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AIR FORCE T.O. 14P4-15-11

TECHNICAL MANUAL

OPERATOR AND UNIT MAINTENANCE MANUAL FOR PROTECTION ASSESSMENT TEST SYSTEM, M41 (NSN: 4240-01-365-8241)



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HEADQUARTERS, DEPARTMENT OF THE ARMY

30 NOVEMBER 1999

PCN 182 102240 00

WARNING SUMMARY

This warning summary includes general safety precautions and instructions that must be understood and applied during the operation and maintenance of this system/equipment to ensure personnel against injury, death, or long-term health hazards. A summary of safety and hazardous material warnings that should be heeded in conduct of operation and maintenance is provided below.

WARNING

ISOPROPYL ALCOHOL

Isopropyl alcohol is hazardous material. DO NOT allow alcohol to get into your eyes. Avoid contact with the skin. Do not swallow or ingest in any way. Alcohol is extremely flammable. DO NOT expose to open flame or sources of ignition. Consuming the alcohol will result in severe illness or death. See WP 0033 00 and WP 0034 00 in this manual for instructions.

The alcohol used with this system is 99.5% pure or greater purity reagent grade isopropyl alcohol. It must be stored, cared for and disposed of properly. See WP 0033 00 and WP 0034 00 in this manual for instructions. The use of other grades/types of alcohol will damage the instrument.

The batteries used with this system are lithium-sulfur dioxide batteries. They must be stored, cared for and disposed of properly. See WP 0032 00 and WP 0034 00 in this manual for instructions.

Batteries in the commercial PORTA COUNT Model 8020 and M41 PATS are not interchangeable. Using the M41 PATS batteries in the Model 8020 may cause fire or explosion.

Use the M41 PATS in a clean area. Do not use in areas with corrosive or acidic atmospheres.

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Date of issue for the original manuals is:

Original .. 0 .. 30 Nov 99

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TECHNICAL MANUAL
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FOR
PROTECTION ASSESSMENT
TEST SYSTEM, M41
(NSN: 4240-01-365-8241)

REPORTING 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. Army Users - mail your letter or DA Form 2028 (Recommended Changes to Publications and Blank Forms), located in the back of this manual, directly to: Director, Edgewood CB Center, ATTN: AMSSB-RBD-B (D. Storms, E3549), 5183 Blackhawk Road, Aberdeen Proving Ground, MD 21010-5424. A reply will be furnished to you. Marine Corps Users: submit NAVMC 10772 to: Commander, Marine Corps Logistics Bases, Code G316, 814 Radford Blvd, Albany, GA 31704-1128. Air Force Users: Recommendations for improving this manual will be forwarded through command channels to HQ AFCESA/CEXR, 139 Barnes Drive, Suite 1, Tyndall AFB, FL 32403-5319, according to T.O. 00-5-1.

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CHAPTER 1

INTRODUCTORY INFORMATION
WITH
THEORY OF OPERATION
FOR
M41 PROTECTION ASSESSMENT TEST SYSTEM



M41, Protection Assessment Test System

GENERAL INFORMATION

0001 00

SCOPE

Type of Manual: Operator and Unit Maintenance Manual (Including Repair Parts and Special Tools Lists).

Model Number and Equipment Name: M41 Protection Assessment Test System (PATS).

Purpose of Equipment: Validates the facepiece fit and proper function of the protective mask.

MAINTENANCE FORMS, RECORDS, AND REPORTS.

Department of the Army forms and procedures used for equipment maintenance will be those prescribed by DA PAM 738-750, Functional Users Manual for the Army Maintenance Management System (TAMMS). Marine Corps personnel refer to the on-line Marine Corps Publication Distribution System (MCPDS) or Marine Corps Stock List SL-1-2, Index of technical publications. Marine Corps personnel will use TM 4700-15, Equipment Record Procedures.

REPORTING EQUIPMENT IMPROVEMENT RECOMMENDATIONS (EIR).

If your M41 PATS needs improvement, let us know. Send us an EIR. You, the user, are the only one who can tell us what you don't like about your equipment. Let us know why you don't like the design or performance. Put it on an SF 368 (Product Quality Deficiency Report). Mail it to the address specified in DA PAM 738-750, Functional Users Manual for the Army Maintenance Management System (TAMMS), or as specified by the contracting activity. We will send you a reply. Marine Corps users submit SF 368 IAW MCO 4855.10 to: Commander, Marine Corps Logistics Base, Code G316, 814 Radford Blvd, Albany, GA 31704-1128. Air Force personnel will submit Material Deficiency Reports IAW T.O. 00-35D-54.

CORROSION PREVENTION AND CONTROL (CPC).

Corrosion Prevention and Control (CPC) of materiel is a continuing concern. It is important that any corrosion problems with this item be reported so that the problem can be corrected and improvements can be made to prevent the problem in future items.

While corrosion is typically associated with rusting of metals, it can also include deterioration of other materials, such as rubber and plastic. Unusual cracking, softening, swelling, or breaking of these materials may be a corrosion problem.

If a corrosion problem is identified, it can be reported using SF 368, Product Quality Deficiency Report. Use of key words such as “corrosion”, “rust,” “deterioration,” or “cracking” will ensure that the information is identified as a CPC problem. The form should be submitted to the address specified in DA PAM 738-750, Functional Users Manual for the Army Maintenance Management System (TAMMS). Marine Corps users should report corrosion problems using MCO 4855.10, Quality Deficiency Report.

DESTRUCTION OF MATERIEL TO PREVENT ENEMY USE.

Refer to TM 43-0002-31 for methods of destruction. War-fighters destroy by weapons, fire, smashing, disassembly, burning, or any other means to render the equipment useless to the enemy.

PREPARATION FOR STORAGE OR SHIPMENT.

Requirements for short term and long term storage are contained in Chapter 4, WP 0020 00. See Chapter 5, WP 0035 00 for Warranty information.

EQUIPMENT CHARACTERISTICS, CAPABILITIES, AND FEATURES**CHARACTERISTICS**

The M41 PATS is a small portable instrument designed to provide the war-fighter with a simple, rapid, and accurate means of validating the facepiece fit and proper function of their protective mask.

CAPABILITIES AND FEATURES

The M41 PATS is less than 100 in³ in size, weighs approximately 4 lbs, and its function is based on a miniature Condensation Nucleus Counter (CNC). The CNC operates by continuously sampling and counting microscopic particles that occur naturally in the surrounding air. The M41 PATS measures the concentration of these particles inside and outside the mask and from these values calculates a fit factor. The fit factor is a measure of the quality of the face seal and function. The M41 PATS ensures that the war-fighter's assigned protective mask is properly sized and fitted and has no critical leaks. It will be used to verify mask fit and proper function whenever a war-fighter is assigned a new mask and as determined by service directives (Air Force: see AF Man 32-4006).

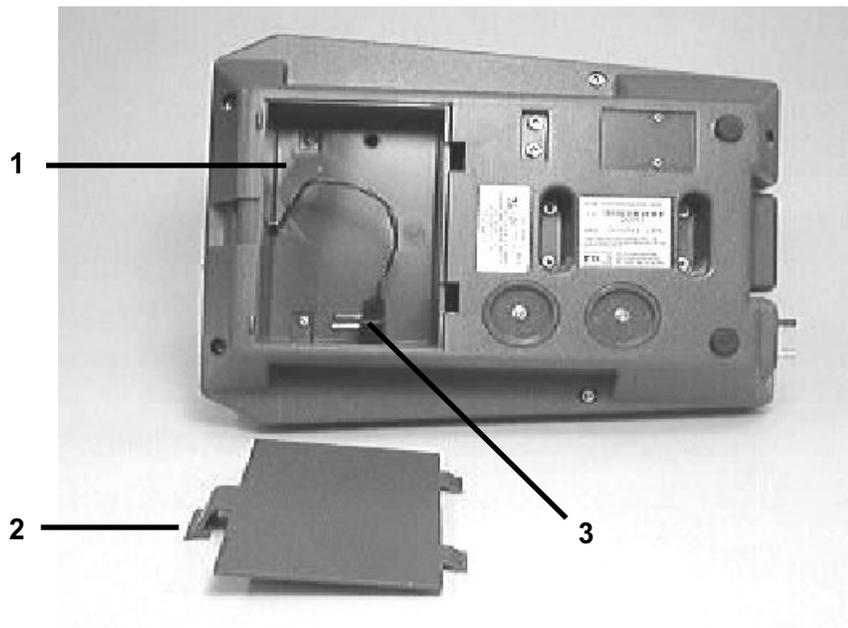
LOCATION AND DESCRIPTION OF MAJOR COMPONENTS

Exhaust Port - Air drawn in through the sample port and ambient port exits through the exhaust port (1).

Ambient Port - The ambient port (2) is used to sample ambient air during a fit test in Fit Test Mode. It is never used in Count Mode. The green tube marked "AMBIENT" of the twin tube assembly connects here. The ambient port fitting is colored green and marked with the letter "A."

Sample Port - The sample port (3) is the inlet used by the Protection Assessment Test Instrument (PATI) when sampling air from a mask during a fit test in Fit Test Mode and at all times while in Count Mode. The clear tube marked "SAMPLE" of the twin tube assembly connects here. The sample port fitting is silver colored and marked with the letter "S."

LOCATION AND DESCRIPTION OF MAJOR COMPONENTS - Continued

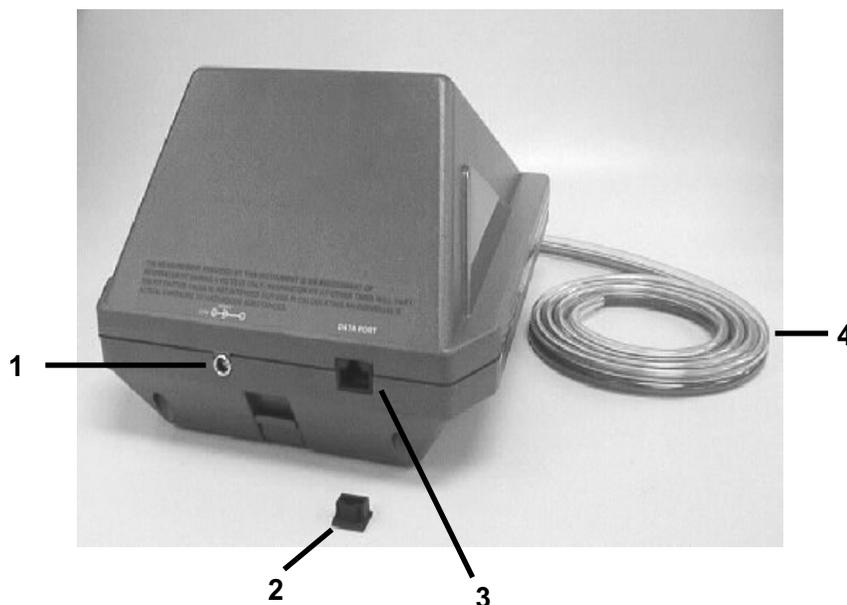


BATTERY COMPARTMENT - The battery is installed at the back of the PATI in the battery compartment (1). A connector in the battery compartment plugs into the battery.

BATTERY COVER - A plastic battery cover (2) snaps in place and conceals the battery compartment. Slide your finger under the battery cover latch and lift to remove the cover. Tools are not required.

BATTERY CONNECTOR - The battery connector (3) is located inside the battery compartment. The connector is polarized (one pin is larger than the other) so that it cannot be plugged into the battery backwards. If the AC adapter is used, a battery need not be installed and the connector can be loose inside the battery compartment. The AC adapter will not charge an installed battery.

LOCATION AND DESCRIPTION OF MAJOR COMPONENTS - Continued



EXTERNAL POWER CONNECTOR - The external power connector (1) is on the back of the PATI. The round metal connector is marked "POWER" just above it. The voltage requirement and polarity are also marked.

DATA PORT PLUG - The rubber data port plug (2) is used to cover the data port.

DATA PORT - The data port (3) allows serial communication with the PATI. It is used to transmit data to a printer or for communications with a microcomputer. The data port uses a standard modular connector.

TWIN TUBE ASSEMBLY - The twin tube assembly (4) consists of a pair of tubes. The sample tube is clear and has the word "SAMPLE" marked on it in several places along its length, and connects to the silver colored sample port. The ambient tube is green and has the word "AMBIENT" marked on it, and connects to the green colored ambient port. The twin tube assembly is about 5 feet (150cm) long and must never be lengthened for fit testing. The sample tube is 1.5 inches (4 cm) longer than the ambient tube on the mask end.

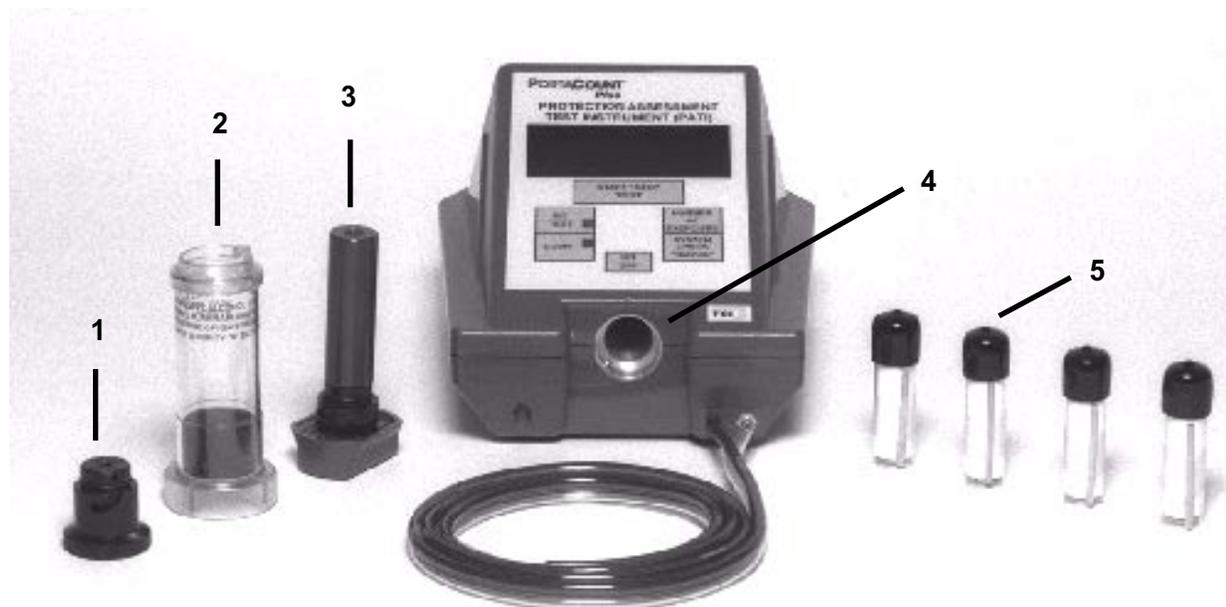
LOCATION AND DESCRIPTION OF MAJOR COMPONENTS - Continued



LINE CORD - The line cord (1) attaches the AC adapter to an external power source.

AC ADAPTER - The AC adapter (2) that is supplied with the M41 plugs into the external power connector on the back of the PATI. The AC adapter is a dual voltage type and can be used with either 115VAC or 230VAC nominal voltages.

LOCATION AND DESCRIPTION OF MAJOR COMPONENTS - Continued



STORAGE CAP - The storage cap (1) is used to cover the cartridge cavity of the PATI when not in use or to cover the alcohol fill capsule when it is not holding the alcohol cartridge.

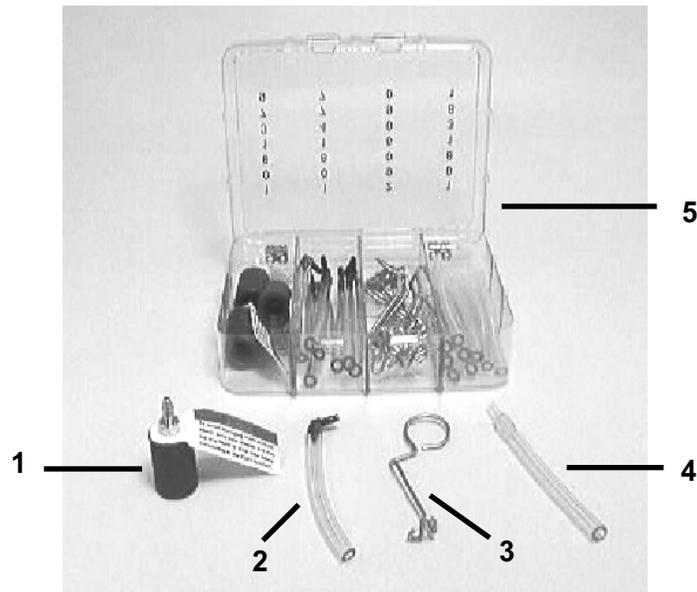
ALCOHOL FILL CAPSULE - The alcohol fill capsule (2) is used to store and fill the alcohol cartridge.

ALCOHOL CARTRIDGE - The plastic alcohol cartridge (3) consists of an alcohol cartridge cap and a wick retainer which holds the alcohol wick and screen.

CARTRIDGE CAVITY - The cartridge cavity (4) is where the alcohol cartridge is inserted during use. It is very important to make certain that dirt and lint do not enter the cartridge cavity.

SPARE ALCOHOL WICKS WITH SCREEN AND WICK REMOVAL TOOL - Four spare alcohol wicks and screens (5) are included with the M41. The wick is inserted into the alcohol cartridge to absorb the alcohol, and the screen prevents contaminants from entering the cartridge cavity. A wick removal tool (wood dowel) is included with each wick.

LOCATION AND DESCRIPTION OF MAJOR COMPONENTS - Continued



DRINK TUBE SAMPLING ADAPTER - Four drink tube sampling adapters (1) provided with the M41 allow the instrument to sample air from inside a mask using the drink tube.

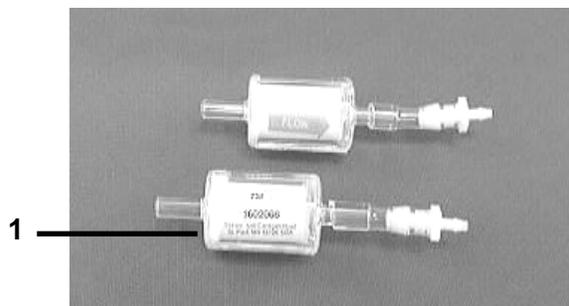
SAMPLE TUBE EXTENSION FOR MCU-2A/P (Air Force only) - Ten sample tube extensions (2) are included with the M41 for use with MCU-2A/P series masks only. They are used to extend the drink tube mouthpiece up into the eye region of the MCU-2A/P.

DRINK VALVE RETAINING LEVERS - Ten drink valve retaining levers (3) are included with the M41 for use with M17 series masks only. They are used to hold the drink valve open during a fit test.

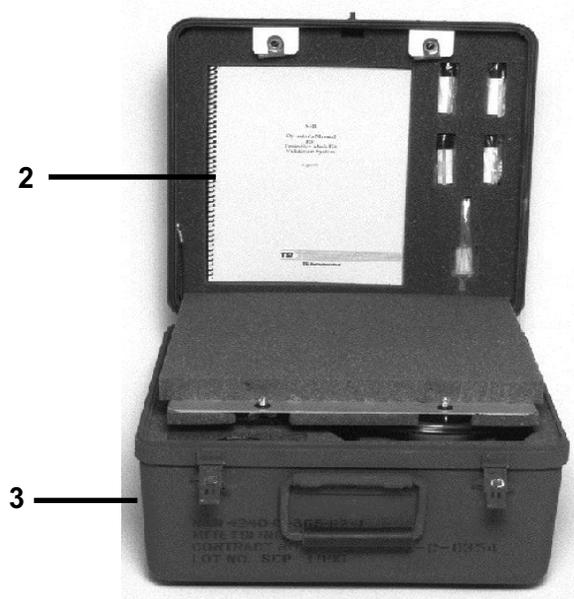
SAMPLE TUBE EXTENSION FOR M17 - Ten extension tubes (4) are included with the M41 for use with M17 series mask only. They are used to extend the drink tube mouthpiece up into the eye region of the M17. The tubes are similar to the sample tube extensions for the MCU-2A/P except they have a straight fitting.

PLASTIC CASE - The plastic case (5) is divided into separate compartments to carry the drink tube sampling adapters, sample tube extensions and drink valve retaining levers which make up the mask sampling kit.

LOCATION AND DESCRIPTION OF MAJOR COMPONENTS - Continued



HIGH EFFICIENCY PARTICULATE AIR (HEPA) FILTER - The HEPA Filter (1) is provided for the purpose of performing a Zero Check and System Check on the PATI to make sure it is working properly. It simulates the same function as the mask filter canister.



NOTE

Units must ensure they have the technical manual on their account.

M41 TECHNICAL MANUAL FOR PROTECTION ASSESSMENT TEST SYSTEM - The M41 Technical Manual (2) provides detailed instructions on operating, maintaining and troubleshooting the unit.

CARRYING CASE - The carrying case (3) is a rugged case that provides protection and storage for the M41.

EQUIPMENT DATA

Size:

PATI	9.5 in. x 7.5 in. x 5.5 in. (24 cm x 19 cm x 14 cm)
Carrying Case	16 in. x 15 in. x 10 in. (41 cm x 38 cm x 25 cm)

Weight:

PATI	4.2 lb (1.9 kg)
PATS including carrying case	22 lb (10 kg)

Power Requirements:

115 VAC or 230 VAC or
lithium-sulfur dioxide battery -
BA 5847/U

Temperature Range:

Operation	35 to 100°F (1.7°C to 37.8°C)
Storage	-40 to 160 °F (-40°C to 70°C)

Alcohol:

Type	99.5% pure or greater purity reagent grade isopropyl alcohol
Hours of Operation per Charge	8 hours at 70 °F (21.1°C)

HOW THE M41 PATS WORKS

The M41 PATS measures respirator fit by comparing the concentration of microscopic particles outside the respirator to the concentration of particles that have leaked into the respirator. The ratio of these two concentrations is called a fit factor. A fit factor of 100 means that the air inside the respirator is 100 times cleaner than the air outside.

$$\text{Fit Factor} = \frac{\text{Outside Concentration}}{\text{Inside Concentration}}$$

Since the microscopic particles in the air cannot pass through the filters used on a protective mask, any particles that get into the facepiece must have come in through a leak.

The M41 PATS has two sample tubes, one samples the air outside the mask (ambient air) and the other attaches to the mask and samples the air from inside it. A valve inside the M41 PATS switches from one tube to the other according to a programmed sequence.

HOW THE M41 PATS COUNTS PARTICLES

The M41 PATS uses a miniature, continuous-flow Condensation Nucleus Counter (CNC) to count particles. The CNC takes particles that are too small to be easily detected, and condenses alcohol on the particles to make them larger, and easily detectable, and then counts them. This makes the M41 PATS sensitive to particles having diameters as small as 0.02 micrometer, but insensitive to variations in particle size, shape, composition, and refractive index. Thus, quantitative fit testing can be performed with virtually any aerosol, including ambient air.

Aerosol is drawn through the instrument by a diaphragm vacuum pump operating at a flowrate of 0.7 liter per minute. The flow enters the instrument through either the ambient port or the sample port. The switching valve determines which port is used. The outlet of the switching valve leads to the saturator end cap where the flow splits. A flowrate of 0.1 liters per minutes enters the saturator and passes through the condenser, nozzle, and sensing volume. The remaining flow passes through the excess air line and is recombined with the sampled flow down-stream of the sensing volume.

The M41 PATS sensor consists of a saturator, condenser and optical elements. The saturator is lined with an alcohol-soaked wick. A thermoelectric device is mounted between the saturator and condenser which cools the condenser and heats the saturator. After passing through the saturator, the aerosol (saturated with alcohol vapor) enters the condenser tube. The alcohol vapor condenses on the particles, causing them to grow into droplets. The droplets then pass through the nozzle and into the sensing volume as depicted in the schematic diagram.

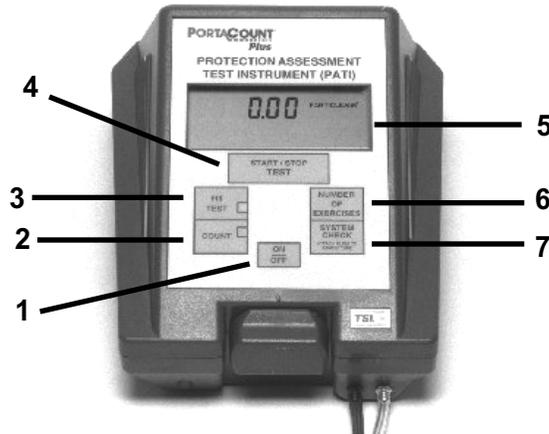
HOW THE M41 PATS COUNTS PARTICLES - Continued

The focusing optics in the sensor consist of a laser diode, and a series of lenses which focus the laser light into a sensing volume just above the nozzle. Each particle passing through the sensing volume scatters light. The light is collected by the receiving optics and focused onto a photodetector. The photodetector generates an electrical pulse from the scattered light as each droplet passes through the sensing volume. The particle count is determined by counting the number of pulses generated during a given time period. Knowing the particle count, time period and flow rate allows particle concentration to be calculated.

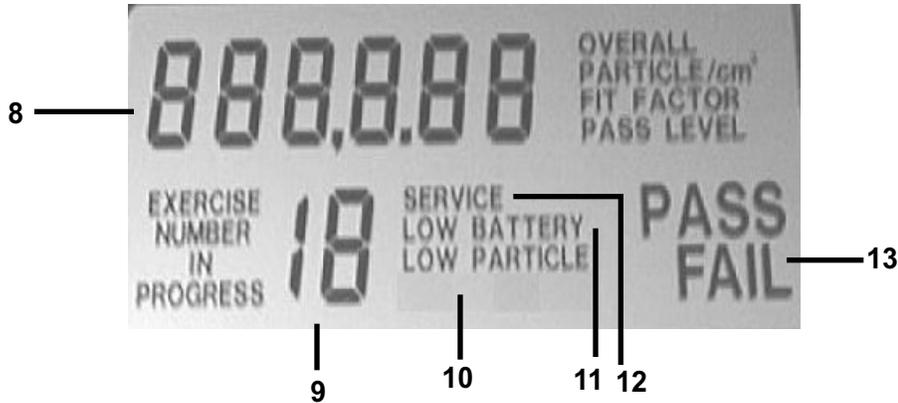
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CHAPTER 2

OPERATOR INSTRUCTIONS
FOR
M41 PATS



KEY	CONTROL OR INDICATOR	FUNCTION OR USE
1	ON/OFF keypad	Turns on the instrument and begins the 60 second warm-up cycle. Turns off instrument.
2	COUNT keypad	Puts the PATI into count mode. In Count Mode, the PATI measures and displays the concentration of particles drawn in through the sample tube.
3	FIT TEST keypad	Puts the PATI into standby Fit Test Mode.
4	START/STOP TEST keypad	Starts or stops a fit test when the PATI is in Fit Test Mode.
5	Display	The PATI contains a liquid crystal display (LCD) on the front panel
6	NUMBER OF EXERCISES keypad	When pressed momentarily, the number of exercises that has been selected is displayed.
7	SYSTEM CHECK keypad	Performs a system check to determine if the PATI is working properly. The HEPA filter must be attached to the sample tube marked "SAMPLE" for this test to be performed properly.



KEY	CONTROL OR INDICATOR	FUNCTION OR USE
8	Concentration	Numeric value for particle concentration is displayed as a number PARTICLE/cm ³ .
9	Exercise Number	The exercise number display is used to display the exercise number in progress during a fit test. During a fit test, the “IN PROGRESS” message will appear next to the exercise number and will flash on and off.
10	LOW PARTICLE	The “LOW PARTICLE” message indicates that the PATI has measured a particle concentration during the ambient sample that is below the pre-programmed cut-off of 1000 particles/cm ³ . This message can only appear during operation in Fit Test Mode.
11	LOW BATTERY Warning	The flashing message: “LOW BATTERY” warns you that there is very little time remaining before the PATI turns itself off due to lack of sufficient battery power.
12	SERVICE	When the message: “SERVICE” is displayed, the PATI is usually low on alcohol; however, there can be other reasons such as moisture in the alcohol wick.
13	PASS/FAIL Message	A “PASS” or “FAIL” message will appear in the lower right hand corner of the display at the completion of each exercise and at the conclusion of the fit test. “PASS” will appear if the fit factor is equal to or greater than the fit factor pass level and “FAIL” will appear if the fit factor is less than the fit factor pass level.

INITIAL SETUP:

Maintenance Level
Operator

PREPARATION FOR USE

Perform the preventive maintenance checks and services in the “Before” column before doing the procedures below (WP 0013 00).

INSTALLING DATA PORT PLUG

Insert the data port plug into the data port if it is not already installed.



TWIN TUBE ASSEMBLY

The PATI is shipped with the twin tube assembly attached. If the tubes are detached, attach the green tube to the green fitting (ambient port) and attach the clear tube to the silver fitting (sample port) as shown.



PREPARATION FOR USE - Continued

CONNECTING THE AC POWER SUPPLY

The PATI may be operated with either the supplied AC adapter or military lithium-sulfur dioxide batteries. If the AC adapter is to be used instead of a battery, follow the instructions below. If a battery is to be used instead, refer to the next section in this chapter on installing the battery.

NOTE

The AC adapter supplied with the M41 is a dual-voltage type power supply. It will automatically detect the AC voltage level (nominally 115 or 230VAC) and adjust itself accordingly.

It is acceptable to have a battery installed inside the PATI while the AC adapter is in use. In this case, the AC adapter will be providing the power to the PATI and the battery will not be used. If the AC adapter is disconnected while a battery is installed, the battery will automatically provide the necessary power without interruption.

The AC adapter will not charge an installed battery.

1. Locate the AC adapter and line cord in the carrying case.
2. Plug the female end of the line cord into the socket on one end of the AC adapter and plug the male end of the line cord into an available AC power outlet.



PREPARATION FOR USE - Continued

3. The AC adapter has a cable permanently attached on the opposite side from the line cord socket. Plug the small round connector on the end of this cable into the external power connector marked "POWER" on the back of the PATI.



Connecting the AC Adapter to the PATI

NOTE

If using the AC adapter, go to adding alcohol.

INSTALLING THE OPTIONAL BATTERY

The PATI may be operated with either the supplied AC adapter or lithium-sulfur dioxide batteries. If a battery is to be used instead of the AC adapter, follow the instructions below. If the AC adapter is to be used instead, refer to the beginning of this section on connecting the AC adapter.

WARNING

Lithium-sulfur dioxide (Li-SO₂) batteries which are used in this equipment contain pressurized sulfur dioxide (SO₂) gas. The gas is toxic, and the battery **MUST NOT** be abused in any way which may cause the battery to rupture.

DO NOT use equipment if battery compartment becomes hot. **IMMEDIATELY** turn off the equipment if battery compartment becomes hot to the touch. Allow battery to cool before removing it.

DO NOT use any battery which shows signs of damage, such as bulging, swelling, a swollen plastic wrap, liquid in the plastic wrap, etc.

PREPARATION FOR USE - Continued

WARNING

DO NOT USE THE M41 PATS IF THE TEMPERATURE IN THE TESTING AREA IS BELOW 35° F (1.7°C) OR ABOVE 100° F (37.8°C).

NOTE

For handling and disposal precautions, refer to WP 0032 00 and WP 0034 00 of this manual.

To install a battery in the PATI:

1. Gently place the PATI on its keypad on a flat surface.
2. Open the battery cover, by pulling on the battery compartment cover latch.



Removing the Battery Cover

PREPARATION FOR USE - Continued

2. Plug the battery connector into the battery. The connector fits only one way.



Plugging in the Battery Connector

3. Insert the battery into the battery compartment in the orientation shown.



Installing the Battery

4. Replace the battery cover by inserting the tabs into the grooves and then pushing in on the battery compartment cover until it is fully seated and snaps shut.

PREPARATION FOR USE - Continued

ADDING ALCOHOL

WARNING

Isopropyl alcohol is a hazardous material. DO NOT allow alcohol to get into your eyes. Avoid contact with the skin. DO NOT swallow or ingest in any way. Alcohol is extremely flammable. DO NOT expose to open flame or source of ignition. Consuming the alcohol will result in severe illness or death. See WP 0033 00 and WP 0034 00 in this manual for instructions.

CAUTION

Never transport or store the PATI with the alcohol cartridge inside the cartridge cavity. Damage to the internal components may occur.

Always keep the alcohol cartridge in the alcohol fill capsule during transport and storage. Always keep the alcohol cartridge clean.

To prevent contaminants from entering the cartridge cavity, never leave the cartridge cavity open longer than necessary. Use the storage cap to cover the cartridge cavity when the M41 is transported or stored.

Keep the storage cap and alcohol cartridge clean. Always set them down with the end standing up. This precaution prevents dirt or debris from entering the instrument and inhibiting operation. The pin-hole size orifice inside the PATI can easily become clogged.

NEVER fill the PATI with alcohol other than 99.5% pure reagent grade isopropyl alcohol. Non-reagent grade isopropyl alcohol that is available from pharmacies, drug stores or other consumer outlets is low purity and usually contains significant percentages of water and other substances that can damage the PATI. It must be stored, cared for and disposed of properly. See WP 0033 00 and WP 0034 00 in this manual for instructions.

PREPARATION FOR USE - Continued

CAUTION

After installation of the alcohol cartridge, the PATI must always remain in the upright position to prevent damage to the internal components.

NEVER install or remove the alcohol cartridge when the PATI is in operation.

Always recap alcohol containers immediately to prevent absorption of moisture.

Dispose of any alcohol with visible contamination (refer to WP 0033 00).

NOTE

Maintaining an adequate alcohol supply inside the PATI is critical to its operation and requires strict adherence to the directions that follow.

Refer to the Material Safety Data Sheet (MSDS) located in WP 0034 00 of this manual for safety precautions. WP 0033 00 contains further information regarding storage, care and disposal of alcohol and wicks.

If the alcohol bottle is not empty you may recap it and store it for later use.

The PATI will consume alcohol at the approximate rate of one ml per hour when the ambient temperature is near 75°F. At higher temperatures alcohol will be consumed faster and at lower temperatures alcohol will be consumed more slowly.

To add alcohol to the PATI, you will need the following items:

Reagent grade isopropyl alcohol
Alcohol fill capsule
Storage cap
Alcohol cartridge

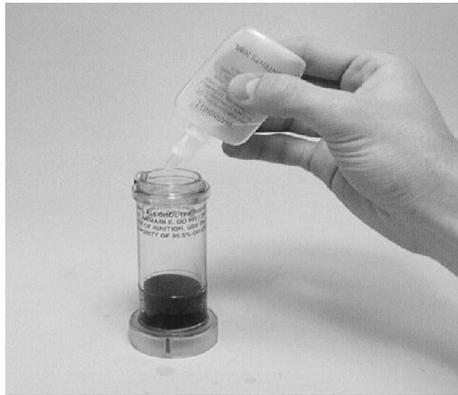
NOTE

The storage cap should be either sealing the alcohol fill capsule or inserted into the PATI cartridge cavity.

1. Ensure that the PATI is off.
2. Open the alcohol fill capsule by twisting the storage cap 1/8 turn. Set the storage cap down on a clean surface with the end standing up.

PREPARATION FOR USE - Continued

3. Open a bottle of alcohol. Invert the bottle and insert the nozzle end into the alcohol fill capsule to make certain that you cannot inadvertently spray alcohol anywhere except down into the capsule.



Filling Capsule with Alcohol

4. Squeeze alcohol into the alcohol fill capsule until the black sponge at the bottom is completely saturated and the liquid level is even with the scribed fill-line near the base. Recap the alcohol bottle.
5. Remove the alcohol cartridge from the PATI and set down on a clean surface with end standing up. Protect the PATI cavity by installing storage cap.

PREPARATION FOR USE - Continued

6. Make certain that the alcohol cartridge is clean (WP 0016 00). Insert the alcohol cartridge into the alcohol fill capsule by aligning the groove with the pin and turning 1/8 turn until it locks into place. Note that the alcohol cartridge compresses the sponge allowing the wick to become saturated with alcohol.

NOTE

Allow at least two minutes for the alcohol wick to saturate with alcohol.



Inserting Cartridge into Capsule

7. Remove the alcohol cartridge from the capsule and gently shake it to allow excess alcohol to drain back into the alcohol fill capsule. Stop when excess alcohol is no longer dripping. It is not necessary to wait until the outside surface of the alcohol cartridge is dry. Remove the storage cap and insert the alcohol cartridge into the cartridge cavity of the PATI. Align the tab on the alcohol cartridge with the corresponding tab on the PATI located just above the cartridge cavity. As you approach full insertion, firmly twist the alcohol cartridge clockwise about 1/8 turn. It should snap into position. Recap the alcohol fill capsule with the storage cap.

PREPARATION FOR USE - Continued



Inserting Cartridge into PATI

8. If you do not intend to use the M41 right now, you should store the alcohol cartridge in the alcohol fill capsule. The alcohol fill capsule is designed to be a safe transportation and storage container for alcohol. The alcohol cartridge can be left soaking in alcohol not exceeding three months (WP 0020 00). Install the storage cap into the cartridge cavity to prevent dirt or lint from getting inside the PATI.



Alcohol Cartridge properly stored in Alcohol Fill Capsule

INITIAL ADJUSTMENTS, BEFORE USE, AND SELF-TEST.

NOTE

Perform the preventive maintenance checks and services in the “Before” column before doing the procedures below (WP 0013 00, item no. 7 only).

1. Turn the PATI on by pressing the ON/OFF key on the keypad.



Turning the PATI on

2. Wait for the display to count down for 60 seconds. The PATI will now be in the Standby Fit Test Mode with the current pass level displayed.

NOTE

If “LOW BATTERY” appears on the display, refer to Troubleshooting (WP 0011 00).

3. Press the COUNT key on the keypad to put the instrument into Count Mode.
4. Make certain that there is nothing attached to the end of the Twin tube assembly such as a hepa filter or mask.

INITIAL ADJUSTMENTS, BEFORE USE, AND SELF-TEST - Continued

NOTE

Air Force Personnel - If the display reads lower than 3000 PARTICLE/cm³, the PATI will not allow a mask fit to be performed.

5. Check the particle count in the air to make sure a test can be conducted successfully. To do this, check to see if the display reads 1000 PARTICLE/cm³ or higher. If this reading is lower than 1000 PARTICLE/cm³, a mask fit test cannot be performed. Refer to the troubleshooting in WP 0011 00.
6. Zero-check the PATI by attaching the supplied HEPA filter to the clear sample tube, marked "SAMPLE", on the twin tube assembly as shown. Make sure the arrow on the filter which indicates flow direction is pointing towards the PATI. Watch the display. The display should read 0.00 PARTICLE/cm³ within 30 seconds. An occasional reading of 0.60 PARTICLE/cm³ is acceptable.

NOTE

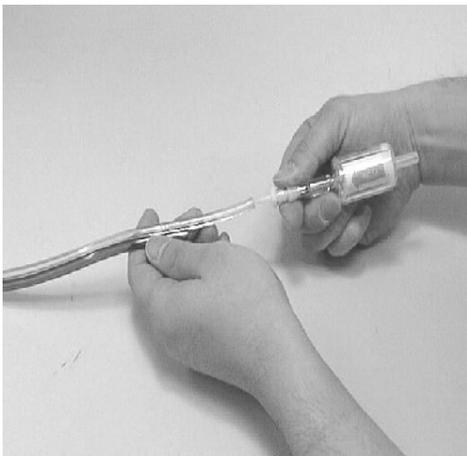
If the display does not show a value of 0.60 or less most of the time, there is a leak in the PATI that must be found and eliminated before performing mask fit tests. See the troubleshooting section to help solve the problem.

INITIAL ADJUSTMENTS, BEFORE USE, AND SELF-TEST - Continued

CAUTION

Always attach the HEPA filter to the twin tube sample line marked "SAMPLE" when the PATI is turned on, but not testing a mask. This will extend the life of the instrument by preventing dust and debris from being drawn into the PATI.

Make certain that the end of the twin tube assembly is never allowed to fall to the ground or any place where dirt or moisture or debris could be drawn into the tubes.



Attaching HEPA Filter



Display showing result

7. Press the SYSTEM CHECK key on the front keypad. This built-in system check function allows the PATI to run through a self diagnostics test. After 30-90 seconds, a PASS or FAIL message will appear. If system check fails, refer to WP 0011 00, Troubleshooting. Every time the PATI is turned on, the system check should be performed.

PREPARING THE MASK FOR FIT TESTING.

NOTE

Perform mask PMCS prior to conducting a fit test.

It is important that smoking not be permitted in the immediate area where mask fit testing is to be conducted.

To achieve accurate results, the war-fighter should not chew gum nor talk during the test. Lotions, perfumes and colognes should be removed from face and neck area prior to donning protective mask. Mouthwash, foods, and other liquids other than water should not be consumed within 30 minutes prior to testing. Tobacco products should not be used within 30 minutes prior to testing. Women will remove hair fasteners/clips and let hair hang freely, but out of the mask seal region. War-fighters who require corrective lenses must be tested with their inserts.

Testing can be performed with or without hood installed on the mask.

For USAF Only: Serviceable filters should be used as a control for testing. Test operators should maintain at least two filters (C2, C2A1, and/or M13A2 as appropriate) per M41 for this purpose. Test operator will replace war-fighter's filter with the control filter prior to testing.

CAUTION

It is extremely important that the mask be clean and free of any loose foreign material prior to conducting a fit test. Presence of these substances may affect facepiece seal and/or result in inaccurate readings.

1. Visually inspect both the inside and outside of mask for dirt, mud, sand, powder, greasy or oily substances. The inside of the facepiece should be cleaned with a damp sponge and dried with a lint-free cloth. The outlet valve disk should also be carefully inspected to ensure it is clean and seated properly. Check to ensure the external drink tube quick disconnect is functioning. Ensure filter elements are properly installed. Refer to the appropriate Operator's Manual listed in References, Supporting Information. WP 0023 00.

PREPARING THE MASK FOR FIT TESTING - Continued

2. Attach drink tube sampling adapter to drink tube quick disconnect coupling as illustrated. **DO NOT** attach sample line of PATI to sampling adapter at this point.



Drink Tube Sampling Adapter connected to the Quick Disconnect Coupling

NOTE

If a distinct “snap action” can no longer be felt when engaging the drink tube quick disconnect coupling to the drink tube adapter, cease using that adapter and discard it. Replace the adapter.

3. Attach the drink valve retaining lever supplied with the M41 to hold the drink valve open. See illustration below.



PREPARING THE MASK FOR FIT TESTING - Continued

4. Have the war-fighter sit down for the mask fit test.

CAUTION

All water or foreign material must be expelled from the mask drink tube before the PATI sample line is connected so that liquid will not be drawn into the PATI. If liquid is drawn into the PATI, it may become inoperative.

5. Have the war-fighter don the mask in accordance with donning procedures listed in the Operator's Manual for the specific mask (See Supporting Information, References), WP 0023 00.
6. Instruct war-fighter to blow as hard as possible several times into the internal drink tube mouthpiece to remove any trapped fluids or foreign matter. **This is a critical step.** The drink tube must be cleared so that foreign matter will not be drawn into the PATI and so that the PATI will be able to draw air from inside the mask.

NOTE

If the drink tube is obstructed and the blockage cannot be removed, then the mask should be returned for maintenance.

7. Have the war-fighter remove the mask.

WARNING

To prevent eye injury, the sample tube extension should be positioned and secured between the fold in the nose cup.

8. Install sample tube extension (cut to 1/2 inch in length) on the drinking tube.

PREPARING THE MASK FOR FIT TESTING - Continued

9. Release the drink valve retaining lever to close the drink valve lever.
10. Don mask and adjust facepiece and tighten head harness following the instructions outlined in the Operator's Manual for the mask being tested. See Supporting Information, References, WP 0023 00.
11. Ensure facepiece is properly fitted and that no hair is under the sealing surface of the facepiece.
12. Check for seal by blocking the open end of the drinking tube sampling adapter and performing a negative pressure check. Refit the mask if a seal cannot be obtained.
13. Attach the drink valve retaining lever so that the drink valve is held in the open position for the duration of the fit test.

CONDUCTING A MASK FIT TEST

NOTE

The measurement provided by this instrument is an assessment of mask fit at that point in time. Mask fit at other times may vary. The fit factor value is not intended for use in calculating an individual's actual exposure to hazardous substances.

This instrument is designed to operate in an enclosed, sheltered area at ambient temperatures between 35° F and 100° F (1.7°C and 37.8°C). TO AVOID INACCURATE READINGS, DO NOT USE THE M41 PATS IF THE TEMPERATURE IN THE TESTING AREA IS BELOW 35° F OR ABOVE 100° F.

It is important that smoking not be permitted in the immediate area where mask fit testing is to be conducted.

To achieve accurate results, the war-fighter should not chew gum nor talk during the test. Lotions, perfumes and colognes should be removed from face and neck area prior to donning protective mask. Mouthwash, foods, and any other liquids other than water should not be consumed within 30 minutes prior to testing. Tobacco products should not be used within 30 minutes prior to testing. Women will remove hair fasteners/clips and let hair hang freely, but out of the mask seal region. War-fighters who required corrective lenses must be tested with their lenses.

Testing can be performed with or without hood installed on the mask.

CONDUCTING A MASK FIT TEST - Continued

1. Remove the HEPA filter from the PATI twin tube assembly.
2. Attach the end of the PATI twin tube assembly (marked "SAMPLE") to the sample port on the end of the drink tube sampling adapter as shown.



Connecting PATI Sample Line to Drink Tube Sampling Adapter.

3. Press the count key, if PATI is not already in the Count Mode. While the war-fighter remains still, monitor the display until a reading of 3.0 particles/cm³ or lower is obtained. If counts remain high after 30 seconds, check fit and tightness of head harness straps. If a proper seal cannot be obtained by adjusting and tightening straps then have the war-fighter remove and then don the mask again. If the count remains above 3.0, you may have an improperly functioning mask or the wrong size mask. If the mask appears to be the correct size (refer to the mask's TM for sizing/fitting criteria) have the user conduct PMCS on the mask. The PATI will not allow a fit test to be performed until the particle count is 3.0 particle/cm³ or less.
4. After obtaining an acceptable seal, press the FIT TEST key on the keypad to bring the instrument into the standby Fit Test Mode.

CONDUCTING A MASK FIT TEST - Continued

NOTE

Before continuing to the next step, brief the war-fighter on how to perform the exercises outlined below. The war-fighter should be instructed to breathe normally during all exercises except the deep breathing exercise.

Each time the exercise number on the PATI display changes, and the “beep” sounds, immediately instruct the war-fighter to start the next exercise.

5. Verify that the number of exercises is set to 5 by momentarily pressing the NUMBER OF EXERCISES key.
6. To begin a fit test, press the START/STOP TEST key on the keypad. The exercise number will flash. Immediately instruct the war-fighter to perform the first of the following set of exercises.

NOTE

For clarity, the operator may elect to explain the next test to the individual just before the warfighter must accomplish it (i.e., during exercise one explain that exercise two requires deep breathing (in through the nose and out through the mouth)).

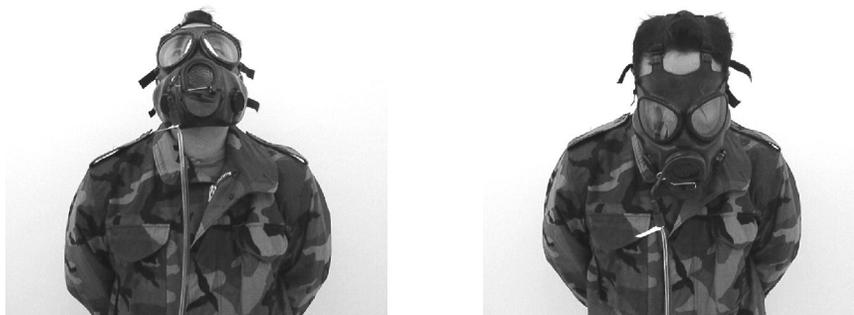
- a. Normal breathing, keeping the head motionless.
- b. Deep breathing, slowly but deeply inhaling through nose and exhaling from mouth.
- c. Head movement side to side, looking over each shoulder in one-second intervals. (See illustration.)



Exercise 3: Moving head side to side, looking over each shoulder

CONDUCTING A MASK FIT TEST - Continued

- d. Head movement up and down, looking at ceiling then floor in one-second intervals. (See illustration.)



Exercise 4: Moving head up and down, looking at ceiling and floor

- e. Exercise 5: Rotate chin, moving the jaw in a circular pattern with mouth slightly open.

NOTE

After the fifth exercise, you will hear a series of three beeps. An overall test result will then be displayed.

7. If the test is a PASS, have the war-fighter remove mask and then continue with steps 8 and 9. If the test is a FAIL, follow the directions outlined in step 10.
8. Remove the drink tube sampling adapter, drink valve retaining lever.
9. Attach the HEPA filter to the twin tube marked "SAMPLE" and put the PATI into Count Mode by pressing the COUNT key. Continue on to the next test subject or if you expect more than 15 minutes to expire before the next test, follow the closing procedure.
- a. Turn the PATI off by pressing the ON/OFF key on the keypad
 - b. Remove the HEPA filter from the SAMPLE tube.
 - c. Remove the storage cap from the alcohol fill capsule.
 - d. Remove the alcohol cartridge and place it in the alcohol fill capsule.
 - e. Replace the storage cap to the PATI.
 - f. Disconnect the AC power supply.
 - g. Repack all the basic issue items in the carrying case.

CONDUCTING A MASK FIT TEST - Continued

10. If the mask fails the test, do the following:
 - a. Check to ensure head harness pad is centered correctly.
 - b. Re-adjust straps to include possible changes in sequence after recentering of head harness pad.
 - c. Check for hair under facepiece sealing surfaces.
 - d. Make sure all connections are correct.
 - e. Make sure the drink valve retaining lever is holding the drink tube valve full open.
 - f. Repeat mask fit test.

If mask fails the test again, repeat the test on a replacement mask of the same size. If the fit test fails on the replacement mask then size down one size and repeat the fitting and fit testing procedures. A smaller size facepiece usually seals better than a larger size. If mask still fails, follow service directive for corrective action.

CAUTION

It is normal for moisture to be visible in the PATI twin tube assembly due to condensation from the war-fighter's breath. It is important however that the moisture not build up to the point where it drips down into the PATI itself.

11. If the condition above occurs, remove the twin tube assembly from the PATI and replace it with the spare dry twin tube assembly supplied. Dry the twin tube assembly in accordance with the maintenance procedure in WP 0017 00.

NOTE

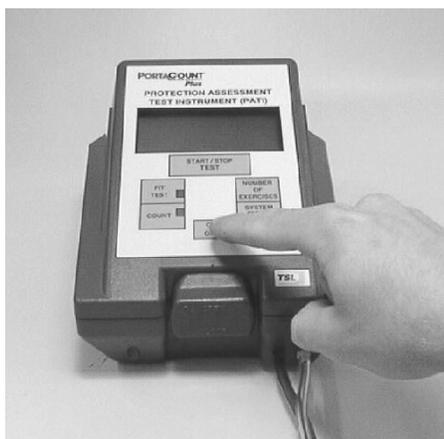
Eventually, the alcohol wick inside the alcohol cartridge will absorb enough moisture to prevent proper operation. Symptoms of excess moisture are service indicator appears, low particle counts (after the start of fit testing), and having to frequently replenish the alcohol supply (such as every hour or less). Refer to troubleshooting (WP 0011 00).

The life of an alcohol wick depends on the conditions of use. When the M41 is used heavily (i.e. 8 hours a day, day after day), the wick may need to be replaced as often as every 5th day. Lighter use requires less frequent wick changes, possibly months apart.

INITIAL ADJUSTMENTS, BEFORE USE, AND SELF-TEST.**NOTE**

Perform the preventive maintenance checks and services in the "Before" column before doing the procedures below (WP 0013 00, item no. 7 only).

1. Turn the PATI on by pressing the ON/OFF key on the keypad.



Turning the PATI on

2. Wait for the display to count down for 60 seconds. The PATI will now be in the Standby Fit Test Mode with the current pass level displayed.

NOTE

If "LOW BATTERY" appears on the display, refer to Troubleshooting (WP 0011 00).

3. Press the COUNT key on the keypad to put the instrument into Count Mode.
4. Make certain that there is nothing attached to the end of the Twin tube assembly such as a hepa filter or mask.
5. Check the particle count in the air to make sure a test can be conducted successfully. To do this, check to see if the display reads 1000 PARTICLE/cm³ or higher. If this reading is lower than 1000 PARTICLE/cm³, a mask fit test cannot be performed. Refer to the troubleshooting in WP 0011 00.

INITIAL ADJUSTMENTS, BEFORE USE, AND SELF-TEST - Continued

6. Zero-check the PATI by attaching the supplied HEPA filter to the clear sample tube, marked "SAMPLE", on the twin tube assembly as shown. Make sure the arrow on the filter which indicates flow direction is pointing towards the PATI. Watch the display. The display should read 0.00 PARTICLE/cm³ within 30 seconds. An occasional reading of 0.60 PARTICLE/cm³ is acceptable.

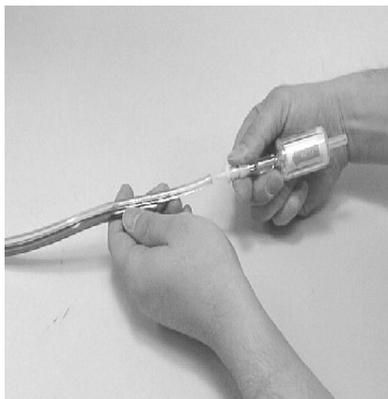
NOTE

If the display does not show a value of 0.60 or less most of the time, there is a leak in the PATI that must be found and eliminated before performing mask fit tests. See the troubleshooting section to help solve the problem.

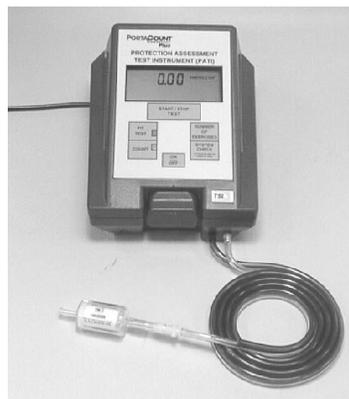
CAUTION

Always attach the HEPA filter to the twin tube sample line marked "SAMPLE" when the PATI is turned on, but not testing a mask. This will extend the life of the instrument by preventing dust and debris from being drawn into the PATI.

Make certain that the end of the twin tube assembly is never allowed to fall to the ground or any place where dirt or moisture or debris could be drawn into the tubes.



Attaching HEPA Filter



Display showing result

7. Press the SYSTEM CHECK key on the front keypad. This built-in system check function allows the PATI to run through a self diagnostics test. After 30-90 seconds, a PASS or FAIL message will appear. If system check fails, refer to WP 0011 00, Troubleshooting. Every time the PATI is turned on, the system check should be performed.

PREPARING THE MASK FOR FIT TESTING.

NOTE

Perform mask PMCS prior to conducting a fit test.

It is important that smoking not be permitted in the immediate area where mask fit testing is to be conducted.

To achieve accurate results the war-fighter should not talk during the test, not wear lotions, perfumes or colognes; use mouthwash, eat, or drink anything within 30 minutes of testing. Women will remove hair fasteners (hair clips) and let hair hang freely before donning mask. Also, it is very important that the war-fighter not smoke for at least 30 minutes before the test begins.

Testing can be performed with or without hood installed on the mask.

CAUTION

It is extremely important that the mask be clean and free of any loose foreign material prior to conducting a fit test. Presence of these substances may affect facepiece seal and/or result in inaccurate readings.

1. Visually inspect both the inside and outside of mask for dirt, mud, sand, powder, greasy or oily substances. The inside of the facepiece should be cleaned with a damp sponge and dried with a lint-free cloth. The outlet valve disk should also be carefully inspected to ensure it is clean and seated properly. Check to ensure the external drink tube quick disconnect is functioning. Ensure canister is secured. Refer to the appropriate Operator's Manual listed in References, Supporting Information. 0023 00.

PREPARING THE MASK FOR FIT TESTING - Continued

2. Attach drink tube sampling adapter to drink tube quick disconnect coupling as illustrated. **DO NOT** attach sample line of PATI to sampling adapter at this point.



Drink Tube Sampling Adapter connected to the Quick Disconnect Coupling

NOTE

If a distinct “snap action” can no longer be felt when engaging the drink tube quick disconnect coupling to the drink tube adapter, cease using that adapter and discard it. Replace the adapter.

3. Have the war-fighter sit down for the mask fit test.

CAUTION

All water or foreign material must be expelled from the mask drink tube before the PATI sample line is connected so that liquid will not be drawn into the PATI. If liquid is drawn into the PATI, it may become inoperative.

4. Have the war-fighter don the mask in accordance with donning procedures listed in the Operator’s Manual for the specific mask (See Supporting Information, References, WP 0023 00).

PREPARING THE MASK FOR FIT TESTING - Continued

5. Instruct war-fighter to blow as hard as possible several times into the internal drink tube mouthpiece to remove any trapped fluids or foreign matter. **This is a critical step.** The drink tube must be cleared so that foreign matter will not be drawn into the PATI and so that the PATI will be able to draw air from inside the mask.

NOTE

If the drink tube is obstructed and the blockage cannot be removed, then the mask should be returned for maintenance.

6. Ensure facepiece is properly fitted.
7. Check for seal by blocking the open end of the drinking tube sampling adapter and performing a negative pressure check. Refit the mask if a seal cannot be obtained.

CONDUCTING A MASK FIT TEST

NOTE

The measurement provided by this instrument is an assessment of mask fit at that point in time. Mask fit at other times may vary. The fit factor value is not intended for use in calculating an individual's actual exposure to hazardous substances.

This instrument is designed to operate in an enclosed, sheltered area at ambient temperatures between 35° F and 100° F (1.7°C and 37.8°C). **TO AVOID INACCURATE READINGS, DO NOT USE THE M41 PATS IF THE TEMPERATURE IN THE TESTING AREA IS BELOW 35° F OR ABOVE 100° F.**

It is important that smoking not be permitted in the immediate area where mask fit testing is to be conducted.

To achieve accurate results the war-fighter should not talk during the test, not wear lotions, perfumes or colognes; use mouthwash, eat, or drink anything within 30 minutes of testing. Women will remove hair fasteners (hair clips) and let hair hang freely before donning mask. Also, it is very important that the war-fighter not smoke for at least 30 minutes before the test begins.

Testing can be performed with or without hood installed on the mask.

1. Remove the HEPA filter from the PATI twin tube assembly.

CONDUCTING A MASK FIT TEST - Continued

2. Attach the end of the PATI twin tube assembly (marked "SAMPLE") to the sample port on the end of the drink tube sampling adapter as shown.



Connecting PATI Sample Line to Drink Tube Sampling Adapter

3. Press the count key, if PATI is not already in the Count Mode. While the war-fighter remains still, monitor the display until a reading of 3.0 particles/cm³ or lower is obtained. If counts remain high after 30 seconds, check fit and tightness of head harness straps. If a proper seal cannot be obtained by adjusting and tightening straps then have the war-fighter remove and then don the mask again. If the count remains above 3.0, you may have an improperly functioning mask or the wrong size mask. If the mask appears to be the correct size (refer to the mask's TM for sizing/fitting criteria) have the user conduct PMCS on the mask. The PATI will not allow a fit test to be performed until the particle count is 3.0 particle/cm³ or less.
4. After obtaining an acceptable seal, press the FIT TEST key on the keypad to bring the instrument into the standby Fit Test Mode.

NOTE

Before continuing to the next step, brief the war-fighter on how to perform the exercises outlined below. The war-fighter should be instructed to breathe normally during all exercises except the deep breathing exercise.

Each time the exercise number on the PATI display changes, and the "beep" sounds, immediately instruct the war-fighter to start the next exercise.

5. Verify that the number of exercises is set to 5 by momentarily pressing the NUMBER OF EXERCISES key.

CONDUCTING A MASK FIT TEST - Continued

6. To begin a fit test, press the START/STOP TEST key on the keypad. The exercise number will flash. Immediately instruct the war-fighter to perform the first of the following set of exercises.

NOTE

For clarity, the operator may elect to explain the next test to the individual just before the warfighter must accomplish it (i.e., during exercise one explain that exercise two requires deep breathing (in through the nose and out through the mouth)).

- a. **Exercise 1:** Normal breathing, keeping the head motionless.
- b. **Exercise 2:** Deep breathing, slowly but deeply inhaling through nose and exhaling from mouth.
- c. **Exercise 3:** Head movement side to side, looking over each shoulder in one-second intervals. (See illustration.) Ensure the canister does not touch shoulders while performing this exercise.



Exercise 3: Moving head side to side, looking over each shoulder

CONDUCTING A MASK FIT TEST - Continued

- d. **Exercise 4:** Ensure the canister does not touch chin while performing this exercise. Head movement up and down, looking at ceiling then floor in one-second intervals. (See illustration.)



Exercise 4: Moving head up and down, looking at ceiling and floor

- e. **Exercise 5:** Rotate chin, moving the jaw in a circular pattern with mouth slightly open.

NOTE

After the fifth exercise, you will hear a series of three beeps. An overall test result will then be displayed.

- 7. If the test is a PASS, have the war-fighter remove mask and then continue with steps 8 and 9. If the test is a FAIL, follow the directions outlined in step 10.
- 8. Remove the drink tube sampling adapter.
- 9. Attach the HEPA filter to the twin tube marked "SAMPLE" and put the PATI into Count Mode by pressing the COUNT key. Continue on to next test subject or if you expect more than 15 minutes to expire before the next test, follow the closing procedure.
 - a. Turn the PATI off by pressing the ON/OFF key on the keypad
 - b. Remove the HEPA filter from the SAMPLE tube.
 - c. Remove the storage cap from the alcohol fill capsule.
 - d. Remove the alcohol cartridge and place it in the alcohol fill capsule.
 - e. Replace the storage cap to the PATI.
 - f. Disconnect the AC power supply.
 - g. Repack all the basic issue items in the carrying case.

CONDUCTING A MASK FIT TEST - Continued

10. If the mask fails the test, do the following:
 - a. Check to ensure head harness pad is centered correctly.
 - b. Re-adjust straps to include possible changes in sequence after recentering of head harness pad.
 - c. Check for hair under facepiece sealing surfaces.
 - d. Make sure all connections are correct.
 - e. Repeat mask fit test.

If mask fails the test again, repeat the test on a replacement mask of the same size. If the fit test fails on the replacement mask then size down one size and repeat the fitting and fit testing procedures. A smaller size facepiece usually seals better than a larger size. If mask still fails, follow service directive for corrective action.

CAUTION

It is normal for moisture to be visible in the PATI twin tube assembly due to condensation from the war-fighter's breath. It is important however that the moisture not build up to the point where it drips down into the PATI itself.

11. If the condition above occurs, remove the twin tube assembly from the PATI and replace it with the spare dry twin tube assembly supplied. Dry the twin tube assembly in accordance with the maintenance procedure in WP 0017 00.

NOTE

Eventually, the alcohol wick inside the alcohol cartridge will absorb enough moisture to prevent proper operation. Symptoms of excess moisture are service indicator appears, low particle counts after the start of fit testing, and having to frequently replenish the alcohol supply (such as every hour or less). Refer to troubleshooting (WP 0011 00).

The life of an alcohol wick depends on the conditions of use. When the M41 is used heavily (i.e. 8 hours a day, day after day), the wick may need to be replaced as often as every 5th day. Lighter use requires less frequent wick changes, possibly months apart.

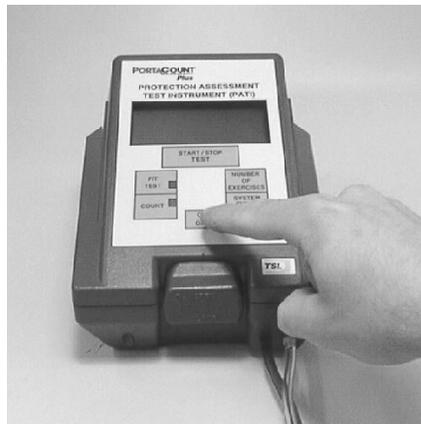
INITIAL ADJUSTMENTS, BEFORE USE, AND SELF-TEST.

NOTE

Perform the preventive maintenance checks and services in the “Before” column before doing the procedures below (WP 0011 00, item no. 7 only).

To achieve accurate results, the war-fighter should not chew gum nor talk during the test. Lotions, perfumes, and colognes should be removed from face and neck area prior to donning protective mask. Mouthwash, foods, and any other liquids other than water should not be consumed within 30 minutes prior to testing. Tobacco products should not be used within 30 minutes prior to testing. Women will remove hair fasteners/clips and let hair hang freely, but out of the mask seal region. War-fighters who require corrective lenses must be tested with their lenses.

1. Make certain that there is nothing attached to the end of the Twin tube assembly such as a HEPA filter or mask.



Turning the PATI on

2. Turn the PATI on by pressing the ON/OFF key on the keypad.

NOTE

If “LOW BATTERY” appears on the display, refer to Troubleshooting, WP 0011 00.

3. Wait for the display to count down for 60 seconds. The PATI will now be in the Standby Fit Test Mode with the current pass level displayed. For the MCU-2A/P the fit factor pass level is 2000. The operator may adjust this level and a variety of other options, to meet the fit factor levels and test requirement of different masks. See WP 0019 00 on Setting the Internal Dip Switches for detailed information on how to change the fit factor, display options, etc.

INITIAL ADJUSTMENTS, BEFORE USE, AND SELF-TEST - Continued

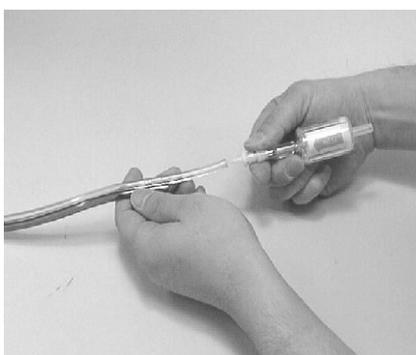
4. Press the COUNT key on the keypad to put the instrument into Count Mode.
5. Check the particle count in the air to make sure a test can be conducted successfully. To do this, check to see if the display reads 3000 PARTICLE/cm³ or higher. If this reading cannot be obtained, refer to the troubleshooting section in WP 0011 00.

NOTE

If moving to another location as suggested by the troubleshooting section is not an option, the operator may use a laboratory liquid or particle generator (e.g., wax candle) to increase the particle count in the room. Place the candle on a table or other stable surface no closer than 6 feet from the mask user, M41 PATS, and any other associated test equipment. Ensure all required fire safety and storage requirements are met before using this open flame source. Light the candle and wait approximately 2 minutes. Repeat step 5 above.

6. Zero-check the PATI by attaching the supplied high efficiency particulate air (HEPA) filter to the clear sample tube, marked "SAMPLE" on the twin tube assembly as shown. Make sure the arrow on the filter which indicates flow direction is pointing towards the PATI. Watch the display. The display should read 0.00 PARTICLE/cm³ within 30 seconds. An occasional reading of 0.60 PARTICLE/cm³ is acceptable.

If the display does not show a value of 0.60 or less most of the time, there is a leak in the PATI that you must find and eliminate before performing mask fit tests. See the troubleshooting section in WP 0011 00 to help solve the problem.



Attaching HEPA Filter



Display showing result

Zero Checking

INITIAL ADJUSTMENTS, BEFORE USE, AND SELF-TEST - Continued

7. Press the SYSTEM CHECK key on the front keypad. This built-in system check function allows the PATI to run through a self diagnostic test. After 30-90 seconds, a PASS or FAIL message will appear. If system check fails, refer to Troubleshooting, WP 0011 00. Every time the PATI is turned on, perform the system check.

CAUTION

Always attach the HEPA filter to the twin tube sample line marked "SAMPLE" when the PATI is turned on, but not testing a mask. This will extend the life of the instrument by preventing dust and debris from being drawn into the PATI.

Make certain that the end of the twin tube assembly is never allowed to fall to the ground or any place where dirt or moisture or debris could be drawn into the tubes.

PREPARING THE MASK FOR FIT TESTING

NOTE

Cigarette/pipe/cigar smoking is not permitted in the immediate area or within 100 ft of the entrance/exit where you conduct mask fit testing.

To achieve proper results, the war-fighter should not chew gum nor talk during the test. Lotions, perfumes, and colognes should be removed from face and neck prior to donning protective mask. Mouthwash, foods, and any other liquids other than water should not be consumed within 30 minutes prior to testing. Tobacco products should not be used within 30 minutes prior to testing. Women will remove hair fasteners/clips and let hair hang freely, but out of the mask seal region. War-fighters who require corrective lenses must be tested with their lenses.

The war-fighter may complete the test with or without mask hood.

This section is specific to the MCU-2A/P masks. Methods for attaching the PATI to other mask systems will differ. Refer to WP 0006 00 for details on how to perform fit tests on M17 series masks.

PREPARING THE MASK FOR FIT TESTING - Continued

CAUTION

It is extremely important that the mask be clean and free of any loose foreign material prior to conducting a fit test. Presence of these substances may affect facepiece seal and/or result in inaccurate readings.

For USAF unit only: Serviceable filters should be used as a control for testing. Test operators should maintain at least two filters (C2, C2A1, and/or M13A2 as appropriate) per M41 for this purpose. Test operator will replace war-fighter's filter with the control filter prior to testing.

1. Visually inspect both the inside and outside of mask for dirt, mud, sand, powder, greasy or oily substances. Ensure the war-fighter has cleaned the inside of the facepiece with a damp sponge and dried with a lint-free cloth. The outlet valve disk should also be carefully inspected to ensure it is clean and seated properly. Refer to T.O. 14P4-15-1, MCU-2A/P manual.
2. Attach drink tube sampling adapter to drink tube quick disconnect coupling as illustrated. DO NOT attach sample line of PATI to sampling adapter at this point.



Drink Tube Sampling Adapter connected to the Quick Disconnect Coupling

PREPARING THE MASK FOR FIT TESTING - Continued**NOTE**

If you do not feel a distinct “snap action” when engaging the drink tube quick disconnect coupling to the drink tube adapter, cease using that adapter and discard it. Replace the adapter.

3. Have the war-fighter don the mask according to T.O. 14P4-15-1 and sit down for the mask fit test.

CAUTION

The war-fighter must expel all water and foreign material from the mask drink tube before the PATI sample line is connected so that liquid will not be drawn into the PATI. If liquid is drawn into the PATI, it may become inoperative.

4. Instruct war-fighter to blow as hard as possible several times into the internal drink tube mouthpiece to remove any trapped fluids or foreign matter. **This is a critical step.** The drink tube must be cleared so that foreign matter will not be drawn into the PATI and so that the PATI will be able to draw air from inside the mask.

NOTE

If the drink tube is obstructed and the blockage cannot be removed, return the mask for maintenance.

5. Have the war-fighter remove the mask.

WARNING

To prevent eye injury, the sample tube extension should be positioned and secured between the fold in the nose cup.

6. Install sample tube extension, cut to 1/2 inch in length on the drinking tube.
7. Don mask and adjust facepiece and tighten head harness following the instructions outlined in T.O. 14P4-15-1 for the mask being tested.
8. Ensure facepiece is properly fitted and that no hair is under the sealing surface of the facepiece.
9. Check for seal by blocking the open end of the drinking tube sampling adapter and performing a negative pressure check. Refit the mask if a seal cannot be obtained.

CONDUCTING A MASK FIT TEST**NOTE**

The measurement provided by this instrument is an assessment of mask fit during a fit test only. Fit at other times may vary. The fit factor value is not intended for use in calculating an individual's actual exposure to hazardous substances.

This instrument is designed to operate in an enclosed, sheltered area at ambient temperatures between 35°F and 100°F (1.7°C and 37.8°C). **TO AVOID INACCURATE READINGS, DO NOT USE THE M41 PATS IF THE TEMPERATURE IN THE TESTING AREA IS BELOW 35°F OR ABOVE 100°F.**

It is important that you do not permit smoking in the immediate mask fit testing area.

To achieve proper results the wearer should not talk during the test. Also, it is very important that the wearer not smoke for at least 30 minutes before the test begins.

1. Remove the HEPA filter from the PATI twin tube assembly.
2. Attach the end of the PATI twin tube assembly (marked "SAMPLE") to the sample port on the end of the drink tube sampling adapter as shown.



Connecting PATI Sample Line to Drink Tube Sampling Adapter

CONDUCTING A MASK FIT TEST - Continued

3. Press the count key, if PATI is not in the Count Mode. While the war-fighter remains still, monitor the display until a reading of 3.0 particles/cm³ or lower. If counts remain high after 30 seconds, check fit and tightness of head harness straps. If the war-fighter cannot obtain a proper seal after adjusting and tightening straps, have the war-fighter remove and then don the mask again.
4. After obtaining an acceptable seal, press the FIT TEST key on the keypad to bring the instrument into standby Fit Test mode.

NOTE

Before continuing to the next step, brief the war-fighter on how to perform the exercises outlined below. Instruct the war-fighter to breathe normally during all exercises except the deep breathing exercise.

5. Verify that the number of exercises is set to 5 by momentarily pressing the NUMBER OF EXERCISES key.

NOTE

Each time the exercise number on the PATI display changes, and the "beep" sounds, immediately instruct the war-fighter to start the next exercise.

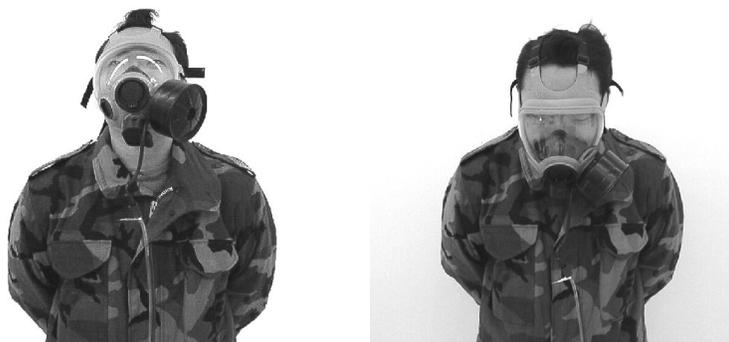
CONDUCTING A MASK FIT TEST - Continued

6. To begin a fit test, press START/STOP TEST on the keypad. The exercise number will flash. Immediately instruct the war-fighter to perform the first of the following set of exercises.
 - a. Exercise 1: Normal breathing, keeping the head motionless.
 - b. Exercise 2: Deep breathing, slowly but deeply inhaling through nose and exhaling from mouth.
 - c. Exercise 3: Head movement side to side, looking over each shoulder in one-second intervals (See illustration.)



Exercise 3: Moving head side-to-side, looking over each shoulder

- d. Exercise 4: Head movement up and down, looking at ceiling, then floor in one-second intervals. (See illustration.)



Exercise 4: Moving head up and down, looking at ceiling and floor

CONDUCTING A MASK FIT TEST - Continued

- e. Exercise 5: Rotate chin, moving the jaw in a circular pattern with mouth slightly open.

NOTE

After the fifth test, you will hear a series of three beeps. An overall test result will then be displayed.

7. If the test is a PASS (overall fit factor of 2000 or higher, have the war-fighter remove the mask. You will extinguish the candle if used and still lit, then continue with steps 8 and 9. If the test is a FAIL, follow the directions outlined in step 10.
8. Remove the drink tube sampling adapter from war-fighter's mask.
9. Attach the HEPA filter to the twin tube marked "SAMPLE" and put the PATI into Count Mode by pressing the COUNT key. If you expect to wait more than 15 minutes before the next test, follow the closing procedure.
 - a. Turn the PATI off by pressing the ON/OFF key on the keypad.
 - b. Remove the HEPA filter from the SAMPLE tube.
 - c. Remove the storage cap from the alcohol fill capsule.
 - d. Remove the alcohol cartridge and place it in the alcohol fill capsule.
 - e. Replace the storage cap on the PATI.
 - f. Disconnect the AC power supply.
 - g. Repack all the basic issue items in the carrying case.
10. If the mask fails the test, do the following:
 - a. Check to ensure head harness pad is centered correctly. Replace the head harness pad if necessary. Adjust straps to include possible changes in sequence after recentering of head harness pad.
 - b. Adjust straps to include possible changes in sequence after recentering of head harness pad.

CONDUCTING A MASK FIT TEST - Continued

- c. Check for hair under facepiece sealing surfaces.
- d. Make sure all connections are correct.
- e. Repeat mask fit test.

If mask fails the test again, repeat the test on a replacement mask of the same size. If the fit test fails on the replacement mask then size down one size and repeat the fitting and fit testing procedures. A smaller size facepiece usually seals better than a larger size. If mask still fails, follow AFMAN 32-4006 for corrective action.

CAUTION

It is normal for moisture to be visible in the PATI twin tube assembly due to condensation from the war-fighter's breath. It is important however that the moisture not build up to the point where it drips down into the PATI itself

- 11. If the condition above occurs, remove the twin tube assembly from the PATI and replace it with the spare dry twin tube assembly supplied. Dry the twin tube assembly in accordance with the maintenance procedure in WP 0017 00.

NOTE

Eventually, the alcohol wick inside the alcohol cartridge will absorb enough moisture to prevent proper operation. Symptoms of excess moisture are service indicator appears, low particle counts after the start of fit testing, and having to frequently replenish the alcohol supply (such as every hour or less). Refer to troubleshooting, WP 0011 00.

The life of an alcohol wick depends on the conditions of use. When the M41 is used heavily (i.e. 8 hours a day, day after day) you may need to replace the wick as often as every 5th day. Lighter use requires less frequent wick changes, possibly months apart.

INITIAL ADJUSTMENTS, BEFORE USE, AND SELF-TEST.**NOTE**

Perform the preventive maintenance checks and services in the "Before" column before doing the procedures below (WP 0011 00, item no. 7 only).

To achieve accurate results, the war-fighter should not chew gum nor talk during the test. Lotions, perfumes and colognes should be removed from face and neck area prior to donning protective mask. Mouthwash, foods, and any other liquids other than water should not be consumed within 30 minutes prior to testing. Women will remove hair fasteners/clips and let hair hang freely, but out of the mask seal region. War-fighters who require corrective lenses must be testing with their lenses.

1. Make certain that there is nothing attached to the end of the Twin tube assembly such as a hepa filter or mask.



Turning the PATI on

2. Turn the PATI on by pressing the ON/OFF key on the keypad.

NOTE

If "LOW BATTERY" appears on the display, refer to Troubleshooting, WP 0011 00.

3. Wait for the display to count down for 60 seconds. The PATI will now be in the Standby Fit Test Mode with the current pass level displayed. The fit factor pass level is 2000. The operator may adjust this level and a variety of other options, to meet the fit factor levels and test requirement of different masks. See WP 0019 00 on Setting the Internal Dip Switches for detailed information on how to change the fit factor, display options, etc.

INITIAL ADJUSTMENTS, BEFORE USE, AND SELF-TEST - Continued

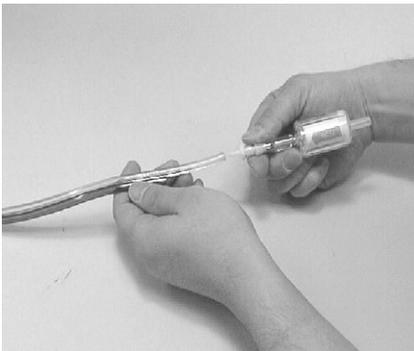
4. Press the COUNT key on the keypad to put the instrument into Count Mode.
5. Check the particle count in the air to make sure a test can be conducted successfully. To do this, check to see if the display reads 3000 PARTICLE/cm³ or higher. If this reading cannot be obtained, refer to the troubleshooting section in WP 0011 00.

NOTE

If moving to another location as suggested by the troubleshooting section is not an option, the operator may use a laboratory liquid or particle generator (e.g., wax candle) to increase the particle count in the room. Place the candle on a table or other stable surface no closer than 6 feet from the mask user, M41 PATS, and any other associated test equipment. Ensure all required fire safety and storage requirements are met before using this open flame source. Light the candle and wait approximately 2 minutes. Repeat step 5 above.

6. Zero-check the PATI by attaching the supplied high efficiency particulate air (HEPA) filter to the clear sample tube, marked "SAMPLE" on the twin tube assembly as shown. Make sure the arrow on the filter which indicates flow direction is pointing towards the PATI. Watch the display. The display should read 0.00 PARTICLE/cm³ within 30 seconds. An occasional reading of 0.60 PARTICLE/cm³ is acceptable.

If the display does not show a value of 0.60 or less most of the time, there is a leak in the PATI that you must find and eliminate before performing mask fit tests. See the troubleshooting section in WP 0011 00 to help solve the problem.



Attaching HEPA Filter



Display showing result

Zero Checking

INITIAL ADJUSTMENTS, BEFORE USE, AND SELF-TEST - Continued

7. Press the SYSTEM CHECK key on the front keypad. This built-in system check function allows the PATI to run through a self diagnostic test. After 30-90 seconds, a PASS or FAIL message will appear. If system check fails, refer to Troubleshooting, WP 0011 00. Every time the PATI is turned on, perform the system check.

CAUTION

Always attach the HEPA filter to the twin tube sample line marked "SAMPLE" when the PATI is turned on, but not testing a mask. This will extend the life of the instrument by preventing dust and debris from being drawn into the PATI.

Make certain that the end of the twin tube assembly is never allowed to fall to the ground or any place where dirt or moisture or debris could be drawn into the tubes.

PREPARING THE MASK FOR FIT TESTING

NOTE

Cigarette/pipe/cigar smoking is not permitted in the immediate area or within 100 ft of the entrance/exit where you conduct mask fit testing.

To achieve proper results, the war-fighter should not chew gum nor talk during the test. Lotions, perfumes, and colognes should be removed from face and neck area prior to donning protective mask. Mouthwash, foods, and any other liquids other than water should not be consumed within 30 minutes prior to testing. Tobacco products should not be used within 30 minutes prior to testing. Women will remove hair fasteners/clips and let hair hang freely, but out of the mask seal region. War-fighters who require corrective lenses must be testing with their lenses.

The war-fighter may complete the test with or without mask hood.

PREPARING THE MASK FOR FIT TESTING - Continued

CAUTION

It is extremely important that the mask be clean and free of any loose foreign material prior to conducting a fit test. Presence of these substances may affect facepiece seal and/or result in inaccurate readings.

For USAF units only: Serviceable filters should be used as a control for testing. Test operators should maintain at least two filters (C2, C2A1, and/or M13A2 as appropriate) per M41 for this purpose. Test operator will replace war-fighter's filter with the control filter prior to testing.

1. Visually inspect both the inside and outside of mask for dirt, mud, sand, powder, greasy or oily substances. Ensure the war-fighter has cleaned the inside of the facepiece with a damp sponge and dried with a lint-free cloth. The outlet valve disk should also be carefully inspected to ensure it is clean and seated properly. Refer to T.O. 14P4-17-3, Interspiro CW mask manual.
2. Attach drink tube sampling adapter to drink tube quick disconnect coupling as illustrated. DO NOT attach sample line of PATI to sampling adapter at this point.



Drink Tube Sampling Adapter connected to the Quick Disconnect Coupling

PREPARING THE MASK FOR FIT TESTING - Continued

NOTE

If you do not feel a distinct "snap action" when engaging the drink tube quick disconnect coupling to the drink tube adapter, cease using that adapter and discard it. Replace the adapter.

3. Have the war-fighter don the mask according to T.O. 14P4-17-3 and sit down for the mask fit test.

CAUTION

The war-fighter must expel all water and foreign material from the mask drink tube before the PATI sample line is connected so that liquid will not be drawn into the PATI. If liquid is drawn into the PATI, it may become inoperative.

4. Instruct war-fighter to blow as hard as possible several times into the internal drink tube mouthpiece to remove any trapped fluids or foreign matter. **This is a critical step.** The drink tube must be cleared so that foreign matter will not be drawn into the PATI and so that the PATI will be able to draw air from inside the mask.

NOTE

If the drink tube is obstructed and the blockage cannot be removed, return the mask for maintenance.

5. Ensure facepiece is properly fitted and that no hair is under the sealing surface of the facepiece.
6. Check for seal by blocking the open end of the drinking tube sampling adapter and performing a negative pressure check. Refit the mask if a seal cannot be obtained.
7. The sample tube extension is not used with the Interspiro CW (Firefighter's) Mask. War-fighter will turn internal drink tube upward away from mouth prior to donning.

CONDUCTING A MASK FIT TEST**NOTE**

The measurement provided by this instrument is an assessment of mask fit during a fit test only. Fit at other times may vary. The fit factor value is not intended for use in calculating an individual's actual exposure to hazardous substances.

This instrument is designed to operate in an enclosed, sheltered area at ambient temperatures between 35°F and 100°F (1.7°C and 37.8°C). **TO AVOID INACCURATE READINGS, DO NOT USE THE M41 PATS IF THE TEMPERATURE IN THE TESTING AREA IS BELOW 35°F OR ABOVE 100°F.**

It is important that you do not permit smoking in the immediate mask fit testing area.

To achieve proper results the wearer should not talk during the test. Also, it is very important that the wearer not smoke for at least 30 minutes before the test begins.

1. Remove the HEPA filter from the PATI twin tube assembly.
2. Attach the end of the PATI twin tube assembly (marked "SAMPLE") to the sample port on the end of the drink tube sampling adapter as shown.



Connecting PATI Sample Line to Drink Tube Sampling Adapter

CONDUCTING A MASK FIT TEST - Continued

3. Press the count key, if PATI is not in the Count Mode. While the war-fighter remains still, monitor the display until a reading of 3.0 particles/cm³ or lower. If counts remain high after 30 seconds, check fit and tightness of head harness straps. If the war-fighter cannot obtain a proper seal after adjusting and tightening straps, have the war-fighter remove and then don the mask again.
4. After obtaining an acceptable seal, press the FIT TEST key on the keypad to bring the instrument into standby Fit Test mode.

NOTE

Before continuing to the next step, brief the war-fighter on how to perform the exercises outlined below. Instruct the war-fighter to breathe normally during all exercises except the deep breathing exercise.

5. Verify that the number of exercises is set to 5 by momentarily pressing the NUMBER OF EXERCISES key.

NOTE

Each time the exercise number on the PATI display changes, and the "beep" sounds, immediately instruct the war-fighter to start the next exercise.

CONDUCTING A MASK FIT TEST - Continued

6. To begin a fit test, press START/STOP TEST on the keypad. The exercise number will flash. Immediately instruct the war-fighter to perform the first of the following set of exercises.
 - a. Exercise 1: Normal breathing, keeping the head motionless.
 - b. Exercise 2: Deep breathing, slowly but deeply inhaling through nose and exhaling from mouth.
 - c. Exercise 3: Head movement side to side, looking over each shoulder in one-second intervals (See illustration.)



Exercise 3: Moving head side-to-side, looking over each shoulder

- d. Exercise 4: Head movement up and down, looking at ceiling, then floor in one-second intervals (See illustration.)



Exercise 4: Moving head up and down, looking at ceiling and floor

CONDUCTING A MASK FIT TEST - Continued

- e. Exercise 5: Rotate chin, moving the jaw in a circular pattern with mouth slightly open.

NOTE

After the fifth test, you will hear a series of three beeps. An overall test result will then be displayed.

- 7. If the test is a PASS (overall fit factor of 2000 or higher), have the war-fighter remove the mask. You will extinguish the candle if used and still lit, then continue with steps 8 and 9. If the test is a FAIL, follow the directions outlined in step 10.
- 8. Remove the drink tube sampling adapter from war-fighter's mask.
- 9. Attach the HEPA filter to the twin tube marked "SAMPLE" and put the PATI into Count Mode by pressing the COUNT key. Continue on to next test subject or if you expect to wait more than 15 minutes before the next test, follow the closing procedure.
 - a. Turn the PATI off by pressing the ON/OFF key on the keypad.
 - b. Remove the HEPA filter from the SAMPLE tube.
 - c. Remove the storage cap from the alcohol fill capsule.
 - d. Remove the alcohol cartridge and place it in the alcohol fill capsule.
 - e. Replace the storage cap on the PATI.
 - f. Disconnect the AC power supply.
 - g. Repack all the basic issue items in the carrying case.
- 10. If the mask fails the test, do the following:
 - a. Check to ensure head harness pad is centered correctly. Replace the head harness pad if necessary. If head harness adjustments do not work, replace the head harness with a skull cap harness.
 - b. Adjust straps to include possible changes in sequence after recentering of head harness pad.

CONDUCTING A MASK FIT TEST - Continued

- c. Check for hair under facepiece sealing surfaces.
- d. Make sure all connections are correct.
- e. Repeat mask fit test.

If mask fails the test again, repeat the test on a replacement mask of the same size. If the fit test fails on the replacement mask then size down one size and repeat the fitting and fit testing procedures. A smaller size facepiece usually seals better than a larger size. If mask still fails, follow AFMAN 32-4006 for corrective action.

CAUTION

It is normal for moisture to be visible in the PATI twin tube assembly due to condensation from the war-fighter's breath. It is important however that the moisture not build up to the point where it drips down into the PATI itself

- 11. If the condition above occurs, remove the twin tube assembly from the PATI and replace it with the spare dry twin tube assembly supplied. Dry the twin tube assembly in accordance with the maintenance procedure in WP 0017 00.

NOTE

Eventually, the alcohol wick inside the alcohol cartridge will absorb enough moisture to prevent proper operation. Symptoms of excess moisture are service indicator appears, low particle counts after the start of fit testing, and having to frequently replenish the alcohol supply (such as every hour or less). Refer to troubleshooting, WP 0011 00.

The life of an alcohol wick depends on the conditions of use. When the M41 is used heavily (i.e. 8 hours a day, day after day) you may need to replace the wick as often as every 5th day. Lighter use requires less frequent wick changes, possibly months apart.

The M41 must be operated under controlled conditions in order to be effective. If the M41 cannot be used because of an environmental conditions (e.g., temperature), personnel will perform qualitative mask fit testing IAW service directives.

TM 3-4240-349-12&P

**CHAPTER 3
OPERATOR TROUBLESHOOTING
PROCEDURES
FOR
M41 PATS**

INTRODUCTION

This chapter lists a series of symptoms, their possible causes and recommended solutions for troubleshooting the M41. If the recommendations in this chapter fail to resolve a problem, seek higher level support.

MALFUNCTION/SYMPTOM INDEX

Malfunction/Symptom	Page Number
Service Message Appears.....	WP 0011-00-1
LOW PARTICLE Message Appears.....	WP 0011-00-2
LOW BATTERY Message Appears.....	WP 0011-00-3
Does not switch on.....	WP 0011-00-3
Fails Zero Check.....	WP 0011-00-4
System Check Fails.....	WP 0011-00-4
Requires Frequent Refill of Alcohol.....	WP 0011-00-5
Excessive Moisture Visible in Twin Tube Assembly.....	WP 0011-00-5

TROUBLESHOOTING PROCEDURES

INITIAL SETUP

Maintenance Level

Operator

SYMPTOM	POSSIBLE CAUSES	SOLUTION
Service Message Appears	Low on alcohol Excessive moisture inside alcohol cartridge Operating near or beyond recommended ambient temperature range.	Replenish alcohol. (WP 0015 00). Change alcohol wick inside alcohol cartridge (WP 0015 00). Operate between 35°F and 100°F temperature range.

TROUBLESHOOTING PROCEDURES - Continued

SYMPTOM	POSSIBLE CAUSES	SOLUTION
<p>LOW PARTICLE message appears.</p>	<p>Low on alcohol.</p> <p>Hoses are reversed on twin tube assembly.</p> <p>Wrong tube is connected to mask.</p> <p>Twin tube assembly is kinked, pinched, or blocked.</p> <p>Particle count in area is low.</p> <p>Moisture build up inside alcohol cartridge.</p> <p>Contaminated alcohol.</p> <p>Alcohol in nozzle.</p> <p>Operating beyond recommended ambient temperature range.</p>	<p>Replenish alcohol. (WP 0015 00).</p> <p>Connect the hoses properly to the PATI. (WP 0005 00).</p> <p>Connect the proper tube to the mask (marked "SAMPLE").</p> <p>Straighten out the twin tube assembly or remove the obstruction.</p> <p>Move to another location or increase particle count.</p> <p>Change alcohol wick inside the alcohol cartridge (WP 0015 00).</p> <p>Change alcohol wick inside the alcohol cartridge (WP 0015 00). Discard alcohol wick (WP 0031 00). Use only approved alcohol.</p> <p>See Clearing the Nozzle (WP 0014 00).</p> <p>Operate between 35°F and 100°F ambient temperature.</p>

TROUBLESHOOTING PROCEDURES - Continued

SYMPTOM	POSSIBLE CAUSES	SOLUTION
LOW BATTERY message appears.	AC adapter is malfunctioning. Battery is low.	Replace AC adapter. Replace the battery (WP 0005 00).
Does not switch on.	AC adapter is malfunctioning. AC adapter not plugged into unit or line cord not plugged into AC outlet. Battery is low. Unit not turned on. Battery connector is unplugged. Battery not installed. Cold ambient temperature.	Connect AC adapter or line cord properly (WP 0005 00). Replace the battery. Press the ON/OFF function on the keypad. Plug the battery connector into the battery. Install the battery. Restart the PATI up to 10 times. If unit does not start, replace battery or switch to AC adapter.

TROUBLESHOOTING PROCEDURES - Continued

SYMPTOM	POSSIBLE CAUSES	SOLUTION
Fails Zero Check.	<p>Alcohol cartridge is loose in cartridge cavity.</p> <p>Twin tube assembly leaks.</p> <p>HEPA Filter leaks.</p> <p>Ends of twin tube assembly are damaged.</p> <p>Twin tube assembly is disconnected.</p> <p>Alcohol in nozzle.</p>	<p>Close the alcohol cartridge.</p> <p>Replace the twin tube assembly.</p> <p>Replace HEPA Filter.</p> <p>Trim the bad ends on the twin tube assembly (WP 0018 00).</p> <p>Connect the twin tube assembly properly.</p> <p>See "Clearing The Nozzle" (WP 0014 00).</p>
System Check fails.	<p>HEPA filter not attached to sample line.</p> <p>HEPA filter leaks.</p> <p>Twin tube assembly is disconnected.</p> <p>Twin tube assembly leaks.</p> <p>Alcohol in nozzle.</p>	<p>Connect the HEPA filter.</p> <p>Replace HEPA filter.</p> <p>Connect the twin tube assembly properly.</p> <p>Replace the twin tube assembly.</p> <p>See Clearing The Nozzle in (WP 0014 00).</p>

TROUBLESHOOTING PROCEDURES - Continued

SYMPTOM	POSSIBLE CAUSES	SOLUTION
<p>System Check Fails (continued)</p> <p>Requires frequent refill of alcohol (every hour or less).</p> <p>Excessive moisture visible in twin tube assembly.</p>	<p>Alcohol level is low.</p> <p>Alcohol cartridge is loose in cartridge cavity.</p> <p>Operating beyond recommended temperature range.</p> <p>Moisture build up inside alcohol wick.</p> <p>Condensation from war-fighter's breath or moisture from inside the twin tube assembly.</p>	<p>Replenish alcohol. (WP 0015 00).</p> <p>Close the alcohol cartridge.</p> <p>Operate between 35°F and 100°F temperature range.</p> <p>Change alcohol wick inside alcohol cartridge.</p> <p>Replace twin tube assembly with a dry tube. Allow wet tube to dry before using it again. (WP 0017 00).</p>

TM 3-4240-349-12&P

**CHAPTER 4
OPERATOR MAINTENANCE INSTRUCTIONS
FOR
M41 PATS**

TM 3-4240-349-12&P

M41 SERVICE UPON RECEIPT

0012 00

THIS WORK PACKAGE COVERS:

Unpacking

INITIAL SETUP:

Maintenance Level
Operator

NOTE

Alcohol may not be overpacked for some services.

1. Remove the two inner boxes from the large box.
2. The smaller box contains the alcohol. Store in accordance with unit directives.
3. Remove the PATS from the box. Remove and discard plastic wrap.
4. Open the carrying case and remove and discard all plastic wrap from items.
5. Inventory components in accordance with WP 0026 00.
6. Set up PATS IAW WP 0005 00.
7. Perform PATS initial adjustments, before use and self-test with applicable work packages.
8. Return all items to the carrying case and close case.
9. Add the M41 to unit supply records and also into the TMDE system.
10. Initial calibration is due 18 months after receipt of PATS and every 18 months thereafter.

END OF TASK

0012 00-1

THIS WORK PACKAGE COVERS:

Introduction, PMCS Procedures

INITIAL SETUP:

Maintenance Level
Operator

INTRODUCTION

General

This section contains instructions for performing Operator PMCS on the M41 PATS. The procedures list checks, services, and criteria to ensure that the M41 PATS is ready for operation. Perform all checks and services at the specified intervals, keeping in mind the following guidelines:

“Before” PMCS is done before you operate the M41.

“During” PMCS is done while the equipment is in operation.

“After” PMCS is done right after operating the M41.

Always pay attention to the WARNINGS and CAUTIONS.

PMCS COLUMN DESCRIPTION

ITEM NO. - The order that PMCS should be performed

INTERVAL - Tells when each check is to be performed.

ITEM TO BE CHECKED OR SERVICED - Lists the item to be checked.

PROCEDURE - A brief description of the procedure by which each check is to be performed.

Equipment Not Ready/Available If - A statement of the condition that would cause the equipment to be less than fully ready to perform its assigned mission.

**M41 PREVENTIVE MAINTENANCE
CHECKS AND SERVICES - Continued**

0013 00

INITIAL SETUP:

Maintenance Level
Operator

Table 1. Preventive Maintenance Checks and Services for M41 PATS

ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
1	Before	Calibration Date	Ensure calibration due date has not been exceeded.	Calibration is overdue.
2	Before	Alcohol Capsule & Cartridge	Check the cartridge for dirt and other foreign matter.	Cartridge is dirty.
3	Before	Twin Tube Assembly	Check the twin tube assembly for cracks and/or brittleness at the end of tube.	Twin tube assembly is cracked or is brittle at the end of the tube.
4	Before	Storage Cap	Make sure that the storage cap is not damaged and installed on the PATI.	Storage cap is damaged or not installed.
5	Before	Battery	Check the battery for signs of damage, such as corrosion, bulging, and swelling.	Battery is damaged.
6	Before	AC Adapter and Line Cord	Check for frayed or cut wires. Check connectors for snug fit, not broken.	Wires are frayed or cut. Connectors are loose.

**M41 PREVENTIVE MAINTENANCE
CHECKS AND SERVICES - Continued**

0013 00

Table 1. Preventive Maintenance Checks and Services for M41 PATS-Continued

ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
7	Before	Zero Check and System check	Perform zero check and system check.	
8	During	Twin Tube Assembly	Check for moisture.	Moisture is drawn into PATI.
9	After	Storage Cap	Check the storage cap for dirt and other foreign matter.	Cap is dirty (WP 0016 00).
10	After	Storage of Alcohol Cartridge	Remove alcohol cartridge and store in fill capsule. Install storage cap on PATI.	Alcohol cartridge remains in PATI (WP 0005 00).

THIS WORK PACKAGE COVERS:

Clearing the Nozzle

INITIAL SETUP

Maintenance Level

Operator

NOTE

The PATI should be cleaned and recalibrated every 18 months. See WP 0022 00 for the Turn-In Procedures for Repair or Recalibration.

CLEARING THE NOZZLE

In the event that the PATI gets alcohol in the internal nozzle, follow these steps:

1. Remove the alcohol cartridge from the PATI and place it in the alcohol fill capsule.
2. Install the storage cap into the cartridge cavity of the PATI.
3. Turn the PATI on and put it into Count Mode. Make certain that the HEPA filter is not attached to the twin tube assembly.
4. Using your thumb over the end of the sample tube marked "SAMPLE", stop the flow of air into the PATI. Stop the flow for about 10 seconds and then suddenly release it. Repeat this 3 or 4 times.
5. Replace the alcohol cartridge into the PATI and check to see if a particle count of at least 1000 particles/cm³ can be achieved.

6. If a particle count cannot be established, remove the alcohol cartridge and install the storage cap in the cartridge cavity of the PATI. Allow the PATI to run in the count mode for 4 to 6 hours. Then perform a particle count check, zero check and system check to ensure that the system is operational. If the system is not operating, seek higher level support.



Interrupting the air flow to clear the Nozzle

END OF TASK

THIS WORK PACKAGE COVERS:

Changing the alcohol and alcohol wick

INITIAL SETUP

Maintenance Level

Operator

CHANGING THE ALCOHOL

1. Remove storage cap from the alcohol fill capsule.
2. Empty the fill capsule of alcohol and properly dispose of the used alcohol IAW local SOP.
3. Use eraser end of pencil to remove the sponge from the fill capsule.
4. Squeeze excess moisture out of the sponge using a lint-free cloth.
5. Wipe inside and outside of capsule with lint-free cloth.
6. Allow capsule and sponge to dry completely.

CHANGING THE ALCOHOL WICK

1. Spare wicks are included with the M41 and are packaged in plastic sleeves. Each sleeve contains one wick and one screen. There is a wick removal tool (wood dowel) attached to each sleeve.

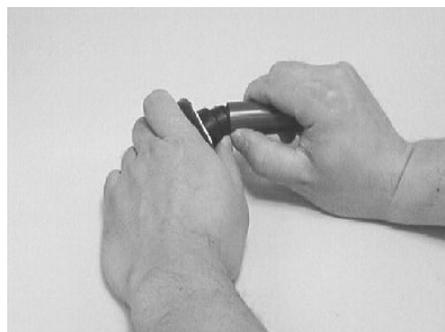
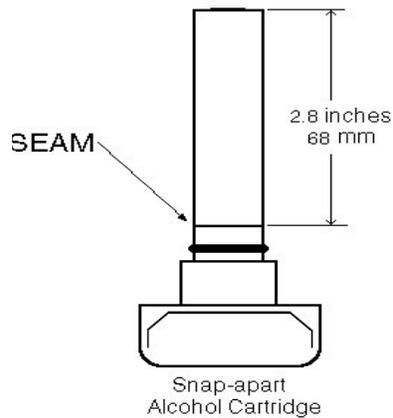
CHANGING THE ALCOHOL WICK-Continued

CAUTION

Always install a new screen each time you install a new wick.

Follow proper procedures when disposing of alcohol and alcohol soaked wicks.
See Supporting Information.

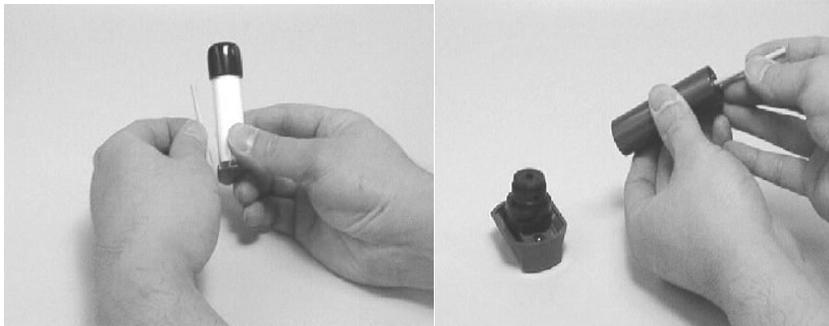
2. To remove the alcohol wick from the alcohol cartridge, grasp the cartridge with both hands, with your thumbs near the seam toward the cap. Firmly apply pressure to separate the alcohol cartridge into two pieces. The alcohol cartridge will snap apart exposing the white alcohol wick.



Separating Alcohol Cartridge

CHANGING THE ALCOHOL WICK-Continued

3. After separating the two parts, push the alcohol wick and screen out of the wick retainer from the opposite end with the wick removal tool.



Removing the Alcohol Wick and Screen

CAUTION

Before installing a new alcohol wick, make certain that all parts are clean. Small bits of the wick or lint can cause serious problems if they get into the PATI.

4. Inspect the inside surfaces of the alcohol cartridge cap and the wick retainer.
5. Clean alcohol cartridge cap and wick retainer. See cleaning procedures, WP 0016 00.
6. Remove a new wick and screen from the plastic sleeve. Blow air onto all surfaces of the new wick to make certain that any loose particles that may have shed from the wick are removed.

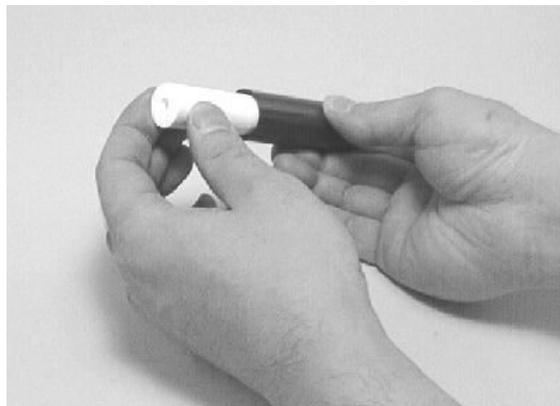
CHANGING THE ALCOHOL WICK-Continued

7. Drop the new, clean screen into the wick retainer and make sure it lies flat on the bottom of the wick retainer.



Inserting Screen

8. Examine both ends of the alcohol wick. You will notice that one end is smoother than the other end. Slide the smoothest end of the alcohol wick into the wick retainer and push firmly until the alcohol wick is fully inserted.



Inserting Alcohol Wick into Wick Retainer

9. Align the two parts of the alcohol cartridge and press them together firmly until they snap in place.
10. Discard the old screen, empty sleeve and wick removal tool. Dispose of the used wick properly. See Supporting Information, WP 0033 00. Replace sponge in fill capsule and refill with new alcohol (WP 0005 00).

END OF TASK

THIS WORK PACKAGE COVERS:

Cleaning the Storage Cap and Alcohol Cartridge

INITIAL SETUP

Maintenance Level

Operator

CAUTION

It is important that the storage cap and alcohol cartridge be kept clean at all times. Dirt, dust, and many other contaminants can have damaging effects on the operation of the PATI.

Cleaning must be done with a lint-free applicator (do not use cotton swabs) and reagent grade isopropyl alcohol.

1. Place several drops of reagent grade isopropyl alcohol on the foam swab (item 2, WP 0031 00).



Applying Alcohol to Foam Swab

2. Wipe the contaminated areas of the storage cap and alcohol cartridge with the foam swab until the items are clean.
3. Replace the dirty swab as required.



Cleaning the Alcohol Cartridge and Storage Cap

END OF TASK

THIS WORK PACKAGE COVERS:

Drying the twin tube assembly

INITIAL SETUP

Maintenance Level

Operator

CAUTION

During repeated use of the PATI, moisture from the war-fighter's breath may result in condensation inside the twin tube assembly which could be pulled into the PATI causing damage.

Be careful not to lift the moist twin tube assembly when removing it in order to prevent moisture from draining into the PATI.

Ensure that the moist twin tube assembly does not touch the ground during removal or drying.



Drying the Twin Tube Assembly

1. Remove the moist twin tube assembly and replace it with a dry twin tube assembly.
2. Drape the moist twin tube assembly over an elevated, protruding object to allow drainage and drying of the moisture buildup inside the twin tube assembly.

END OF TASK

THIS WORK PACKAGE COVERS:

Trimming the ends of the twin tube assembly

INITIAL SETUP

Maintenance Level

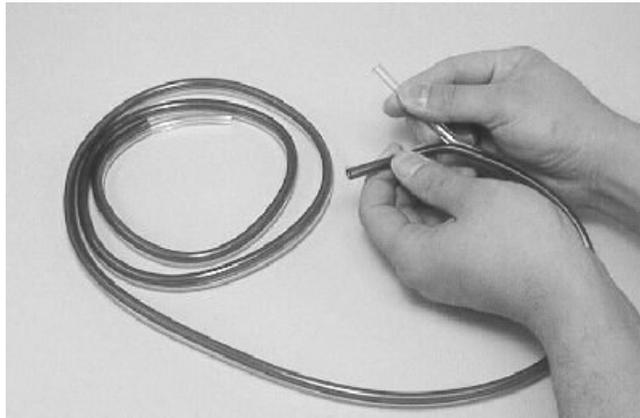
Operator

NOTE

The twin tube assembly must never be shorter than 48 inches and no longer than 60 inches.

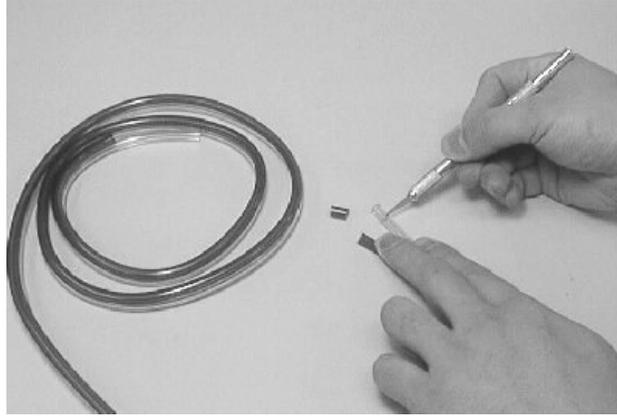
If the twin tube assembly ends become cracked, stretched or deformed, they can be trimmed.

1. Separate the twin tube assembly sample tube from the ambient tube by pulling them apart as far as required.



Separating the Twin Tube Assembly

2. With a sharp instrument, remove the bad ends of the twin tube assembly by trimming an equal amount from the sample and ambient tubes on the damaged ends.



Trimming the Twin Tube Assembly

3. Ensure that one end of the twin tube assembly contains evenly trimmed sample and ambient tubes while the opposite end of the twin tube assembly contains a sample tube that is two inches longer than the ambient tube.

END OF TASK

THIS WORK PACKAGE COVERS:

Setting the internal dip switches

INITIAL SETUP

Maintenance Level

Operator

CAUTION

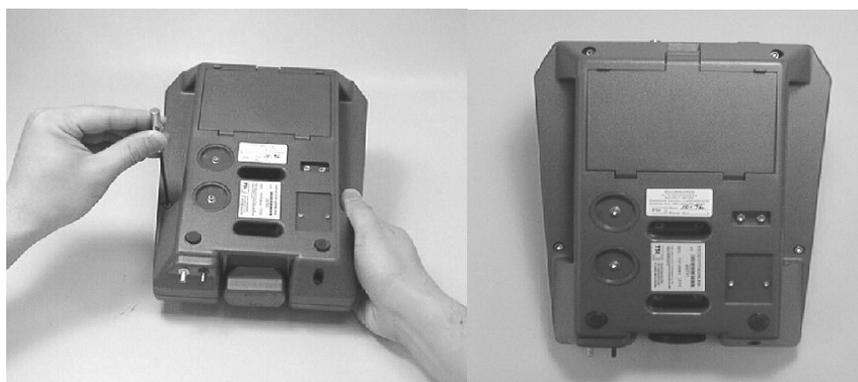
Make sure the PATI is always off when changing DIP switch settings.

NOTE

Setting internal functions through the use of these dip switches IAW these procedures does not invalidate the calibration warranty.

There is a group of eight DIP switches located inside the PATI. To gain access to the switches, you must separate the top and bottom halves of the unit. Follow the instructions below:

1. Turn the PATI off and disconnect the power (AC adapter and battery).
2. Turn the PATI over so that it is face down and locate the four screws on the bottom that hold the two halves of the unit together. Remove all four screws using a 7/64-inch hex wrench (not supplied with M41). **DO NOT SEPARATE BOTTOM HALF FROM TOP HALF AT THIS TIME.**



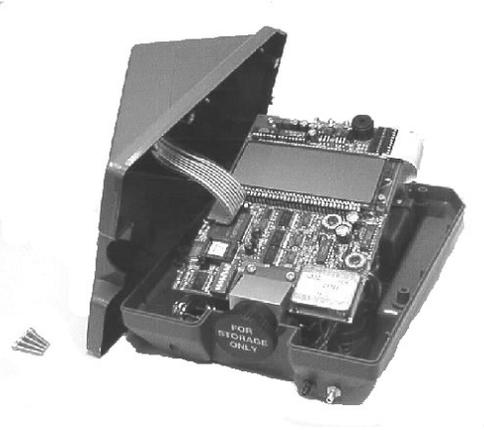
Removing Screws

3. Turn the PATI right side up while holding the two halves of the unit together so they do not separate.

NOTE

Do not disconnect the ribbon cable connecting the top and bottom halves of the unit.

4. Gently lift the top half of the case and set it down just to the left of the unit.

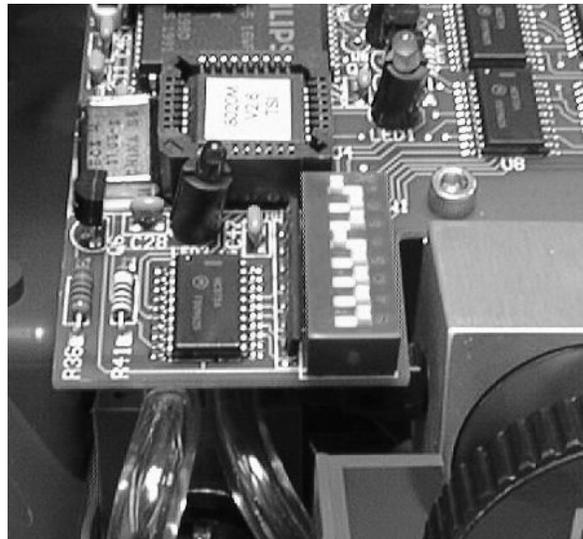


Top Half of Unit Removed

5. Set DIP switches as desired according to the tables at the end of this work package.
6. Reposition the top half of the unit making certain that the ribbon cable does not become disconnected. Turn the PATI over so that it is face down and fasten the four screws.
7. Turn the PATI right side up and turn it on. After a 60-second count down, verify that the desired pass level is displayed.

NOTE

The DIP switches are located toward the bottom of the circuit board just to the left of center. The top switch is number 1, and the bottom switch is number 8. A switch is considered to be ON when the switch is on the right side and OFF when the switch is on the left side.



Dip Switches

The DIP switches are set as follows:

Switch Number	Factory Setting	Description
1	OFF	Pass/fail level
2	ON	Pass/fail level
3	ON	Pass/fail level
4	OFF	Pass/fail level
5	ON	Factory checkout
6	ON	Reset on power-up
7	OFF	Numeric fit factors
8	OFF	Memory Lock

The functions of DIP switches 1, 2, 3, 4, and 7 follow.

NOTE

DIP switches 5, 6 and 8 should always remain at the factory setting as indicated above.

SETTING THE INTERNAL DIP SWITCHES - AIR FORCE & SURETY SITES - 0019 00
CONTINUED

Switches 1, 2, 3 and 4 are used to set the pass/fail level for fit factors. Fit factors at or above the pass/fail level will result in a "PASS" indication on the PATI display. Fit factors below the pass/fail level will result in a "FAIL" indication. The switch settings for various pass/fail levels are:

Pass/Fail Level	Switch 1	Switch 2	Switch 3	Switch 4
1250	OFF	ON	OFF	ON
1667	OFF	ON	ON	OFF
2000	OFF	ON	ON	ON
2500	ON	ON	OFF	OFF
3000	ON	ON	ON	ON
3500	ON	ON	OFF	ON
4000	ON	OFF	OFF	OFF
4500	ON	ON	ON	OFF
5000	ON	OFF	OFF	ON
6667	ON	OFF	ON	OFF
10000	ON	OFF	ON	ON

DIP SWITCH 7: DISPLAY NUMERIC FIT FACTORS

When switch 7 is ON, the PATI will display numerical fit factors as well as the PASS or FAIL indication for each exercise and also for the overall fit test result. When switch 7 is off, numerical results will not be displayed and only the PASS or FAIL indicator will be displayed for the overall fit test result at the completion of the fit test.

Display	Switch 7
Overall Pass/Fail only	OFF
Numbers & Pass/Fail	ON
Number of Exercises for Surety Sites	6*

*Verify that the number of exercises is set to 6 by momentarily pressing the NUMBER OF EXERCISES key. If the number of exercises is not 6, press and hold the NUMBER OF EXERCISES key until the number 6 appears on the LCD display. Release the key while the number 6 is displayed to make the change take effect. Verify that the number of exercises is set to 6 by momentarily pressing the NUMBER OF EXERCISES key. (To change the number of exercises, set dip switch 8 to the ON position. Set it back to the OFF position after following the above instructions.)

Reassemble the PATI.

END OF TASK

THIS WORK PACKAGE COVERS:

Short-term storage and shipment and long-term storage

Short-Term Storage and Shipment

It is important to remove all alcohol from the PATI during transportation and storage. Anytime you put the PATI back into the carrying case you should:

1. Remove the alcohol cartridge from the PATI and store it in the alcohol fill capsule.
2. Cover the cartridge cavity with the storage cap.
3. Never ship the PATI without the carrying case and accessories.

The alcohol fill capsule is designed to be a safe transportation and storage container for alcohol. The alcohol cartridge can be left soaking in alcohol for up to three months (see long-term storage). Installing the storage cap into the cartridge cavity prevents dirt or lint from getting inside the PATI.

CAUTION

Never transport or store the PATI with the alcohol cartridge inside the cartridge cavity. Flooding of the optics may occur.

Always keep the alcohol cartridge in the alcohol fill capsule during transport and storage.

Always use the alcohol storage cap to cover the cartridge cavity of the PATI during transport and storage.

Never leave the cartridge cavity open.

Always recap alcohol containers immediately to prevent absorption of moisture.

Keep the storage cap and alcohol cartridge clean. Always set them down with the end standing up. This precaution prevents dirt or debris from entering the instrument and inhibiting operation. The pin-hole size orifice inside the PATI can easily become clogged.

NOTE

For shipment of alcohol, refer to Materiel Safety Data Sheets (WP 0034 00) and other applicable regulations.

LONG-TERM STORAGE

If the M41 is to be stored for a period of time exceeding 3 months, follow the instructions below in addition to the short term storage instructions outlined above.

1. Remove and properly dispose of all alcohol inside the alcohol fill capsule. Allow sponge and capsule to dry completely before storage. See maintenance procedure for changing the alcohol and alcohol wick (WP 0015 00).
2. Remove and properly dispose of the used alcohol wick inside the alcohol cartridge (WP 0033 00).
3. Install a new, dry wick into the alcohol cartridge (WP 0015 00).
4. Remove all alcohol bottles from the M41 carrying case, and store in an authorized storage area in accordance with the local SOP.
5. Remove all batteries from the PATI and M41 carrying case and store in an authorized storage area in accordance with the local SOP.

END OF TASK

NOTE

This demilitarization procedure applies only to the M41's that have not been contaminated with agent. Decontaminate or dispose of in accordance with proper regulations.

1. Separate the isopropyl alcohol from the M41. Usable containers will be turned-in to the supply system in accordance with the existing regulations. Dispose of unusable items in accordance with its individual procedure. Alcohol is considered a RCRA hazardous waste due to the characteristic of ignitability and must be disposed of properly (See Supporting Information).
2. Separate the lithium-sulfur dioxide battery from the M41. Turn-in usable items to the supply system in accordance with existing regulations. If the battery has a discharge switch, use it to completely discharge the battery. The battery can then be disposed of as non-hazardous waste with general refuse. Batteries without a discharge switch are considered a RCRA hazardous waste due to the characteristic of reactivity and must be disposed of in accordance with Defense Reutilization and Marketing Office (DRMO) instructions. Refer to Army TB 43-0130 for disposal of lithium-sulfur dioxide batteries. Marine Corps personnel should refer to T1 6135-15/3, Disposal of Lithium Batteries.
3. The M41 demilitarization code is "B." Turn-in the M41 to DRMO.

When preparing the M41 PATS for shipment, remove the alcohol and battery. Repackage all the other items in the carrying case. It is recommended that the M41 PATS be returned in its original shipping box (if available).

Army will turn-in the M41 PATS through normal supply procedures IAW AR 725-50, Requisition Receipt and Issue System, Chapter 7 and DA PAM 710-4, Management of Excess Material Return for Maintenance. Air Force users contact their servicing Test Measurement and Diagnostic Equipment (TMDE) laboratory for repair or calibration information (see T.O. 33K1-100-1). Marine Corps personnel should contact Commander, Marine Corps Logistics Bases, Code 835, 814 Radford Blvd., Albany, GA 31704-1128 for repair, calibration and turn-in procedures.

For repair or recalibration procedures, the M41 PATS may be turned into the local TMDE support organization or shipped directly to the following address:

US Army TMDE Activity
ATTN: AMSAM-TMD-SS
Building 5435, Fowler Road
Redstone Arsenal, AL 35898-5400

Coordinate all direct shipments with your local TMDE support organization so that they can log your M41 PATS into the TMDE scheduling and recall systems. Provide the following information with each M41 PATS shipped to the TMDE activity:

Owner UIC
Owner DODAAC
Name of your local TMDE scheduler

Marine Corps personnel should send a report of excess to the item manager at Commander, Marine Corps Logistics Bases, Code 835, 814 Radford Blvd., Albany, GA 31704-1128 for repair, calibration and turn-in procedures. The item manager will provide disposition instruction with the shipping address and transportation funding.

TM 3-4240-349-12&P

CHAPTER 5
SUPPORTING INFORMATION
FOR
M41 PATS

REFERENCES

0023 00

SCOPE

This work package lists all forms, technical manuals and miscellaneous publications referenced in this manual.

AR's

Army Materiel Maintenance Policy and Retail Maintenance Operations	AR 750-1
Requisition Receipt and Issue System	AR 725-50

FORMS

Product Quality Deficiency Report	SF 368
Quality Deficiency Report	MCO 4855.10

TECHNICAL MANUALS

Destruction of Chemical Weapons and Defense Equipment to Prevent Enemy Use	TM 43-0002-31
Equipment Record Procedures	TM 4700-15
Interspiro CW Mask Manual	T.O. 14P4-17-3
Operator's Manual for Chemical-Biological Mask: Field, M40A1 and Chemical-Biological Mask: Combat Vehicle, M42A2	TM 3-4240-346-10
Operator's Manual for Chemical-Biological Mask: Field, M40 and Chemical-Biological Mask: Combat Vehicle, M42/M42A1	TM 3-4240-347-10
Operator's Manual: For Chemical-Biological Mask Type MCU-2/P, MCU-2A/P	T.O. 14P4-15-1
Operator's Manual: For Mask, Chemical-Biological, Field, ABC-M17, M17A1 and M17A2	TM 3-4240-279-10
Operator's Manual for Mask, Chemical-Biological: M45	TM 3-4240-341-10

REFERENCES

0023 00

TECHNICAL MANUALS - Continued

- | | |
|--|--------------------|
| Operation, Service, and Repair of Masks, Protective Field, M17, M17A1, and M17A2 and Accessories | T. O. 14P4-9-31 |
| Unit Maintenance Manual (Including Repair Parts and Special Tools List) for Mask, Chemical-Biological: M45 | TM 3-4240-341-20&P |

MISCELLANENOUS PUBLICATIONS

- | | |
|--|----------------|
| Army Medical Department Expendable/Durable Items | CTA 8-100 |
| Disaster Preparedness Planning and Operations | AFI 32-4001 |
| Disposal of Lithium Batteries | T1 6135.15/3 |
| Expendable/Durable Items (Except Medical, Class V Repair | |
| Functional Users Manual for the Army Maintenance Management System (TAMMS) | DA PAM 738-750 |
| Instructions for the Safe Handling and Identification of US Army Communications - Electronics Command-Managed Lithium-Sulfur Dioxide Batteries | TB 43-0130 |
| Management of Excess Material Return for Maintenance | DA PAM 710-4 |
| Nuclear, Biological, and Chemical (NBC) Mask Fit and Liquid Hazard Simulant Training | AF Man 32-4006 |
| USAF Materiel Deficiency Reporting and Investigating System | T.O. 00-35D-54 |

INTRODUCTION

The Army Maintenance System MAC

This introduction provides a general explanation of all maintenance and repair functions authorized at various maintenance levels under the standard Army Maintenance System concept.

The Maintenance Allocation Chart (immediately following the introduction) designates overall authority and responsibility for the performance of maintenance functions on the identified end item or component. The application of the maintenance functions to the end item or component will be consistent with the capacities and capabilities of the designated maintenance levels which are shown on the MAC in column (4) as:

Unit - includes two subcolumns, C (operator/crew) and O (unit) maintenance.

Direct Support - includes an F and ICS (Interim Contractor Support) subcolumn.

General Support - includes an H subcolumn.

Depot - includes a D subcolumn.

The tools and test equipment requirements (immediately following the MAC) lists the tools and test equipment required for each maintenance function as referenced in the MAC.

The remarks (immediately following the tools and test equipment requirements) contain supplemental instructions and explanatory notes for a particular maintenance function.

MAINTENANCE FUNCTIONS

Maintenance functions will be limited to and defined as follows:

Inspect. To determine the serviceability of an item by comparing its physical, mechanical, and/or electrical characteristics with established standards through examination (e.g., by sight, sound, or feel).

Test. To verify serviceability by measuring the mechanical, pneumatic, hydraulic, or electrical characteristics of an item and comparing those characteristics with prescribed standards.

Service. Operations required periodically to keep an item in proper operating condition; e.g., to clean (includes decontaminate, when required), to preserve, to drain, to paint, or to replenish fuel, lubricants, chemical fluids, or gases.

Adjust. To maintain or regulate, within prescribed limits, by bringing into proper position, or by setting the operating characteristics to specified parameters.

Align. To adjust specified variable elements of an item to bring about optimum or desired performance.

Calibrate. To determine and cause correction to be made or to be adjusted on instruments or test, measuring, and diagnostic equipment used in precision measurement. Consists of comparisons of two instruments, one of which is a certified standard of known accuracy, to detect and adjust any discrepancy in the accuracy of the instrument being compared.

Remove/Install. To remove and install the same item when required to perform service or other maintenance functions. Install may be the act of emplaning, seating, or fixing into position a spare, repair part, or module (component or assembly) in a manner to allow the proper functioning of an equipment or system.

Replace. To remove an unserviceable item and install a serviceable counterpart in its place. "Replace" is authorized by the MAC and assigned maintenance level is shown as the 3rd position code of the SMR code.

Repair. The application of maintenance services including fault location/troubleshooting, removal/installation, and disassembly/assembly procedures, and maintenance actions to identify troubles and restore serviceability to an item by correcting specific damage, fault, malfunction, or failure in a part, subassembly, module (component or assembly), end item, or system.

Overhaul. That maintenance effort (service/action) necessary to restore an item to a completely serviceable/operational conditions as prescribed by maintenance standard in appropriate technical publications. Overhaul does not normally return an item to like new condition.

Rebuild. Consists of those services/actions necessary for the restoration of unserviceable equipment to a like new condition in accordance with original manufacturing standards. Rebuild is the HIGHEST degree of materiel maintenance applied to Army equipment. The rebuild operation includes the act of returning to zero those age measurements (hours/miles, etc.) considered in classifying Army equipment/components.

EXPLANATION OF COLUMNS IN THE MAC

Column (1), Group Number. Column (1) lists functional group code numbers, the purpose of which is to identify maintenance significant components, assemblies, subassemblies, and modules with the next higher assembly.

Column (2), Component/Assembly. Column (2) contains the item names of components, assemblies, subassemblies, and modules for which maintenance is authorized.

Column (3), Maintenance Function. Column (3) lists the functions to be performed on the item listed in column (2).

Column (4), Maintenance Level. Specifies each level of maintenance authorized to perform each function listed in Column 3, by indicating work time required (expressed as man-hours in whole hours or decimals) in the appropriate subcolumns. This work-time figure represents the active time required to perform that maintenance function. The work-time figure represents the average time required to restore an item to a serviceable condition under typical field operating conditions. This time includes preparation time (including any necessary disassembly/assembly time), troubleshooting/fault location time, and quality assurance time in addition to the time required to perform the specific tasks identified for the maintenance functions.

The symbol designations for the various maintenance levels are as follows:

- C** Operator or Crew
- O** Unit Maintenance
- F** Direct Support Maintenance
- L** Specialized Repair Activity (SRA)
- H** General Support Maintenance
- D** Depot Maintenance

Column (5), Tools and Equipment. Column (5) specifies, by code, those common tool sets (not individual tools), and special tools, TMDE, and support equipment required to perform the designated function.

Column (6), Remarks. This column shall, when applicable, contain a letter code, in alphabetic order, which shall be keyed to the remarks.

EXPLANATION OF COLUMNS IN TOOL AND TEST EQUIPMENT REQUIREMENTS

Column (1), Reference Code. The tool and test equipment reference code correlates with the code used in Column 5 of the MAC.

Column (2), Maintenance Level. The lowest level of maintenance authorized to use the tool or test equipment.

Column (3), Nomenclature. Name or identification of the tool or test equipment.

Column (4), National Stock Number. The National stock number of the tool or test equipment.

Column (5), Tool Number. The manufacturer's part number.

EXPLANATION OF COLUMNS IN REMARKS

Column (1), Reference Code. The code recorded in column 6 of the MAC.

Column (2), Remarks. This column lists information pertinent to the maintenance function being performed as indicated in the MAC.

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MAINTENANCE ALLOCATION CHART (MAC) - Continued

0024 00

MAINTENANCE ALLOCATION CHART FOR M41 Protection Assessment Test System (PATS)

Table 1. MAC for M41 Protection Assessment Test System (PATS)

(1) GROUP NUMBER	(2) COMPONENT/ FUNCTION	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE LEVEL					(5) TOOLS AND EQUIPMENT REF CODE	(6) REMARKS CODE	
			UNIT		DIRECT SUPPORT	GENERAL SUPPORT				DEPOT
			C	O	F	H	D			
00	PATS, M41	Inspect	.1					.2	1	A
		Test	.1					.5		
		Service	.1							
		Calibrate						.5		
01	PATI	Repair		.1				.5	1	B
		Inspect	.1					.2		
		Test	.1					.5		
		Repair						.5		
		Adjust		.1						

TOOLS AND TEST EQUIPMENT for M41 Protection Assessment Test System (PATS)

Table 2. Tools and Test Equipment for M41 Protection Assessment Test System (PATS) -

AIR FORCE

TOOLS AND TEST EQUIPMENT REFERENCE CODE	MAINTENANCE LEVEL	NOMENCLATURE	NATIONAL STOCK NUMBER	TOOL NUMBER
1	O	Handle, Hex Key, 7/64	5120-01-009-7850	387AS660

REMARKS

Table 3. Remarks for M41 Protection Assessment Test System (PATS)

REMARKS CODE	REMARKS
A	All other field units - the M41 shall be recalibrated every 18 months.
B	Surety Sites - the M41 shall be recalibrated every 12 months.

SCOPE

This RPSTL lists and authorizes spares and repair parts; special tools; special test, measurement, and diagnostic equipment (TMDE), and other special support equipment required for performance of Unit maintenance of M41 Protection Assessment Test System (PATS). It authorizes the requisitioning, issue, and disposition of spares, repair parts and special tools as indicated by the source, maintenance and recoverability (SMR) codes.

GENERAL

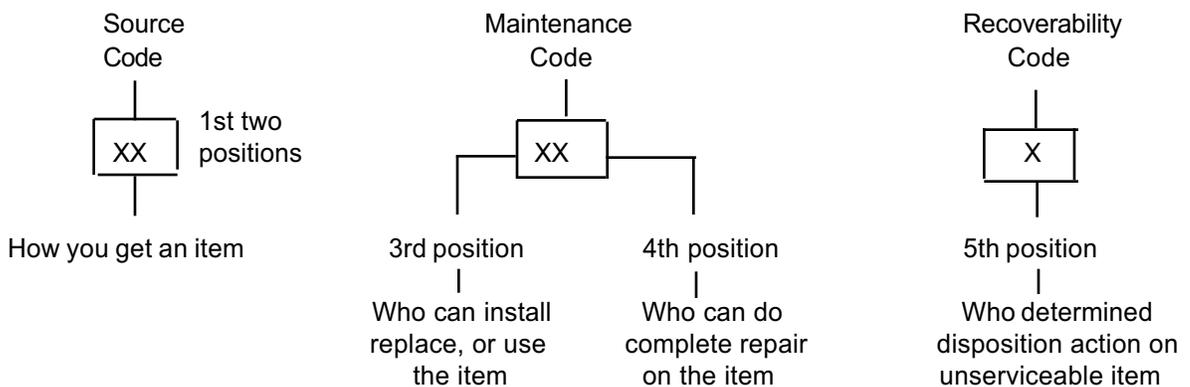
In addition to the Introduction work package, this Repair Parts and Special Tools List (RPSTL) is divided into the following work packages.

1. Repair Parts List Work Packages. Work packages containing lists of spares and repair parts authorized by this RPSTL for use in the performance of maintenance. These work packages also include parts that must be removed for replacement of the authorized parts. Parts lists are composed of functional groups in ascending alphanumeric sequence, with the parts in each group listed in ascending figure and item number sequence. Repair parts kits are listed with their applicable figure and appear in item number sequence. Repair parts for reparable special tools are also listed. Items listed are shown on the associated illustration.
2. Special Tools List Work Packages. Not Applicable.
3. Cross-reference Index Work Packages. There are two cross-reference index work packages in this RPSTL: The National Stock Number Index and the Part Number Index. The National Stock Number Index work package refers you to the figure and item number. The Part number Index refers you to the figure and item number.

EXPLANATION OF COLUMNS IN THE RPSTL WORK PACKAGES

ITEM NO. (Column (1)). Indicates the number used to identify items called out in the illustration.

SMR CODE (Column (2)). The Source, Maintenance, and Recoverability (SMR) code contains supply/requisitioning information, maintenance level authorization criteria, and disposition instruction, as shown in the following breakout:



NOTE

Complete Repair: Maintenance capacity, capability and authority to perform all corrective maintenance tasks of the "Repair" function in a use/user environment in order to restore serviceability to a failed item.

Source Code. The source code tells you how to get an item needed for maintenance, repair, or overhaul of an end item/equipment. Explanations of source codes follows:

Source Code	Application/Explanation
PA PB PC	Stock items; use the applicable NSN to requisition/request items with these source codes. They are authorized to the level indicated by the code entered in the 3rd position of the SMR code.

PD
PE
PF
PG

NOTE

Item coded PC are subject to deterioration

KD
KF
KB

Items with these codes are not to be requested/requisitioned individually. They are part of a kit which is authorized to the maintenance level indicated in the 3rd position of the SMR code. The complete kit must be requisitioned and applied.

MO-Made at unit/
AVUM level
MF-Made at
DS/AVIM level

MH-Made at GS
Level
ML-Made SRA
MD-Made at
Depot

Items with these codes are not to be requisitioned/requested individually. They must be made from bulk material which is identified by the part number in the DESCRIPTION AND USABLE ON CODE (UOC) column and listed in the bulk material group of the repair parts list of the RPSTL. If the item is authorized to you By the 3rd position code of the SMR code, but the source code indicates it is made at higher level, order the item from the higher level of maintenance.

<p>AO-Assembled by unit/AVUM level AF-Assembled by DS/(ICS)AVIM level</p>	<p>Items with these codes are not to be requested/requisitioned individually. The parts that make up the assembled item must be requisitioned or fabricated and assembled at the level of maintenance indicated by the source code. If the 3rd position of the SMR code authorizes you to replace the item, but the source code indicates the item is assembled at a higher level of maintenance.</p>
<p>AH-Assembled by GS level AL-Assembled by SRA AD-Assembled by Depot</p>	

XA - Do not requisition an "XA coded item. Order the next higher assembly. (Refer to NOTE below).

XB - If an item is not available from salvage, order it using the CAGEC and part number.

XC - Installation drawing, diagrams, instruction sheet, field service drawing; identified by manufacturer's part number.

XD - Requisition a "XD" coded item using CAGEC and part number.

NOTE

Cannibalization or controlled exchange, when authorized, may be used as a source of supply for items with the above source codes except for those source coded "XA" or those aircraft support items restricted by requirements of AR 750-1.

Maintenance Code. Maintenance codes tell you the level(s) of maintenance authorized to USE and REPAIR support items. The maintenance codes are entered in the third and fourth positions of the SMR Code as follows:

Third Position. The maintenance code entered in the third position tells you the lowest maintenance level authorized to remove, replace, and use an item. The maintenance code entered in the third position will indicate authorization to one of the following levels of maintenance.

Maintenance Code	Application/Explanation
C	- Crew or operator maintenance done within unit/AVUM maintenance.
O	- Unit or Aviation Unit level can remove, replace, and use the item.
F	- Direct support or Aviation Intermediate level can remove, replace, and use the item.
H	- General support maintenance can remove, replace, and use the item.
L	- Specialized repair activity can remove, replace, and use the item.
D	- Depot can remove, replace, and use the item.

Fourth Position. The maintenance code entered in the fourth position tells whether or not the item is to be repaired and identifies the lowest maintenance level with the capability to do complete repair (i.e., perform all authorized repair functions). (NOTE: Some limited repair may be done on the item at a lower level of maintenance, if authorized by the Maintenance Allocation Chart (MAC) and SMR codes). This position will contain one of the following maintenance codes.

Maintenance Code	Application/Explanation
O	- Unit or Aviation Unit is the lowest level that can do complete repair of the item.
F	- Direct Support (DS) or Aviation Intermediate is the lowest level that can do complete repair of the item.
H	- General support is the lowest level that can do complete repair of items.
L	- Specialized repair activity (designated the specialized repair activity) is the lowest level that can do complete repair of the item.
D	- Depot is the lowest level that can do complete repair of the item.
Z	- Nonreparable. No repair is authorized.
B	- No repair is authorized. No parts or special tools are authorized for maintenance of "B" coded item. However, the item may be reconditioned by adjusting, lubricating, etc., at the user level.

Recoverability Code. Recoverability codes are assigned to items to indicate the disposition action on unserviceable items. The recoverability code is entered in the fifth position of the SMR Code as follows:

Recoverability Codes	Application/Explanation
Z	- Nonreparable item. When unserviceable, condemn and dispose of the item at the level of maintenance shown in 3rd position of SMR Code.
O	- Reparable item. When uneconomically repairable, condemn and dispose of the item at unit level.
F	- Reparable item. When uneconomically repairable, condemn and dispose of the item at the Direct support (DS) or Aviation Intermediate level.
H	- Reparable item. When uneconomically repairable, condemn and dispose of the item at the General Support level.
D	- Reparable item. When beyond lower level repair capability, return to depot. Condemnation and disposal of item are not authorized below depot level.
L	- Reparable item. Condemnation and disposal not authorized below Specialized Repair Activity (SRA).
A	- Item requires special handling or condemnation procedures because of specific reasons (such as precious metal content, high dollar value, critical material, or hazardous material). Refer to appropriate manuals/directives for specific instructions.

NSN (Column (3)). The National Stock Number for the item is listed in this column.

CAGEC (Column (4)). The Commercial and Government Entity Code (CAGEC) is a 5-digit code which is used to identify the manufacturer, distributor, or Government agency, etc., that supplies the item.

PART NUMBER (Column (5)). Indicates the primary number used by the manufacturer (individual, company, firm, corporation, or Government activity), which controls the design and characteristics of the item by means of its engineering drawings, specifications standards, and inspection requirements to identify an item or range of items.

NOTE

When you use an NSN to requisition an item, the item you receive may have a different part number from the part listed.

DESCRIPTION AND USABLE ON CODE (Column (6)). This column includes the following information:

1. The Federal item name and, when required, a minimum description to identify the item.
2. The statement END OF FIGURE appears just below the last item description in column 6 for a given figure.

QTY (Column (7)). The QTY (quantity per figure column) indicates the quantity of the item used in the breakout shown on the illustration figure, which is prepared for a functional group, sub-function group, or an assembly. A "V" appearing in this column in lieu of a quantity indicates that the quantity is variable and the quantity may vary from application to application.

EXPLANATION OF PART NUMBER INDEX FORMAT AND COLUMNS

Part numbers in this index are listed by part number in ascending alphanumeric sequence (i.e., vertical arrangement of number and letter combination which places the first digit of each group in order numbers 0 through 9, followed by the letters A through Z and each following digit or letter in like order).

PART NUMBER Column. Indicates the primary number used by the manufacturer (individual, firm, corporation, or Government activity), which controls the design and characteristics of the item by means of its engineering drawings, specifications standards, and inspection requirements to identify an item or range of items.

FIG. Column. This column lists the number of the figure where the item is identified/located.

ITEM Column. The item number is that number assigned to the item as it appears in the figure referenced in the adjacent figure number column.

SPECIAL INFORMATION

Not applicable.

HOW TO LOCATE REPAIR PARTS

1. When NSNs or Part Numbers Are Not Known.

First. Using the table of contents, determine the assembly or subassembly to which the item belongs. This is necessary since figures are prepared for assembly groups and subassembly groups, and lists are divided into the same groups.

Second. Find the figure covering the functional group or subfunctional group to which the item belongs.

Third. Identify the item on the figure and note the number.

Fourth. Look in the repair parts list for the figure and item numbers. The NSNs and part numbers are on the same line as the associated item numbers.

2. When the NSN Is Known.

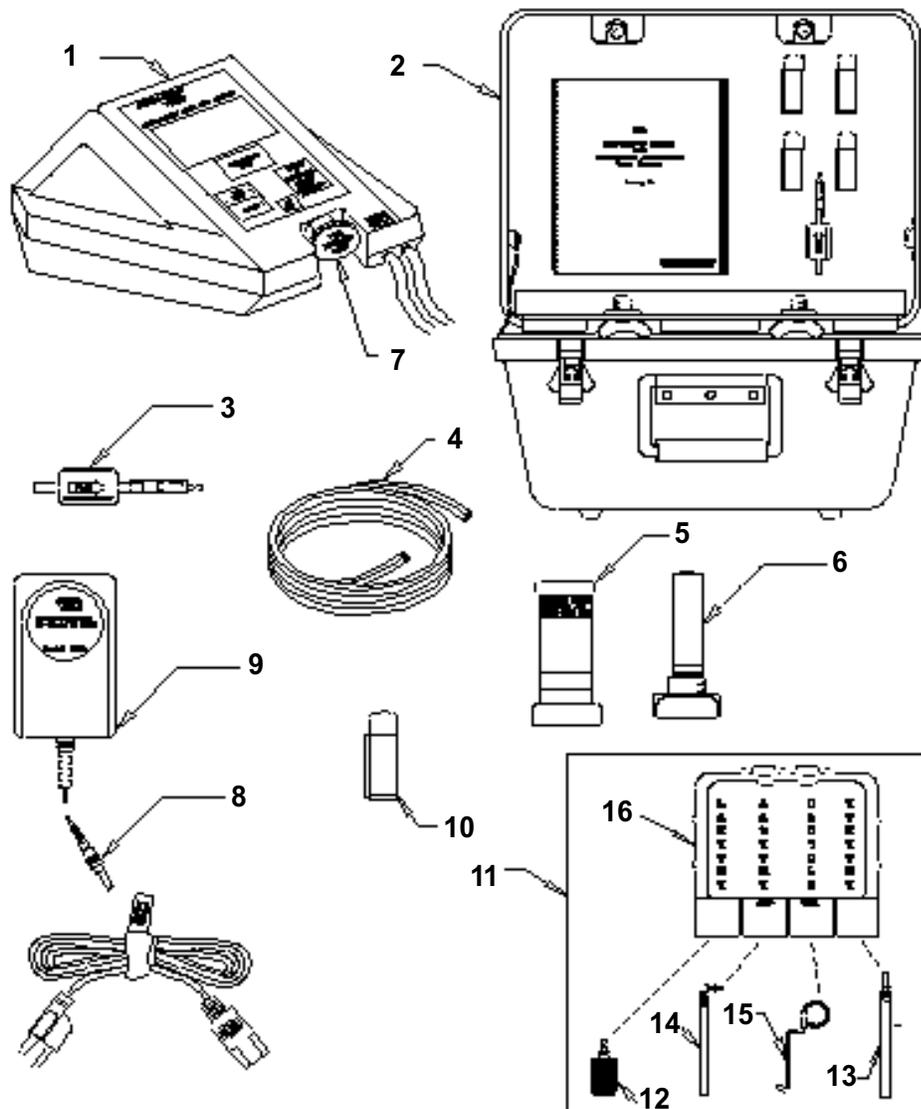
First. If you have the NSN, look in the STOCK NUMBER column of the NSN index work package. The NSN is arranged in NIIN sequence. Note the figure and item number next to the NSN.

Second. Turn to the figure and locate the item number. Verify that the item is the one you are looking for.

When Part Number is Known

- a. First. If you have the P/N and not the NSN, look in the PART NUMBER column of the P/N index work package. Identify the figure and item number.
- b. Second. Look up the item on the figure in the applicable repair parts list work package.

The illustration for this group is on page 2 and the tabular list is on page 3.



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GROUP 00 PROTECTION ASSESSMENT TEST SYSTEM

0026 00

(1) ITEM NO	(2) SMR CODE	(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODE (UOC)	(7) QTY
					GROUP 00 AND 01 PROTECTION ASSESSMENT TEST SYSTEM, M41 AND PROTECTION ASSESSMENT TEST INSTRUMENT	
					FIG. 1 PROTECTION ASSESSMENT TEST SYSTEM, M41	
1	XAOLL		24575	1081452	PROTECTION ASSESSMENT TEST INSTRUMENT	1
2	PAOZZ	6625-01-377-5874	24575	1319062	CASE, TEST SET	1
3	PAOZZ	4240-01-340-3715	24575	1602066	FILTER, AIR, CHEMICAL	2
4	PCOZZ	4240-01-382-3652	24575	1081285	TWIN TUBE ASSEMBLIES	2
5	PCOZZ	4240-01-382-3584	24575	1081397	CAPSULE, ALCOHOL FILL	2
6	PCOZZ	4240-01-382-3519	24575	1081282	CARTRIDGE, ALCOHOL WICK	2
7	PCOZZ	5340-01-378-2291	24575	1081181	PLUG, PROTECTIVE DUST	1
8	PAOZZ	6130-01-379-7122	24575	1081399	POWER SUPPLY ASSY	1
9	PAOZZ	6150-01-111-1717	16428	17743	CABLE ASSY, POWER	1
10	PAOZZ	9390-01-379-6385	24575	1081322	WICK, ALCOHOL	4
11	AOOOO		24575	1081311	KIT, MASK SAMPLING	1
12	PCOZZ	4240-01-382-3558	24575	1081379	ADAPTER, DRINK TUBE	4
13	PCOZZ	4240-01-382-3635	24575	1081381	TUBE, M17 EXTENSIONS	10
14	PCOZZ	4240-01-382-3614	24575	1081477	TUBE, MCU-2A/P EXTENSIONS	10
15	PAOZZ	5340-01-378-2883	24575	2906090	HOLDER, DRINK VALVE	10
16	PAOZZ	6625-01-377-5875	24575	1319066	CASE, TEST SET	1

END OF FIGURE

STOCK NUMBER	FIG.	ITEM
--------------	------	------

6150-01-111-1717	1	9
4240-01-340-3715	1	3
6625-01-377-5874	1	2
6625-01-377-5875	1	16
5340-01-378-2291	1	7
5240-01-378-2883	1	15
9390-01-379-6385	1	10
6130-01-379-7122	1	8
4240-01-382-3519	1	6
4240-01-382-3558	1	12
4240-01-382-3584	1	5
4240-01-382-3614	1	14
4240-01-382-3635	1	13
4240-01-382-3652	1	4

PART NUMBER INDEX

0028 00

PART NUMBER	FIG.	ITEM
1081181	1	7
1081282	1	6
1081285	1	4
1081311	1	11
1081322	1	10
1081379	1	12
1081381	1	13
1081397	1	5
1081399	1	8
1081452	1	1
1081477	1	14
1319062	1	2
1319066	1	16
1602066	1	3
17743	1	9
2906090	1	15

INTRODUCTION

Scope

This work package lists COEI and BII for the M41 Protection Assessment Test System to help you inventory items for safe and efficient operation of the equipment.

General

The COEI and BII information is divided into the following lists:

Components of End Item (COEI). Not applicable.

Basic Issue Items (BII). These essential items are required to place the M41 PATS in operation, operate it, and to do emergency repairs. Although shipped separately packaged, BII must be with the M41 PATS during operation and when it is transferred between property accounts. Listing these items is your authority to request/requisition them for replacement based on authorization of the end item by the TOE/MTOE.

Explanation of Columns in the COEI List and BII List

Column (1), Item Number, gives you the number of the item.

Column (2), National Stock Number, identifies the stock number of the item to be used for requisitioning purposes. Since many of these items are Non-Developmental Items (NDI), NSN have not been assigned to those particular items. Contractor Logistics Support (CLS) will stock and issue these items.

Column (3), Description, CAGEC, and Part Number, identifies the Federal item name (in all capital letters) followed by a minimum description when needed.

Column (4), U/M (unit of measure), indicates how the item is issued for the National Stock Number shown in column 2.

Column (5), Qty rqr, indicates the quantity required.

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COMPONENTS OF END ITEM (COEI) AND BASIC ISSUE ITEMS LIST -
CONTINUED

0029 00

COMPONENTS OF END ITEM LIST

Table 1. Components of End Item List

Not Applicable

BASIC ISSUE ITEMS (BII) LIST

Table 2. Basic Issue Items List

(1) NUMBER	(2) NSN	(3) DESCRIPTION, CAGEC, AND PART NUMBER	(4) U/M	(5) QTY RQR
1		TM 3-4240-349-12&P, Operator's and Unit Maintenance Manual for Protection Assessment Test System, M41	EA	1

INTRODUCTION

Scope

This work package lists additional items you are authorized for the support of the M41 PATS.

General

This list identifies items that do not have to accompany the M41 PATS and that do not have to be turned in with it. These items are all authorized to you by CTA, MTOE, TDA, or JTA.

Explanations of Columns in AAL

Column (1), National Stock Number, identifies the stock number of the item to be used for requisitioning purposes.

Column (2), Description, CAGEC, and Part Number, identifies the Federal item name followed by a minimum description when needed. The last line below the description is the CAGEC (Commercial and Government Entity Code) (in parentheses) and the part number.

Column (3), U/M (unit of measure), indicates how the item is issued for the National Stock Number shown in column (1).

Column (4), Qty Recm, indicates the quantity recommended.

(1) NSN	(2) DESCRIPTION (CAGEC) AND PART NUMBER	(3) U/M	(4) QTY RQR
6135-01-090-5364	Battery, Primary, Lithium, Nonrechargeable (80058) BA-5847/U	EA	1

INTRODUCTION

Scope

This work package lists expendable and durable items that you will need to operate and maintain the M41 PATS. This list is for informational only and is not authority to requisition the listed items. These items are authorized to you by CTA 50-970, Expendable/Durable Items (Except Medical, Class V Repair Parts and Heraldic Items), or CTA 8-100, Army Medical Department Expendable/Durable Items.

Explanation of Columns in the Expendable/Durable Items List

Column (1) - Item Number. This number is assigned to the entry in the list and is referenced in the narrative instructions to identify the item (e.g. "Use cloth (Item 1, WP 0031 00).")

Column (2) - Level. This column includes the lowest level of maintenance that requires the listed item (C = Operator/Crew).

Column (3) - National Stock Number. This is the NSN assigned to the item which you can use to requisition it. You will notice many items do not have an NSN; this is because the items are Commercial items and are being provided under Contractor Logistics Support (CLS).

Column (4) - Item Name, Description, Commercial and Government Entity Code (CAGE), and Part Number (P/N). This column provides the other information you need to identify the item.

Column (5) - Unit of Measure (U/M). This code shows the physical measurement or count of an item, such a gallon, dozen, gross, etc.

EXPENDABLE AND DURABLE ITEMS LIST

Table 1. Expendable and Durable Items List

(1) ITEM NUMBER	(2) LEVEL	(3) NATIONAL STOCK NUMBER	(4) ITEM NAME, DESCRIPTION CAGE, PART NUMBER	(5) U/M
1		6810-01-382-2904	Isopropyl Alcohol (quantity of 16, 30 mL bottles) (24575) 8016M	EA
2		7045-01-154-1317	Swab, foam (quantity of 50 per bag) (21994) TX700	EA

END OF TASK

For disposal of lithium-sulfur dioxide batteries, see Army TB 43-0130. Marine Corps personnel should refer to T1 6135-15/3, Disposal of Lithium Batteries. Air Force users should contact the installation hazardous material pharmacy, DRMO, and/or environmental management for disposal instructions.

Turn in damaged, spent, or unusable batteries to your hazardous waste management office or Defense Reutilization and Marketing Office (DRMO).

WARNING

Lithium-sulfur dioxide (Li-SO₂) batteries which are used in this equipment contain pressurized sulfur dioxide (SO₂) gas. The gas is toxic, and the battery **MUST NOT** be abused in any way, which may cause the battery to rupture.

DO NOT use equipment if battery compartment becomes hot. **IMMEDIATELY** turn off the equipment if battery compartment becomes hot to the touch. Allow battery to cool before removing it.

DO NOT use any battery which shows signs of damage, such as bulging, swelling, a swollen plastic wrap, liquid in the plastic wrap, etc.

NOTE

Refer to the Material Safety Data Sheets (MSDS) located in WP 0034 00 of this manual for safety precautions.

Unused portions of alcohol can be left in their original plastic bottles, recapped, and stored for later use.

Full or partly filled alcohol bottles which are no longer needed must be properly disposed of using local procedures for disposal of liquid flammable wastes. Waste alcohol should be placed in a suitable, properly marked, flammable waste container and returned to a designated disposal collection area, according to your local SOP.

Alcohol soaked wicks must be properly disposed of using local procedures for disposal of liquid flammable wastes. Waste wicks should be placed in a suitable, properly marked, flammable waste container and returned to a designated disposal collection area, according to your local SOP.

WARNING

Isopropyl alcohol is a hazardous material. DO NOT allow alcohol to get into your eyes. Avoid contact with the skin. DO NOT swallow or ingest in any way. Alcohol is extremely flammable. Do not expose to open flame or source of ignition.

NOTE

Refer to the Material Safety Data Sheet (MSDS) located in WP 0034 00 of this manual for safety precautions.

MATERIAL SAFETY DATA SHEETS

0034 00

ISOPROPYL ALCOHOL (90 - 100%)

ISOPROPYL ALCOHOL (90 - 100%)

MSDS Number: I8840 --- Effective Date: 09/08/97

1. Product Identification

Synonyms: 2-Propanol; sec-propyl alcohol; isopropanol; sec-propanol; dimethylcarbinol

CAS No.: 67-63-0

Molecular Weight: 60.10

Chemical Formula: (CH₃)₂CHOH

Product Codes:

J.T. Baker: 5082, 9080, U298

Mallinckrodt: 3027, 3031, 3032, 3035, 3037, 3043, 4359, 6569, H604, V073, V345, V555, V566

2. Composition/Information on Ingredients

Ingredient	CAS No	Percent	Hazardous
Isopropyl Alcohol	67-63-0	90 - 100%	Yes
Water	7732-18-5	0 - 10%	No

3. Hazards Identification Emergency Overview

WARNING! FLAMMABLE LIQUID AND VAPOR. HARMFUL IF SWALLOWED OR INHALED. CAUSES IRRITATION TO EYES AND RESPIRATORY TRACT. AFFECTS CENTRAL NERVOUS SYSTEM. MAY BE HARMFUL IF ABSORBED THROUGH SKIN. MAY CAUSE IRRITATION TO SKIN.

J.T. Baker SAF-T-DATA(tm) Ratings (Provided here for your convenience)

Health Rating: 1 - Slight

Flammability Rating: 4 - Extreme (Flammable)

Reactivity Rating: 2 - Moderate

Contact Rating: 2 - Moderate

Lab Protective Equip: GOGGLES; LAB COAT; VENT HOOD; PROPER GLOVES; CLASS B EXTINGUISHER

Storage Color Code: Red (Flammable)

Potential Health Effects

Inhalation:

Inhalation of vapors irritates the respiratory tract. Exposure to high concentrations has a narcotic effect, producing symptoms of dizziness, drowsiness, headache, staggering, unconsciousness and possibly death.

Ingestion:

Can cause drowsiness, unconsciousness, and death. Gastrointestinal pain, cramps, nausea, vomiting, and diarrhea may also result. The single lethal dose for a human adult = about 250 mls (8 ounces).

Skin Contact:

May cause irritation with redness and pain. May be absorbed through the skin with possible systemic effects.

Eye Contact:

Vapors cause eye irritation. Splashes cause severe irritation, possible corneal burns and eye damage.

Chronic Exposure:

Chronic exposure may cause skin effects.

Aggravation of Pre-existing Conditions:

Persons with pre-existing skin disorders or impaired liver, kidney, or pulmonary function may be more susceptible to the effects of this agent.

4. First Aid Measures

Inhalation:

Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Call a physician.

Ingestion:

Give large amounts of water to drink. Never give anything by mouth to an unconscious person. Get medical attention.

Skin Contact:

Immediately flush skin with plenty of water for at least 15 minutes. Call a physician if irritation develops.

Eye Contact:

Immediately flush eyes with plenty of water for at least 15 minutes, lifting lower and upper eyelids occasionally. Get medical attention immediately.

5. Fire Fighting Measures**Fire:**

Flash point: 12C (54F) CC

Autoignition temperature: 399C (750F)

Flammable limits in air % by volume: lel: 2.0; uel: 12.7

Listed fire data is for Pure Isopropyl Alcohol.

Explosion:

Above flash point, vapor-air mixtures are explosive within flammable limits noted above. Contact with strong oxidizers may cause fire or explosion. Vapors can flow along surfaces to distant ignition source and flash back. Sensitive to static discharge.

Fire Extinguishing Media:

Water spray, dry chemical, alcohol foam, or carbon dioxide. Water spray may be used to keep fire exposed containers cool, dilute spills to nonflammable mixtures, protect personnel attempting to stop leak and disperse vapors.

Special Information:

In the event of a fire, wear full protective clothing and NIOSH-approved self-contained breathing apparatus with full facepiece operated in the pressure demand or other positive pressure mode.

6. Accidental Release Measures

Ventilate area of leak or spill. Remove all sources of ignition. Wear appropriate personal protective equipment as specified in Section 8. Isolate hazard area. Keep unnecessary and unprotected personnel from entering. Contain and recover liquid when possible. Use non-sparking tools and equipment. Collect liquid in an appropriate container or absorb with an inert material (e. g., vermiculite, dry sand, earth), and place in a chemical waste container. Do not use combustible materials, such as saw dust. Do not flush to sewer! If a leak or spill has not ignited, use water spray to disperse the vapors, to protect personnel attempting to stop leak, and to flush spills away from exposures.

J. T. Baker SOLUSORB(tm) solvent adsorbent is recommended for spills of this product.

7. Handling and Storage

Protect against physical damage. Store in a cool, dry well-ventilated location, away from any area where the fire hazard may be acute. Outside or detached storage is preferred. Separate from incompatibles. Containers should be bonded and grounded for transfers to avoid static sparks. Storage and use areas should be No Smoking areas. Use non-sparking type tools and equipment, including explosion proof ventilation. Containers of this material may be hazardous when empty since they retain product residues (vapors, liquid); observe all warnings and precautions listed for the product.

8. Exposure Controls/Personal Protection

Airborne Exposure Limits:

For Isopropyl Alcohol (2-Propanol):

-OSHA Permissible Exposure Limit (PEL):
400 ppm (TWA)

-ACGIH Threshold Limit Value (TLV):
400 ppm (TWA), 500 ppm (STEL)

Ventilation System:

A system of local and/or general exhaust is recommended to keep employee exposures below the Airborne Exposure Limits. Local exhaust ventilation is generally preferred because it can control the emissions of the contaminant at its source, preventing dispersion of it into the general work area. Please refer to the ACGIH document, Industrial Ventilation, A Manual of Recommended Practices, most recent edition, for details.

Personal Respirators (NIOSH Approved):

If the exposure limit is exceeded, a full facepiece respirator with organic vapor cartridge may be worn up to 50 times the exposure limit or the maximum use concentration specified by the appropriate regulatory agency or respirator supplier, whichever is lowest. For emergencies or instances where the exposure levels are not known, use a full-facepiece positive-pressure, air-supplied respirator.

WARNING: Air purifying respirators do not protect workers in oxygen-deficient atmospheres.

Skin Protection:

Wear impervious protective clothing, including boots, gloves, lab coat, apron or coveralls, as appropriate, to prevent skin contact. Neoprene and nitrile rubber are recommended materials.

Eye Protection:

Use chemical safety goggles and/or a full face shield where splashing is possible. Maintain eye wash fountain and quick-drench facilities in work area.

9. Physical and Chemical Properties

Appearance: Clear, colorless liquid.
 Odor: Rubbing alcohol.
 Solubility: Miscible in water.
 Specific Gravity: 0.79 @ 20C/4C
 pH: No information found.
 % Volatiles by volume @ 21C (70F): 100
 Boiling Point: 82C (180F)
 Melting Point: -89C (-128F)
 Vapor Density (Air=1): 2.1
 Vapor Pressure (mm Hg): 44 @ 25C (77F)
 Evaporation Rate (BuAc=1): 2.83

10. Stability and Reactivity

Stability:
 Stable under ordinary conditions of use and storage. Heat and sunlight can contribute to instability.

Hazardous Decomposition Products:

Carbon dioxide and carbon monoxide may form when heated to decomposition.

Hazardous Polymerization:

Will not occur.

Incompatibilities:

Heat, flame, strong oxidizers, acetaldehyde, acids, chlorine, ethylene oxide, hydrogen-palladium combination, hydrogen peroxide-sulfuric acid combination, potassium tert-butoxide, hypochlorous acid, isocyanates, nitroform, phosgene, aluminum, oleum and perchloric acid.

Conditions to Avoid:

Heat, flames, ignition sources and incompatibles.

11. Toxicological Information

Oral rat LD50: 5045 mg/kg; skin rabbit LD50: 12.8 gm/kg; inhalation rat LC50: 16,000 ppm/8-hour; investigated as a tumorigen, mutagen, reproductive effector.

-----\Cancer Lists\-----

Ingredient	---NTP Carcinogen---		
	Known	Anticipated	IARC Category
Isopropyl Alcohol (67-63-0)	No	No	3
Water (7732-18-5)	No	No	None

12. Ecological Information

Environmental Fate:

When released into the soil, this material is expected to quickly evaporate. When released into the soil, this material may leach into groundwater. When released into the soil, this material may biodegrade to a moderate extent. When released to water, this material is expected to quickly evaporate. When released into the water, this material is expected to have a half-life between 1 and 10 days. When released into water, this material may biodegrade to a moderate extent. This material is not expected to significantly bioaccumulate. When released into the air, this material is expected to be readily degraded by reaction with photochemically produced hydroxyl radicals. When released into the air, this material is expected to have a half-life between 1 and 10 days. When released into the air, this material may be removed from the atmosphere to a moderate extent by wet deposition.

Environmental Toxicity:

The LC50/96-hour values for fish are over 100 mg/l. This material is not expected to be toxic to aquatic life.

13. Disposal Considerations

Whatever cannot be saved for recovery or recycling should be handled as hazardous waste and sent to a RCRA approved incinerator or disposed in a RCRA approved waste facility. Processing, use or contamination of this product may change the waste management options. State and local disposal regulations may differ from federal disposal regulations. Dispose of container and unused contents in accordance with federal, state and local requirements.

14. Transport Information

Domestic (Land, D.O.T.)

Proper Shipping Name: ISOPROPANOL

Hazard Class: 3

UN/NA: UN1219

Packing Group: II

Information reported for product/size: 355LB

International (Water, I.M.O.)

Proper Shipping Name: ISOPROPANOL

Hazard Class: 3.2

UN/NA: UN1219

Packing Group: II

Information reported for product/size: 355LB

15. Regulatory Information

-----\Chemical Inventory Status - Part 1\-----

Ingredient	TSCA	EC	Japan	Australia
Isopropyl Alcohol (67-63-0)	Yes	Yes	Yes	Yes
Water (7732-18-5)	Yes	Yes	Yes	Yes

-----\Chemical Inventory Status - Part 2\-----

Ingredient	Korea	DSL	NDSL	Phil.
Isopropyl Alcohol (67-63-0)	Yes	Yes	No	Yes
Water (7732-18-5)	Yes	Yes	No	Yes

-----\Federal, State & International Regulations - Part 1\-----

Ingredient	-SARA 302-		-----SARA 313-----	
	RQ	TPQ	List	Chemical Catg.
Isopropyl Alcohol (67-63-0)	No	No	Yes	No
Water (7732-18-5)	No	No	No	No

-----\Federal, State & International Regulations - Part 2\-----

Ingredient	CERCLA	-RCRA-	-TSCA-
		261.33	8(d)
Isopropyl Alcohol (67-63-0)	No	No	No
Water (7732-18-5)	No	No	No

Chemical Weapons Convention: No TSCA 12(b): Yes CDTA: Yes
 SARA 311/312: Acute: Yes Chronic: Yes Fire: Yes Pressure: No
 Reactivity: No (Mixture / Liquid)

Australian Hazchem Code: 2[S]2
 Poison Schedule: No information found.

WHMIS:

This MSDS has been prepared according to the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all of the information required by the CPR.

16. Other Information

NFPA Ratings: Health: 2 Flammability: 3 Reactivity: 0

Label Hazard Warning:

WARNING! FLAMMABLE LIQUID AND VAPOR. HARMFUL IF SWALLOWED OR INHALED. CAUSES IRRITATION TO EYES AND RESPIRATORY TRACT. AFFECTS CENTRAL NERVOUS SYSTEM. MAY BE HARMFUL IF ABSORBED THROUGH SKIN. MAY CAUSE IRRITATION TO SKIN.

Label Precautions:

- Keep away from heat, sparks and flame.
- Keep container closed.
- Use only with adequate ventilation.
- Wash thoroughly after handling.
- Avoid breathing vapor or mist.
- Avoid contact with eyes, skin and clothing.

Label First Aid:

If swallowed, give large amounts of water to drink. Never give anything by mouth to an unconscious person. If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. In case of contact, immediately flush eyes or skin with plenty of water for at least 15 minutes. Remove contaminated clothing and shoes. Wash clothing before reuse. In all cases, get medical attention.

Product Use:

Laboratory Reagent.

Revision Information:

MSDS Section(s) changed since last revision of document include: 15.

Disclaimer:

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Prepared by: Strategic Services Division
Phone Number: (314) 539-1600 (U.S.A.)

SAFT AMERICA ADVANCED BATTERY SYSTEMS DIV -- LITHIUM SULFUR DIOXIDE BATTERY,BA-5847-U - LITHIUM SULFUR DIOXIDE BATTERY SAFT AMERICA ADVANCED BATTERY SYSTEMS DIV -- LITHIUM SULFUR DIOXIDE BATTERY,BA-5847-U - LITHIUM SULFUR DIOXIDE BATTERY

MATERIAL SAFETY DATA SHEET

NSN: 6135010905364

Manufacturer's CAGE: 7X634

Part No. Indicator: A

Part Number/Trade Name: LITHIUM SULFUR DIOXIDE BATTERY,BA-5847/U

General Information

Item Name: LITHIUM SULFUR DIOXIDE BATTERY

Company's Name: SAFT AMERICA INC ADVANCED BATTERY SYSTEMS DIVISION

Company's Street: LOVELADY LN

Company's P. O. Box: 280

Company's City: VALDESE

Company's State: NC

Company's Country: US

Company's Zip Code: 28690

Company's Emerg Ph #: 704-874-4111

Company's Info Ph #: 704-874-4111

Record No. For Safety Entry: 003

Tot Safety Entries This Stk#: 003

Status: SE

Date MSDS Prepared: 31JAN92

Safety Data Review Date: 10APR97

MSDS Serial Number: BPXYV

Hazard Characteristic Code: J7

Ingredients/Identity Information

Physical/Chemical Characteristics

Appearance And Odor: NOT KNOWN

Boiling Point: NOT KNOWN

Melting Point: >200F,>93C

Vapor Pressure (MM Hg/70 F): NOT KNOWN

Vapor Density (Air=1): NOT KNOWN

Specific Gravity: >1 (WATER=1)

Decomposition Temperature: NOT KNOWN

Evaporation Rate And Ref: NOT KNOWN

Solubility In Water: INSOLUBLE

Fire and Explosion Hazard Data

Flash Point: NONFLAMMABLE
Lower Explosive Limit: NOT KNOWN
Upper Explosive Limit: NOT KNOWN
Extinguishing Media: USE WATER/CARBON DIOXIDE ON BURNING CELLS OR BATTERIES. USE CLASS D FIRE EXTINGUISHING AGENT ONLY ON A RAW LITHIUM FIRE.
Special Fire Fighting Proc: WEAR SELF-CONTAINED BREATHING APPARATUS.
Unusual Fire And Expl Hazrds: BATTERY MAY VENT WHEN SUBJECTED TO EXCESSIVE HEAT - EXPOSING CELL CONTENTS.

Reactivity Data

Stability: YES
Cond To Avoid (Stability): HEATING, MECHANICAL ABUSE, & ELECTRICAL ABUSE (SUCH AS RECHARGING, VOLTAGE REVERSAL & SHORT CIRCUITING) MAY (SEE SUPP DATA)
Materials To Avoid: BATTERY CONTAINS HERMETICALLY SEALED CELLS & IS NONREACTIVE PROVIDED THE BATTERY INTEGRITY IS MAINTAINED (SEE SUPP DATA)

Health Hazard Data

Precautions for Safe Handling and Use

Control Measures

Transportation Data

=====
Trans Data Review Date: 92170
DOT PSN Code: IJN
DOT Proper Shipping Name: LITHIUM BATTERY
DOT Class: 9
DOT ID Number: UN3090
DOT Pack Group: II
DOT Label: CLASS 9
IMO PSN Code: JAM
IMO Proper Shipping Name: LITHIUM BATTERIES
IMO Regulations Page Number: 9033
IMO UN Number: 3090
IMO UN Class: 9
IMO Subsidiary Risk Label: -
IATA PSN Code: PFT
IATA UN ID Number: 3090
IATA Proper Shipping Name: LITHIUM BATTERIES, LIQUID CATHODE +
IATA UN Class: 9
IATA Label: MISCELLANEOUS
AFI PSN Code: PFT
AFI Symbols: 0
AFI Prop. Shipping Name: LITHIUM BATTERIES,
AFI Class: 9
AFI ID Number: UN3090
AFI Pack Group: II
AFI Basic Pac Ref: 13-7
=====

Disposal Data

=====
Label Data
=====

Label Required: YES
Label Status: G
Common Name: LITHIUM SULFUR DIOXIDE BATTERY,BA-5847/U
Label Name: SAFT AMERICA INC ADVANCED BATTERY SYSTEMS DIVISION
Label Street: LOVELADY LN
Label P.O. Box: 280
Label City: VALDESE
Label State: NC
Label Zip Code: 28690
Label Country: US
Label Emergency Number: 704-874-4111

WARRANTY INFORMATION

0035 00

Copyright

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Address

TSI Incorporated/500 Cardigan Road/P.O. Box 64394/St. Paul, MN 55164/USA

Limitation of warranty and liability TSI Incorporated warrants that the PATS, under normal use and service as described in the operator's manual, shall be free from defects in workmanship and material for a period of twelve (12) months from the date of shipment to the customer. This limited warranty is subject to the following exclusions:

- 1) Batteries, hot wire or hot film sensors and certain components when indicated in specifications are warranted for a period of 90 days from the date of shipment to the customer.
- 2) With respect to any repair services rendered, Seller warrants that the parts repaired or replaced will be free from defects in workmanship and material, under normal use, for a period of 90 days from the date of shipment to the customer.
- 3) Seller does not provide any warranty on finished goods manufactured by others. Only the original manufacturer's warranty applies.
- 4) Unless specifically authorized in a separate writing by Seller, Seller makes no warranty with respect to, and shall have no liability in connection with, any goods which are incorporated into other products or equipment by the Buyer. All goods returned under warranty shall be at the Buyer's risk of loss, Seller's factory prepaid, and will be returned at Seller's risk of loss, Buyer's factory prepaid.

The foregoing is **IN LIEU OF** all other warranties and is subject to the conditions and **LIMITATIONS** stated herein. **NO OTHER EXPRESS OR IMPLIED WARRANTY OF FITNESS FOR PARTICULAR PURPOSE OR MERCHANTABILITY IS MADE.**

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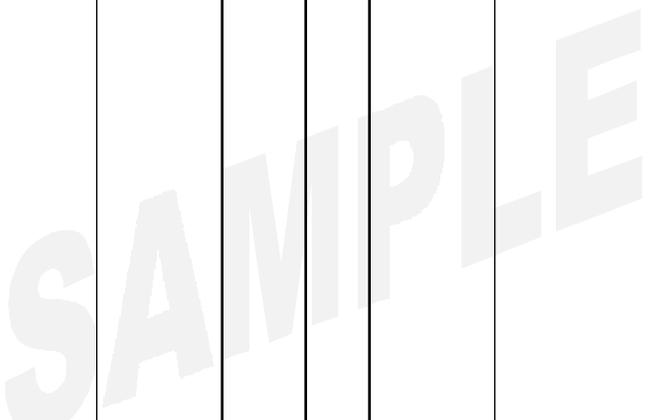
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For use of this form, see AR 25-30; the proponent agency is ODISC4.							
TO: (Forward to proponent of publication or form) (Include ZIP Code) Director, Edgewood CB Center, ATTN: AMSSB-RBD-B (D. Storms, E3549), 5183 Blackhawk Road, Aberdeen Proving Ground, MD 21010-5424						FROM: (Activity and location) (Include ZIP Code) Your address	
PART I – ALL PUBLICATIONS (EXCEPT RPSTL AND SC/SM) AND BLANK FORMS							
PUBLICATION/FORM NUMBER TM 3-4240-349-12&P				DATE 30 Nov 99	TITLE Operator and Unit Maintenance Manual for Protection Assessment Test System, M41		
ITEM NO.	PAGE NO.	PARA-GRAPH	LINE NO.*	FIGURE NO.	TABLE NO.	RECOMMENDED CHANGES AND REASON (Provide exact wording of recommended changes, if possible).	
1	0018 00-1	NOTE	2			"06 inches" should read "60 inches". Reason: Typo.	
<i>*Reference to line numbers within the paragraph or subparagraph.</i>							
TYPED NAME, GRADE OR TITLE ANDREW JONES Chief, Maintenance Branch				TELEPHONE EXCHANGE/AUTOVON, PLUS EXTENSION		SIGNATURE	

TO: <i>(Forward direct to addressee listed in publication)</i>	FROM: <i>(Activity and location) (Include ZIP Code)</i>	DATE
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PART II – REPAIR PARTS AND SPECIAL TOOL LISTS AND SUPPLY CATALOGS/SUPPLY MANUALS

PUBLICATION NUMBER					DATE		TITLE
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PAGE NO.	COLM NO.	LINE NO.	NATIONAL STOCK NUMBER	REFERENCE NO.	FIGURE NO.	ITEM NO.	TOTAL NO. OF MAJOR ITEMS SUPPORTED	RECOMMENDED ACTION
								

PART III – REMARKS *(Any general remarks or recommendations, or suggestions for improvement of publications and blank forms. Additional blank sheets may be used if more space is needed.)*

TYPED NAME, GRADE OR TITLE ANDREW JONES Chief, Maintenance Branch	TELEPHONE EXCHANGE/AUTOVON, PLUS EXTENSION	SIGNATURE
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TYPED NAME, GRADE OR TITLE				TELEPHONE EXCHANGE/AUTOVON, PLUS EXTENSION		SIGNATURE	

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PART II – REPAIR PARTS AND SPECIAL TOOL LISTS AND SUPPLY CATALOGS/SUPPLY MANUALS

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By Order of the Secretary of the Army:

ERIC K. SHINSEKI
General, United States Army
Chief of Staff

Official


JOEL B. HUDSON
Administrative Assistant to the
Secretary of the Army
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