This article builds on the information contained in "Avoiding an Engineer's Nightmare: The Mine-Clearing Line Charge (MICLIC)," Engineer, December 1994, pages 18-24.

Maintaining the MICLIC

By Captain Joe Birchmeier, Sergeant First Class Terry Purdin, and Sergeant First Class Ted Roberts

The Mine-Clearing Line Charge (MICLIC) is a critical mobility asset—even with its limitations. Engineers use it to clear a path through obstacles without having to dismount.

The following information will help engineer units reduce or eliminate some common problems associated with the MICLIC. Units should follow these techniques and procedures in conjunction with those in Technical Manual (TM) 9-1375-215-14&P when performing maintenance or training on the MICLIC system.

Most of the MICLIC problems observed at the National Training Center (NTC) are attributed to—

- Poor unit maintenance.
- A lack of system knowledge at both the soldier and the leader level.

Poor readiness rates occur in units that do not maintain the complete system. Units have arrived at the NTC with launchers or trailers that were "up" to -10 standards; however, the system was "down" due to a faulty firing cable. A weakness of TM 9-1375-215-14&P is that it does not require a check of the complete system during the preventive maintenance checks and services (PMCS).

Deficiencies in leader/soldier knowledge of the system result from insufficient training. Because most units do not fire the line charge often and lack a complete training aid, they arrive at the NTC improperly trained in MICLIC operations. The end result is long MICLIC preparation times and high misfire rates.

PMCS of Launcher

Problem. TM 9-1375-215-14&P does not provide enough detail about the U-bolts that attach the launcher to the trailer or the armored vehicle-launched MICLIC (AVLM) mount. Many units arrive at the NTC to fire live line charges with U-bolts missing from the launcher.

Solution. The launcher must be secured with four U-bolts. If any U-bolts are missing or loose, consider the system nonmission capable.

Problem. Some units conduct a PMCS of the MICLIC system without checking the M34 blasting machine. Some units arrive at the NTC with only one operational M34.

Solution. Two M34 blasting machines should be available when the MICLIC is operated. Check the M34s with a multimeter. To be used with the MICLIC, the M34s must produce at least 222 volts DC.

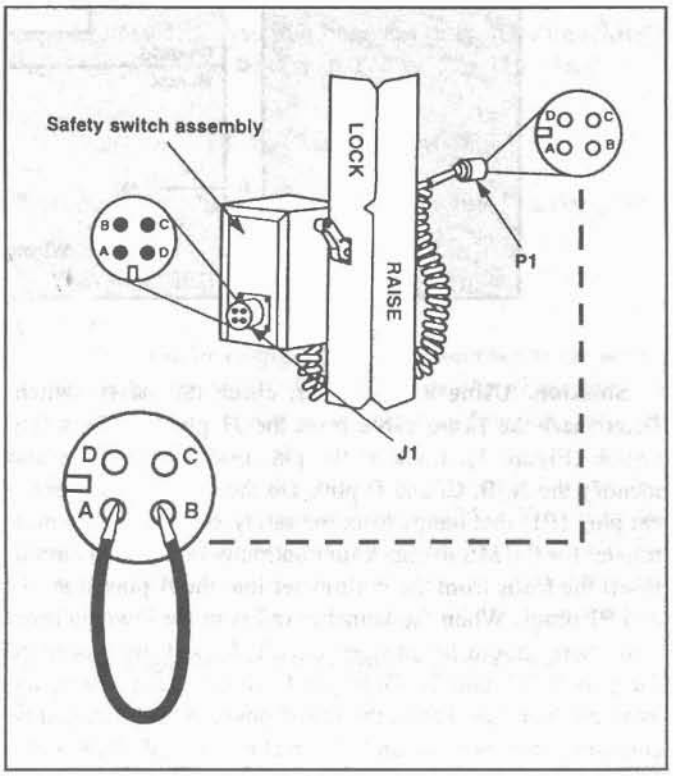


Figure 1

Problem. Units do not check the firing cable and safety switch for continuity when they conduct a PMCS of the MICLIC without a line charge or rocket.

Solution. Use the M51 test set and a 3-inch piece of communications wire with the ends stripped. Connect the firing cable to the J1 plug (Figure 1) on the safety switch. Attach the selector switch to the other end of the firing cable. Taking the 3-inch piece of communications wire and the P1 cable, jump the pin marked "A" and the pin marked "B" (Figure 1). This check replicates a line charge and will check both the firing cable and the safety switch.

Note: If a light does not come on when the launcher arm is in the raised position, test the safety switch. If the safety switch is operational, the firing cable is defective.

Problem. When checking the firing cable, a light appears when the launcher arm is in the lowered position; or there is no light when the launcher arm is in the raised position.

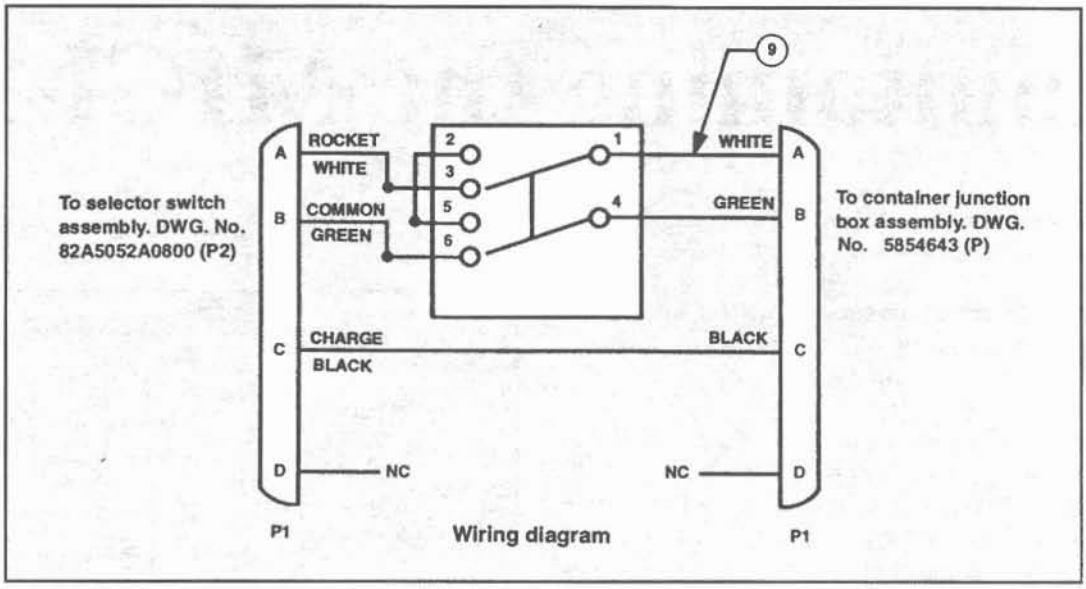


Figure 2

Solution. Using a multimeter, check the safety switch. Disconnect the firing cable from the J1 plug on the safety switch (Figure 1). Look at the pin inside the J1 plug and identify the A, B, C, and D pins. Do the same on the electrical plug (P1) that hangs from the safety switch. Set the multimeter for OHMS to check for continuity or a closed circuit. Insert the leads from the multimeter into the A pins at the J1 and P1 plugs. When the launcher rail is in the lowered position, there should be an open circuit. Repeat the procedure for pins B, C, and D. Only pin C should have continuity. With the launcher arm in the raised position, there should be continuity in pins A, B, and C. Pin D is not used (Figure 2).

Note: If there is continuity in pins A and B in the lowered position, or if there is no continuity in pins A and B in the raised position, refer to TM 9-1375-215-14&P (pages 5-8) and adjust the roller switch lever. If the safety switch checks out after adjustment, recheck the firing cable for continuity.

Problem. The line charge is not properly secured to the trailer or the AVLM.

Solution. For the trailer-mounted MICLIC, the line charge must be connected to the trailer with four turnbuckles and locking nuts. Tighten the turnbuckles, but allow threads to show on the inside of each end. Then tighten the locking nuts to ensure that the turnbuckle will not unthread itself. Use two chains and binders for the AVLM. Pull the hook and chain through the rear line charge tie-down and attach the hook to the chain approximately 6 to 8 inches from the charge tie-down (Figure 3). Route the chain through the rear launcher tie-down to the front launcher tie-down, up through the front line charge tie-down, and attach the hook approximately 6 to 8 inches from the charge tie-down. Install the binder under the center and ensure that the binder handle is facing rearward. After the binder is locked, secure the binder handle with tape. Repeat these steps for the other side of the charge.

Setting Up the Line Charge and Rocket

Problem. The MICLIC line charges sink due to settling, which may cause them to deploy erratically and/or misfire.

Solution. Inspect the line charge as soon as it is opened. The line charge should be flush with the sides of the container. If it sinks more than 1 1/2 inches, do not use it. Return the line charge to the ammunition supply point for inspection.

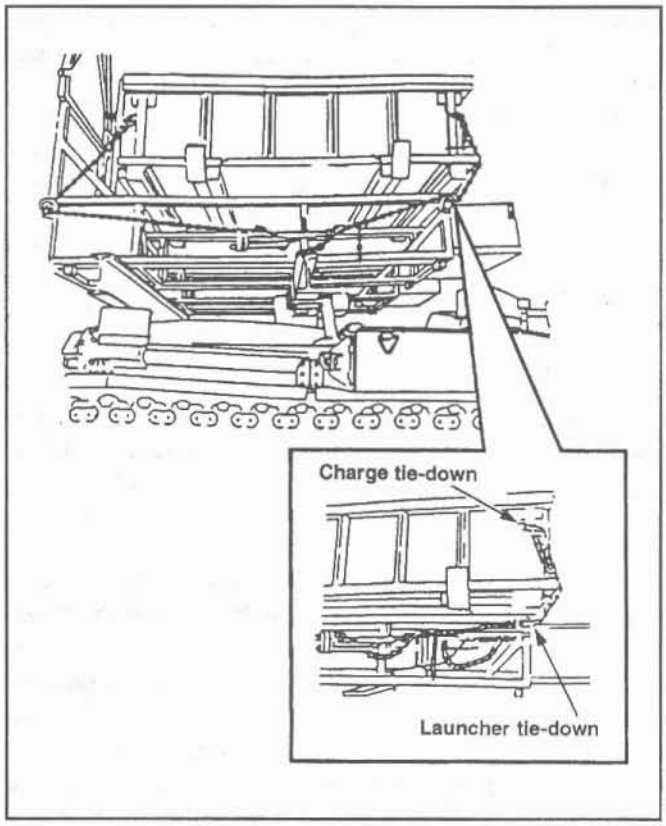


Figure 3

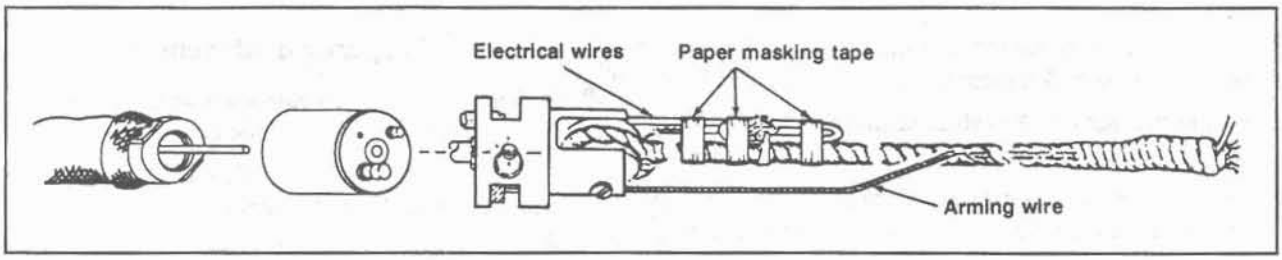


Figure 4

Problem. TM 9-1375-215-14&P does not describe how to ensure that the arming cable will not cut the firing wire at the base of the fuze.

Solution. As part of each MICLIC preparation, pull back the nylon sock from the arming cable side of the fuze connector. Align the electrical wires on the side opposite the arming wire and neatly tape them with paper masking tape (Figure 4). Return the nylon sock to its original position.

Problem. The rocket bridle cable slips out of the cable sheath.

Solution. The improved method of taping the rocket bridle cable to the launcher rail is to tape the bridle in two places—just to the front and just to the rear of the cable sheath. Use electrical tape (Figure 5) to keep the bridle cable from moving back and forth. Ensure that the bridle forms an "S" shape when it is laid on top of the charge and connected.

Problem. Some rockets come unlocked, due to excessive stress on the launcher rail, while traveling across rough terrain with the rocket attached to the MICLIC launcher.

Solution. Ensure that the rocket locking mechanism locks the rocket in place. Always travel with the ball-lock pins in the LOCK position. To keep the rocket secure, put some packing material from the rocket shipping container under the head of the rocket. Use a ratchet strap to secure the launcher rail with the rocket to the launcher.

Note: The strap must go over the top of the launcher rail, not just over the rocket, to prevent undue stress on the rocket.

Problem. Units travel at excessive speeds over rough terrain. Several line charge misfires at the NTC may have been caused when the charges shifted in the container before they were fired.

Solution. For trailer-mounted MICLICs, maintain speeds of 15 mph or less on improved trails and 10 mph or less when traveling cross-country; the top speed for the AVLM is 30 mph. Leaders must plan for the low speeds and coordinate with their supported maneuver units.

Checking the System

The following checklists for precombat checks (PCCs) and precombat inspections (PCIs) were developed to help leaders ensure that the complete MICLIC system is combat-ready. The checklists do not replace the PMCS in TM 9-1375-215-14&P.

PCC/PCI Checklist

- Perform PMCS on the armored personnel carrier (APC) or the AVLM.
- Perform PMCS on the launcher.

Notes:

(1) On a trailer configuration, the launcher is connected to the trailer with four U-bolts. The line charge container is fastened with two 6-inch turnbuckles in front and two 12-inch turnbuckles in the rear.

(2) On the AVLM configuration, the launcher is connected with two U-bolts in the rear and two modified U-bolts on the center I-beam. Chain and binders are used to secure the line charge container. The binders must face rearward when closed; secure the binder to the chain with 100-mph tape.

Start the inspection at the top of the line charge:

- Ensure that the rocket is tied down properly and locked into position.

Note: The tie-down straps must be attached to all four hand knobs on the rocket rail guide.

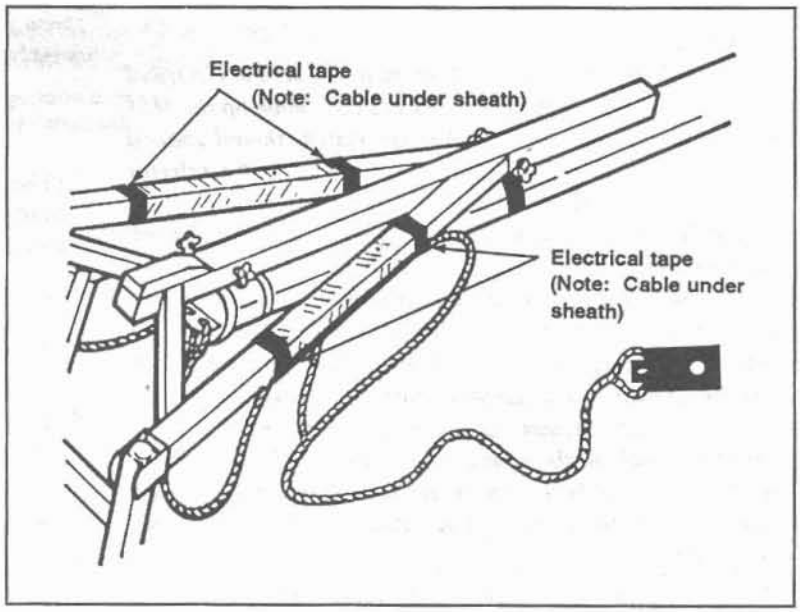


Figure 5

- Give the ball-lock pin for the rocket motor to the crew or secure it to the rocket motor.
- Ensure that both bridle cables behind the sheath have an 18-inch loop in place.
- Lay the bridle cables forward of the sheath on top of the line charge and configure them in an S-curve pattern.
- Place the bridle cables in the sheaths on both sides of the launcher and secure the cables with electrical tape.
- Pull back the nylon sock from the arresting cable fuze connector and inspect the connector.

Note: *The electrical firing wire must be secured to the nylon rope opposite the arming wire using ONLY paper masking tape. Do not tape the arming wire.*

Move to the rear of the MICLIC launcher :

- Connect the safety switch cable to the tub of the line charge.

Note: *Before beginning the continuity check, shunt the rocket receptacle with either a shunt plug or a jump receptacle with a 3-inch piece of communications wire.*

- Verify that the hydraulic cylinder will hold from 3200 to 3500 psi and that the control valve is set to the pressure accumulator.
- Engage the detents.
- Ensure that the two ball-lock pins are in place on the rail.

Note: *The ball-lock pins must be placed in the RAISE position; however, when traveling, the pins must be in the LOCK position.*

- Mount and connect all cables.
- Move to the location where the control box will be fired.
- Verify the continuity check.

Notes:

(1) With the rocket in the down position, set the electrical control box selector switch to SAFE/TEST; hook up the M51 test set and depress the handle; the system should show a light. The system should not show a light when the selector switch is set on ROCKET or CHARGE. If a light is observed on the ROCKET or CHARGE setting, stop and notify the unit maintenance section.

(2) Raise the rocket from the control box and observe if it locks into position. Ensure that white marks on the inner launcher rail supports are visible but have not risen high enough for the vertical white marks (T-strips) to be seen above the outer lower launcher rail supports. Move the selector switch on the control box to ROCKET, and depress the handle of the M51. You should see a light on the test set. Move the selector switch to CHARGE and again you should see a light.

- Place the protective cover on the line charge.
- Rehearse the misfire and evacuation drills.

Prepare for Movement

- Position the electrical control box so that it receives maximum protection yet affords quick access.
- Secure the cable for travel. This is especially important when using APCs with trailers.

Note: *The 60-foot cable frequently is damaged when it falls between the APC and the trailer. Run the cable so that it does not interfere with troop reaction to enemy contact. For example, ensure that the cable will not be severed when troop hatches are closed during an indirect-fire attack.*

- Place packing material from the rocket shipping container between the line charge and the rocket. Secure with a cargo strap.

Note: *The strap will extend from one side of the launcher over the rocket and guide rail. Secure the strap to the other side of the launcher.*

- Put the protective cover in place and check the line charge once more.

Notes:

(1) The bridle cable must be in the S-curve pattern; the protective cover must not interfere with the firing operation.

(2) The bridle cables must be secured properly.

(3) The rocket ball-lock pin must be attached to the rocket or be in the hands of the crew.

- Insert the launcher rail ball-lock pins in the lock position.
- If towing the MICLIC, secure the trailer to the APC.
- When towing the MICLIC, maintain speeds of 15 mph or less on improved trails and 10 mph or less when traveling cross-country. The speed for an AVLM should be no greater than 30 mph.

Note: *Excessive speed may require that the MICLIC spend more time at the assault position rather than moving quickly forward to fire.*

Prepare for Firing

The MICLIC must be prepared for firing before it is moved forward for deployment. This preparation time will minimize soldiers' exposure to enemy contact.

- Remove the ratchet strap and packing material.
- Remove the ball-lock pins from the LOCK position and insert them in the RAISE position slots.
- Pump the hydraulic cylinder until the pressure gauge indicates between 3200 and 3500 psi. Then set the control valve to the PRESSURE ACCUMULATOR position.
- Attach the rocket receptacle cable to the tub.
- Ensure that the detents are in the down position.
- Place the ball-lock pin in the rocket head.
- Move the system forward to fire.

Table 1. Recommended BOM for MICLIC Operations

NSN	Nomenclature	Quantity
6625-01-131-8586	Digital multimeter (fluke)	1
7510-00-198-5831	Tape, masking (roll)	1
5975-00-074-2072	Strap, tie-down	50
5970-00-686-9151	Tape, electrical (roll)	1
4925-00-999-3454	Test set (blasting cap) M51	1
1375-00-567-0223	Blasting machine, M34	2
1670-00-725-1437	Tie-down, cargo	1
	(AVLM Only)	
Steel Pole	Cheater pole (for binders)	1
	(Do not use an aluminum pole!)	
	Tape, 100 mph (for binders) (roll)	1

NOTE: The AVLM is considered one system.

References : TM 9-2320-205-14&P M200A1 Trailer
TM 9-1375-215-14&P w/change #1 MICLIC
TB 43-0001-36-5 *Equipment Improvement Report*

Table 2. Recommended PLL Stockage

NSN	Nomenclature	Quantity
5306-01-226-8720	Bolt, U-	4
5310-00-491-5895	- Washer, flat	8
5310-00-937-0453	- Washer, lock	8
5310-00-764-6609	- Nut, hex	8
6150-01-348-4036	Cable assembly, power: W5	1
6150-01-347-8428	Cable assembly, power: W3 60-foot	1
4320-01-072-4918	Pumping unit, hydraulic, hand	1
1055-01-316-7764	- Handle, pump	2
3040-01-218-6145	Accumulator, hydraulic	1
5340-01-230-0093	Pin, quick release	2
5930-01-218-4673	Switch, safety, firing	1
4730-01-342-0587	Cover, protective, rocket launcher	1
4730-01-345-4083	- Shock cord	8
5340-01-248-7962	Turnbuckle: 1.00 x 6	2 *
5340-01-249-0589	Turnbuckle: 1.00 x 12	2 *
5305-00-947-4354	Bolt, hex (Grade 8)	4 **
3990-00-171-9775	Load binder	4 **
4010-00-171-4426	Chain, 14-foot	4 **
5310-01-284-6395	Beveled washer, 1-inch diameter	6 **
5310-01-317-0480	Beveled washer, 3/4 -inch diameter	8 **
5310-01-373-6951	Beveled washer, 5/8-inch diameter	8 **
5310-00-499-3333	Nut, hex, self-locking	24 **

NOTE: * For trailer configuration only.
** For AVLM configuration only.

- Simultaneously give the authority to fire both the rocket and the line charge.

Notes:

(1) Valuable time is taken from, or added to, breach time by units trying to make firing the rocket and firing the charge a two-part command. Recommend that commanders give authority to fire both the rocket and the line charge when they order the emplacing engineer to move forward from an assault position.

(2) All supporting units in the battlefield must be prepared for the safety standoff when the line charge detonates.

Table 1 gives a suggested bill of materials (BOM) for MICLIC setup. Table 2 provides a suggested prescribed load list (PLL) for MICLIC operations.

Commander's Challenge

With the information in this article and the applicable technical manual, the commander can ensure that his MICLICs are always ready for employment in a combat environment. (Refer also to *Engineer,* December 1994, page 18.) Your challenge is to instill this knowledge in the leaders and soldiers responsible for this weapon system. Stay abreast of all current guidance involving the MICLIC and conduct appropriate inspections to ensure the maintenance status and mission capability of this valuable combined arms breaching asset.

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