

2.4.7.4.8 Loader's Intercom Box Connection. Connect Loader's cable 2W4P6 to the Loader's Intercom Box as follows:

- a. Route Loader's Crew Station cable 2W4 to the right side of the Loader's Intercom Box.
- b. Connect connector 2W4P6 to the open receptacle J801 on the right side of the Loader's Intercom Box.

2.4.7.4.2.9 AM-1780/VRC Intercom Amplifier Connection. Connect Loader's cable 2W4P7 to the AM-1780MtC Intercom Amplifier as follows:

- a. Route cable 2W4P7 to the amplifier.
- b. Locate receptacle J501 (on the right side of the amplifier) and disconnect the **onboard** connector.
- c. Connect cable 2W4P7 to the receptacle on the amplifier.

2.4.7.4.2.10 Speaker/Amplifier Connection. Install the speaker/amplifier:

- (1) Place the speaker beside the COAX ammunition storage box.
- (2) Connect Loader's Crew Station cable connector 2W4P8 to the speaker/amplifier power jack.
- (3) Connect Loader's Crew Station cable connector 2W4P9 to the Speaker/Amplifier audio jack.
- (4) Place the speaker/amplifier power switch in the ON (|) position.

2.4.7.4.3 Tank Commander's Station.

2.4.7.4.3.1 **TC's Keypad Installation.** Install the TC's keypad by placing the keypad on the turret wall to the right of the TC's position. Use the magnets on the back of the keypad to secure it.

2.4.7.4.3.2 **Commander's Crew Station Cable Initial Position.** Position the Commander's Crew Station cable 2W1 to make the connections shown in Figure 2-52 as follows:

- a. Locate connector 2W1P1, the large, single connector at the end of the Commander's Crew Station cable.
- b. Route the end of the Commander's Crew Station cable with this connector along the Gunner's Station under the Computer Control Panel, around the back of the GPS, then behind the back of the COAX spent brass box, and under the main gun.

2.4.7.4.3.3 **TC's Control Handle Connection.** Connect Commander's Crew Station cable 2W1 to the TC's Control as follows:

- a. Locate quick-disconnect-type connector J1 at the back of the control handle housing.
- b. Disconnect the actual tank cable.
- c. Connect connector 2W1P3 to the receptacle on the back of the TC's Control Handle housing.

2.4.7.4.3.4 **Commander's Panel Connection.** Connect the Commander's Crew Station cable to the Commander's Panel as follows:

- a. Locate quick-disconnect-type connector J1 on the lower surface of the actual control panel, located on the right side of the control panel.
- b. Disconnect the actual tank cable.



The Commander's Panel connection is difficult to complete. Ensure the AFIST connector is fully seated in the receptacle before tightening it. Tightening an improperly seated connector can damage connectors and onboard receptacles.

- c. Connect M1A1 adapter connector 2CS1W1P2 to the control panel receptacle. Connect M1A1 adapter connector 2CS1W1P1 to 2W1P2 on the Commander's Crew Station cable (M1A1).

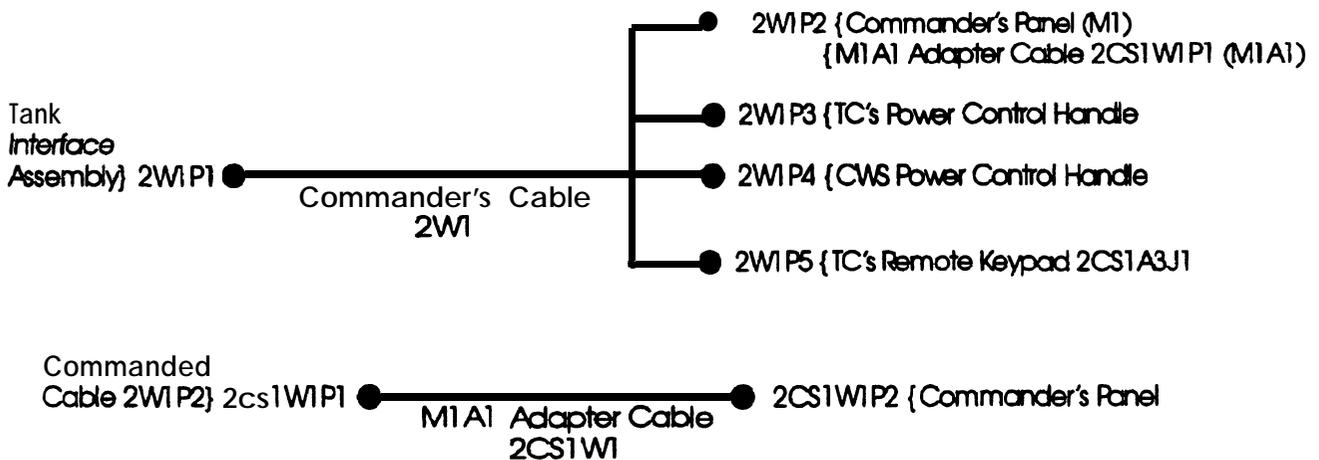


Figure 2-52. Commander's Crew Station Cable 2W1 Wire Diagram
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- d. Connect connector 2W1P2 on the Commander's Crew Station cable with the receptacle on the bottom of the Commander's Panel (MI). Ensure the connector is fully seated before tightening it.

2.4.7.4.4 Driver's Station.

NOTE

When installing sensors at the Driver's Station, start with the Driver's hatch open, the seat back fully raised, and Driver's Crew Station cable 2W5 in position. The various controls are easier to reach from this position. Lower the Steer-Throttle Control from the stowed position, so the crew member can reach around it to the service brake linkage shaft and can install the Transmission Shift Control connector.

2.4.7.4.3.5 CWS Power Control Handle Connection. Connect Commander's Crew Station cable 2W1 to the CWS Power Control Handle as follows:

- a. Locate the quick-disconnect-type connector at the end of the Power Control Handle's heavy coiled cord next to the turret wall.
- b. Disconnect the actual tank connector.
- c. Connect connector 2W1P4 on the Commander's Crew Station cable to the receptacle on the coiled cord.

2.4.7.4.3.6 TC's Keypad Connection. Connect Commander's Crew Station cable connector 2W1P5 to the receptacle on the right side of the keypad.

2.4.7.4.4.1 Brake Sensor Installation. The brake sensor (see Figure 2-53.) senses how far the Driver depresses the service brake pedal while braking during an exercise. Install the brake sensor as follows.

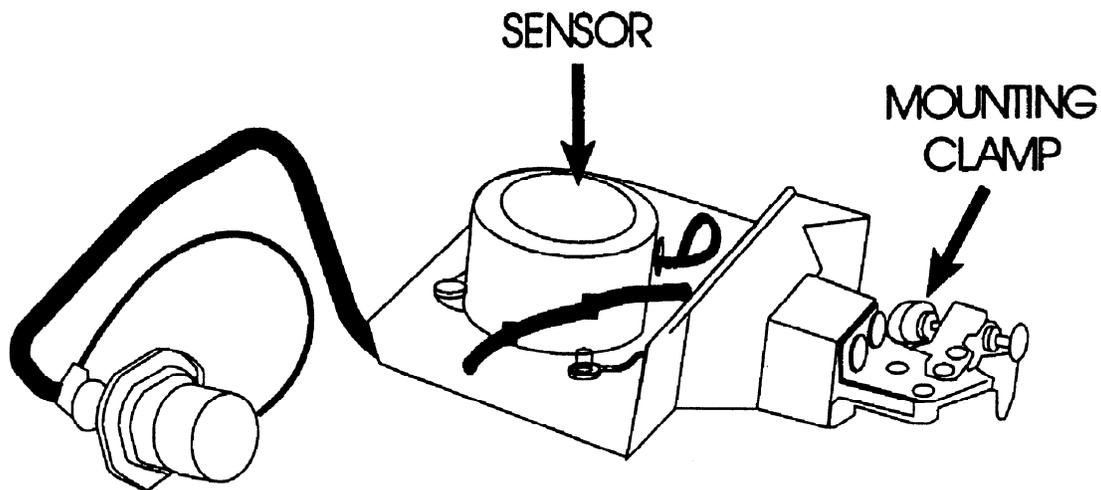


Figure 2-53 Brake Sensor

- a. Ensure the Driver's hatch is still open and locate the service brake linkage shaft to which the service brake pedal arm is attached. (The shaft is approximately 1-inch in diameter; when the pedal is depressed, the shaft turns.)
- b. Hold the brake sensor so that the sensor (the round grey object) is below the shaft. Then, square the mounting clamp so that the jaws of the mounting clamp open away from the Driver's position.
- c. Position the sensor on the linkage shaft approximately 8 inches to the right of the service brake pedal. Rotate and align the device so that the sensor is below the shaft and the mounting bracket is around the shaft and the sensor is level.
- d. Close the jaws of the bracket around the shaft and allow the clamp to tighten on the shaft. The sensor should not move on the shaft.

- e. Check the mounting by depressing the pedal to ensure the sensor bracket does not slip on the shaft when the shaft rotates.

2.4.7.4.4.2 Steering Sensor Installation. The steering sensor senses how far and in which direction the Steer-Throttle Control has been turned. Install the steering sensor, shown in Figure 2-54, as follows:

- a. Move the Steer-Throttle Control into the **rearmost** (lowest operational) position, as prescribed in the Operator's Manual appropriate for the tank in use.
- b. Loosen the clamping device on the steering sensor assembly. Unscrew the small retaining bolts from the nuts and allow the nut to swing freely on its retaining wire.
- c. Hold the sensor assembly with the base of the wedge block up and the knurled knob down and forward.

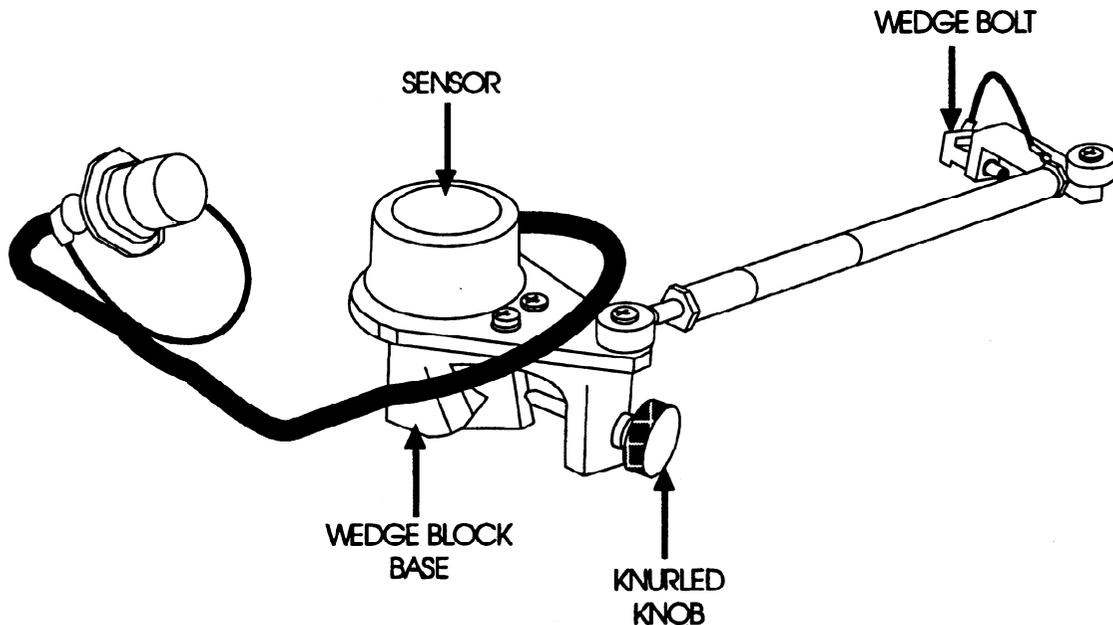


Figure 2-54 Steering Sensor

- d. Approximately 6 inches forward of the Steer-Throttle Control, locate a bracket with a cylinder. This is the actuating cylinder. (Refer to Figure 2-55.)
- e. Loosely clamp the sensor end of the assembly to the actuating cylinder.
- f. Position the wedge bolt (at the end of the wire) on the left side of the turn-buckle end just forward of the Steer-Throttle Control.
- g. Position the wedge bolt as far forward as possible and use a 3/16-inch Allen wrench to secure it.
- h. Adjust the forward end of the sensor assembly until the sensor is level. Tighten and secure.
- i. Push the Steer-Throttle Control left and right to ensure the sensor is firmly attached. The sensor on the shaft will rotate, but the mounting bracket should not move.

CAUTION

With the sensor assembly properly installed, only the two lower operational positions of the Steer-Throttle Control can be used. Forcing the Steer-Throttle control into other positions can damage cables and connectors.

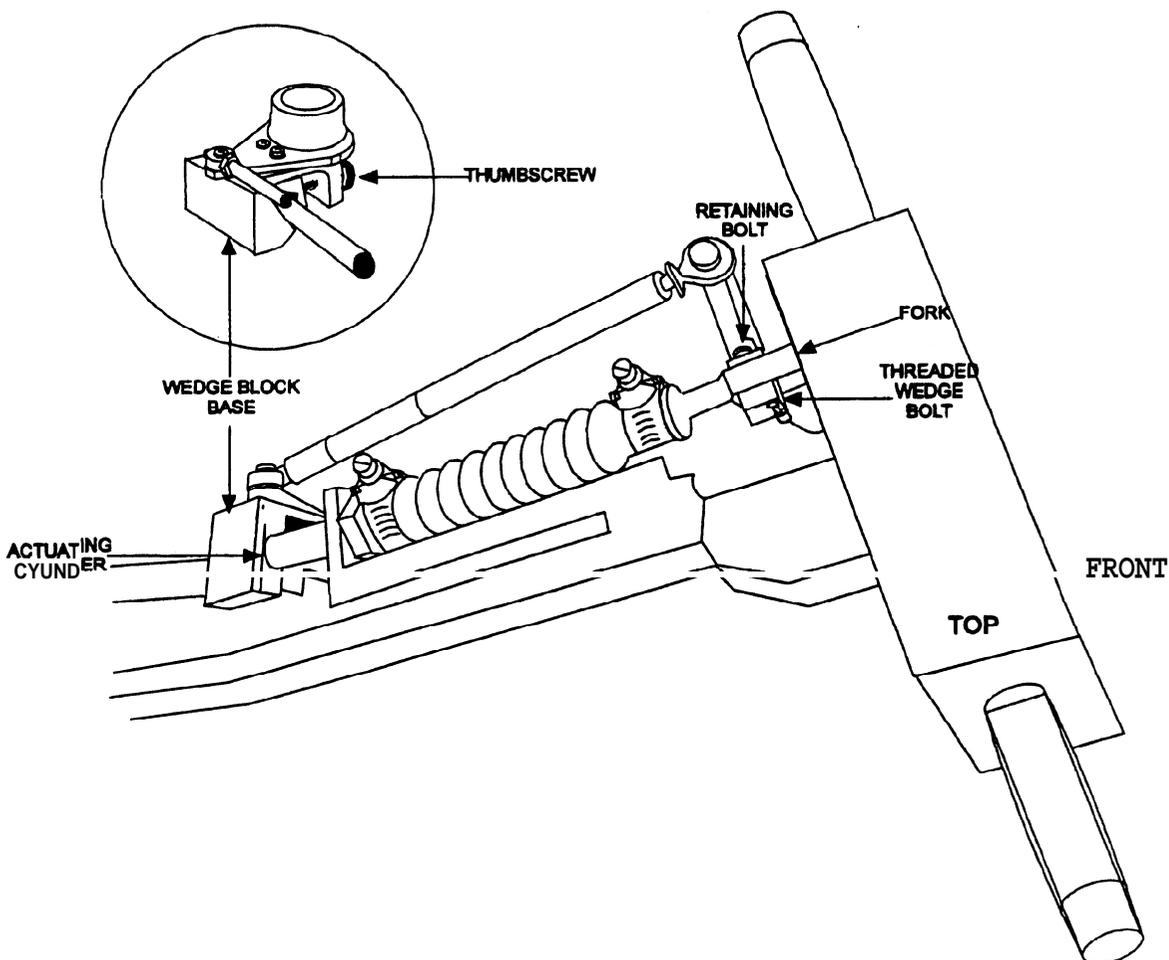


Figure 2-55. Installed Steering Sensor Assembly

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2.4.7.4.4.3 Driver's Crew Station Cable Initial Position. Position Driver's Crew Station cable 2W5 to make the connections shown in Figure 2-56 as follows:

- a. Route the cable from under the main gun toward the **front** of the turret, around the left side of the turret floor behind the Loader's Station, and to the rear of the Driver's seat. The cable divides into a **right-hand** branch and a left-hand branch behind the Driver's seat. The right-hand branch contains the connectors for the steering sensor, 2W5P3, and the Driver's Master Control Panel, 2W5P2. The **left-hand** branch contains the connectors for the brake sensor, 2W5P4, the throttle control, 2W5P6, and the transmission selector, 2W5P5. Position the cable as follows:

CAUTION

Ensure all connectors on the Driver's Crew Station cable are clear of the Driver's seat when changing seat positions. Connectors can get caught in the seat mechanism and become damaged.

- (1) Position the right-hand branch of the Driver's Crew Station cable by leading the cable around the right side of the Driver's seat behind the Driver's intercom box, and under the Driver's Master Control Panel.

- (2) Position the left-hand branch of the Driver's Crew Station cable by leading the cable around the left side of the Driver's seat. Lead the rest of the left-hand branch behind the Driver's Instrument Panel.

2.4.7.4.4.4 Brake Sensor Connection. Connect the Driver's Crew Station cable as follows:

- a. Attach connector 2W5P4 on the Driver's crew station cable to receptacle 2CS4A3J1/2W5P4 on the; brake sensor.
- b. Check the mounting by depressing the pedal to ensure the sensor bracket does not slip on the shaft when the shaft rotates.

2.4.7.4.4.5 Throttle Control Cable Connection. Connect the Throttle Control cable as follows:

- a. With the left hand, reach to the bracket by the Driver's left knee. Find the electrical connector on the bracket.
- b. Trace the wire connected to this fixture back to the Steer-Throttle Control, confirming that this is Throttle Control connector 2D 10 1 J1.
- c. Disconnect the **onboard** connector on the front side of the bracket.

NOTE

Some tanks may have the connector on the rear of the bracket.

- d. Locate connector 2W5P6 on the left branch of the Driver's Crew Station cable and connect it to Throttle Control connector 2D101J1.

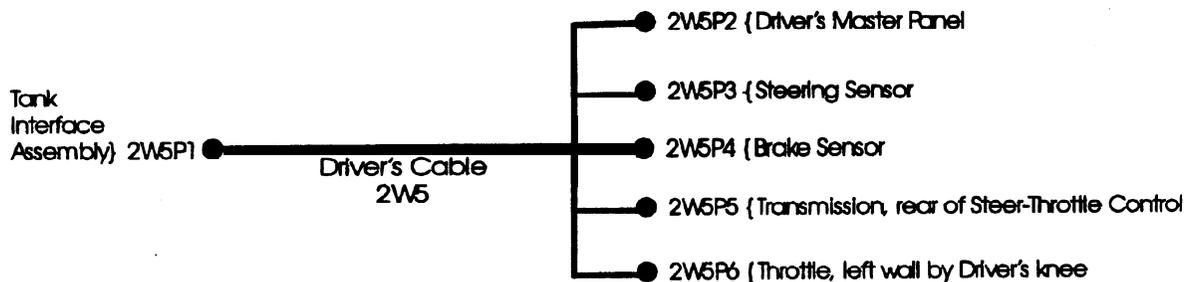


Figure 2-56. Driver's Crew Station Cable 2W5 Wire Diagram

- e. Secure the cable with the cable ties.

2.4.7.4.4.6 Transmission Shift Control Cable Connection. Connect Driver's Crew Station cable to the Transmission Shift Control cable as follows:

- a. Locate the quick-disconnect-type connector in the center of the rear surface of the Steer-Throttle Control housing.
- b. Unscrew the connector and connect connector 2W5P5 of the Driver's Crew Station cable in its place.
- c. Secure the cable with attached cable ties.

2.4.7.4.4.7 Steering Sensor Connection. Connect the Driver's Crew Station cable to the Steering sensor as follows:

- a. Locate 2W5P3 on the Driver's Crew Station cable
- b. Connect it to the receptacle on the steering sensor assembly.

2.4.7.4.4.8 Driver's Master Control Panel Connection. Connect the Driver's Master Control Panel as follows:

- a. Disconnect the cable on the left side of the Driver's intercom box.
- b. Remove the left mounting bolt securing the intercom box.
- c. Rotate the intercom box away from the Driver's

Master Control Panel.

- d. Locate the quick-disconnect-type connector on the bottom of the Driver's Master Control Panel.
- e. Disconnect this connector and replace it with connector 2W5P2 of the Driver's Crew Station cable.
- f. Move the intercom box back into position and replace the mounting bolt.
- g. Reconnect the connection on the left side of the Driver's intercom box.
- h. Close the Driver's hatch.

2.4.7.4.5 Tank Interface Assembly Positioning and Connection. Install the Tank Interface Assembly, shown in Figure 2-57, as follows:



Injury or death could result if the main gun is moved while personnel are near the main gun tube.

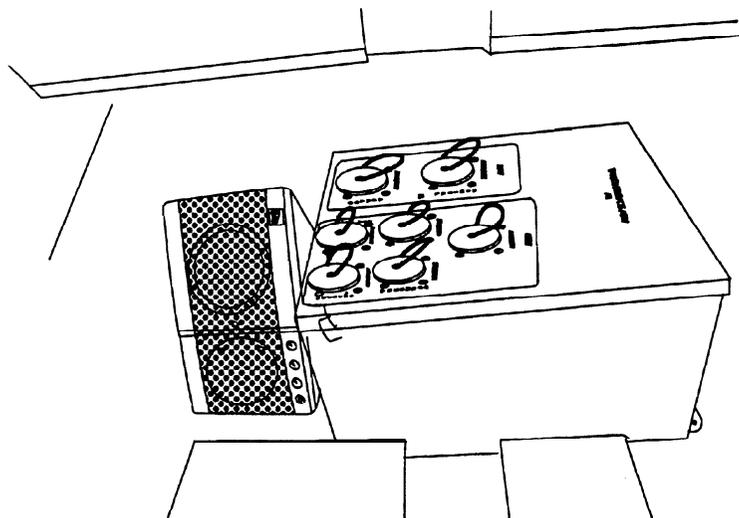


Figure 2-57 . Tank Interface Assembly and Speaker/Amplifier (M1A1)

NOTE

Before positioning the Tank Interface Assembly, ensure the Ejection Guard or **SAFE/ARMED** Handle connector is connected to the Gunner's Crew Station cable. See 2.4.7.4.1.8.

- a. Ensure the rear deck is clear, then manually raise the main gun breech by depressing the main gun.
- b. Position the two tank interface cables, **W4P1** and **W5P1**, at the IOS Interface Connector Panel at the IOS rear for TD 17/162A and at the rear of Case 1A4 for TD 17/162B



Route cables on the outside of the tank where they will not be stepped on by tank crew members moving around on the tank. Tripping over cables may cause personal injury. Walking on cables and other rough treatment damages cables and connectors.

- c. Route cables **W4P2** and **W5P2** through the open vision block in the Loader's hatch, over and then down behind the COAX ready ammunition box, then under the main gun breech.

- d. Place the Tank Interface Assembly on the turret floor underneath the rear of the main gun breech. Connect each of the crew station cables and the tank interface cables to the Tank Interface Assembly as follows:

- (1) INPUT panel:
 - (a) Tank interface cable **W4P** — receptacle **2A1J1/W4P2** (DIGITAL).
 - (b) Tank interface cable **W5P** — receptacle **2A1J2/W5P2** (ANALOG).
- (2) OUTPUT panel:
 - (a) Gunner's Crew Station cable **2W2** — receptacle **2 A 1 J 5 / 2 W 2 P 1** (GUNNER'S A).
 - (b) Driver's Crew Station cable **2W5** — receptacle **2 A 1 J 7 / 2 W 5 P 1** (DRIVER'S).
 - (c) Gunner's Crew Station cable **2W3** — receptacle **2 A 1 J 4 / 2 W 3 P 1** (GUNNER'S B).
 - (d) Commander's cable **2W 1** — receptacle **2A1J3/2W1P1** (CWS).
 - (e) Loader's Crew Station cable **2W4** — receptacle **2 A 1 J 6 / 2 W 4 P 1** (LOADER'S).

- e. Move the Tank Interface Assembly forward under the breech. The box fits behind the small ledge that is approximately 15 inches below the breech opening of the main gun.

CAUTION

Do not lower the main gun breech onto the Tank Interface Assembly or the cables connected to it. Doing so could damage the assembly and cables.

NOTE

The Tank Interface Assembly leans back on the breech in an M1 tank. (See Figure 2-58.)

- f. Manually lower the main gun breech over the assembly to allow AFIST travel lock installation.

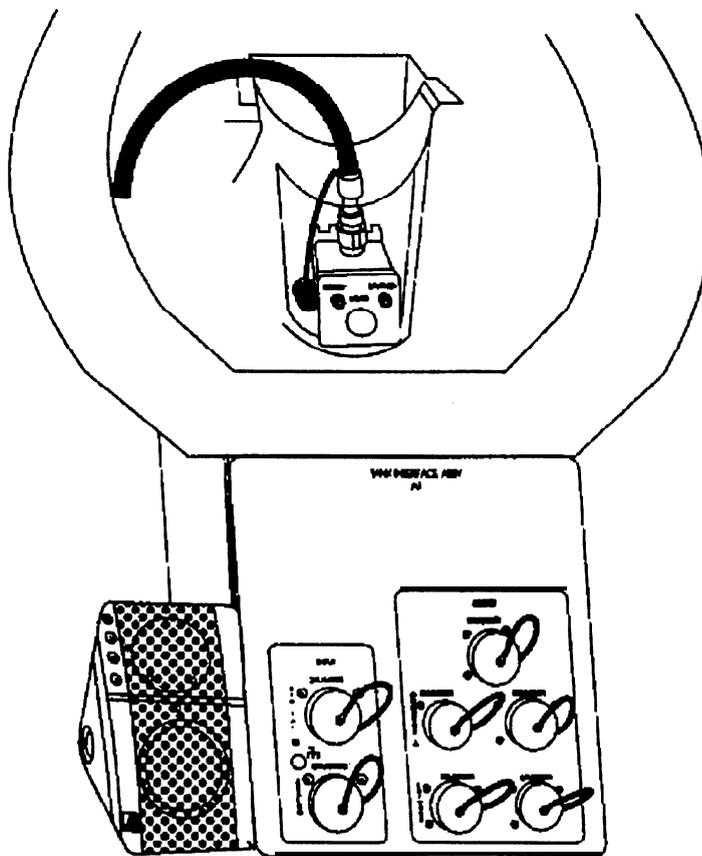


Figure 2-58. Tank Interface Assembly and Speaker/Amplifier (M1)

2.4.7.4.6 **AFIST Gun Elevation Lock Installation.** Install the AFIST Gun elevation lock (see Figure 2-59.) as follows:

- a. Using a **3/8-inch** Allen wrench, remove the silver bolt from the AFIST gun elevation lock.
- b. Using a **5/16-inch** Allen wrench, loosen the black pan head bolt from the AFIST gun elevation lock.
- c. Adjust and install the AFIST gun elevation lock for the appropriate tank configuration as follows:

(1) Mltank

⓪ Replace and tighten the silver **3/8-inch** Allen bolt in slot #14.

(b) Use the mounting pin to attach the bottom end of the AFIST gun elevation lock to the right side of the main gun in the main gun travel lock mounting bracket.

⓪ Manually elevate the main gun until able to secure the top end of the AFIST gun elevation lock to the turret roof travel lock (rear) mounting bracket with the mounting pin..

CAUTION

Take care when elevating the main gun to ensure no cables are damaged.

(2) M1A1 tank

⓪ Replace and tighten the silver **3/8-inch** Allen bolt in slot #3.

(b) Use the mounting pin to attach the bottom end of the AFIST gun elevation lock to the right side of the main gun in the main gun travel lock (forward) mounting bracket.

CAUTION

Take care when elevating the main gun to ensure no cables are damaged.

⓪ Manually elevate the main gun until able to secure the top end of the AFIST gun elevation lock to the turret roof travel lock mounting bracket with the mounting pin.

d. The main gun is properly elevated when the AFIST gun elevation lock is in place, with both pins installed.

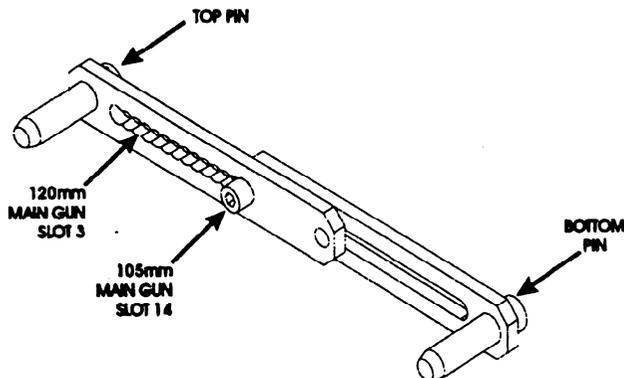


Figure 2-59. AFIST Gun Elevation Lock

2.4.7.5 Components Installed Outside the Tank. Components to be mounted outside the tank include the following:

- a. CWS monitor mount, mirrors, and monitor.
- b. GPS collimator lens.
- c. GPS monitor mount and monitor.
- d. GAS collimator lens.
- e. GAS monitor mount and monitor.
- f. Driver's monitor mount and monitor.
- g. Light shrouds for the GPS, GAS, and Driver's monitors.
- h. Monitor video and power cables.
- i. Light shroud support.

CAUTION

Connectors can be damaged by handling them roughly, carelessly dropping them on hard surfaces, or throwing cables. Take special care to ensure connectors are not damaged during handling.

Forcing connectors together with misaligned pins can damage cables and **onboard** tank components. Take care to align the **keyways** in plugs and connectors before pushing the connectors.

Do not allow light shrouds to cover cooling vents on monitors. The monitors could overheat and become damaged.

NOTES

Installation of the **tank**-appended components in the Driver's compartment is easier while the Driver's hatch is still open. Thus, when installing components inside and outside the tank concurrently, install the CWS, GAS, and GPS monitors first. Once the internal tank-appended components have been installed, close the Driver's hatch, and install the Driver's monitor mount and monitor.

Make minor adjustments to monitor video images with the controls on the monitor fronts or align the image by physically adjusting the monitor. Make these adjustments and alignments during system calibration.

Once all adjustments and alignments are made, install the GPS, GAS, and Driver's monitor light shrouds.

During the monitor **installation** procedures, refer to Table 2-1 to make monitor video and power cable connections.

Table 2-1. Monitor Video and Power Connections

	VIDEO		POWER	
	Monitor	IOS	Monitor	Extension Cord
CWS	W7P2	W7P1	2W7P2	2W7P1
GPS	W8P2	W8P1	2W6P2	2W6P1
GAS	W9P2	W9P1	2W8P2	2W8P1
DRIVER	W10P2	W10P1	2W9P2	2W9P1

2.4.7.5.1 CWS Monitor Mount and Monitor Installation.

Install the CWS monitor (see Figure 2-60.) as follows:



To avoid personal injury or damage to equipment, do not attempt to install the monitor alone. The monitor weighs over 37 pounds and requires a two-person lift.

- a. Place the CWS mount mirrors in the mount.
 - (1) The mirrors are two-sided. One side has a pinkish reflective surface. Place the mirrors so that the pinkish surfaces face each other.
 - (2) Align the mirrors, one at a time, along the guides inside the mount and slide them into the mount. Ensure the bottom of the mirrors are seated securely in the receptacles in the bottom of the mount.

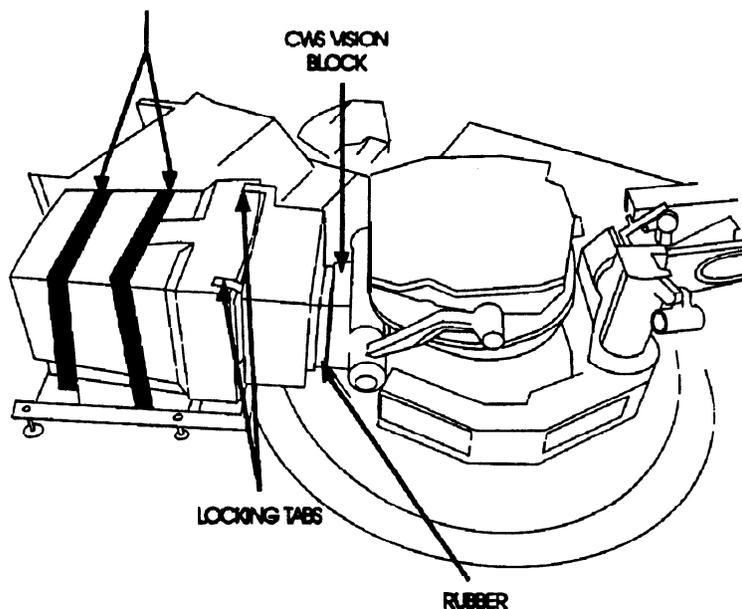


Figure 2-60. CWS Monitor Mount and Monitor
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- b. Position the CWS monitor mount so that the rubber surrounding the vision port on the mount aligns with the CWS vision port. Slide the mount forward until the rubber on the mount comes in contact with the CWS vision block.
- c. Place the CWS monitor on the mount and slide the monitor up until the face of the monitor touches the inside rubber cushion on the mount and the top of the monitor aligns with the locking tabs. Secure the monitor to the mount by placing the locking tabs in the grooves on top of the monitor.
- d. Slide the velcro straps on the mount around the top of the monitor, through the straps on the side of the mount, and secure the straps.
- e. Use an adjustable wrench to adjust the mount feet until the mount sits level on the turret without moving and the front of the mount is lowered as close to the tank as possible.

NOTE

Final positioning and adjustments are made during system calibration. (Refer to 2.6.7.3.)

- f. Use Figure 2-61 as a guide to make the following monitor cable connections:

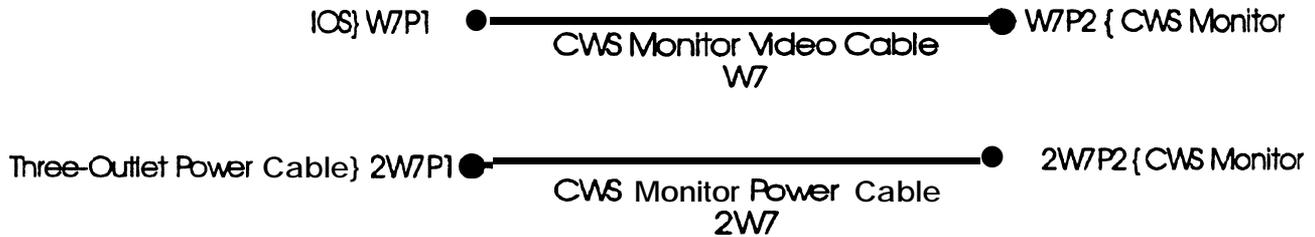


Figure 2-61. CWS Monitor Wire Diagrams

- (1) Connect video cable W7 connector W7P2 to the High Density D-sub connector on the monitor rear. (See Figure 2-62 and 2-62a.)
- (2) Connect ac power cable 2W7 connector 2W7P2 to the ac receptacle on the monitor rear.
- (3) Route the cable toward the main gun, down under the turret overhang to the IOS.

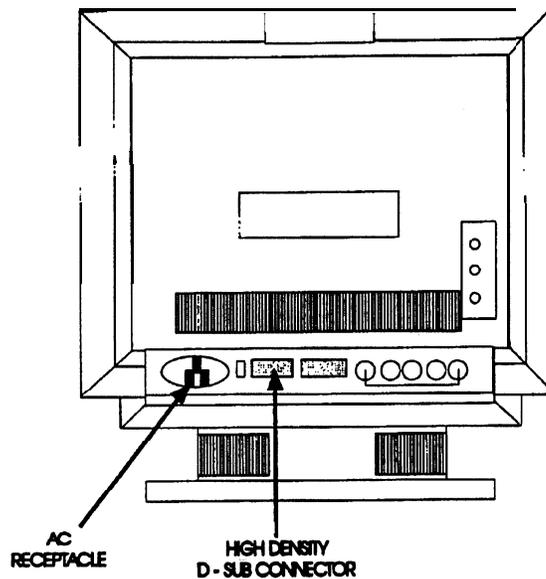


Figure 2-62. CWS, GPS, and GAS 17-inch (MAG) Monitor Rear

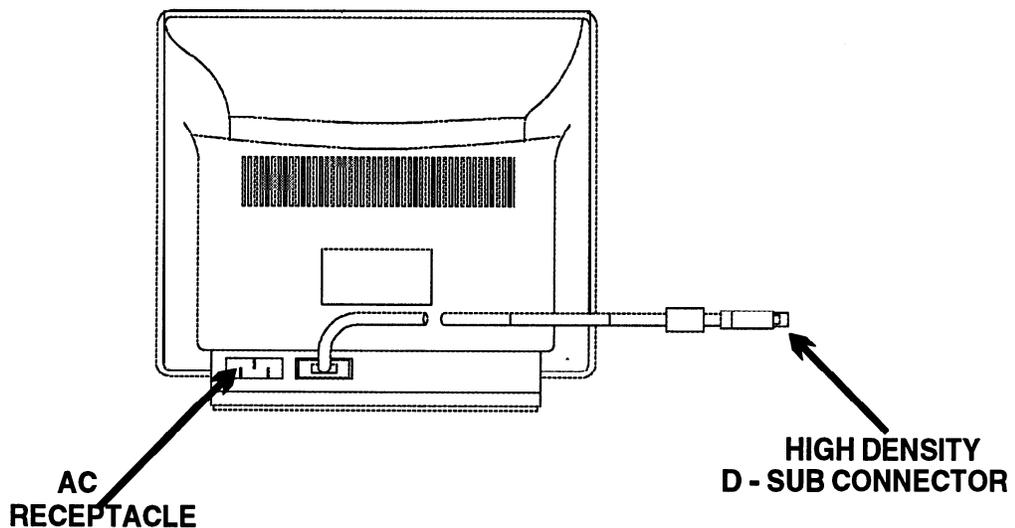


Figure 2-62a. CWS, GPS, and GAS 17-inch (Shamrock) Monitor Rear

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2.4.7.5.2 GPS Collimator Lens Assembly Installation. Install the GPS collimator lens assembly, shown in Figure 2-63, as follows:

- a. Position the GPS collimator lens assembly in front of the GPS daylight channel so that the retaining ring faces the tank.
- b. Tilt the top of the assembly away from the tank and place the lower lip of the assembly on top of the raised metal lip on the bottom of the GPS opening.
- c. Use the two pins on the top of the assembly to compress and lower the top retaining bar.

- d. With the retaining bar still compressed, tilt the top of the assembly back toward the tank. When the assembly is vertical, release the pins to lock the retaining bar under the top lip of the GPS opening and secure the assembly.

NOTES

When properly installed, the GPS collimator lens is approximately ½ inch from the right doghouse door, as you face it.

- e. Once the assembly is in place, look through the GPS to ensure the lens assembly mounting bracket cannot be seen and does not obstruct the GPS 3X field of view. Reposition as required.

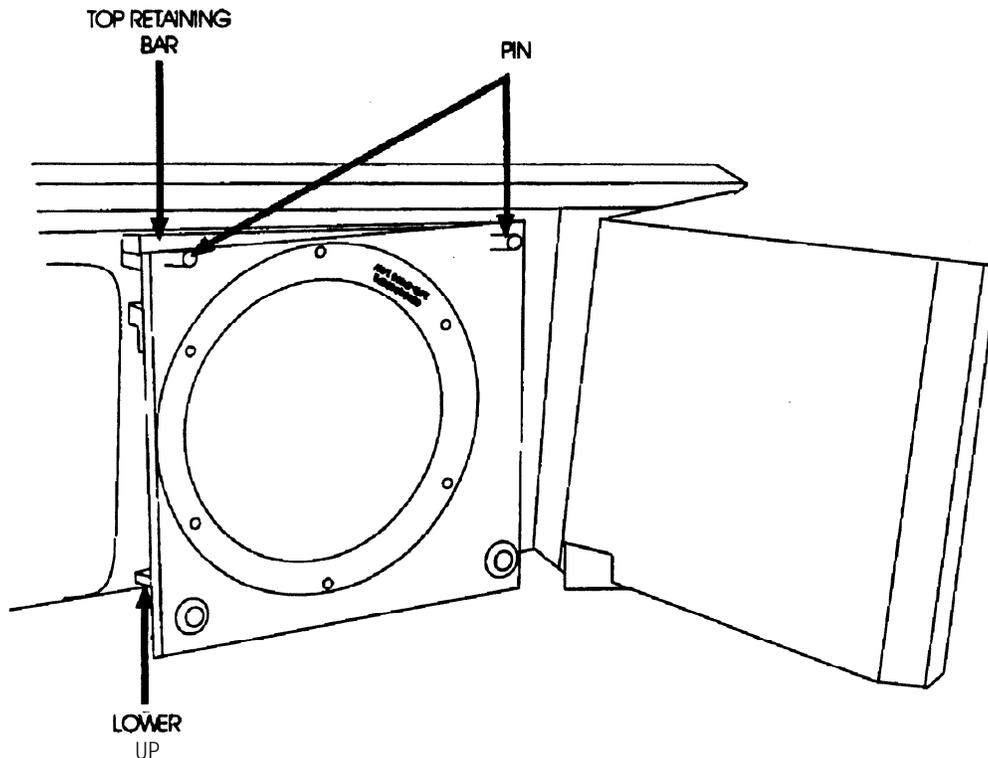


Figure 2-63. GPS Collimator Lens Assembly

2.4.7.5.3 GPS Monitor Mount and Monitor Installation.
Install the GPS monitor mount and monitor, shown in Figure 2-64, as follows:

WARNING

To avoid personal injury or damage to equipment, do not attempt to install the monitor alone. The monitor weighs over 37 pounds and requires a two-person lift.

- a. Place the GPS monitor squarely on the mount.

- b. Slide the velcro straps on the mount around the top of the monitor, through the buckles on the opposite side of the mount, and secure the straps.
- c. Position the mount so that the face of the monitor is approximately 18 inches from the collimator lens.
- d. Align the center of the monitor face with the center of the collimator lens.
- e. Use an adjustable wrench to adjust the mount feet until the mount sits level on the turret without moving and the front of the mount is lowered as close to the tank as possible.

NOTE

Final positioning and adjustments are made during system calibration. (Refer to 2.6.7.3.)

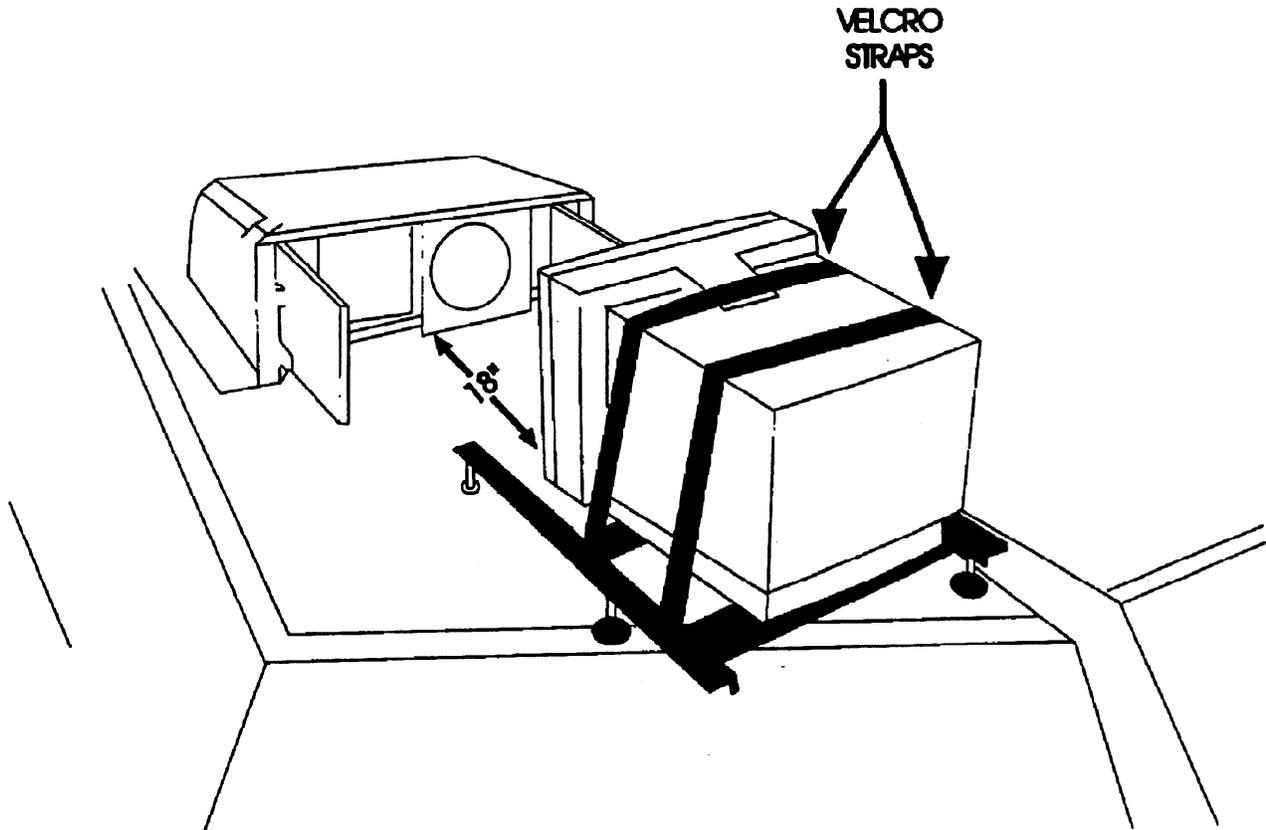


Figure 2-64. GPS Monitor Mount and Monitor

- f. Use Figure 2-65 as a guide to make the following monitor cable connections:

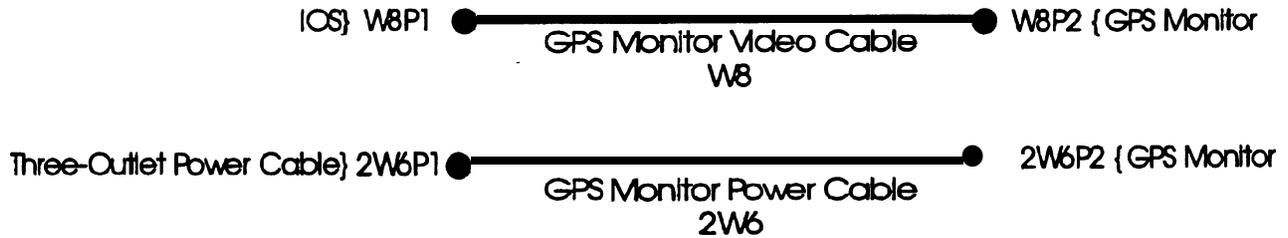


Figure 2-65. GPS Monitor Wire Diagrams

- (1) Connect video cable W8 connector W8P2 to the High Density D-sub connector on the monitor rear.
- (2) Connect ac power cable 2W6 connector 2W6P2 to the ac receptacle on the monitor rear.
- (3) Route the cables toward the main gun, under the turret overhang to the IOS.

2.4.7.5.4 GAS Collimator Lens Installation. Install the GAS collimator lens assembly (Figure 2-66) as follows:

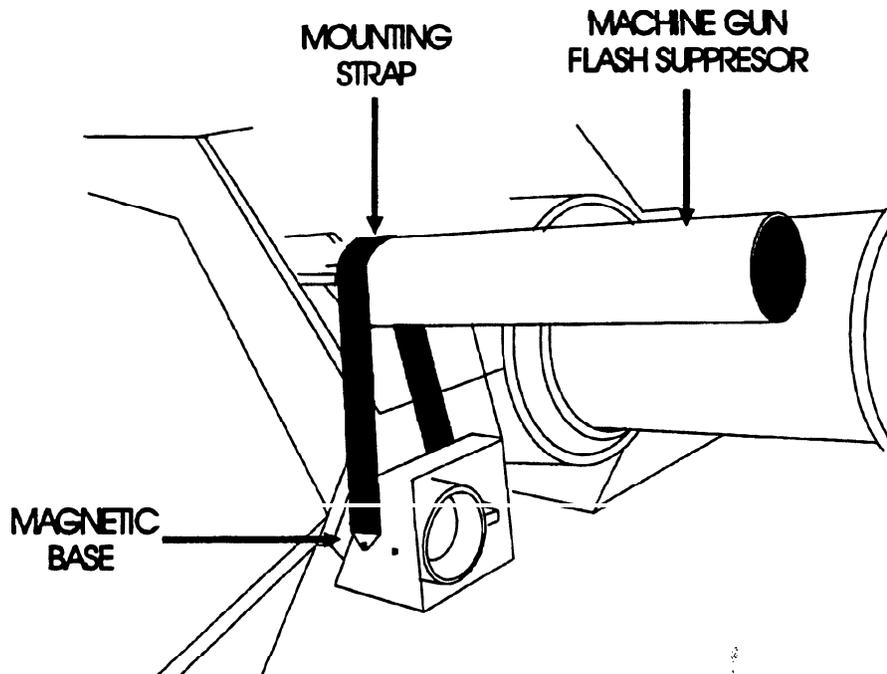


Figure 2-66. GAS Collimator Lens

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NOTE

Before installation of the GAS collimator lens assembly, ensure that the **AFIST** elevation lock has been installed (see 2.4.7.4.6) and the velcro strap is attached to the lens assembly by the screws closest to the magnetic mounts.

- a. Hold the lens assembly so that the magnetic mounts face the turret and the mounting strap is at the top of the assembly.
- b. Loosely drape the mounting strap over the coax machine gun flash suppressor and position the magnetic mounts on each side of the GAS aperture in the turret armor, aligning the lens with the GAS aperture.
- c. Being careful to ensure the magnetic mounts base are aligned **vertically** on either side of the aperture, place the mount against the armor and allow the magnetic base to hold the mount in place.
- d. Secure the assembly to the machine gun flash suppressor with the velcro mounting strap.
- e. Ensure the collimator lens completely covers the GAS aperture.
- f. Once the lens assembly is in place, look through the GAS to ensure the lens assembly mounting bracket cannot be seen and does not obstruct the GAS field of view. Reposition as required.

CAUTION

Do not release the lens assembly until the mounting strap secures the assembly to the machine **gun** flash suppressor. With only the magnetic mounts holding it in place, the lens assembly may fall.

2.4.7.5.5 GAS Monitor Mount and Monitor Installation.
 Install the GAS monitor mount (see Figure 2-67) and monitor as follows:

WARNING

To avoid personal injury or damage to equipment, do not attempt to install the monitor alone. The monitor weighs over 37 pounds and requires a two-person lift.

NOTE

Before installing the GAS monitor mount and monitor, ensure the main gun has been elevated and the AFIST gun elevation lock has been installed. See 2.4.7.4.6.

- a. Place the monitor mount at the back edge of the rear deck.
- b. Place the GAS monitor squarely on the mount.
- c. Slide the velcro straps on the mount around the top of the monitor, through the buckles on the opposite side of the mount, and secure the straps.

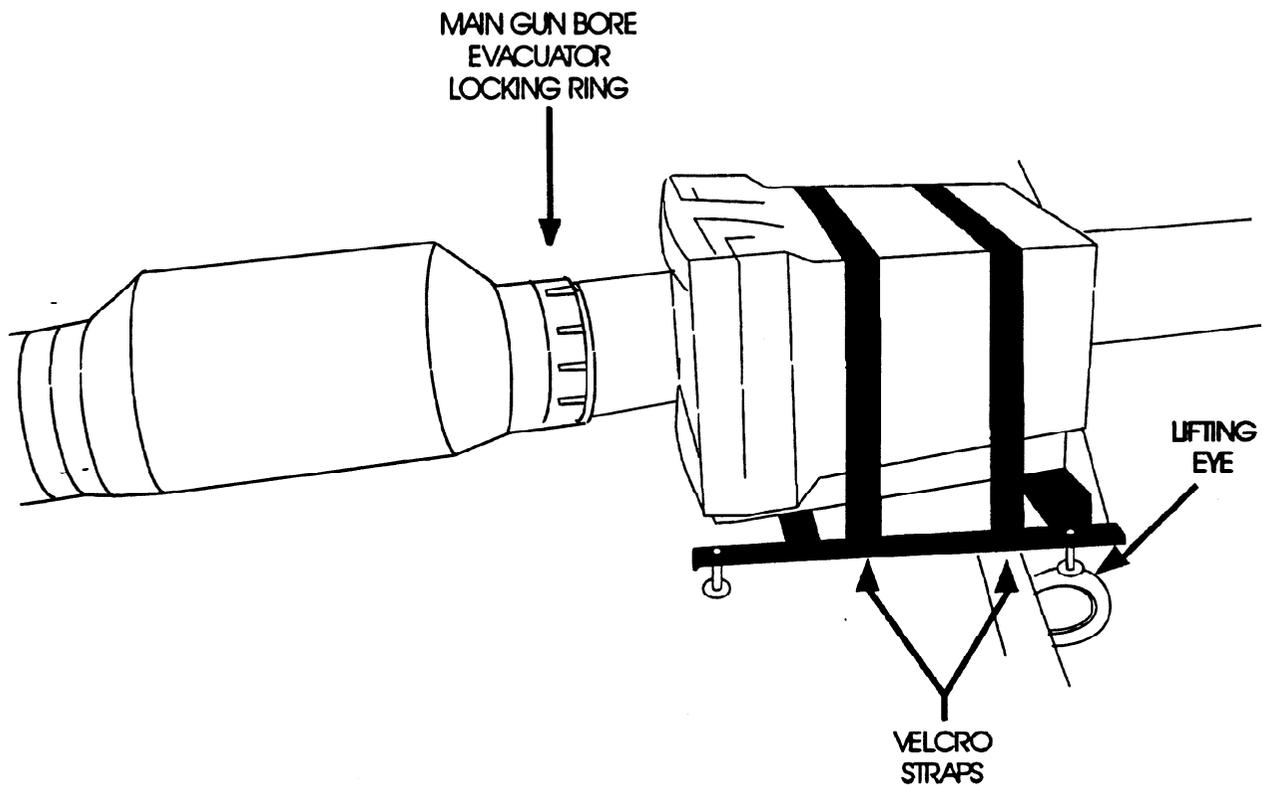


Figure 2-67. GAS Monitor Mount and Monitor

- d. Position the GAS monitor mount and monitor so that the front right top corner of the monitor just touches the forward edge of the main gun bore evacuator locking ring.
- e. Align the monitor mount so that the monitor face is parallel to and centered on the GAS collimator lens.
- f. Use an adjustable wrench to adjust the mount feet until the mount sits level on the deck without moving and the front of the mount is lowered as close to the tank as possible.

NOTE

Final positioning and adjustments are made during system calibration. (Refer to 2.6.7.3.)

- g. Use Figure 2-68 as a guide to make the following monitor cable connections:

- (1) Connect video cable **W9** connector **W9P2** to the High Density D-sub connector on the monitor rear.

- (2) Connect ac power cable **2W8 2W8P2** to the ac receptacle on monitor rear.
- (3) Route the cables toward the main gun, under the turret overhang to the IOS.

- h. Use Figure 2-69 as a guide to position and connect power cable **W3**:

- (1) Connect GAS monitor ac power cable connector **2W8P1**, CWS monitor ac power cable connector **2W7P1**, and GPS monitor ac power cable **2W6P1** to blue three-outlet power cable **W3** at connector **W3P2**.
- (2) Route blue power cable **W3** to the IOS.

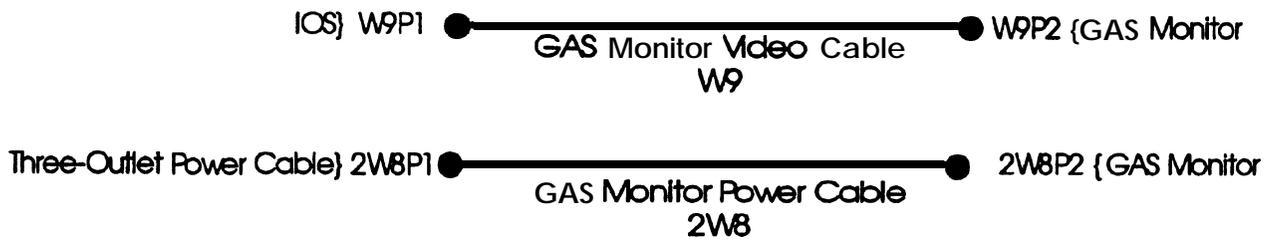


Figure 2-68. GAS Monitor Wire Diagrams

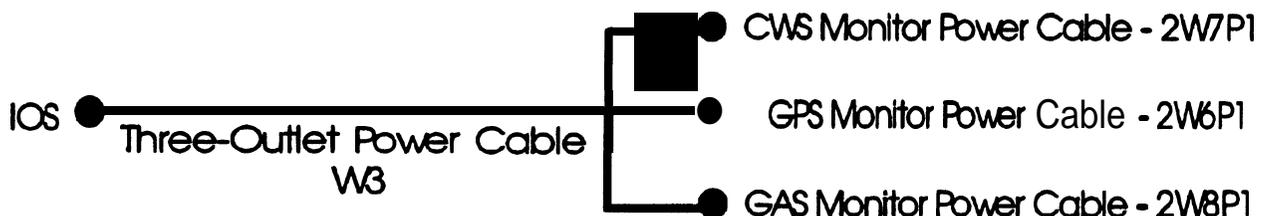


Figure 2-69. Power Cable W3 Wire Diagram

2.4.7.5.6 Driver's Monitor Mount and Monitor Installation.
Install the Driver's monitor mount and monitor, shown in Figure 2-70, as follows:

WARNING

To avoid personal injury or damage to equipment, do not attempt to install the monitor alone. The monitor weighs over 35 pounds and requires a two-person lift.

- a. Close the Driver's hatch.
- b. Place the monitor mount and monitor on the front slope.
- c. Place the monitor squarely on the mount.

- d. Slide the velcro strap on the mount around the top of the monitor, through the buckle on the opposite side of the mount, and secure the strap.
- e. Center the mount so that the monitor face is positioned in the center of the Driver's vision block. Move the mount as close as possible to the vision 'block until the monitor touches the turret overhang.
- f. Use an adjustable wrench to adjust the mount feet until the mount sits level on the deck without moving and the front of the mount is lowered as close to the tank as possible.

NOTE

Final positioning and adjustments are made during system calibration. (Refer to 2.6.7.3.)

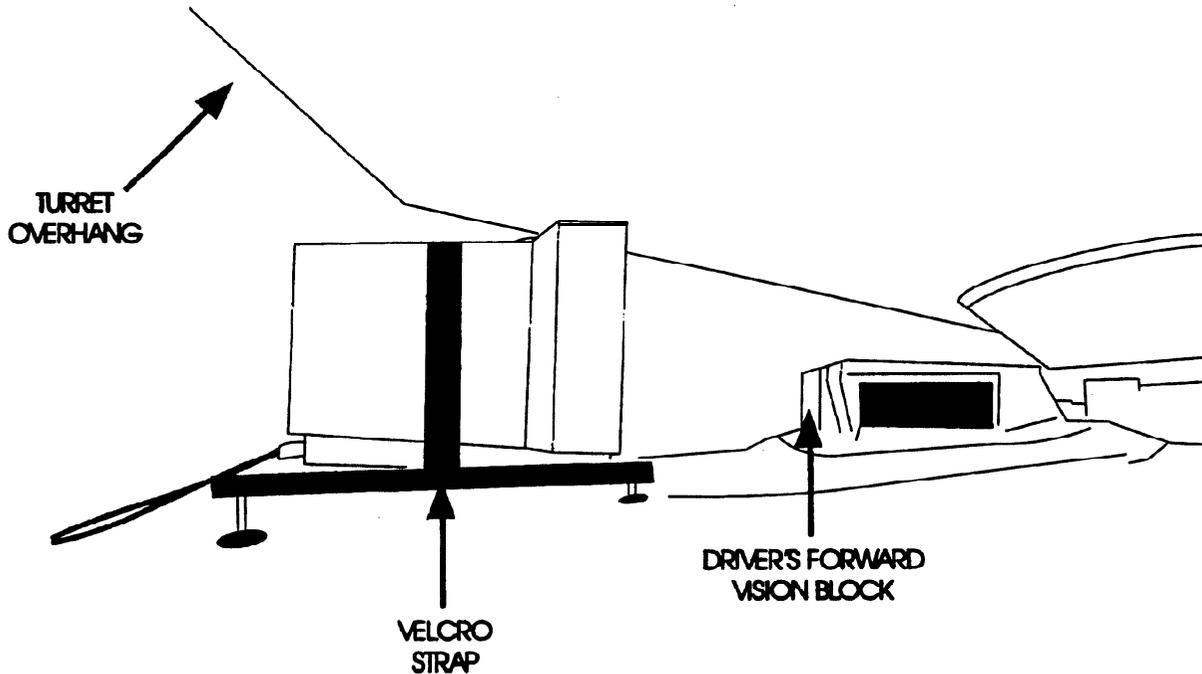


Figure 2-70. Driver's Monitor Mount with Monitor

g. Use Figure 2-71 as a guide to make the following monitor cable connections:

- (1) Connect video cable **W10** connector **W10P2** to the mini D-sub on the built-in video cable on the monitor's rear.
- (2) Connect ac power cable **2W9** connector **2W9P2** to the ac power receptacle on the monitor rear (see Figures 2-72, 2-72a and 2-72b) and to the blue SO-foot single-outlet power cable **W11** at connector **W11P2**.



Route cables on the outside of the tank where they will not be stepped on by tank crew members moving around on the tank. Tripping over cables may cause personal injury. Walking on cables and other rough treatment damages cables and connectors.

- (3) Route video cable connector **W10P1** and ac power cable connector **2W11P1** toward the 10s.

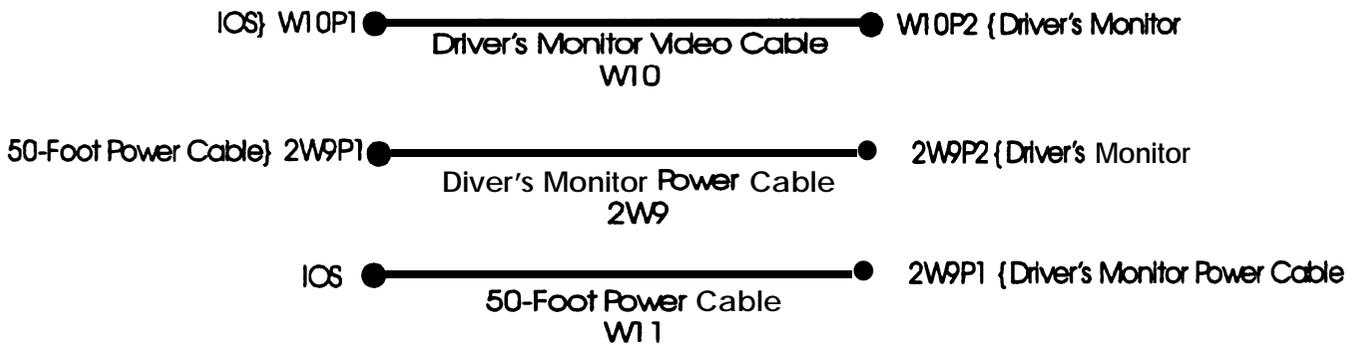


Figure 2-71. Driver's Monitor Wire Diagrams

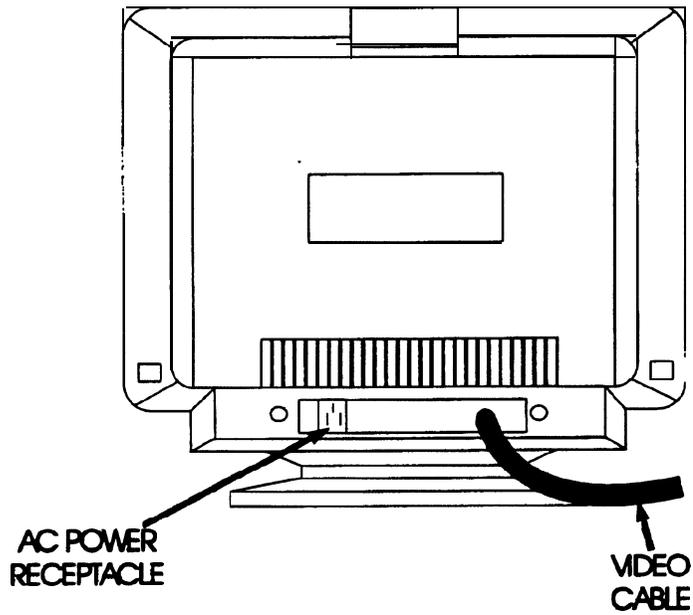


Figure 2-72. Driver's 14-inch (MAG) Monitor Rear

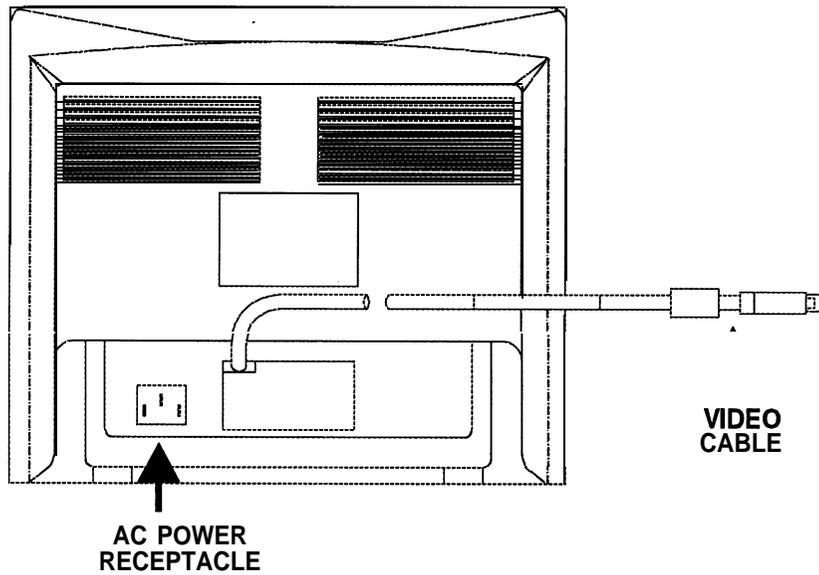


Figure 2-72a. Driver's 15-inch (Viewsonic) Monitor Rear

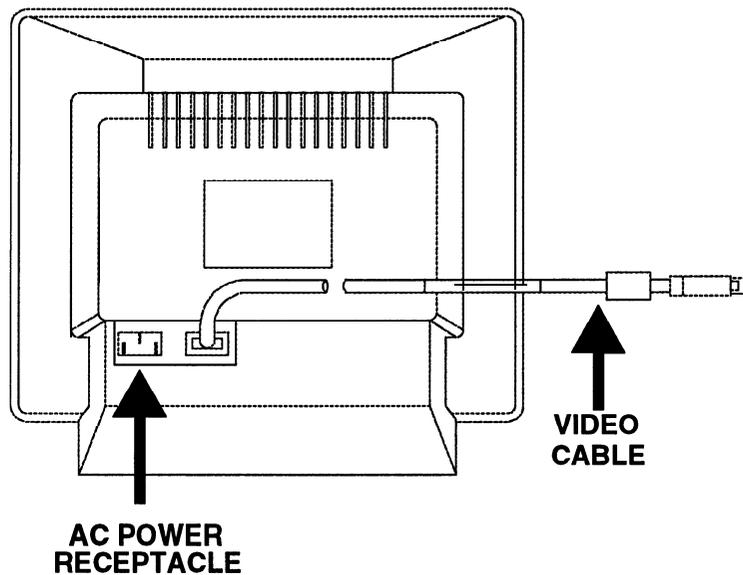


Figure 2-72b. Driver's 15-inch (Shamrock) Monitor Rear

2.4.8 Installation Inspection Checklist. After all components have been installed on the outside and inside of the tank, the I/O makes a final check before connecting the tank interface cables to the IOS. The I/O uses the Installation Inspection Checklist (Figure 2-73) to ensure that all components are present and have been hooked up properly.

INSIDE TANK			
TC's Station		Loader's Station	
Commander's Panel		Breech Switch Facade	
TC's Control Handle		Loader's Panel	
CWS Power Control Handle		AM 1780/VRC Amplifier	
TC's Keypad		Loader's Intercom Box	
Gunner's Station		Knee Switch	
Gunner's Power Control Handles		AMMUNITION SELECT Switch Facade	
GPS Control Panel		Driver's Station	
GAS Proximity Sensor		Master Control Panel	
GPS RETICLE Intensity Knob Facade		Throttle Control	
TIS Control Unit (Three Connections)		Transmission Shift Control	
GPS MAGNIFICATION Lever Facade		Brake Sensor	
LRF (RANGE) Switch Facade		Steering Sensor	
FLTR/CLEAR/SHTR Switch Facade		General (Inside Turret)	
GAS RETICLE Select Switch Facade		Tank Interface Assembly	
GAS RETICLE Illumination Connection		Domelight Harness	
Ejection Guard/SAFE/ARMED Handle		Tank Interface Assembly Cables	
Gun Elevation Lock		Speaker/Amplifier	
OUTSIDE TANK			
CWS		GAS	
Monitor and Mount		Collimator Assembly	
GPS		Monitor, Mount, and Shroud	
Collimator Assembly		Driver's Hatch	
Monitor, Mount, and Shroud		Monitor, Mount, and Shroud	
General			
Monitor ac Power and Video Connectors			

Figure 2-73. Installation Inspection Checklist

CAUTION

Shut down the 24-Vdc domelight power before installing sensor cables to the IOS. Installing cables with power applied to the 24-Vdc domelight power system may damage the circuit boards.

2.4.9 Connecting Tank Interface, Video, and Grounding Cables to the IOS. When all of the tank-appended components listed on the I/O Installation Inspection Checklist have been connected, connect the two tank interface cables and the video cables to the Interface Connector panel on the IOS as follows. (See Figures 2-37 and 2-37a.)

WARNING

Place cables on the outside of the tank where they will not be stepped on by tank crew members moving around on the tank. Tripping over cables may result in personal injury. Walking on the cables and other rough handling will damage cables and connectors.

WARNING

Under no circumstances should the system be operated without properly attaching the IOS ground cable to an approved earth ground. Serious injury to personnel or damage to the equipment may result. In the event the equipment is located from earth ground beyond the length of the cable supplied, the ground cable may be lengthened by attaching it to an approved ground cable of equal or greater diameter. The total electrical resistance between the equipment and earth ground should not exceed 5 .0 milliohms.

- a. Shut down power to the domelights at the I/O Control Panel:
 - (1) Place the DOMELIGHT POWER switch in the OFF position (down). The DOMELIGHT POWER light dims.
 - (2) Turn the INSTRUCTOR/OPERATOR passkey to the OFF position.
 - (3) Place the MAIN POWER SWITCH in the OFF position (down). The SYSTEM POWER and 24V, +12V, -12V, and 5V POWER SUPPLY STATUS lights dim. The IOS is now shutdown.

- b. Use Figure 2-74 as a guide to make the following Tank Interface cable connections:
 - (1) Connect Tank Interface cable W4 (digital cable). Locate connector W4P1 on cable W4 and connect it to receptacle A11J12/W4P1 on the IOS Connector Panel of TD 17/162A. For TD 17/162B, connect W4P1 to rear of Unit 1A4 receptacle A4A5J12/W4P1.
 - (2) Connect Tank Interface cable W5 (analog cable). Locate connector W5P1 on cable W5 and connect it to receptacle A1 1J13/W5P1 on the IOS Interface Connector Panel of TD 17/162A. For TD 17/162B connect W5P1 to rear of Unit 1A4 receptacle A4A5J13/W5P1.
- d. Connect the video cables.
 - (1) Locate video connector W10P1 and seat it in receptacle A1 1 J1/W10P1 Drivers's video of TD 17/162A. For TD 17/162B Connect W10P1 to the rear of Unit 1A5 A5A1J3/W10P1receptacle.
 - (2) Locate video connector W8P1 and seat it in receptacle A1 1 J2/W8P1 GPS video of TD 17/162A. For TD 17/162B connect W8P1 to the rear of Unit 1A5 A5A1J2/W8P1receptacle.
 - (3) Locate video connector W7P1 and seat it in receptacle A1 1 J3/W7P1 CWS video of TD 17/162A. For TD 17/162B connect W7P1 to the rear of Unit 1A2 A2A4J2/2W7P1 receptacle.
 - (4) Locate video connector W9P1 and seat it in receptacle A1 1 J4/1W9P1 GAS video of TD 17/162A. For TD 17/162B connect W9P1 to the rear of Unit 1A2 A2A4J3/2W9P1 receptacle.
- e. At AC Power Interface section of the IOS Interface Connector Panel, connect the ac monitor power cables W3P1 and W11P1 to the two Tank Monitor Power outlets, A1 1J8A/W3 and A11J83/W11 of TD 17/162A. For TD 17/162B connect cables W3P1 and W11P1 to the rear of Unit 1A4 A4A5J8A/W3 and A4A5J8B/W11, respectively.

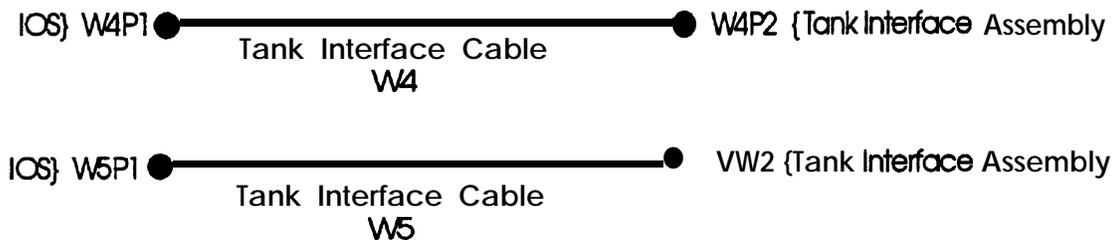


Figure 2-74. Tank Interface Cable Wire Diagrams

2.4.10 Monitor Light Shroud Installation. Once monitors are properly aligned and calibration is completed in accordance with 2.6.7, install the light shrouds in accordance with the following procedures.

NOTE

Install monitor light shrouds only after monitors are properly aligned and calibration is complete.

2.4.10.1 GPS Monitor Light Shroud Installation. Install the GPS monitor light shroud, shown in Figure 2-75, as follows.

- a. Position the closed, weighted end of the shroud behind the GPS ballistic door housing.
- b. Pull the open end of the shroud forward over the shroud support and front of the monitor to form a tunnel. Align the seams of the shroud with the monitor corners.
- c. Secure the velcro strips on the underside of the shroud with the velcro on the monitor top and sides. The shroud is properly installed when the weighted edges are flush with the turret and the shroud forms a light-free tunnel covering the monitor face and ballistic door housing.

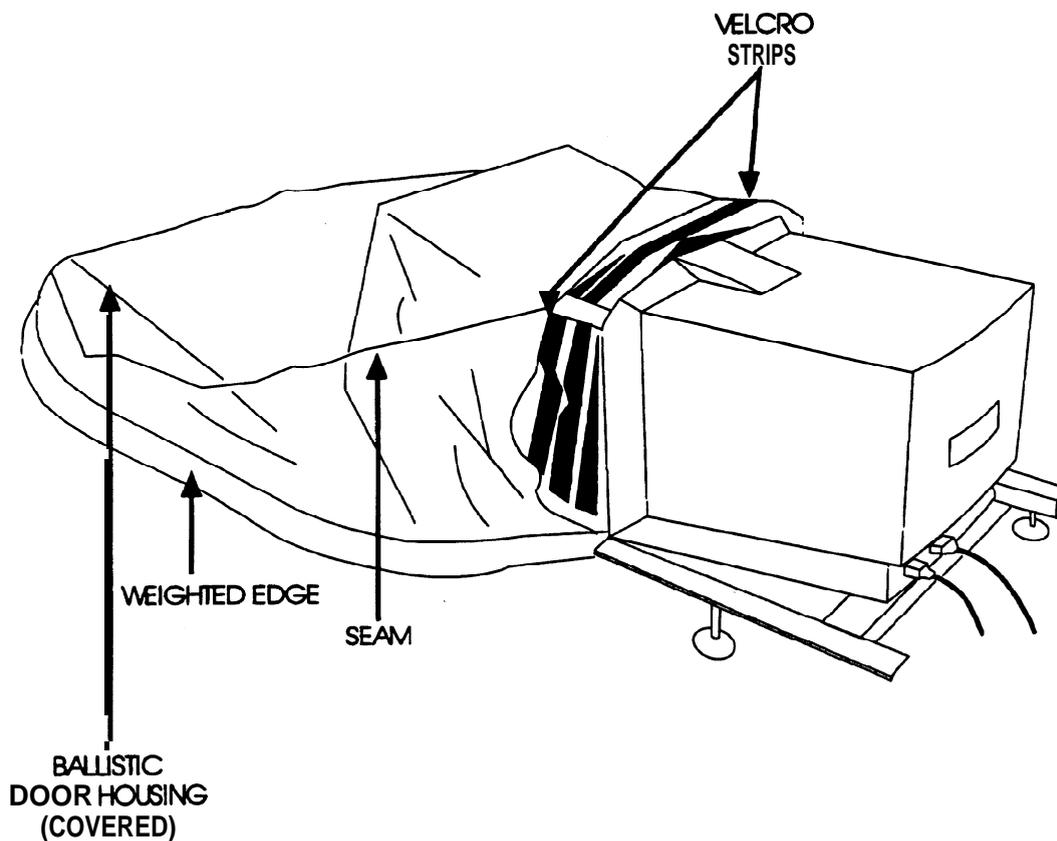


Figure 2-75. GPS Monitor Light Shroud

2.4.10.2 GAS Monitor Light Shroud Installation. Install the **GAS** monitor light shroud, shown in Figure 2-76, as follows.

- a. Position two light shroud supports at approximately **12- to 18-inch** intervals between the monitor face and the GAS collimator assembly.
- b. Loosely drape the smaller opening of the shroud over and around the lens assembly.

CAUTION

Do not release the lens assembly until the mounting strap secures the assembly and shroud to the machine gun flash suppressor. With only the magnetic mounts holding it in place, the lens assembly may fall.

- c. Position the shroud over the lens assembly, aligning the screw holes in the shroud with the front set of screws on each side of the lens assembly.
- d. Secure the shroud to the lens assembly by screwing it into the front set of screw holes on each side of the lens assembly.
- e. Pull the shroud forward over the light supports, ensuring all supports remain erect. Align the seams of the shroud with the monitor edges.
- f. Secure the velcro strips on the underside of the shroud with the velcro on the monitor top and sides. The shroud is properly installed when the weighted edges are flush with the turret and the shroud forms a light-free tunnel covering the monitor face and collimator lens assembly.

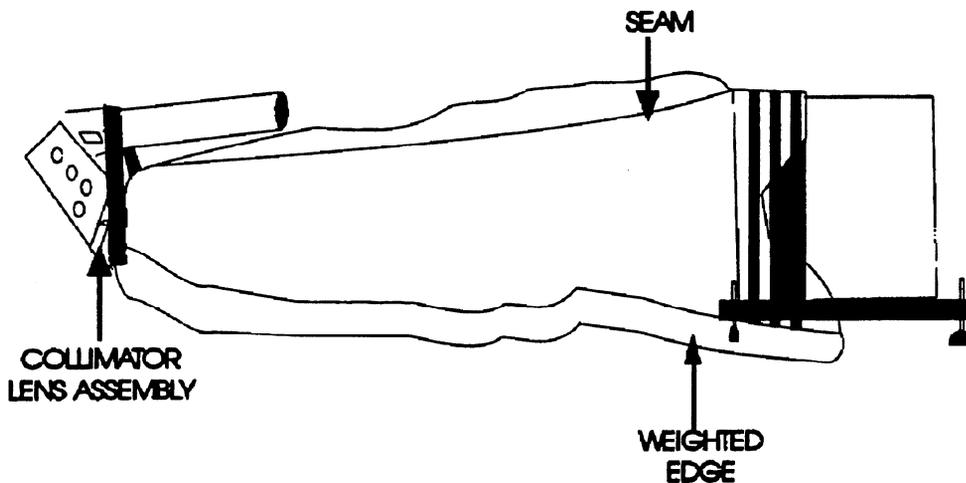


Figure 2-76. GAS Monitor Light Shroud

2.4.10.3 Driver's Monitor Light Shroud Installation. Install the Driver's monitor light shroud, shown in Figure 2-77, as follows.

- a. Position the closed end of the shroud over the Driver's hatch, ensuring both side vision ports are covered.
- b. Place the **18-inch** baffle under the front edge of the monitor mount to block light. Pull the shroud forward over the monitor face to form a tunnel. Secure the velcro on the underside of the shroud with the velcro on the monitor top and sides.
- c. The shroud and baffle are properly installed when the weighted edges are flush with the turret and the shroud forms a light-free tunnel covering the monitor face and Driver's hatch.

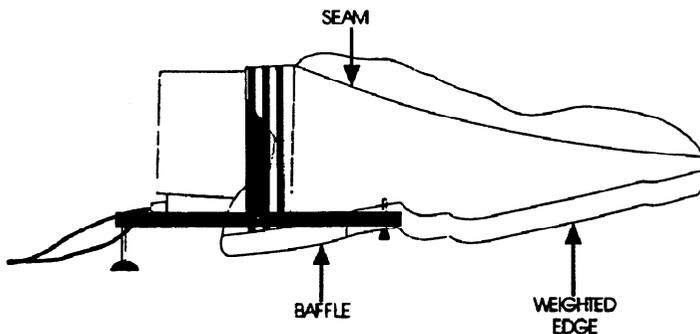


Figure 2-77. Driver's Monitor Light Shroud

2.4.10.4. TC's Hatch Shroud Installation. Install the TC's Hatch light shroud, shown in Figure 2-78, as follows.

- a. Place the TC's hatch in the open protected position.
- b. Position the shroud over the hatch so that the shroud surrounds the hatch opening and the flap covers the CWS monitor and mount. The shroud is open to the rear to allow space for the TC machine gun mount.
- c. The shroud is properly installed when the weighted edges are on the top of the turret and the shroud forms a light-barring cover over the hatch cover and the CWS monitor.

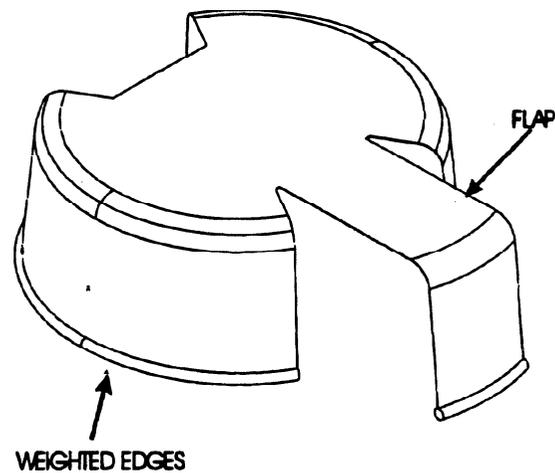


Figure 2-78. TC's Hatch Shroud

2.4.11 Actions when AFIST is Installed from a Previous Training Period. The simulator trainer may remain installed on the M1/M1A1 tank between scheduled training periods. When the simulator trainer is already installed, perform daily PMCS in accordance with the PMCS Table in Section II of this chapter before starting up the system.

2.4.12 Unusual Conditions.

2.4.12.1 Environmental Conditions. The AFIST is designed to operate in a sheltered and reasonably clean environment, protected from the direct effect of the elements, in a temperature range (surrounding the IOS and IG) from 40 to 90 degrees Fahrenheit and a relative humidity range from 30 to 90 percent. Unusual environments are considered to be those environmental conditions which differ from those described above. Operators can take the steps below to alleviate some environmental conditions.

2.4.12.1.1 High Temperatures. When temperatures surrounding the IOS exceed 90 degrees Fahrenheit, open the rear door of the IOS and place a fan at the rear of the IOS to blow air directly into the components to cool their interiors.

2.4.12.1.2 Cold Temperatures. When the temperature surrounding the IOS and the IG is less than 40 degrees Fahrenheit, warming the area with a heater will permit operation of the AFIST. Do not overheat AFIST by directing a strong and prolonged amount of high heat at the system. Too much heat can disable the system by damaging its components.

2.4.12.1.3 Dusty Conditions. If required to operate in dusty conditions, make every effort to restrict the amount of dust reaching the IOS. Shelter the IOS by shielding it with a poncho or other material, but do not drape the material directly on the equipment. Inspect the equipment after each training session, cleaning the air filters thoroughly. Clean the surfaces of the IOS frequently.

2.4.12.1.4 Damp Conditions. If required to operate the system in a damp environment, with a relative humidity above 90 percent, turn on the IG fans for 15 minutes prior to system start-up as follows:

- a. Remove all three doors on the IOS front.
- b. Place the IG MAIN POWER circuit breaker bar to the off position (down).
- c. Verify the IG FANS ENABLE switch is in the on (|) position.
- d. Place the I/O Control Panel MAIN POWER SWITCH to the ON position.
- e. Place the INSTRUCTOR/OPERATOR passkey in the ON position.
- f. Push the PUSH TO START button. The IG fans come on.
- h. After 15 minutes, shut the system off as follows:
 - (1) Place the I/O Control Panel MAIN POWER SWITCH to the OFF position.
 - (2) Place the INSTRUCTOR/OPERATOR passkey in the OFF position.
- i. Place the IG MAIN POWER circuit breaker bar to the on position (up).
- j. Start the system normally as outlined in 2.5.

2.4.12.2. External Power Sources. The AFIST TD/162A requires an uninterrupted source of 120-Volts alternating current (VAC) power from one 20-amp circuit and an uninterrupted source of 220-Volts alternating current (VAC) power from one 20-amp circuit, to operate effectively and to prevent damage to the system. The AFIST TD17/162B requires one dedicated 120-VAC, 20-amp, 60 HZ circuit and one dedicated 220-VAC, 20-amp, 60 HZ circuit. Before attempting to operate the system, adequate sources of power must be surveyed and approved by the facilities staff.

2.5 INITIAL ADJUSTMENTS, CHECKS, AND BUILT-IN TEST (BIT).

2.5.1 Prestart Checks. AFIST is configured so that the complete system is powered up and controlled from the I/O Control Panel. Before starting the system, the I/O verifies that the individual component controls are in the proper operating mode. To do this, check the following:

- a. Remove all three doors from the IOS front (for TD 17/162A).
- b. I/O Control Panel.
 - (1) **Confirm** the Instructor/Operator passkey is inserted and in the OFF (twelve o'clock) position.
 - (2) Set the DOMELIGHT POWER switch to ON.
 - (3) Set the SYSTEM MODE SELECT switch to TRAINING.
 - (4) Set the MONITOR MODE SELECT switch to MENU.
- c. System Controller. **Confirm** the red ON/OFF switch is in the on position (|). TD 17/162B has a black ON/OFF switch.
- d. Audio Preamp Mixer Unit.
 - (1) Connect the headset into the HEADSET receptacle.
 - (2) Turn the SPEAKER VOLUME knob fully counterclockwise.
 - (3) Turn the HEADSET VOLUME knob fully counterclockwise.
 - (4) Turn the MIC OUT knob fully counterclockwise.
- e. Sampler/Playback Synthesizer (S/P).
 - (1) Turn VOLUME knob fully clockwise.
 - (2) Insert the sound bank disk into the floppy disk drive.
 - (3) Set the PWR/OFF switch to PWR.

- f. Printer (in the printer drawer).
 - (1) Verify the On-line menu is displayed.
 - (2) Verify the Menu switch is in the ON LINE position.
 - (3) Verify the Style switch is in the FONT1 position,
 - (4) Verify the Power switch is in the on (|) position.
 - (5) Verify paper is loaded.
- g. IG. Confirm the MAIN POWER circuit breaker bar and FANS ENABLE switch are in the ON position (up).

2.5.2 System Start-up. Turn on the system as follows:



If required to operate the system in a damp environment, with a relative humidity above 90 percent, turn the IG fans on for 15 minutes prior to system start-up. Refer to 2.4.12.1. for procedure

- a. Place MAIN POWER SWITCH in the ON position. The 24V POWER SUPPLY STATUS light lights.
- b. Turn the Instructor/Operator passkey to the ON (three o'clock) position. The PASSKEY ENGAGED and DOMELIGHT POWER lights light.

c. Push the PUSH TO START button. The following occurs:

- (1) The +12V, -12V, and 5V POWER SUPPLY STATUS lights light.
- (2) The SYSTEM POWER light lights.
- (3) The PASSKEY ENGAGED light goes out.
- (4) The left screen indicates that the system is conducting a boot-up procedure and loading the OS (operating system), the AFIST logo and a "Welcome: Press Ctrl-Alt-Delete to log on" screen will appear.

CAUTION

Do not press "Spacebar when the prompt: "Press Spacebar NOW to invoke the Last Known Good Menu" appears when starting the system. Doing so may damage the system configuration.

```

***** Built-In Test *****
II-I----- In Progress -----II----

Printer verification =II-III-----I-----III----- > PASSED
MIDI verification =====II=====II===== > PASSED
DIO Board 4 verification -----m-----m----- > PASSED
DIO Board 5 verification =====II-----II----- > PASSED
DIO Board 6 verification =====I-----I)----- > PASSED
DAQ Board 12 verification ==m===== > PASSED
TC Station verification =====II----- > PASSED
Gunner Station verification ---II===== > PASSED
Driver Station verification =====II===== > PASSED
Loader Station verification I)===== > PASSED
Image Generator verification in progress
-- waiting for IG to warm-up
    
```

Figure 2-79. Automatic BIT Screen

- (5) Press the "Ctrl", "Alt" and "Delete" keys **simultaneously**. When the "Logon" screen appears, type your assigned Username and password to logon to the system.
- (6) The Built-In-Test (BIT) (see Figure 2-79.) will run automatically. AFIST automatically initiates the BIT upon each system logon to identify equipment faults. When BIT detects an equipment fault, the monitor displays the BIT Screen, Figure 2-80, which shows the BIT results to the I/O. The I/O then conducts or directs a **physical** check of the appropriate items. If this check does not result in a fully operational system, refer to the troubleshooting procedures in Chapter 3.
- (7) The right screen is blank (for approximately 5 minutes), then displays either a European or desert scene,
- (8) The system controller ON/OFF switch lights.
- (9) The audio preamp mixer unit POWER light lights.
- (10) The S/P menu lights.
- (11) The printer ON LINE light lights, but does not flash

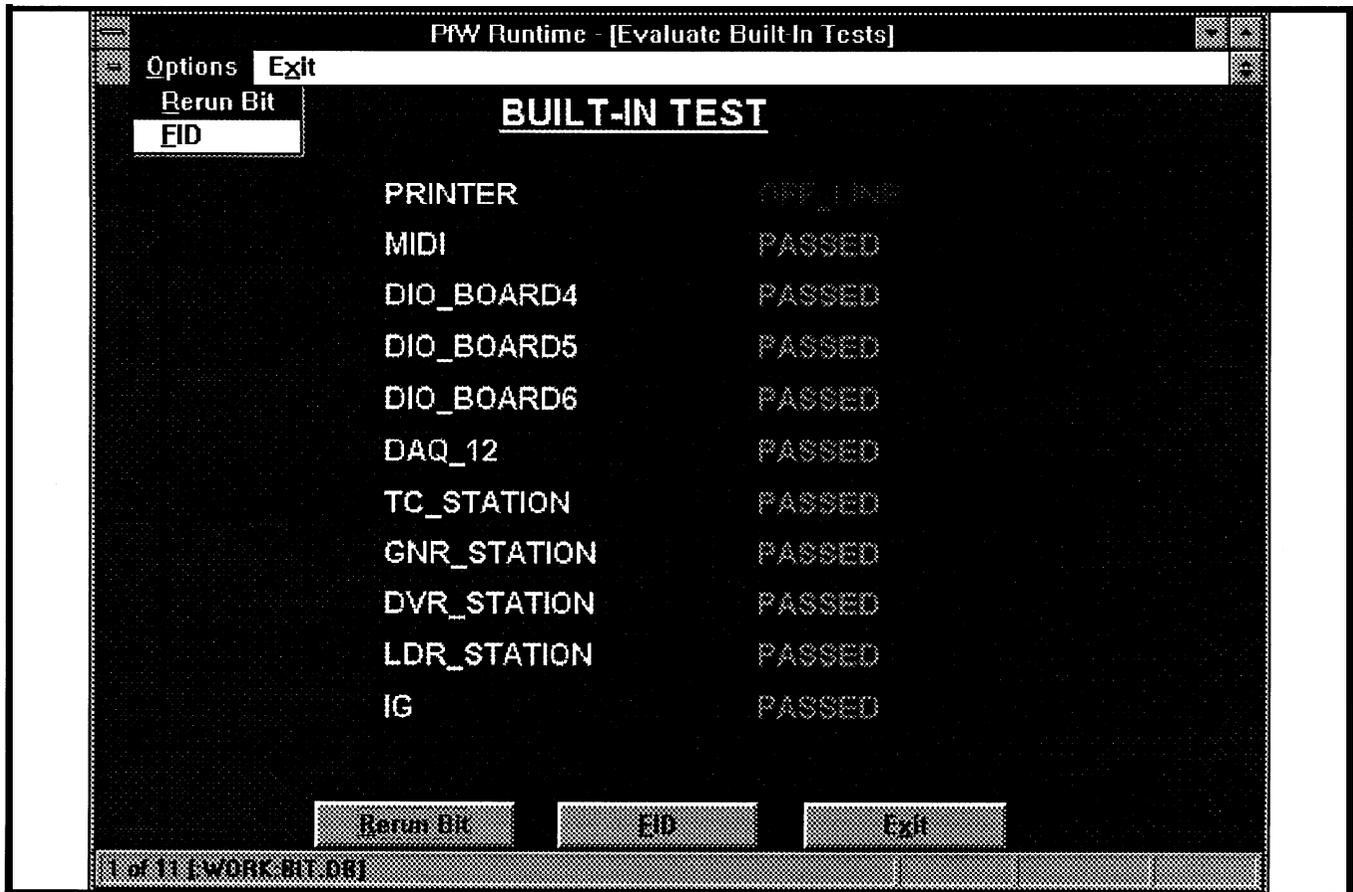


Figure 2-80. BIT Screen

CAUTION

Do not enter any commands until the blue AFIST screen appears.

- (12) Once the BIT is complete successfully, the AFIST Main Screen appears on the left screen (Figure 2-81).
- d. If the listed cues do not occur, refer to the Troubleshooting Table in Chapter 3.
- e. Set the printer typeface to Hi-Speed.

- (1) Push the MENU slide switch to the STYLE position.
- (2) Press the HI-SPEED menu option.
- (3) Push the MENU slide switch back to the ON LINE position.

2.5.3 Poststart Checks. Immediately after starting the system and upon successful completion of the BIT, perform the following checks:

- a. Open the back of the IG cabinet and verify that all five cooling fans at top of the IG are operating by placing a hand over the fans. If any of the fans is not operating, immediately shut down the IG by turning MAIN POWER circuit breaker bar on the IG Control Panel to the off (down) position.

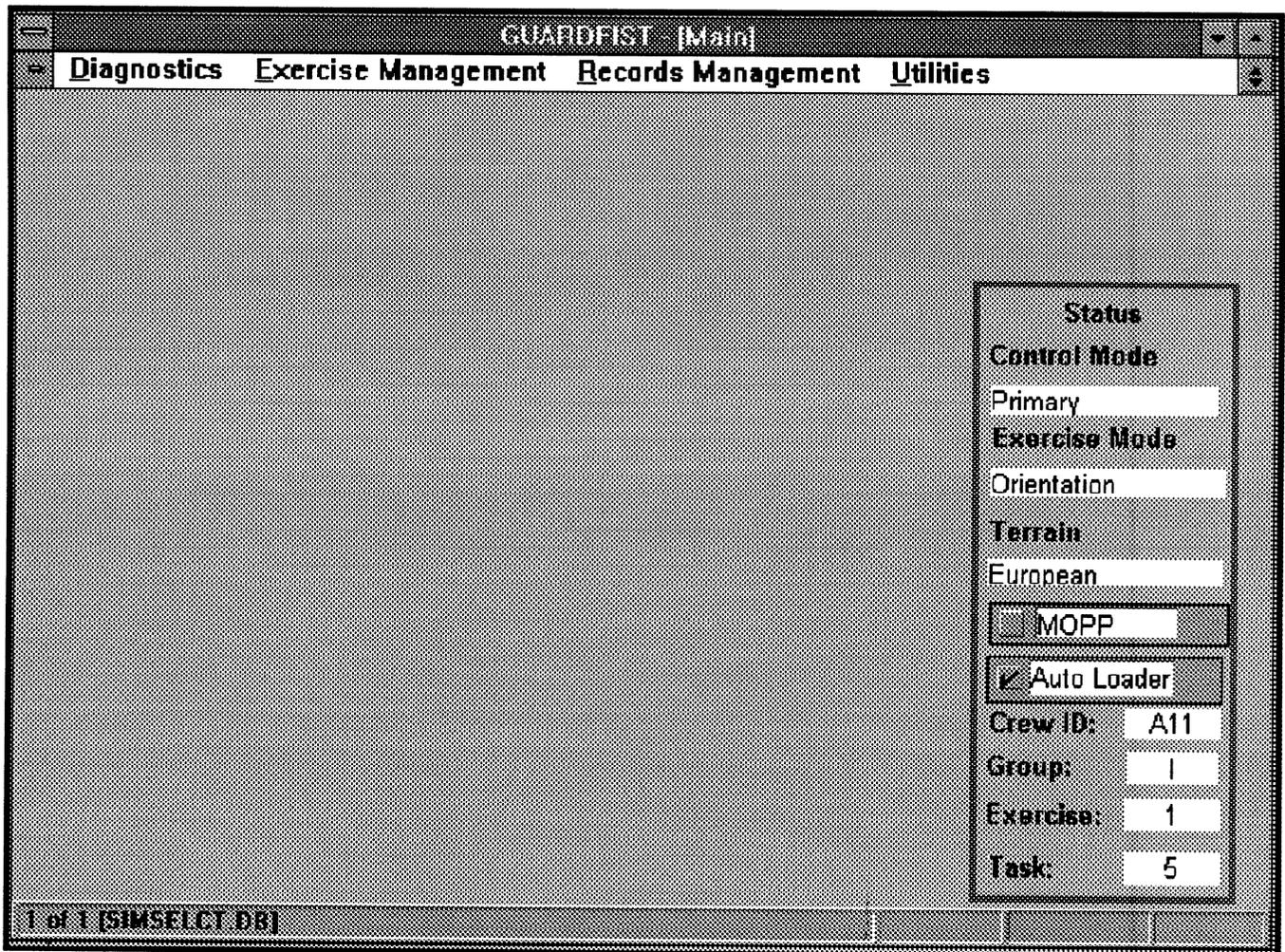


Figure 2-81. AFIST Main Screen

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CAUTION

All five cooling fans must be operating in order to operate the IG. The system produces a significant amount of heat and will be damaged if the cooling mechanism is not operating. If any fan is not operating, immediately shut down the system by turning the MAIN POWER switch off (down) at the IOS Control Panel. If problems persist, call contract maintenance personnel.

- b. If any other component has not come on, verify that the individual component has been turned on at its ON/OFF switch. If it has been turned on, and still does not operate, consult the troubleshooting procedures in Chapter 3, Section II.
- c. When the simulator trainer has started properly, the I/O should see the following:
 - (1) IG fans blowing
 - (2) System controller ON/OFF light lit.
 - (3) The left screen displaying the AFIST Main Screen.
 - (4) Righthand monitor screen (Gunner's view) displaying a view of some terrain, without a reticle.
- d. Verify all tank monitors are turned on.
- e. Verify the S/P VOLUME knob is turned fully clockwise.
- f. Adjust the following volume knobs on the Audio Preamp Mixer Unit to $\frac{2}{3}$ full-clockwise:
 - (1) SPEAKER VOLUME.
 - (2) HEADSET VOLUME.
 - (3) MIC OUT.
- g. Ensure the appropriate tank type is selected. Refer to 2.6.5 for procedures to select tank type.
- h. Conduct the Daily Readiness Check (DRC), according to procedures in 2.6.6.
- i. Align the monitors on the tank and calibrate the tank controls according to the procedures in 2.6.7.

2.6 OPERATING PROCEDURES.

2.6.1 Basic Screen Format. The AFIST screens were developed using a basic screen format to standardize and simplify the screens. The components of the basic screen format are shown in Figure 2-82.

- a. Title Bar. The bar across the top of each screen containing the name of the screen.
- b. Menu Bar. Located below the screen title bar. The menu bar contains options for use in the **particular** screen.

- c. Borders. The grayed edges of the screen. These are used to change the size and shape of the screen.
- d. Scroll Bars. Bars at the right and bottom sides of the screen. Scroll bars have arrows at each end and **scroll** boxes. A screen will only have scroll bars if the monitor is not large enough to display the entire contents of the screen.

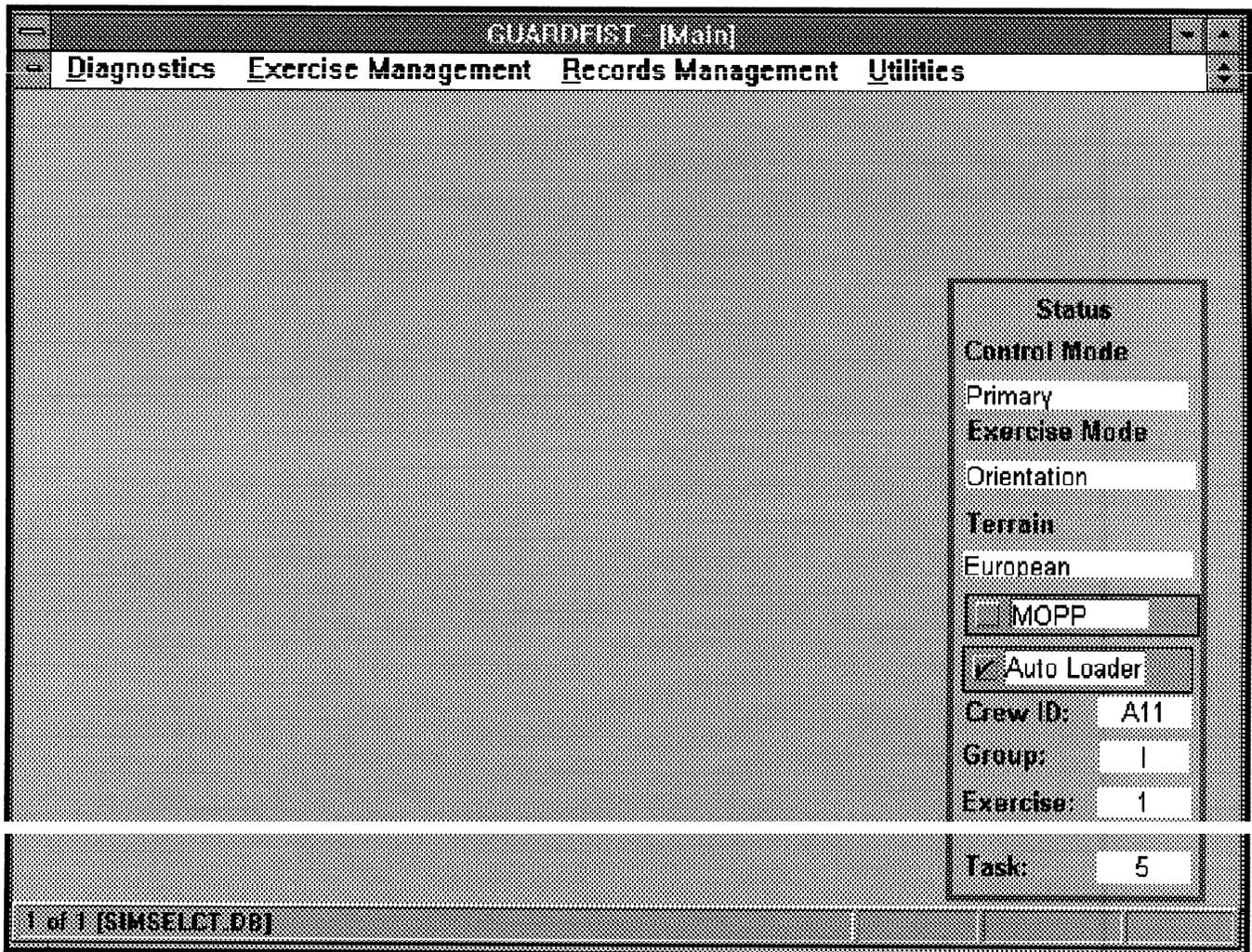


Figure 2-82. Basic Screen Format

NOTE

Items e through h are not normally used during AFIST operation and are listed here for information only.

Control Bar. The hollow bar in the upper-left corner of the screen. Click on the control bar to display the Control menu. This menu is common to all screens and provides the following options:

- (1) Restore. Restores the screen to its former size after it has been enlarged (by using the Maximize button) or reduced to an icon (by using the Minimize button).
- (2) Move. Used with the keyboard to move the screen to another position.
- (3) Size. Used with the keyboard to change the size of the screen.
- (4) Minimize. Reduces the screen to an icon.
- (5) Maximize. Enlarges the screen to its maximum size.
- (6) Close. Closes the screen.
- (7) Switch To. Opens the Task List of running applications. Click on the application to switch to it and to rearrange windows and icons on the desktop.

- f. Maximize button. The button located in the upper-right hand corner of the screen. Click on the **Maximize** button to enlarge the screen so that it fills the entire window.
- g. Minimize button. The button located to the left of the Maximize button in the upper-right hand corner of the screen. Click on the Minimize button to reduce the screen to an icon.
- h. Activating Option button. A button on the screen which activates (selects) the option when clicked. Activating option buttons include SELECT, PRINT, and EXIT buttons.
- i. Status Message. Status or explanatory text displays in the lower-left corner of the screen. To display an explanatory message, the mouse point must be pointing to an object on the screen.

2.6.2 System Response to Operator Errors (System Messages). AFIST system displays messages to alert the I/O or TC to the following types of occurrences:

- a. Operator errors. For example, when the I/O attempts to exit the Add Crew Screen without completing a last name entry for one of the crew members, AFIST displays the message shown in Figure 2-83.

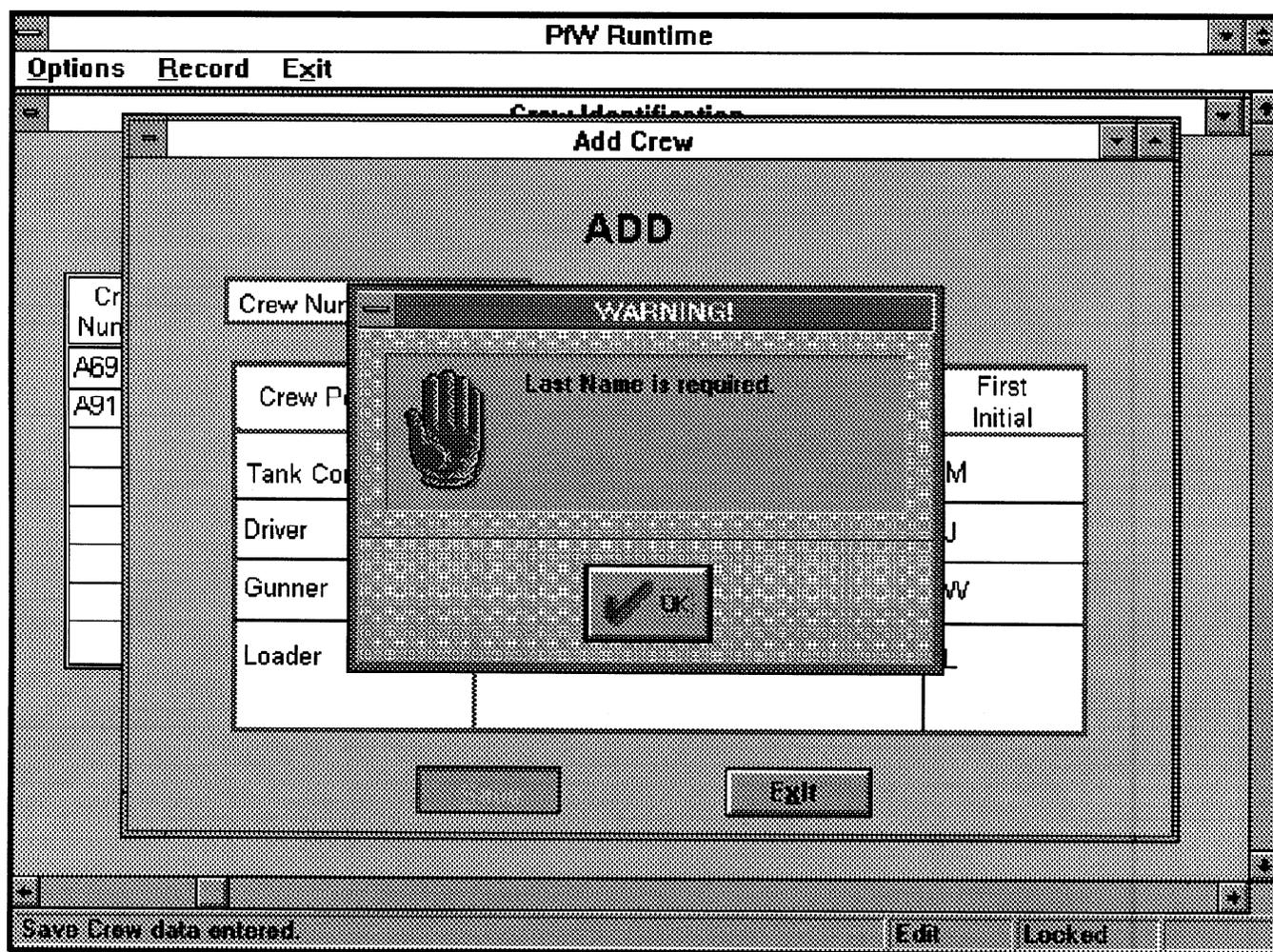


Figure 2-83. Last Name Required Message

- b. The system cannot respond as directed. For example, when the I/O or TC requests the Rounds Screen to display after a task in which no rounds were fired, AFIST displays the message shown in Figure 2-84.

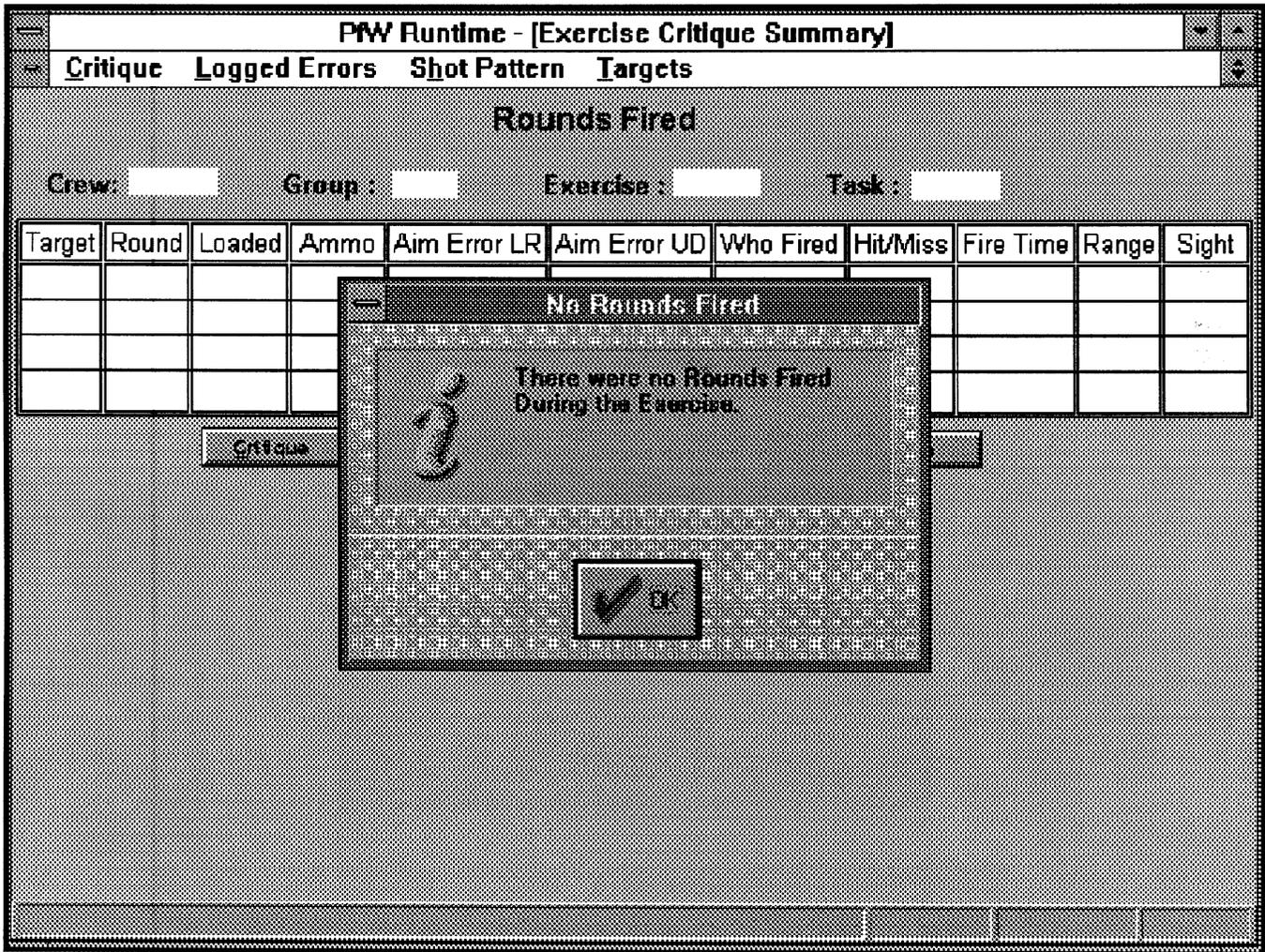


Figure 2-84. No Rounds Fired Message