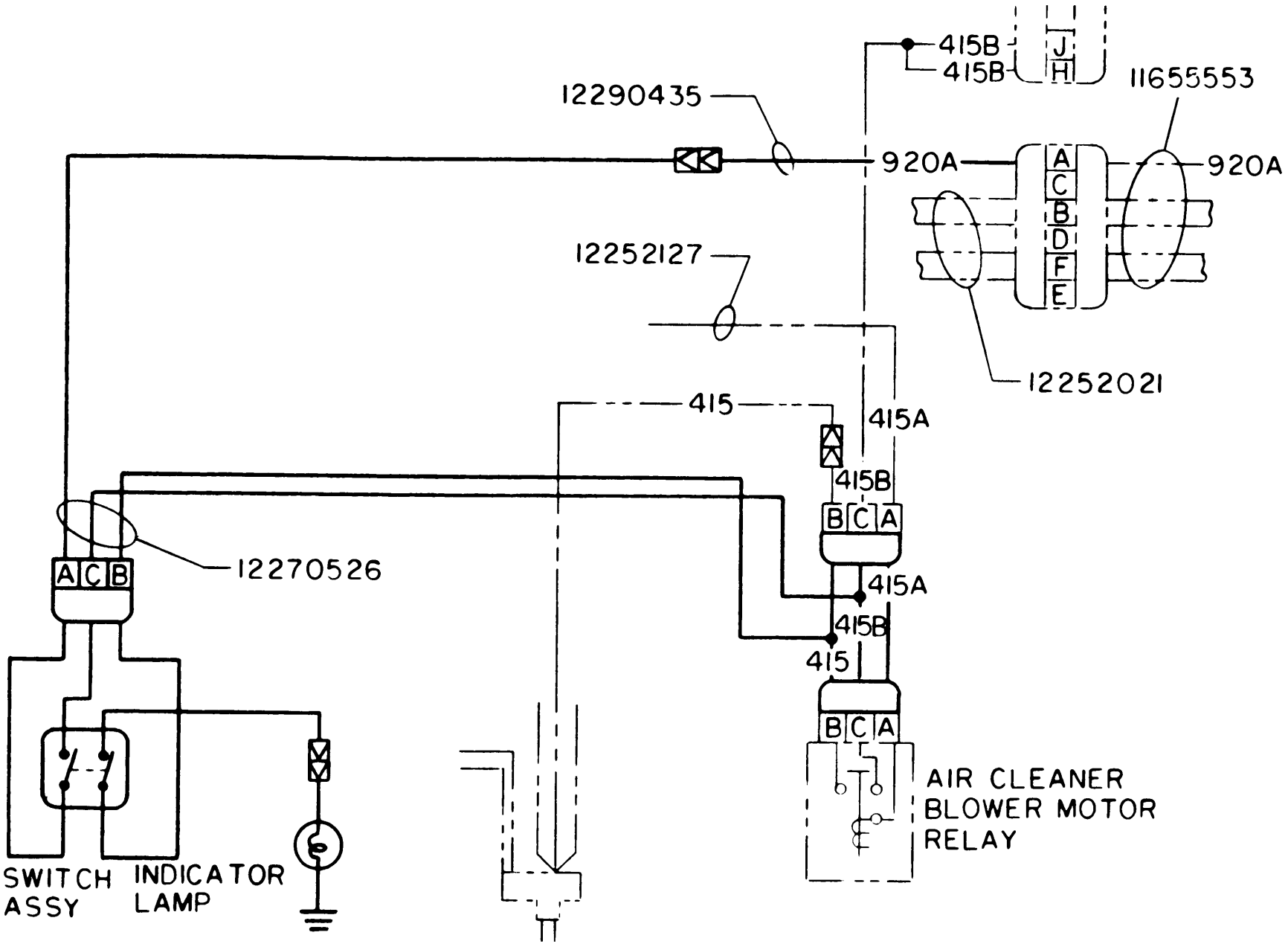


Figure 43. Hull Wiring Diagram for M728

Section V. Hull Wiring Instructions for M48A5 Tanks

(1) Assemble smoke generator switch bracket (refer to section II).

(2) Rework the fire extinguisher clamp assembly 11615403 located on the right side of the driver's compartment (refer to figures 44 and 46).

(3) Install the previously assembled switch bracket assembly to the reworked fire extinguisher clamp 12290449 using four screws MS907 26-9, four lockwashers MS35333-40, four flat washers MS27183-10, and four nuts MS51968-2. Temporarily leave the lower rear screw loose in order to secure the harness later (refer to figures 44 and 45).

(4) Connect the kit wiring harness switch receptacle to the switch connector and secure the harness with one clamp MS2 1333-100 and screw left loose in step 3 (refer to figure 45).

(5) Remove and retain one screw MS90725-3, lockwasher MS35 338-44, and flat washer MS27I83-10 from each of the wiring harness securing straps 10905840 (refer to figure 45).

(6) Route the kit harness 12270526 along the existing harness to the air cleaner blower motor relay. Disconnect the relay receptacle and connect the kit harness spliced jumper lead into the relay circuit (refer to figures 44 and 45).

(7) Secure the receptacle and excess cable with two straps MS3367-6-9 (refer to figure 44).

(8) Route the single lead on the kit wiring harness along the existing harness up to the starter harness receptacle (refer to figures 44 and 45).

(9) Remove the electrical disconnect access plate and disconnect the starter harness receptacle from the bulkhead. Remove the existing filler rod and contact from pin location "A" and insert lead assembly 12290435 contact into this location. Reconnect the receptacle connector to the bulkhead and install the access plate (refer to figures 44, view D).

(10) Secure the total wiring harness with the previously removed straps 10905840. (Refer to figure 45).

(11) Remove and discard the existing identification band of the starter cable assembly and apply identification band M43436/1-3 with the new part number 12290448. (refer to figures 44 and 47).

NOTE

Check harness routing and connections to insure a neat and secure installation.

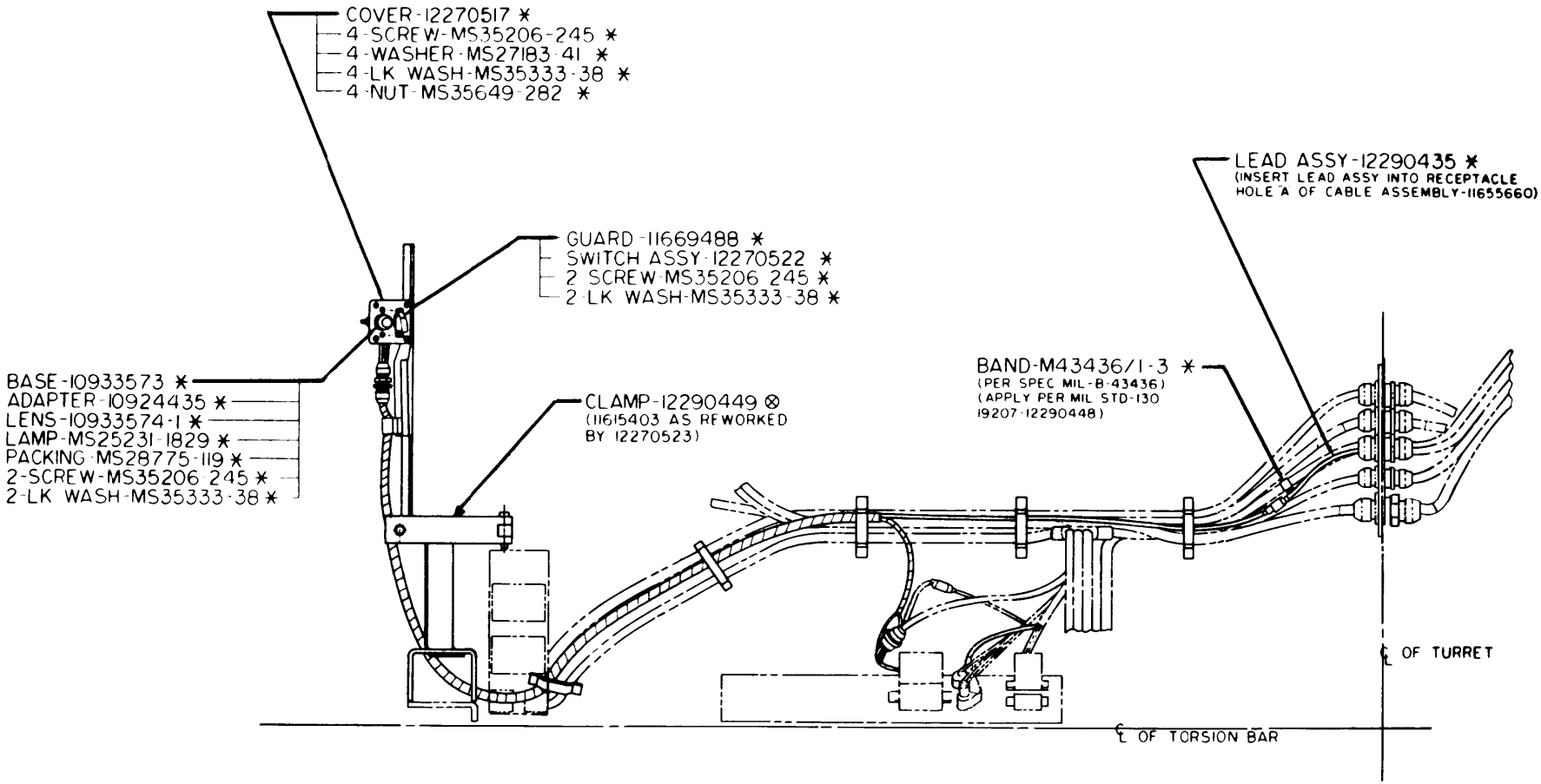
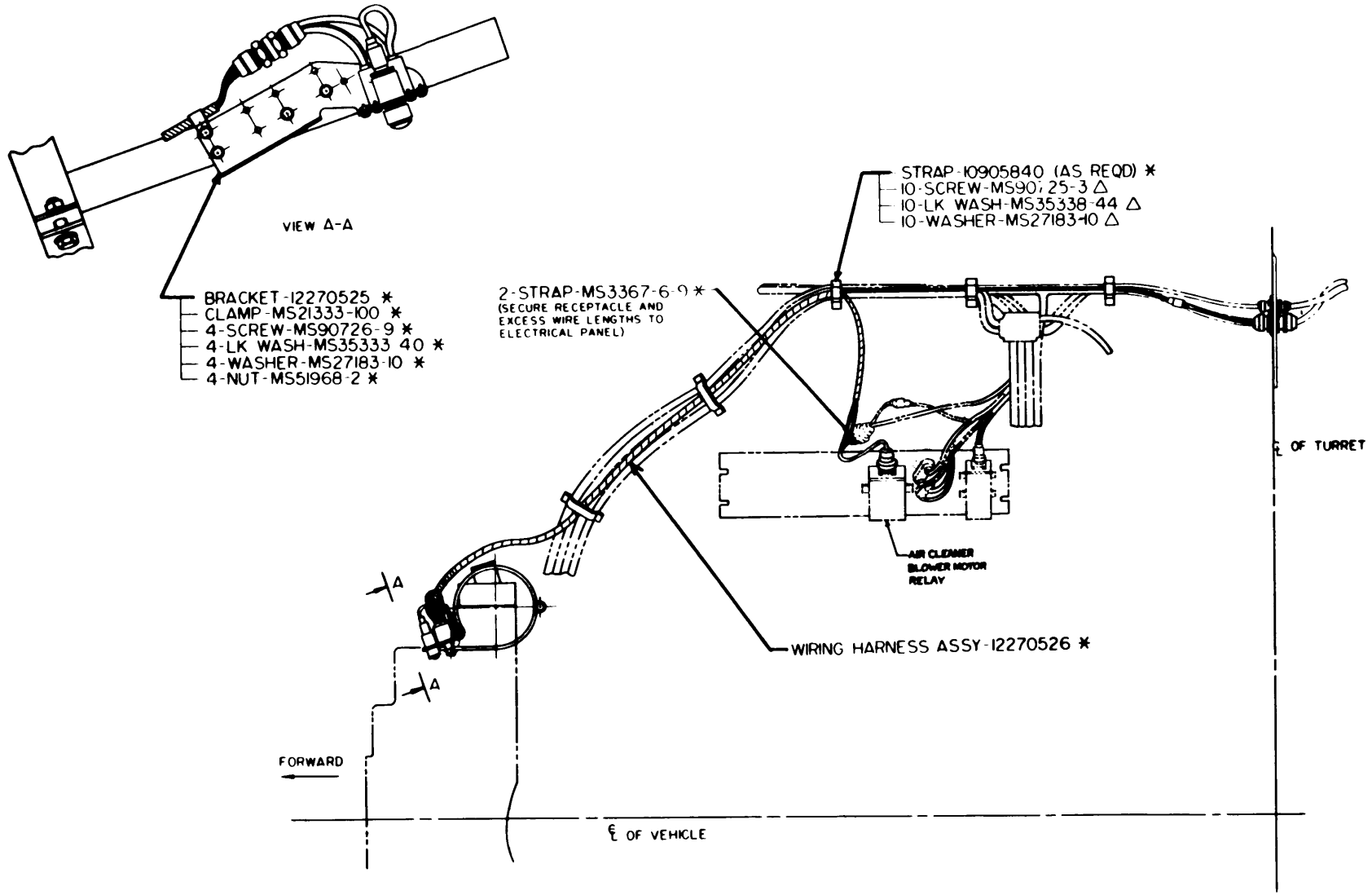


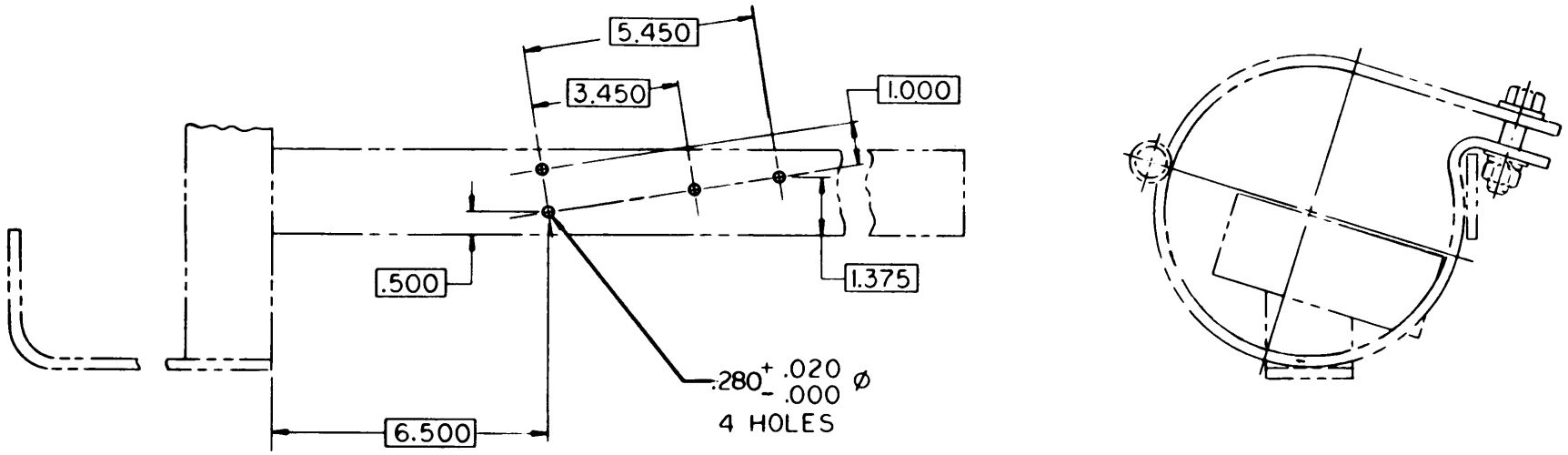
Figure 44. Front View of Harness Kit Installation for M48A5

TA271380



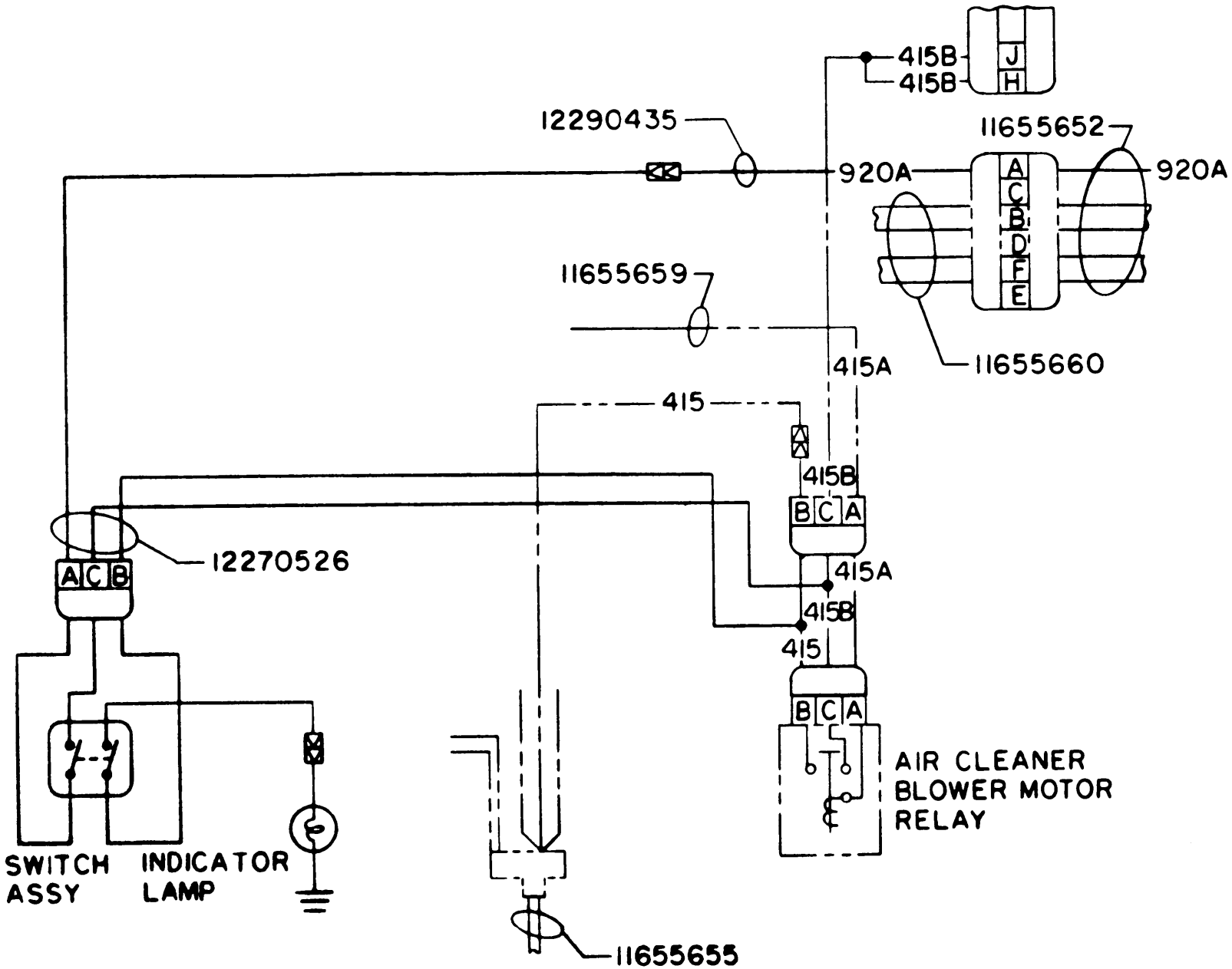
TA271381

Figure 45. Top View of Harness Kit Installation for M48A5



NOTES:
1. REWORK 11615403 AS SHOWN

Figure 46. Reworked Fire Extinguisher Clamp to Install Switch on M48A5



TA271383

Figure 47. Hull Wiring Diagram for M48A5

Section VI. Hull Wiring Instructions for M48A5 and M60A1 AVLB

(1) Assemble smoke generator switch bracket (refer to section II).

NOTE

Figures 48, 49 and 50 correspond to the M60A1 AVLB.
Figures 51, 52 and 53 correspond to the M48A5 AVLB.
Figure 54 is common to both.

(2) Remove and discard two screws MS90726-6 and two lockwashers MS35338-44 from the left side of the master control panel. Then install the previously assembled switch bracket assembly to the master control panel using two screws MS90726-9 and two lock washers MS35333-40 (refer to figure 54).

(3) Drill one hole in support 10934246 as shown in figure 54.

(4) Connect the kit wiring harness switch receptacle to the switch connector and secure the harness with one clamp MS21333-100, screw MS90726-7, lockwasher MS35333-40, and nut MS51968-2 to the support 10934246 (refer to figure 54).

(5) Remove and retain one screw MS90725-5 and flat washer MS27183-10 from each of the wiring harness securing straps 10905840 as shown in figures 49 and 52.

(a) Remove lockwasher MS35333-33 from each wiring harness securing straps on the M60A1 AVLB and replace with lockwasher MS35335-33.

(b) Remove and retain to be re-used, each lockwasher MS35338-44 on all securing straps of the wiring harness, on the M48A5 AVLB.

(6) Route the kit harness 12270526 along the existing harness to the air cleaner blower motor relay. Disconnect the relay receptacle and connect the kit harness spliced jumper into the relay circuit (refer to figures 48 and 51).

(7) Secure the receptacle and excess cable with two straps MS3367-6-9 as shown in figures 49 and 52.

(8) Route the single lead of the kit wiring harness along the existing harness up to the starter harness receptacle (refer to figures 48, 49, 51 and 52).

(9) Remove the electrical disconnect access plate (figure 28, view D) and disconnect the starter harness receptacle from the bulkhead. Remove the existing filler rod and contact from pin location "A'' and insert lead assembly 12290435 contact into this location. Reconnect the receptacle connector to the bulkhead and install the access plate (refer to figures 48, 51 and 28, view D).

(10) Secure the total wiring harness with the previously removed straps 10905840 (refer to figures 49 and 52).

(11) Remove and discard the existing identification band of the starter cable assembly at the positive bus and apply identification band M43436/1-3 with the new part number 12290741 for M48A5 AVLB'S or No. 12290743 for M60A1 AVLB'S (refer to figures 48 and 51).

NOTE

Check harness routing and connect ions to insure a neat and secure installation.

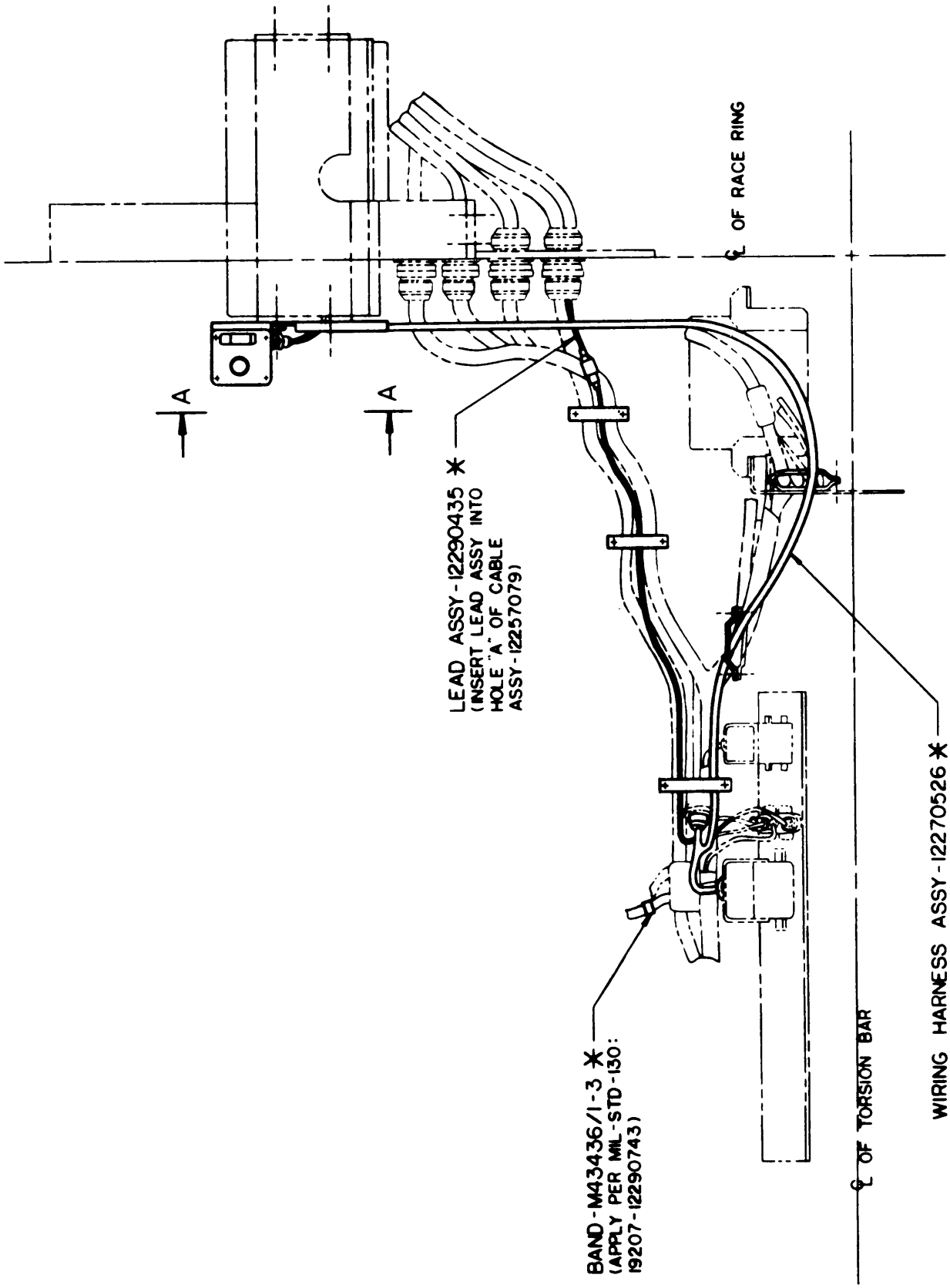


Figure 48. Front View of Harness Kit Installation for M60A1 AVLB

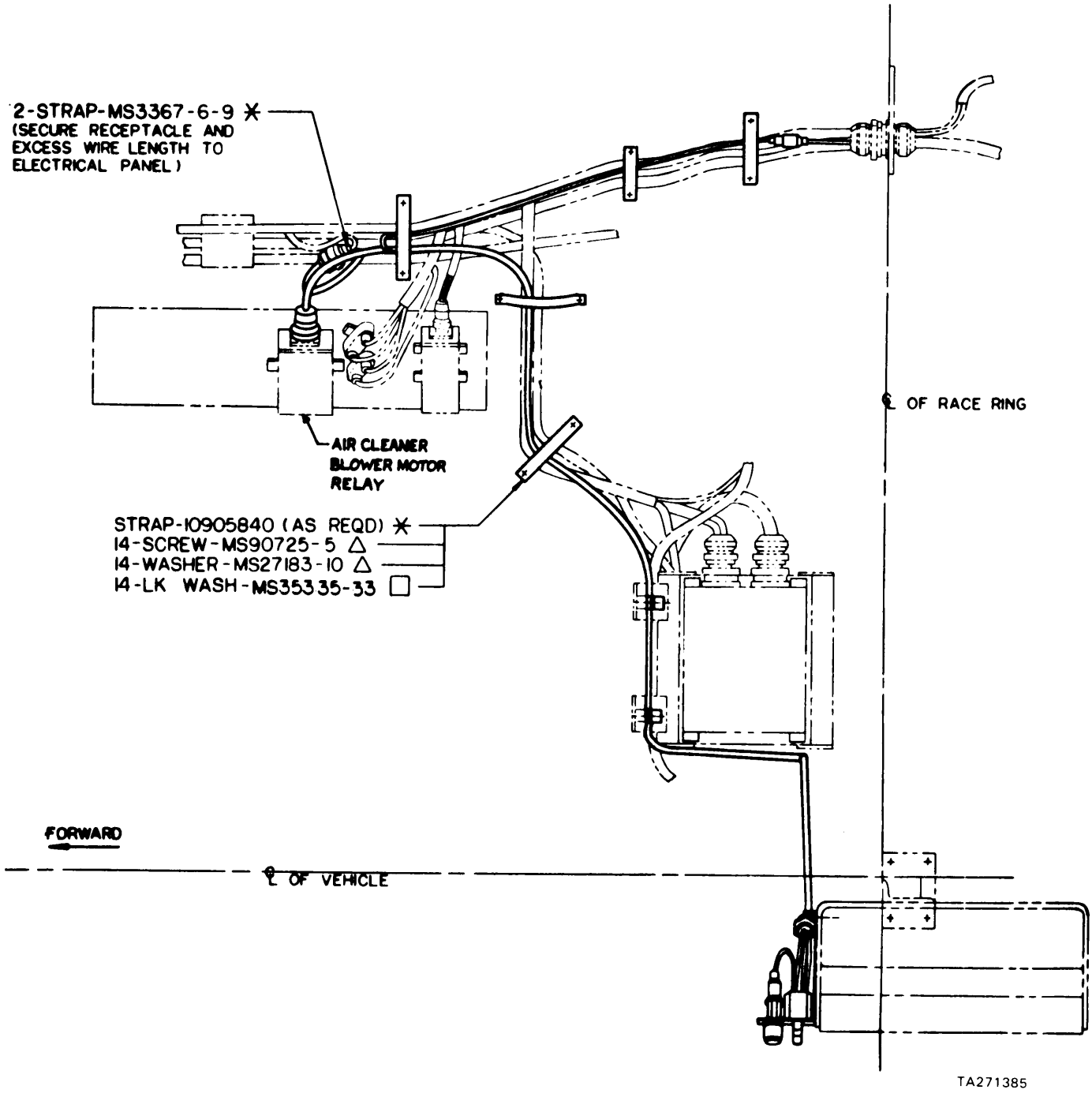
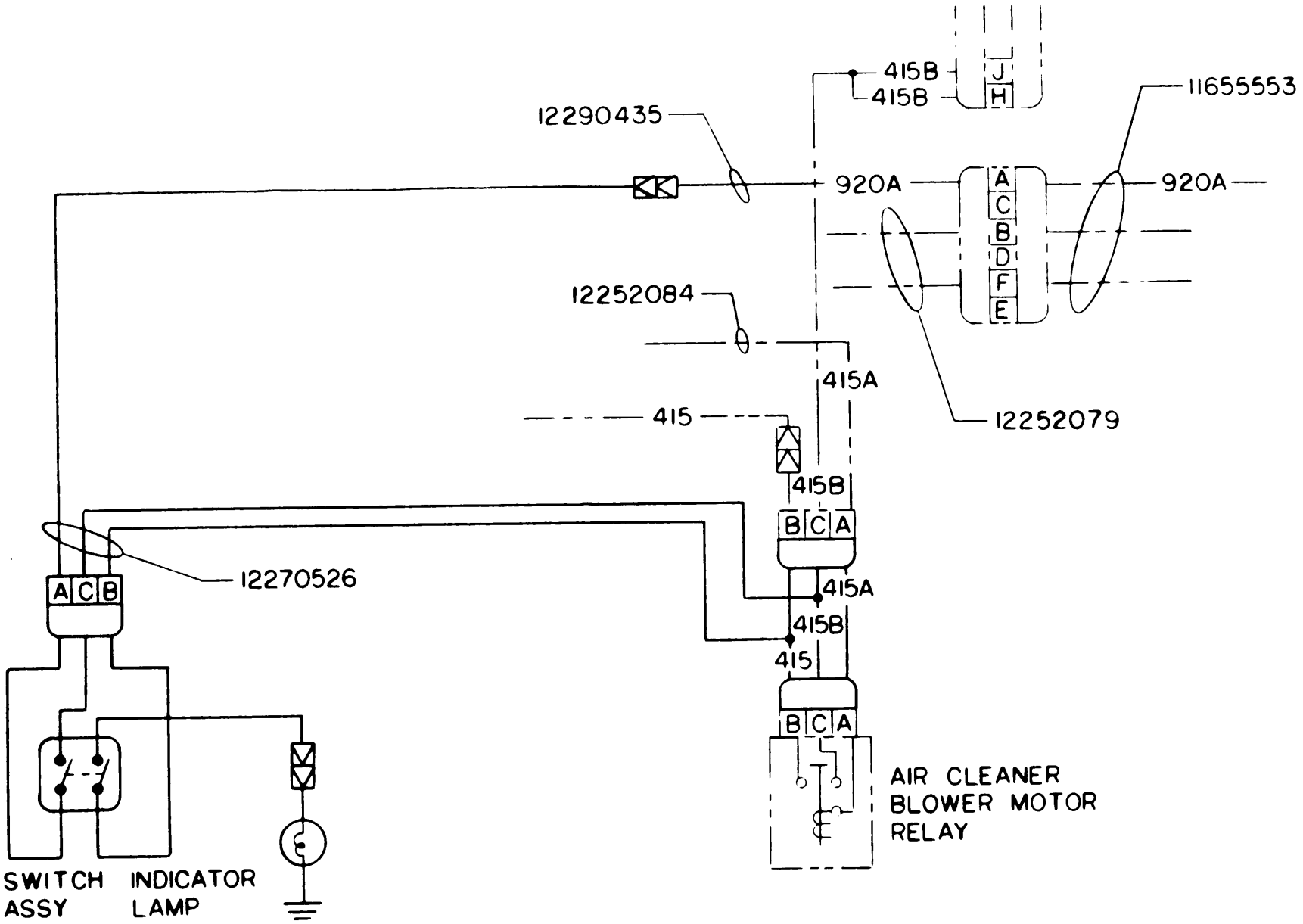


Figure 49. Top View of Harness Kit Installation for M60A1 AVLB



TA271386

Figure 50. Hull Wiring Diagram for M60A1 AVLB

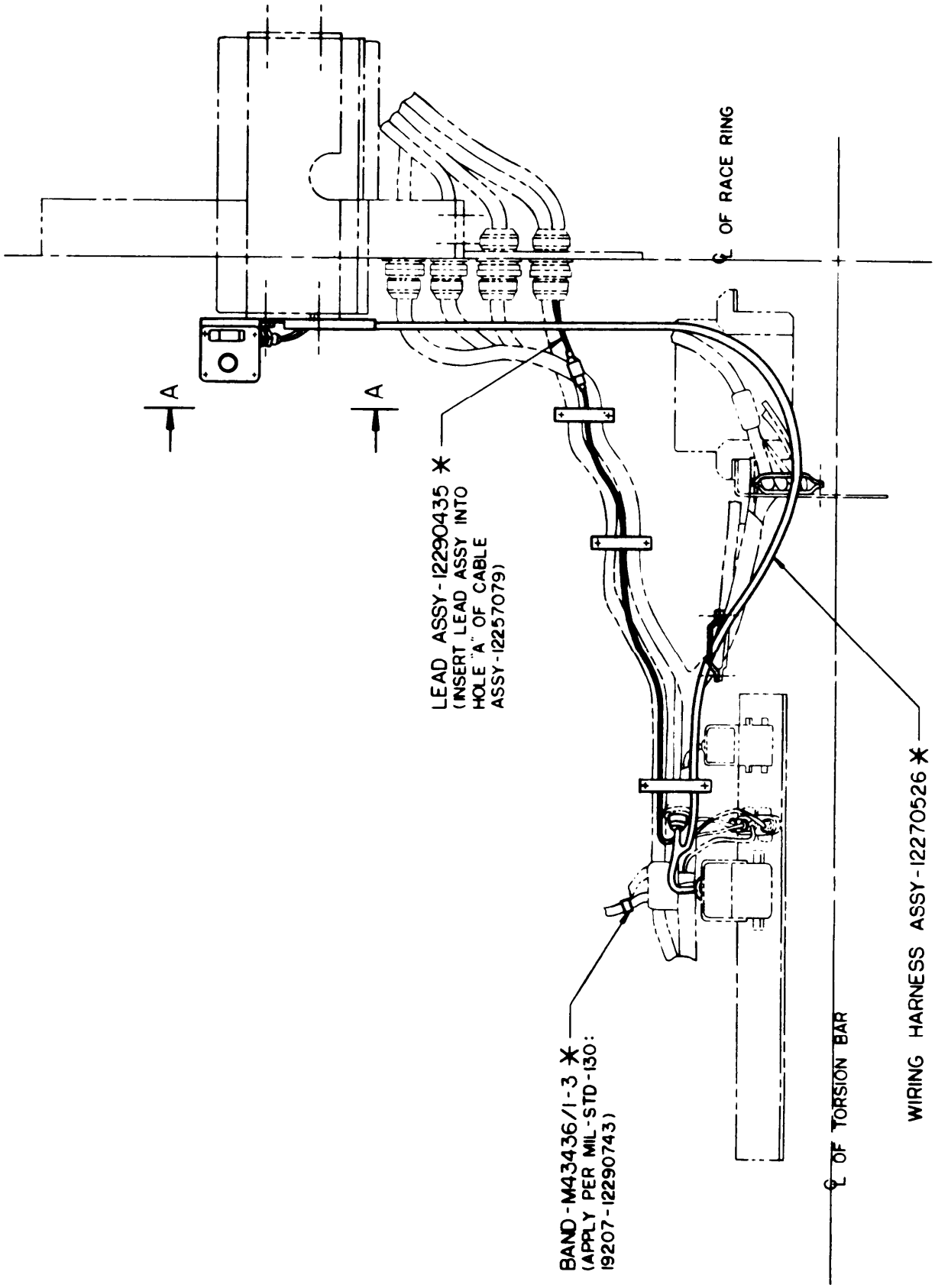


Figure 51. Front View of Harness Kit Installation for M48A5 AVLB

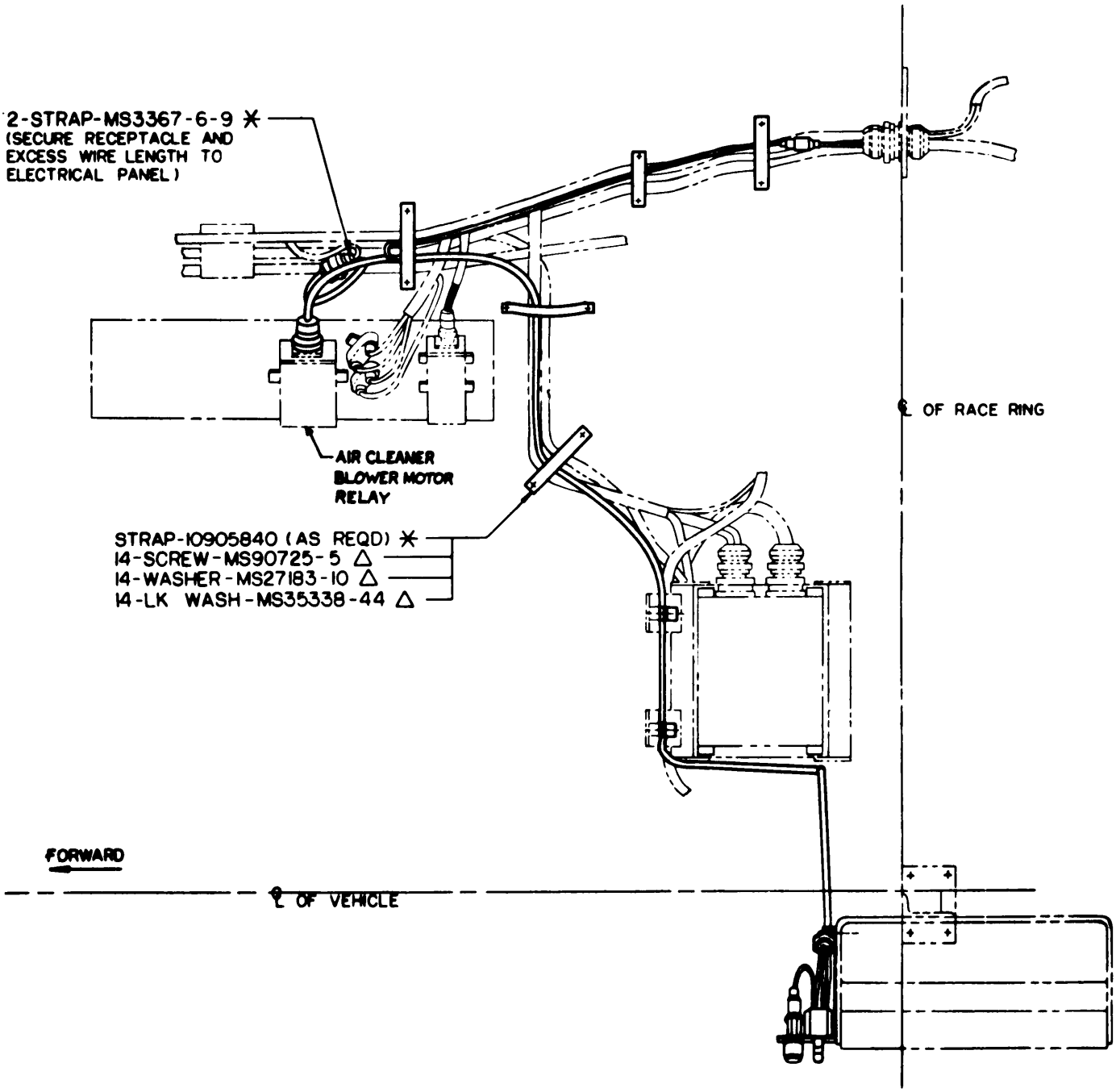
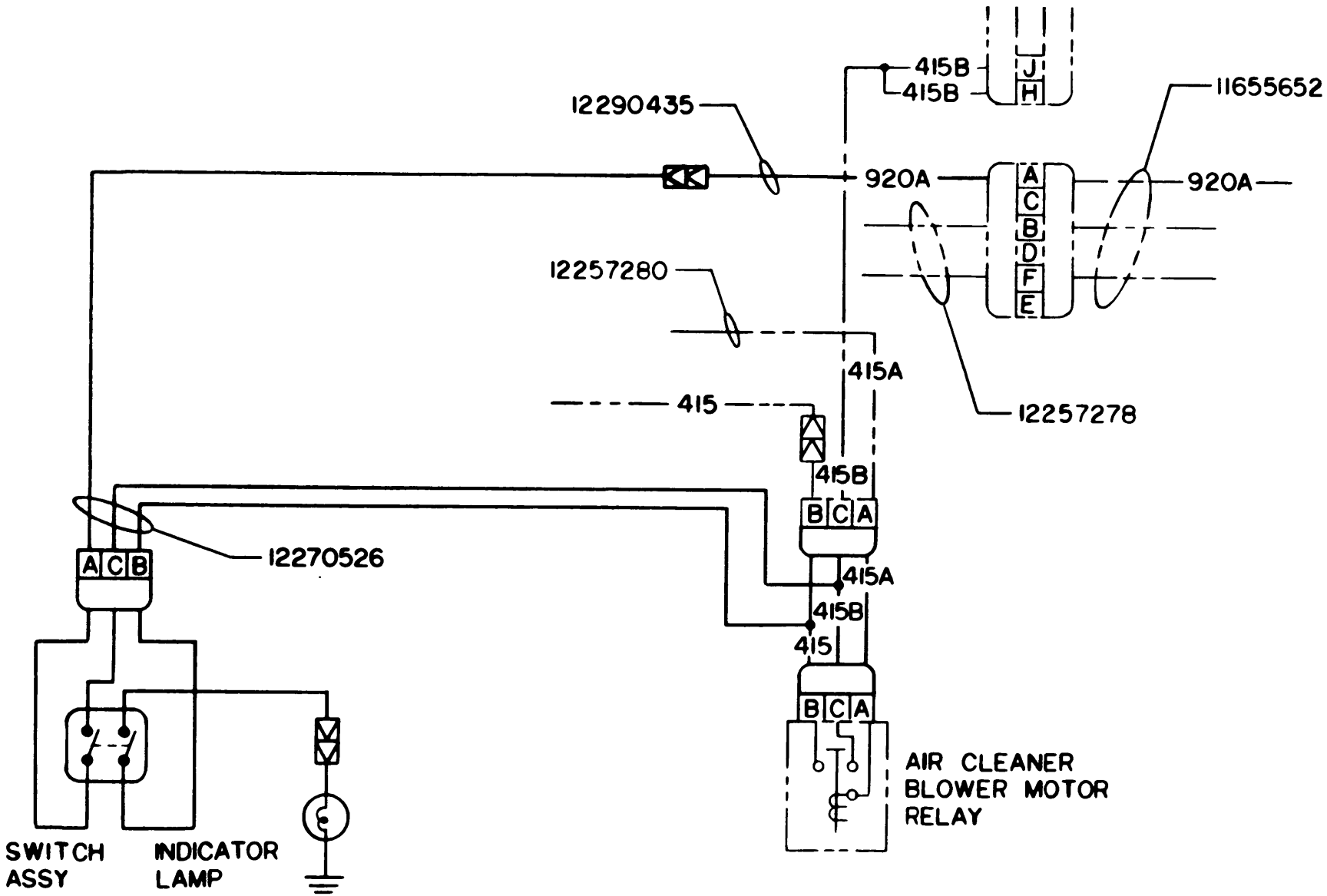
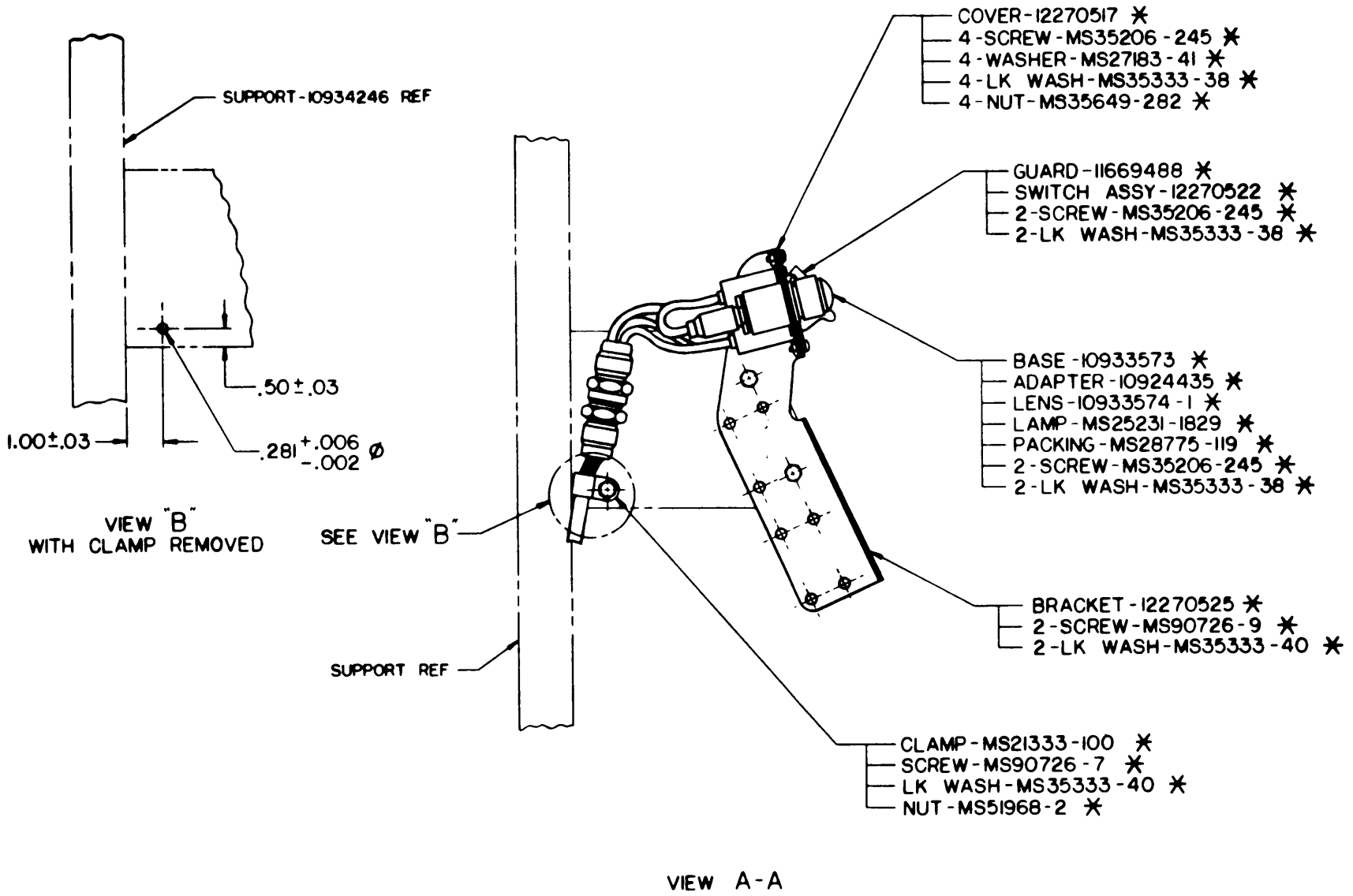


Figure 52. Top View of Harness Kit Installation for M48A5 AVLB



TA271389

Figure 53. Hull Wiring Diagram for M48A5 AVLB



TA271390

Figure 54. Expanded View of Switch Assembly Mounting to Master Control Panel and Clamp Hole Location for M60A1 AVLB and M48A5 AVLB

Section VIII System Operation and Leak Check

NOTE

- To Properly leak check all fuel line connections, it will be necessary to actuate the smoke system before the powerpack is installed in the vehicle.
- If engine test stand is used to test run engine, it will be necessary to wire a switch into test stand panel to activate smoke solenoids. Do not use a voltage source that is 'hot' when engine is NOT running.

a. Temporarily install engine exhaust stacks to divert smoke back.

b. Move powerpack and vehicle (or engine stand) to an open area.

WARNING

Never activate smoke generator in a building or closed area with personnel near.

WARNING

During functional check have a man on hand with a fire extinguisher.

WARNING

To eliminate the possibility of fuel line rupture due to heat/pressure build-up, the manual shut-off valve must normally remain in the open position while operating vehicle. The shut-off valve is to be used as a troubleshooting aid only.

CAUTION

Always be aware of wind direction and speed when using smoke generator.

CAUTION

Do not activate smoke generator when engine is idling. Engine speed should beat least 1600 RPM.

NOTE

- Engine should be run a while after smoke system is shut off to clear exhaust.
- Do not operate smoke generator if fuel supply is low. Fuel consumption rate will increase about three times with system activated.

c. Remove universal joints (refer to vehicle TM-20).

NOTE

When installing starter cable connector, be sure that pin in position "A" (Ckt 920A) has not been pushed back into grommet.

d. Connect ground hop hardware (refer to vehicle TM-20).

e. Purge fuel/water separator (refer to vehicle TM-20).

f. Connect battery ground terminals (refer to vehicle TM-20).

g. Start engine and bring it up cooperating temperature.

h. Run engine up to 1600 RPM and turn smoke generator switch ON. A dense cloud of white smoke should emit from both exhaust stacks. If it does not, refer to troubleshooting procedures in paragraph ll or vehicle TM-20.

i. While smoke system is operating, inspect fuel line connections for leaks.

j. Shut smoke switch OFF, run engine about a minute to purge exhaust and shut engine OFF.

k. Disconnect battery ground terminals.

1. Remove groundhog hardware (refer to vehicle TM-20).

m. Install universal joints (refer to vehicle TM-20).

n. Install power plant (refer to vehicle TM-20).

o. Operate smoke system after power plant is installed to be sure system is operationaL Troubleshoot according to Section VIII.

Section VIII. Troubleshooting

a. Vehicle fails to make smoke when engine is running and smoke generator is activated.

(1) Insure shut-off valve is open.

(2) Insure blower motor switch is on (M60A1-RISE and M60A3 only).

(3) Bring engine speed to 1000 rpm momentarily to insure generator output. Generator output is necessary to close the air cleaner blower motor relay which provides power to the air cleaner blower motors and the smoke generator solenoids. If air cleaner blower motors are not operating, check generator output.

(4) Check for fuel running out of hull drains, indicating a ruptured fuel hose of loose connection.

(5) Check solenoid valves. With engine running, have someone turn smoke generator switch on and off. Feel valves to see if they are activated. Check for voltage at valves and good ground connection. The solenoid valves can also be checked without releasing fuel into the exhaust pipes by closing the shut-off valve.

(6) Check for plugged, pinched or damaged fuel tube assemblies.

b. Smoke produced is of poor quality or quantity.

(1) Check for fuel running out of hull drains, indicating a ruptured fuel line or loose connect ion.

(2) Check for plugged, pinched, or damaged fuel tube assemblies.

(3) Check engine fuel filters, replace as necessary.

c. Vehicle smokes when smoke generator is not activated.

(1) Check for voltage at solenoid valves. If voltage is indicated, check wiring harness and bulkhead connectors for short.

(2) Check solenoid valves. Replace solenoid valves if they do not shut off fuel flow.

11. CALIBRATION REQUIREMENTS

None.

12. WEIGHT AND BALANCE DATA

Weight and balance are not significantly affected.

13. QUALITY ASSURANCE REQUIREMENTS

General. The following information is supplied to insure the proper application of this MWO The provisions include physical inspection, a post installation functional check and troubleshooting.

b. Physical Inspection. Check components that were removed or installed during the MWO for security of mounting, paying close attention to. the fuel lines. Inspect harness and lead assemblies for proper and neat routing.

c. *Post* Installation Functional Check.

OPERATION

Start the engine and bring it up to operating temperature. Operate engine at 1600 rpm and activate the smoke generator. The left and right exhaust pipes should emit white smoke.

WARNING

Never activate smoke generator in a building or closed area or with personnel near.

CAUTION

Always be aware of wind direction and speed when using smoke generator.

CAUTION

Do not activate smoke generator when engine is idling. Engine speed should beat least 1600 rpm.

CAUTION

After initial operation, recheck the system for any possible fuel leaks.

NOTE

Do not operate smoke generator if fuel supply is low.

NOTE

Engine should be run for a while after smoke system is shutdown to clear exhaust.

14. RECORDING AND REPORTING OF THE MODIFICATION.

a. *Records and report forms.*

(1) DA Form 2408-5, DA Form 2408-J7 or DA Form 2409. Record the modification on DA Form 2408-5, Equipment Modification Record, when multiple form assembled Equipment Logbook is applicable, or DA Form 2409, Equipment Maintenance Log (Consolidated) indicated in TM 38-750.

(2) Completion *of DA* Form 2407, Maintenance Request. The serial number to be reported in Block 2 must be in the serial range stated in paragraph 3 of the MWO. The NSN for End Items to be reported in Block 6 must be the same as the NSN shown in paragraph 3. The NSN for components, assemblies, and subassemblies to be reported in Block 6 must be the same as the NSN shown in paragraphs 4 and 5. The NSN of the item actually modified will be entered in Block 20h. This NSN must match the NSN shown in Block 6. The UIC to be reported in Block 1 c must be the six character code that is put on the Unit/Organization shown in Block la. (Normally, this will be the code that is put on the Unit/Organization Morning Report). List by NSN the number of kits used to accomplish this MWO using Block 20 and/or Block 35. If more space is needed, use DA 2407-1, Continuation Sheet. After completing the form, mail the NMP copy (Copy 2) to: Commander, U.S. Army Tank Automotive Command, ATTN: DRSTA-MRP, Warren, Michigan 48090. Mail the Control Copy (Copy 3) to: Commander, U.S. Army Depot System Command, ATTN: DRSDS-PM, Chambersburg, PA 17201, for PAC 98 (Non-AIF Field Activities). Forward the Organizational Copy (Copy 4) as directed by local corn mander. See Appendix for example.

(3) *DA Form* 2408-2408-9. Not applicable.

b. *Marking equipment.* Instructions for marking the modified component are included in the rework instructions.

c. *Identification data.* Refer to table 8 to cross-reference part number and/or NSN of items reworked and re-identified

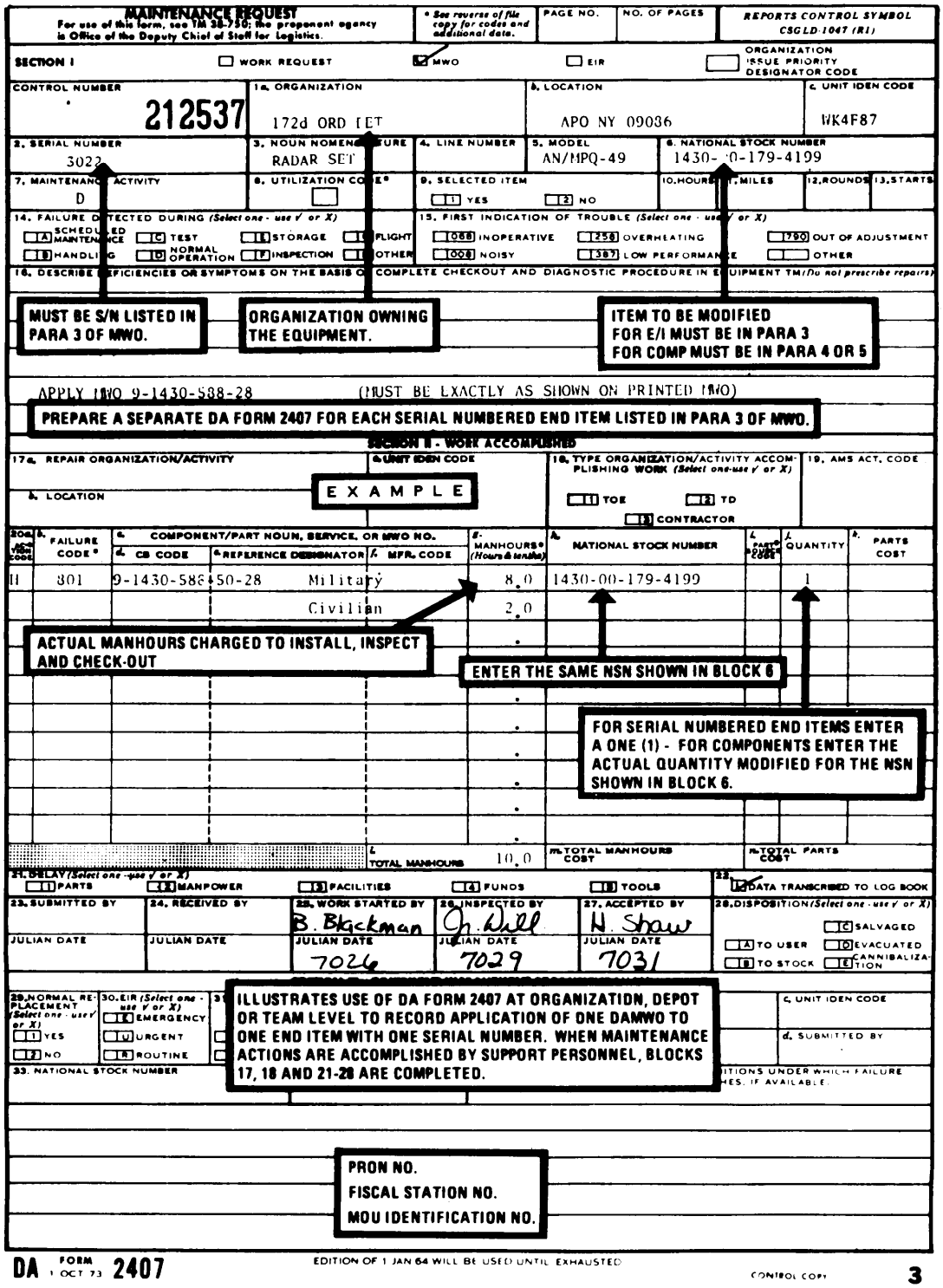
Table 8. Identification Data

Description	Part No.		National Stock No.	
	Before Mod.	After Mod.	Before Mod.	After Mod.
Wiring Harness	11673827	12290437	2590-00-606-2395	--
Wiring Harness	12252021	12290436	2590-01-054-0325	--
Wiring Harness	12252079	12290743	2590-01-52-9464	--
Wiring Harness	12257278	12290741	2590-01-003-5546	--
Wiring Harness	11655660	12290448	2590-01-026-4527	--

15. PRODUCT IMPROVEMENT PROPOSAL (PIP) NUMBER.
1-TT-05-5902

APPENDIX

This appendix gives examples of forms required to be completed upon completion of this MWO.



Maintenance Request DA2407, Single MWO to Single item of Equipment.

By Order of the Secretary of the Army:

JOHN A. WICK.HAM, JR.
General, United States Army
Chief of Staff

Official:

ROBERT M. JOYCE
Major General, United States Army
The Adjutant General

Distribution

To be distributed in accordance with DA Form 12-37, MWO requirements for Tanks, Combat Full Tracked, M60, M60A1; Miscellaneous Combat Vehicles, Combat Engineer, Full Track, M728; Tank, Bridge Launcher, AVLB; Tank, Combat, Full Tracked: M60A1 (RISE); Tank, Combat, Full Tracked: M48A5 and M60A3 Tank Turret.

4 U.S. GOVERi'hIENT PRINTING OFFICE: 1984-754-017/7052

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Your mailing address

DATE SENT

Date you fill out this form.

PUBLICATION NUMBER	PUBLICATION DATE	PUBLICATION TITLE

BE EXACT PIN-POINT WHERE IT IS

PAGE NO	PARA-GRAPH	FIGURE NO	TABLE NO
3		2	
.09		51	
2-8			2-1
12	1-6a		

IN THIS SPACE TELL WHAT IS WRONG AND WHAT SHOULD BE DONE ABOUT IT:

Item 10. Change illustration. Reason: Tube end shown assembled on wrong side of lever cam.

Item 3. The NSN and P/N are not listed on the AMDF nor the MCRL. Request correct NSN and P/N be furnished.

Preventive Maintenance Checks and Services. Item 7 under "Items to be inspected" should be changed to read as follows: Firing linkage and firing mechanism pawl.

Since there are both 20- and 30- round magazines for this rifle, data on both should be listed.

SAMPLE

PRINTED NAME, GRADE OR TITLE AND TELEPHONE NUMBER

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THE METRIC SYSTEM AND EQUIVALENTS

LINEAR MEASURE

1 Centimeter = 10 Millimeters = 0.01 Meters = 0.3937 Inches
1 Meter = 100 Centimeters = 1000 Millimeters = 39.37 Inches
1 Kilometer = 1000 Meters = 0.621 Miles

WEIGHTS

1 Gram = 0.001 Kilograms = 1000 Milligrams = 0.035 Ounces
1 Kilogram = 1000 Grams = 2.2 Lb.
1 Metric Ton = 1000 Kilograms = 1 Megagram = 1.1 Short Tons

LIQUID MEASURE

1 Milliliter = 0.001 Liters = 0.0338 Fluid Ounces
1 Liter = 1000 Milliliters = 33.82 Fluid Ounces

SQUARE MEASURE

1 Sq. Centimeter = 100 Sq. Millimeters = 0.155 Sq. Inches
1 Sq. Meter = 10,000 Sq. Centimeters = 10.76 Sq. Feet
1 Sq. Kilometer = 1,000,000 Sq. Meters = 0.386 Sq. Miles

CUBIC MEASURE

1 Cu. Centimeter = 1000 Cu. Millimeters = 0.06 Cu. Inches
1 Cu. Meter = 1,000,000 Cu. Centimeters = 35.31 Cu. Feet

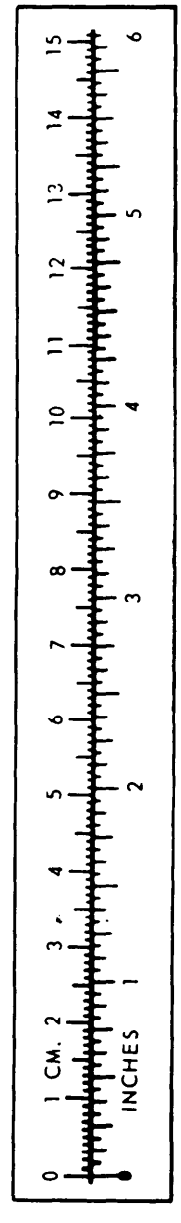
TEMPERATURE

$\frac{5}{9}(°F - 32) = °C$
212° Fahrenheit is equivalent to 100° Celsius
90° Fahrenheit is equivalent to 32.2° Celsius
32° Fahrenheit is equivalent to 0° Celsius
$\frac{9}{5}\,°C + 32 = °F$

APPROXIMATE CONVERSION FACTORS

TO CHANGE	TO	MULTIPLY BY
Inches	Centimeters	2.540
Feet	Meters	0.305
Yards	Meters	0.914
Miles	Kilometers	1.609
Square Inches	Square Centimeters	6.451
Square Feet	Square Meters	0.093
Square Yards	Square Meters	0.836
Square Miles	Square Kilometers	2.590
Acres	Square Hectometers	0.405
Cubic Feet	Cubic Meters	0.028
Cubic Yards	Cubic Meters	0.765
Fluid Ounces	Milliliters	29.573
Pints	Liters	0.473
Quarts	Liters	0.946
Gallons	Liters	3.785
Ounces	Grams	28.349
Pounds	Kilograms	0.454
Short Tons	Metric Tons	0.907
Pound-Feet	Newton-Meters	1.356
Pounds per Square Inch	Kilopascals	6.895
Miles per Gallon	Kilometers per Liter	0.425
Miles per Hour	Kilometers per Hour	1.609

TO CHANGE	TO	MULTIPLY BY
Centimeters	Inches	0.394
Meters	Feet	3.280
Meters	Yards	1.094
Kilometers	Miles	0.621
Square Centimeters	Square Inches	0.155
Square Meters	Square Feet	10.764
Square Meters	Square Yards	1.196
Square Kilometers	Square Miles	0.386
Square Hectometers	Acres	2.471
Cubic Meters	Cubic Feet	35.315
Cubic Meters	Cubic Yards	1.308
Milliliters	Fluid Ounces	0.034
Liters	Pints	2.113
Liters	Quarts	1.057
Liters	Gallons	0.264
Grams	Ounces	0.035
Kilograms	Pounds	2.205
Metric Tons	Short Tons	1.102
Newton-Meters	Pound-Feet	0.738
Kilopascals	Pounds per Square Inch	0.145
Kilometers per Liter	Miles per Gallon	2.354
Kilometers per Hour	Miles per Hour	0.621



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