TECHNICAL MANUAL

OPERATOR'S, UNIT AND
DIRECT SUPPORT MAINTENANCE MANUAL
(INCLUDING REPAIR PARTS AND SPECIAL TOOLS LIST)
FOR

GAMMON MINI-MONITOR FUEL SAMPLING KIT

This technical manual is an authentication of the manufacturer's commercial literature and does not conform with the format and the content requirements normally associated with Army technical manuals. This technical manual does, however, contain all essential information required to operate and maintain the equipment.

Approved for public release; distribution is unlimited.

HEADQUARTERS, DEPARTMENT OF THE ARMY

28 SEPTEMBER 1990

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SUPPLEMENTARY INTRODUCTORY MATERIAL

1-1. Maintenance Forms and Records.

Department of the Army forms and procedures used for equipment maintenance will be those described by DA Pam 738-750, The Army Maintenance Management System.

1-2. 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. Mail your letters, DA Form 2028 (Recommended Changes to Publications and Blank Forms), or DA Form 2028–2 located in the back of this manual, directly to: Commander, U.S. Army Troop Support Command, ATTN: AMSTR–MCTS, 4300 Goodfellow Blvd., St. Louis, MO 63120-1798. A reply will be furnished to you.

1-3. Destruction of Army Material to Prevent Enemy Use.

Refer to TM 750-244-3 for instructions covering the destruction of Army Material to prevent enemy use.

1-4. Administrative Storage of Equipment.

a. Placement of equipment in administrative storage should be for short periods of time when a shortage of maintenance effort exists. Items should be in mission readiness within 24 hours or within the time factors as determined by the directing authority. During the storage period appropriate maintenance records will be kept.

b. Before placing equipment in administrative storage, current preventive maintenance checks and services should be completed. Shortcomings and deficiencies should be corrected, and all modification work orders (MWO's) should be applied.

c. Storage site selection. Inside storage is preferred for items selected for administrative storage. If inside storage is not available, trucks, vans, conex containers and other containers may be used.

GAMMON TECHNICAL PRODUCTS

INC.

235 PARKER AVE. P.O. BOX 400
MANASQUAN, N.J. 08736
TELEX 132484 GAMMONTEC — MNQN

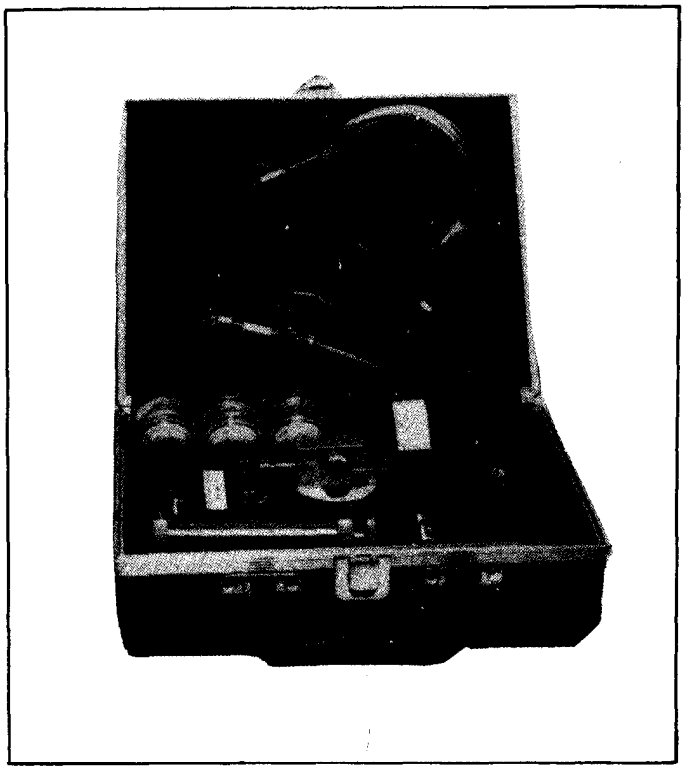
Specialists in Petroleum Handling Equipment

Phone (201) 223-4600

MINI MONITOR®
KIT

BULLETIN
68-8 (10-87)

MiniMonitor® Kit



The MiniMonitor® Kit has been designed and developed by Gammon Technical Products Inc., specifically for aircraft fuel sampling with standard field monitors. These kits with carrying cases weigh only 4 lbs. and include the following design features.

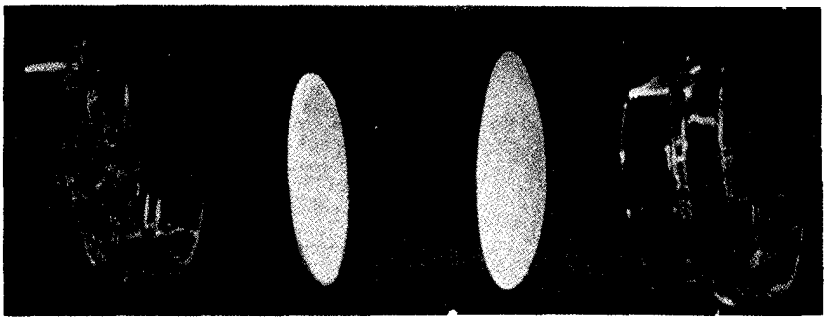
FEATURES

Short Flow Path and Low Surface Area minimizes possibility of contamination of the sample.

Sampling Probe insures uncontaminated test sampling.

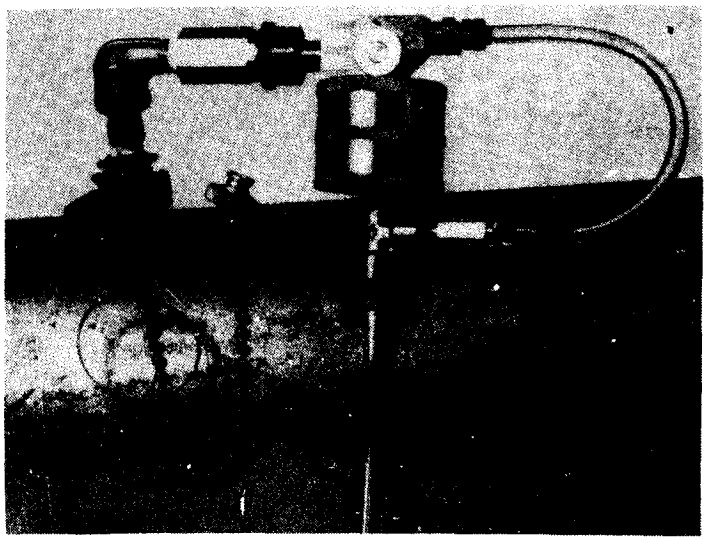
Stainless Steel Parts — test sample contacts only stainless steel before reaching filter membrane.

Developed specifically for field testing of aircraft fuel with plastic monitors per ASTM D-2276/IP-216 and D 3830.



The MiniMonitor® housing includes a flushing valve located on top of the monitor with a by-pass hose and fittings. Before flushing sample connection, move arrow located on flushing valve handle to STOP position. Check connections of by-pass hose for firm seating. After connections have been checked, move arrow to the FLUSH position and allow one gallon (or specified volume) to collect in a measuring container. Then turn the valve to the TEST position to direct flow through the filter membrane. This test volume may be from 1 to 5 gallons depending upon contract provisions. The membrane is then rated as to its color using a color rating booklet which may be ordered separately. The darker the color, the dirtier the fuel. Some contracts require the weight of contaminant to be determined. The same apparatus can be used but arrangements must be made with a laboratory.

Electrical bonding is a safety requirement of ASTM Method D2276. Our Bonding and Grounding Hose Assembly clips to the metal measuring container (not shown) and also to pipe fitting shown in the photograph.



ORDERING INFORMATION

MiniMonitor Kit Contamination Detector with flushing valve	GTP-172
Same kit without flushing valve	GTP-169

Parts and Accessories

Monitor Housing (if sold separately)	GTP-172H * ✓
Replacement Seals: Inlet of plastic monitor	GTP-172-006
Outlet of plastic monitor	GTP-172-012
Reducing Bushing 3/8″ MNPT x 1/4″ FNPT	RB6-4 ✓
Reducing Bushing 1/2″ MNPT x 1/4″ FNPT	RB8-4 ✓
Coupling 1/4″ FNPT x 1/4″ FNPT	C-4 ✓
Bonding and Grounding Hose	GTP-1110 ✓ (Part of GTP-172H)
Carrying Case for MiniMonitor Kit	GTP-303 ✓
Bypass Tee Assembly	GTP-302C ✓ (Part of GTP-172H)
Bypass Quick Disconnect & Hose Assy	GTP-1250 ✓ (Part of GTP-172H)
Color Rating Book (Appendix III, ASTM D22[illegible])	GTP-1074-1
Plastic Monitors, 0.8 m membranes (48/box)	GTP-1985(✓ 6 monitors only)
Membranes and Support Pads (100/box)	GTP-1983
Tweezers	GTP-2099

* **Includes selector valve bypass tee, and bypass quick disconnect and hose assembly.**

Color Rating Book is now included with the GTP-172 and GTP-169

Miscellaneous Parts

Quick Disconnect Coupler, 1/4″ MNPT	SVEC4-4M ✓
Sampling Probe	GTP-144 ✓
Probe Kit (Sampling Probe w/Quick Disconnect)	Kit No. 5
Syringe	GTP-165 ✓
Hex Nipple with tapered hole to fit syringe	HN25
Dust Plug for quick disconnect	AMPE4 (W/BC)
Dust Cap for MiniMonitor inlet	ADCE (W/BC)
Actuator Nipple for quick disconnect	SPEN4-2F
Membrane Filing Pages	GTP-1331
Note Book	GTP-1400
Mini-Envelopes	GTP-1267

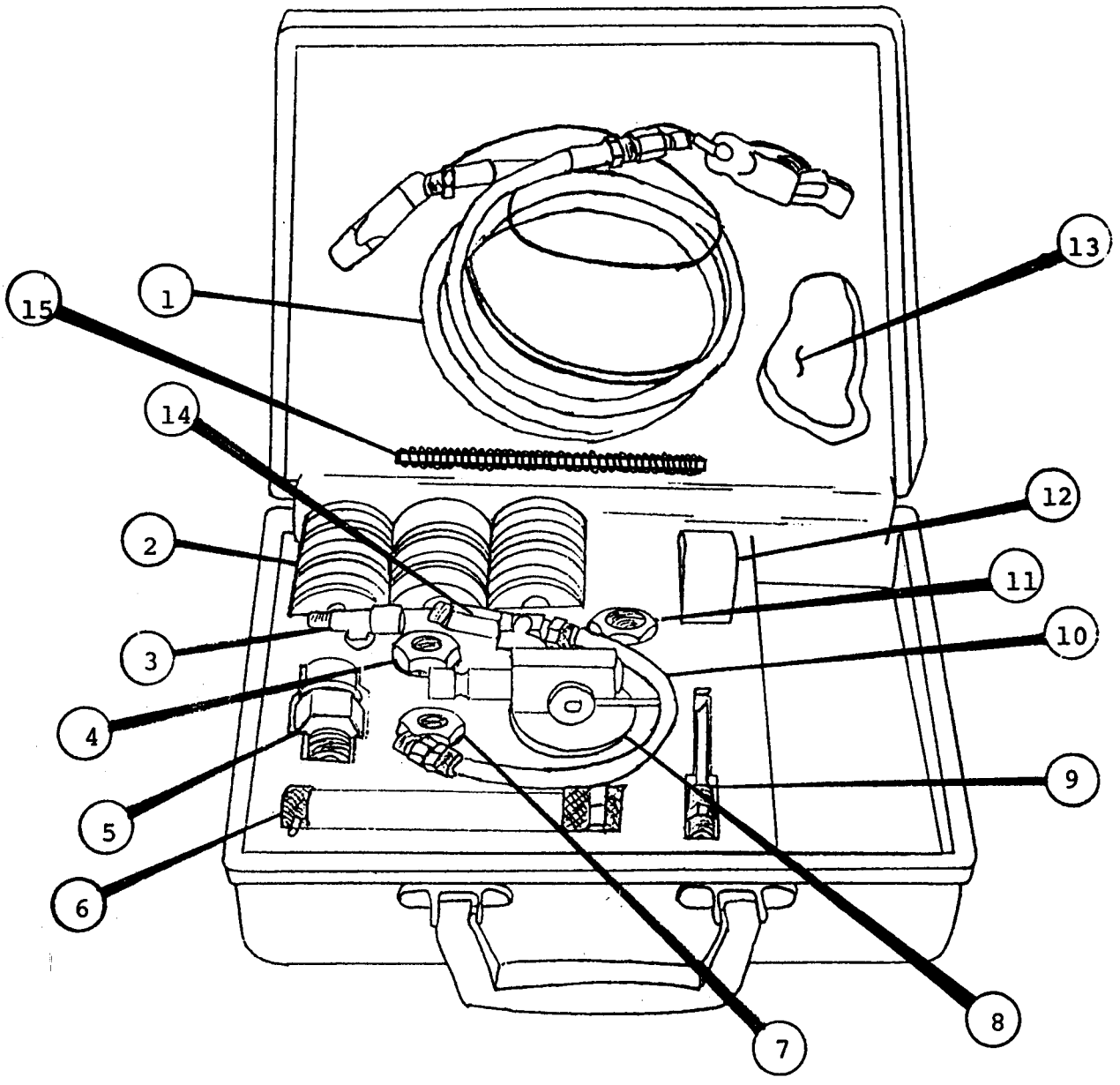
FNPT means internal pipe thread
MNPT means external pipe thread
✓ These items are included in the GTP-172 Kit

INSTRUCTIONS

BULLETIN 84–101

MINI MONITOR® KIT --- DEVELOPED SPECIFICALLY FOR AIRCRAFT FUEL SAMPLING WITH STANDARD FIELD MONITORS -- PER ASTM METHODS D-2276 AND D3830

REVISED DECEMBER 1987



ITEM	PART NO.	
1	GTP-1110	BONDING AND GROUNDING HOSE ASSEMBLY
2	GTP-1985	PLASTIC MONITORS
3	GTP-302C	BY-PASS TEE AND CHECK VALVE
4	RB6-4	REDUCER BUSHING
5	SVEC4-4M	QUICK DISCONNECT COUPLER
6	GTP-165	SYRINGE
7	RB8-4	REDUCER BUSHING
8	GTP-172H	MINI MONITOR HOUSING W/FLUSHING VALVE
9	GTP-144	SAMPLING PROBE
10	GTP-301	BYPASS HOSE ASSEMBLY
11	C4	PIPE COUPLING
12	————	TEFLON TAPE
13	————	INSTRUCTION SHEET
14	GTP-1250	BYPASS QUICK DISCONNECT
15	GTP-1074-1	Color Rating Booklet

MiniMonitor Kit
P/N GTP-172

1. THE SAMPLING CONNECTION

The most frequent cause of poor test results is an incorrect sampling connection.

We recommend permanently installed stainless steel connections as described in our Bulletin No. 68-3.

Keep in mind that any branch connection in a piping system is *a* perfect dirt trap in the case of a sampling connection, no flow takes place, except when a contamination test is run. Therefore, the internal flow passages must be small in diameter so that a reasonably high velocity will take place while flushing. Metal surfaces must be corrosion resistant so that no rust will be generated in sampling connection.

If a permanently installed sampling connection is not present where a test is to be run, use the parts from the MiniMonitor Kit:

1. Install the probe (9) in a convenient pipe fitting with the FLOW arrow (stamped on one hex flat) pointing in direction of pipeline flow. Use reducing bushings (4 or 7) as needed. Use Teflon pipe thread sealant tape. Wrap one layer around thread (male end). Pull slightly to force tape into thread, pull harder and it tears apart at the end of one wrap. Then screw threaded joint together.

2. Mount the quick disconnect coupler (5) on the probe, using pipe coupling (11)

3. Flush the sampling connection that was assembled in steps 1 and 2 by inserting the male fitting on the end of hose (1) in the sampling coupler. Connect and disconnect several times to thoroughly flush all fittings.

2. ASSEMBLING THE MINIMONITOR KIT

1. Install the by-pass hose (10) and lever-type quick disconnect (14).

2. Using Teflon tape, screw by-pass tee (3) into the bottom cap of the monitor housing (8).

3. Next, screw threaded end of hose 1 into the by-pass tee (3).

4. Open the monitor housing (8) by unscrewing the bottom cap.

5. Remove colored plastic plugs from the plastic monitor (2) and install it on bottom cap. An O-ring in the bottom cap seals. around the small hub of the plastic monitor. BE SURE THE SPOKED or gridded SIDE OF THE PLASTIC MONITOR IS TOWARD THE BOTTOM CAP.

6. Screw the bottom cap on the monitor housing 8 but be certain that the small O-ring is in position around the short tube in the monitor housing.

7. Now connect the bypass quick disconnect (14) to the side fitting of the by-pass tee (3).

NOTE : The above procedure applies to Model GTP-172. If you have Model GTP-169, the hose (1) screws directly into the bottom cap of the monitor housing.

3. THE FLUSHING PROCEDURE

Although the sampling connection was flushed in Step 3 of Section 1, it is necessary to flush the ports in the monitor housing while the piping system is pressurized.

1. Turn the valve handle so the arrow points to STOP.

2. Place the end of Bonding and Grounding Hose (1) in a container such as a metal pail.

3. Attach the clip on the Bonding and Grounding Hose to the pail.

4. Connect the MiniMonitor assembly to the quick disconnect coupler 5.

   NOTE : Connection to the sampling coupler can be made without risk of spraying fuel by following this procedure:

   A. Slide the collar of the coupler all the way as far as it will go toward its threaded end. Remember that the collar does not open the internal valve.

   B. Insert the connecting nipple in the open port of the coupler as far as it will go without depressing the internal valve, but continue to hold the collar.

   C. Then quickly press the nipple straight in with a force of about 25 lbs. and pull the collar back to its original position. This 25 lb. force causes the internal valve to open.

   D. A dry disconnection can be made simply by depressing the collar while pulling outward on the nipple.

5. Attach the grounding clip from the inlet end of the Hose (1) to the pipe fitting where the sample is being taken, Slowly turn the valve to the FLUSH position and allow a minimum of one gallon to pass through.

NOTE : If you have Model GTP-169, there is no flushing valve. However, adequate flushing can be performed as follows:

Remove the membrane and pad from a used plastic monitor (2) and install the empty monitor in the monitor housing. Connect to the quick disconnect coupler (5) and flush at least one gallon through the assembly.

4. CONTAMINATION TEST PROCEDURE

1. Turn the valve to TEST position to allow fuel to pass through the membrane in the plastic monitor. Various specifications require different amounts of fuel to pass through the membrane. We recommend 3 gallons but if a different volume is used, it must always be the same amount if results are to be comparable.

2. Turn the valve to the STOP position, release the quick disconnect and follow procedure recommended in Section 5.

5. AFTER-TEST PROCEDURE - SAFETY

When the MiniMonitor is disconnected, DO NOT remove the bottom cap for 5 minutes to allow static charges to dissipate. At least one major oil company has adopted this practice on a world-wide basis. Accidents are extremely rare, but we know of at least 3 fires caused by arcing when the two halves of a monitor housing have been separated.

1. When the plastic monitor has been removed from the housing, place it with the spoked or gridded side toward the tubular fitting on the side of syringe (6). Press it firmly in place, being certain that the syringe handle is first pressed all the way in.

2. Pull outward on syringe handle one time only to extract fuel from plastic monitor. Remove the plastic monitor and push the handle in again to expel fuel into a safe container.

3. Additional extractions can be made if desired, but the plastic monitor must be removed each time to expel fuel.

4. Replace the colored plastic plugs.

6. EVALUATION OF TEST RESULTS

The evaluation of results should be in accordance with one of the procedures in ASTM D2276/IP 216 and D3830.

1. If the color method is to be used, open plastic monitor by inserting and twisting a coin in the groove on the OD. Compare the color of the thin membrane with the ASTM color standard chart. Report color rating, volume throughput and state whether evaluated wet or dry. A dry rating is preferred.

2. If a gravimetric determination is to be made, the membrane must be pre-weighed on a laboratory balance and then weighed again after the test in strict accordance with ASTM procedures.

3. If matched weight plastic monitors are used, there will be 2 membranes of equal weight in the plastic monitor. Pre-weighing is unnecessary. A laboratory simply weighs both membranes after the test and reports contamination as the difference in weight between the top and bottom membranes. ASTM procedures must be followed.

7. DISCUSSION

1. Before replacing components of the MiniMonitor Kit in the carrying case, force all fuel out of the syringe by operating it through several strokes. Residual fuel can be removed from the hose by slinging it in an open area.

2. For best results, maintain constant flow in the piping system being tested. Never move upstream valves during a test.

3. If system pressure is very low, the test can be speeded up by partially closing a valve downstream of the sample point.

4. The standard test membrane for testing kerosene fuels has a pore size of 0.8 microns.

   *If you order GTP-1983, you will receive a package of 100 membranes and 100 support pads.

   *If you order GTP-1985, you will receive a box of 48 preloaded plastic monitors ready to use.

5. The ASTM Method D3830 can be purchased from us by specifying our catalog No. GTP-3043.

6. The color chart for Method D3830 can be obtained from us by specifying our GTP-1074-1. This is now included in the kit.

7. Replacement components for the MiniMonitor Kit can be ordered from us:

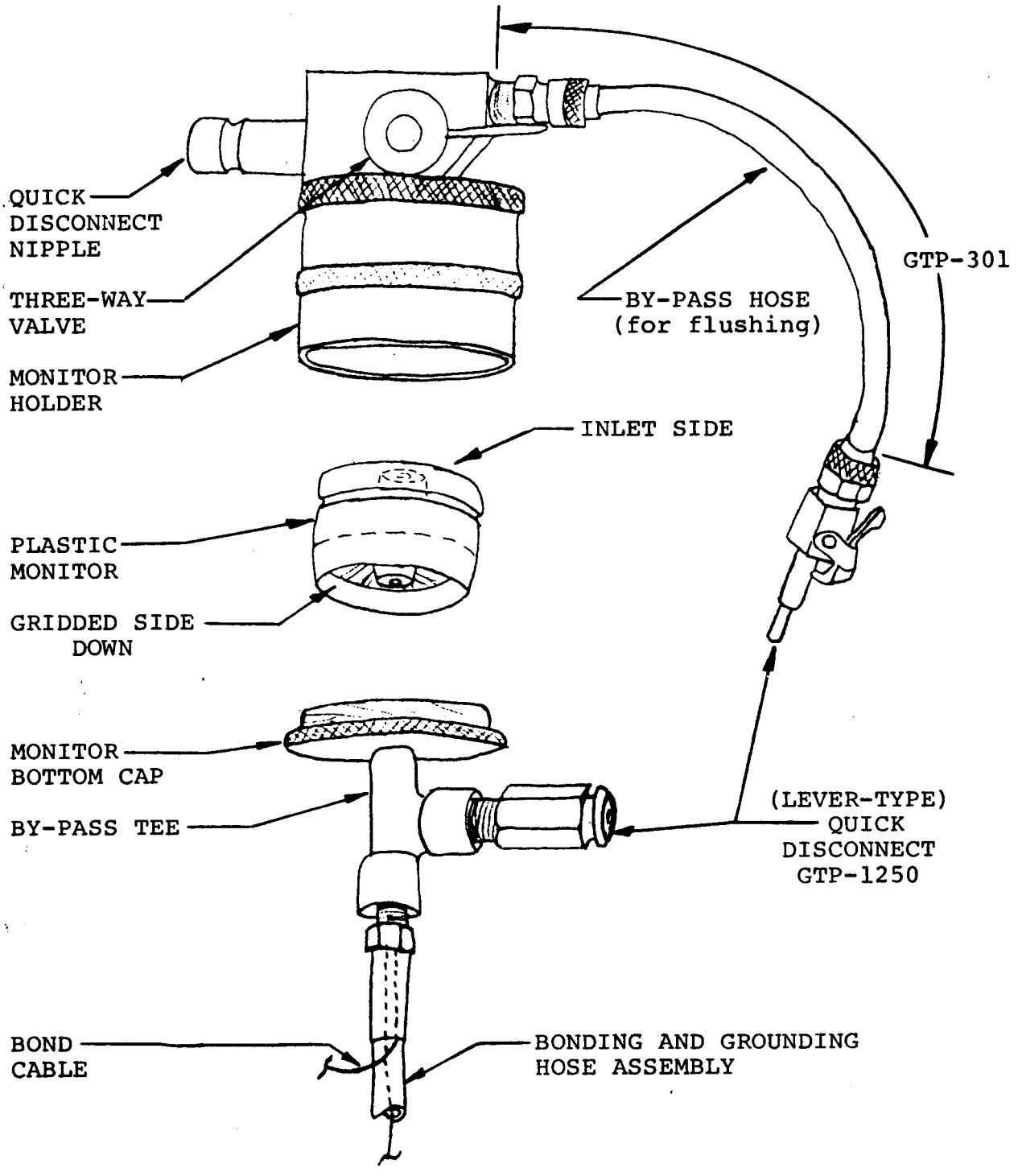
DESCRIPTION	MODEL NO.
MiniMonitor Kit, complete, without flushing valve	GTP-169
MiniMonitor Kit, complete, with flushing valve	GTP-172
Monitor Housing only - without flushing valve	GTP-169H
Monitor Housing only - with flushing valve	GTP-172H
Syringe (used to evacuate plastic monitor after test)	GTP-165
Sampling Probe	GTP-144
Quick Disconnect Coupler	SVEC4-4M
Reducing Bushing 3/8″ male to 1/4″ female NPT	RB6-4
Reducing Bushing 1/2″ male to 1/4″ female NPT	RB8-4
Coupling, Pipe 1/4″ female to 1/4″ female NPT	C4
Bonding and Grounding Hose (male nipple at one end fits quick disconnect coupler; 1/8″ male threaded fitting at other end fits housing outlet)	GTP-111O
Bypass Hose (use in GTP-172 only)	GTP-301
Bypass Tee with check valve (use in GTP-172 only)	GTP-302C
Bypass Quick Disconnect	GTP-1250
Instruction Booklet	84-101
Carrying Case	GTP-303

8. Related Literature - write to us requesting copies. Aircraft Fuel Sampling Equipment (Bulletin 68-3) describes sampling kits for permanent installation.

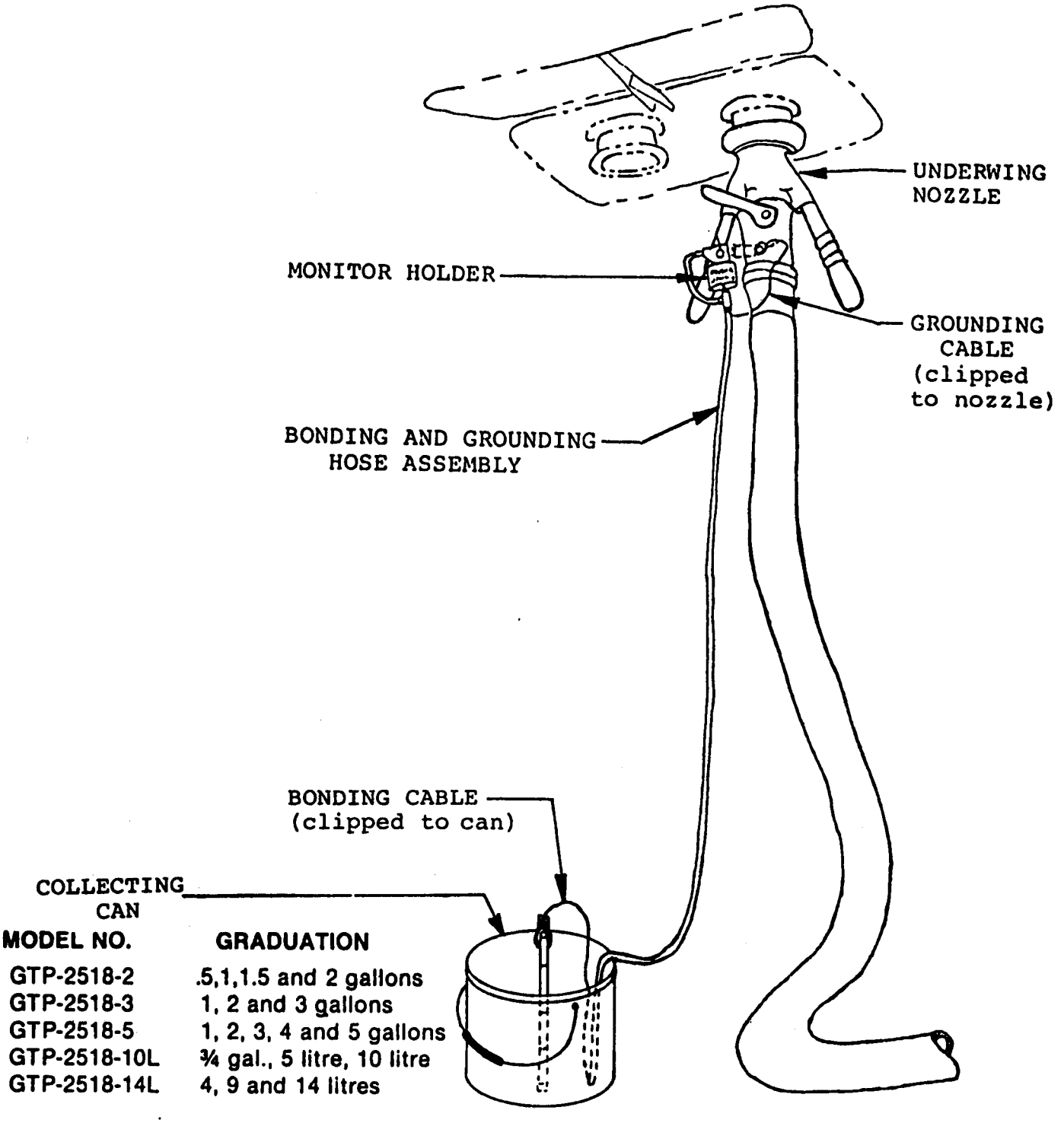
   Jet Test QD Coupler (Bulletin 70-14) - a miniature quick disconnect suitable for permanent installation on fueling nozzles. Use for performing contamination tests, Aqua-Glo tests and for checking fuel pressure.

   Aqua-Glo Series III Water Detector Kit (Bulletin 82-86) - A highly accurate, fast test for water in aviation fuels -- measures from 1 to 60 ppm.

   Teflon Pipe Thread Sealant Tape (Bulletin 68-6) - To seal sample connection pipe threads.

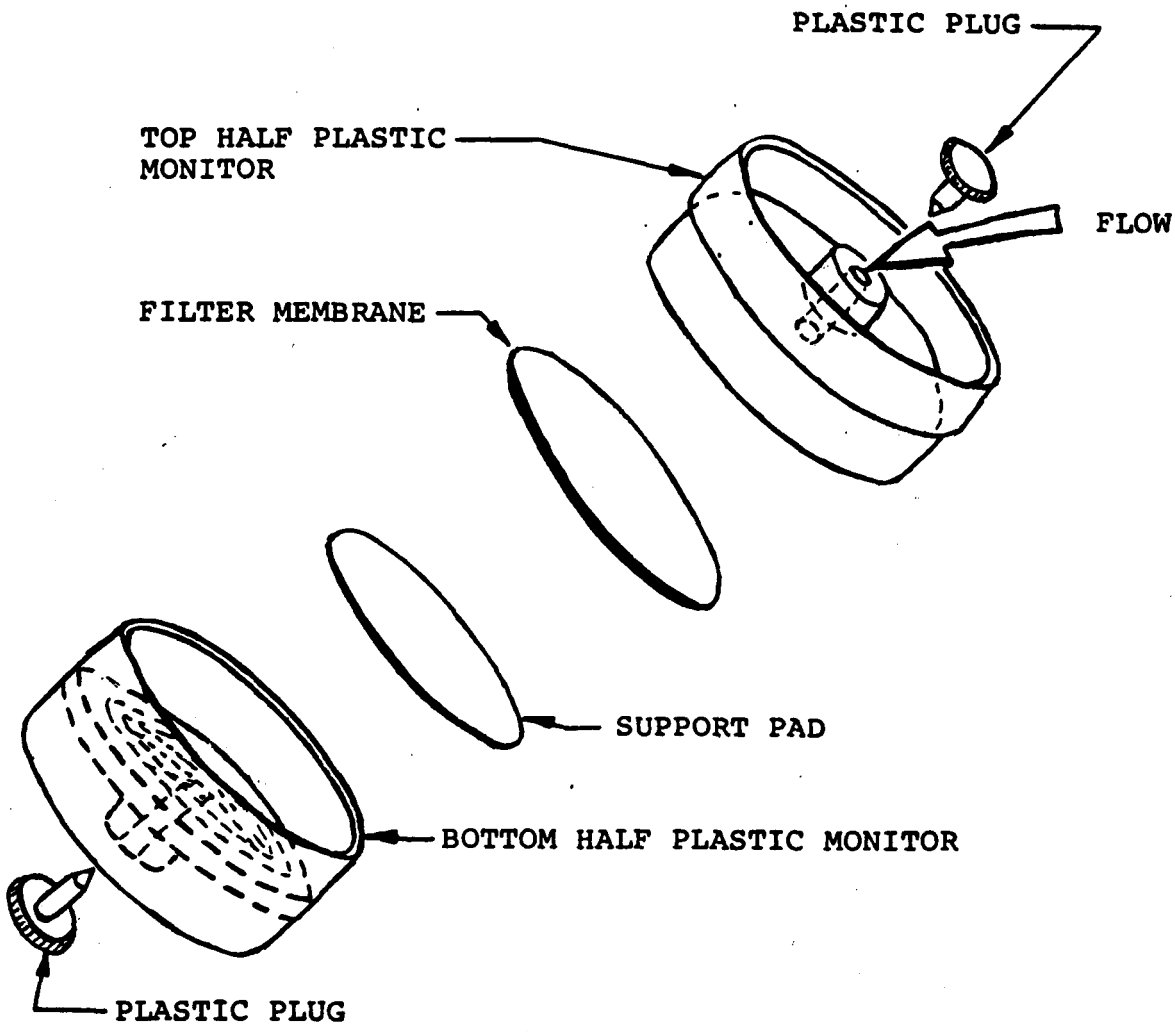


MINI MONITOR ASSEMBLY



MODEL NO.	GRADUATION
GTP-2518-2	.5,1,1.5 and 2 gallons
GTP-2518-3	1, 2 and 3 gallons
GTP-2518-5	1, 2, 3, 4 and 5 gallons
GTP-2518-10L	¾ gal., 5 litre, 10 litre
GTP-2518-14L	4, 9 and 14 litres

TYPICAL TEST EQUIPMENT SET UP
FOR SAMPLING DURING
FUELING OPERATION



FIELD MONITOR ASSEMBLY

APPENDIX A

REFERENCES

A-1. **Scope.** This appendix contains all forms, pamphlets and technical manuals referenced in both the Air mobile and Semitrailer mounted Laboratories.

A-2. **Forms.**

Recommended Changes to Publications . . . . . DA Form 2028
DA Form 2028-2
Quality Deficiency Report . . . . . SF 368
Equipment Inspection and Maintenance Work Sheet . . . . . DA Form 2404
Hand Receipts . . . . . DA Form 2062

A-3. **Field Manuals.**

Petroleum Testing Facilities:
Laboratories and Kits FM10-72
Inspecting and Testing Petroleum Products . . . . . FM 10-70
ASTM Test Method Supplement to . . . . . FM 10-92C1/C2

A-4. **Technical Manuals.**

Atlas-Copco Compressor . . . . . TM 10-4310-392-13&P
Alcor Jet Fuel Thermal Oxidation Tester Operating
and Maintenance Manual . . . . . TM 10-6635-210-13&P
Bacharach Gas Alarm and Calibration Data . . . . . TM 10-6665-297-13&P
Brother Portable Typewriter . . . . . TM 10-7430-218-13&P
Chemtrix Field Ph Meter . . . . . TM 10-6630-237-13&P
Elkay Manufacturing 30 GPH Cooler . . . . . TM 10-4130-240-13&P
Emcee Micro-Separometer . . . . . TM 10-6640-222-13&P
Foxboro Pressure Recording Gauge . . . . . TM 10-6685-365-13&P
Gammon Aqua Glo Water Detector . . . . . TM 10-6640-221-13&P
Gammon Mini Monitor Fuel Sampling Kit . . . . . TM 10-6630-230-13&P
Jelrus Burn–Out Furnace . . . . . TM 10-6640-231-13&P
Koehler Cleveland Open Tester . . . . . TM 10-6630-236-13&P
Koehler Cloud and Pour Point Chamber . . . . . TM 10-6630-238-13&P
Koehler Copper Strip Corrosion Bomb Bath . . . . . TM 10-6640-220-13&P
Koehler Distillation Apparatus . . . . . TM 10-6630-233-13&P
Koehler Dropping Point Apparatus . . . . . TM 10-6635-211-13&P
Koehler Electric Pensky-Martins Tester . . . . . TM 10-6630-231-13&P
Koehler Foaming Characteristics Determination Apparatus . . . . . TM 10-6640-228-13&P
Koehler Kinematic Viscosity Bath . . . . . TM 10-6630-239-13&P
Koehler Tag Closed Cup Flash Tester . . . . . TM 10-6630-235-13&P
Lab-Line Explosion Proof Refrigerator . . . . . TM 10-6640-219-13&P
Lily Freezer . . . . . TM 10-6640-234-13&P
Millipore OM 39 Filter Holder . . . . . TM 10-6640-225-13&P
Millipore Vacuum Pump . . . . . TM 10-6640-217-13&P
Ohaus Harvard Trip Balance . . . . . TM 10-6670-278-13&P
Precision Gas-Oil Distillation Test Equipment . . . . . TM 10-6630-219-13&P
Precision General Purpose Water Bath . . . . . TM 10-6640-229-13&P

Precision High Temperature Bronze Block Gum Bath . . . . . TM 10-6630-234-13&P
Precision General Purpose Ovens . . . . . TM 10-6640-218-13&P
Precision Heater Instruction Manual and Parts List . . . . . TM 10-6640-223-13&P
Precision Oxidation Stability Bath . . . . . TM 10-6640-232-13&P
Precision Pensky-Martens Flash Testers . . . . . TM 10-6630-231-13&P
Precision Reid Vapor Pressure Bath . . . . . TM 10-6640-226-13&P
Precision Slo-Speed Stirrer . . . . . TM 10-6640-224-13&P
Precision Universal Centrifuge . . . . . TM 10-6640-230-13&P
Precision Universal Penetrometer . . . . . TM 10-6640-228-13&P
Sargent-Welch Vacuum Pump . . . . . TM 10-4310-391-13&P
Sartorious Analytical Balance . . . . . TM 10-6670-277-13&P
Scotsman Cuber . . . . . TM 10-6640-227-13&P
Soltec VOM-Multimeter . . . . . TM 10-6625-3127-13&P
Teel Self-Priming Centrifugal Pump . . . . . TM 10-6640-217-13&P
Teel Submersible Pump . . . . . TM 10-4320-320-13&P
Texas Instrument TI-503011 Calculator . . . . . TM 10-7420-210-13&P

A-5. **Pamphlets.**

The Army Maintenance Management System (TAMMS) . . . . . DA Pam 738-750

A-6. **Miscellaneous Publications.**

The Army Integrated Publishing and Printing Program . . . . . AR 25-30
Laboratory, Airmobile, Aviation Fuel . . . . . MIL-L-52733A(ME)
Apparatus, instruments, Chemicals, Furniture, and Supplies for Industrial,
Clinical, College and Government Laboratories . . . . . Fisher Scientific Laboratories Catalog
Petroleum-Petrochemical Testing Equipment . . . . . Precision Scientific Catalog

APPENDIX B

MAINTENANCE ALLOCATION CHART

Section I. INTRODUCTION

B-1 . **General.**

a. This section provides a general explanation of all maintenance and repair functions authorized at various maintenance categories.

b. The Maintenance Allocation Chart (MAC) in Section II 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 categories.

c. Section Ill lists the tools and test equipment (both special tools and common tool sets) required for each maintenance function as referenced from Section II.

d. Section IV contains supplemental instructions and explanatory notes for a particular maintenance function.

B-2. **Maintenance Functions.** Maintenance functions will be limited to and defined as follows:

a. *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).

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

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

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

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

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

g. *Remove/Install.* To remove and install the same item when required to perform service or other maintenance functions. Install may be the act of emplacing, 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.

h. Replace. To remove an unserviceable item and install a serviceable counterpart in its place. “Replace” is authorized by the MAC and is shown as the third position code of the SMR code.

i. *Repair.* The application of maintenance services, [1] including fault location/troubleshooting, [2] removal/installation, and disassembly/assembly procedures, [3] and maintenance actions, [4] 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.

j. *Overhaul.* That maintenance effort (service/action) prescribed to restore an item to a completely serviceable/operational condition as required by maintenance standards in appropriate technical publications (i.e, DMWR). Overhaul is normally the highest degree of maintenance performed by the Army. Overhaul does not normally return an item to like-new condition.

k. *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.

B-3. Explanation Of Columns In The MAC, Section II.

a. *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. End item group number shall be "00."

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

c. *Column 3. Maintenance Function.* Column 3 lists the functions to be performed on the item listed in column 2. (For a detailed explanation of these functions, see paragraph B-2.)

d. *Column 4. Maintenance Category.* Column 4 specifies, by the listing of a work time figure in the appropriate subcolumn(s), the category of maintenance authorized to perform the function listed in column 3. This figure represents the active time required to perform that maintenance function at the indicated category of maintenance. If the number or complexity of the tasks within the listed maintenance function vary at different maintenance categories, appropriate work time figures will be shown for each category. The work time figure represents the average time required to restore an item (assembly, subassembly, component, module, end item, or system) 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/quality control time in addition to the time required to perform the specific tasks identified for the maintenance functions authorized in the maintenance allocation chart, The symbol designations for the various maintenance categories are as follows:

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1 *Services – inspect, test, service, adjust, align, calibrate, and/or replace.*

2 *Fault locate/troubleshoot – the process of investigating and detecting the cause of equipment malfunctioning; the act of isolating a fault within a system or unit under test (UUT).*

3 *Disassemble/assemble – encompasses the step–by–step taking apart (or breakdown) of a spare/functional group coded item to the level of its least componency identified as maintenance significant (i.e., assigned an SMR code) for the category of maintenance under consideration.*

4 *Actions – welding, grinding, riveting, straightening, facing, remachining, and/or resurfacing.*

C .. . . Operator/Crew
O . . . . . Unit Maintenance
F . . . . . Direct Support Maintenance
H . . . . . General Support Maintenance
D . . . . . Depot Maintenance

e. *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.

f. *Column 6. Remarks.* This column shall, when applicable, contain a letter code, in alphabetic order, which shall be keyed to the remarks contained in section IV.

B-4. **Explanation Of Columns In Tool And Test Equipment Requirements, Section III.**

a. *Column I. Reference Code.* The tool and test equipment reference code correlates with a code used in the MAC, section II, column 5.

b. *Column 2. Maintenance Category.* The lowest category of maintenance authorized to use the tool or test equipment.

c. *Column 3. Nomenclature.* Name or identification of the tool or test equipment.

d. *Column 4. National Stock Number.* The National stock number of the tool or test equipment.

e. *Column 5. Tool Number.* The manufacturer's part number.

B-5. **Explanation Of Columns In Remarks, Section IV.**

a. *Column I. Reference Code.* The code recorded in column 6, Section II.

b. *Column 2. Remarks.* This column lists information pertinent to the maintenance function being performed as indicated in the MAC, section II.

Section II. MAINTENANCE ALLOCATION CHART

(1) GROUP NUMBER	(2) COMPONENT/ ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE LEVEL					(5) TOOLS AND EQUIPMENT	(6) REMARKS
			UNIT		DS	GS	DEPOT		
			C	O	F	H	D		
01	MINI MONITOR FUEL SAMPLING KIT (AIRCRAFT)	INSPECT REPLACE REPAIR	0.2	 0.2 0.2				1	A

Section III. TOOL AND TEST EQUIPMENT REQUIREMENTS FOR MAINTENANCE ALLOCATION CHART

(1) TOOL/TEST EQUIP. REF CODE	(2) MAINTENANCE CATEGORY	(3) NOMENCLATURE	(4) NSN	(5) TOOL NUMBER
1	O	TOOL KIT, GENERAL KIT,GENERAL AUTOMOTIVE	5180–00–177–7033	(50980) SC 5180–90–CL–N26

Section IV. REMARKS

REFERENCE CODE	REMARKS
A	Repair is limited to the replacement of parts.

APPENDIX C

COMPONENTS OF END ITEM AND BASIC ISSUE ITEMS LISTS

Section I. INTRODUCTION

C-1. Scope.

This appendix lists components of end item and basic issue items for the Mini Monitor Fuel Sampling Kit to help you inventory items required for safe and efficient operation.

C-2. General.

The Components of End item and Basic Issue Items Lists are divided into the following sections:

a. *Section II. Components of End Item.* This listing is for informational purposes only, and is not authority to requisition replacements. These items are part of the end item, but are removed and separately packaged for transportation or shipment. As part of the end item, these items must be with the end item whenever it is issued or transferred between property accounts. Illustrations are furnished to assist you in identifying the items.

b. *Section III. Basic Issue Items.* These are the minimum essential items required to place the Mini Monitor Fuel Sampling Kit in operation, to operate it, and to perform emergency repairs. Although shipped separately packaged, Bll must be with the shelter during operation and whenever it is transferred between property accounts. The illustrations will assist you with hard-to-identify items. This manual is your authority to request/requisition replacement Bll, based on TOE/MTOE authorization of the end item.

C-3. Explanation of Columns.

The following provides an explanation of columns found in the tabular listings:

a. Column (1) - Illustration Number (Illus Number). This column indicates the number of the illustration in which the item is shown.

b. Column (2) - National Stock Number. Indicates the National stock number assigned to the item and will be used for requisitioning purposes.

c. Column (3) - Description. Indicates the Federal item name and, if required, a minimum description to identify and locate the item. The last line for each item indicates the CAGEC (in parentheses) followed by the part number.

d. *Column (4) - Unit of Measure (U/M).* Indicates the measure used in performing the actual operational/maintenance function. This measure is expressed by a two-character alphabetical abbreviation (e.g., ea, in, pr).

e. Column (5) - Quantity required (QTY RQR). Indicates the quantity of the item authorized to be used with/on the equipment.

SECTION II. COMPONENTS OF END ITEM

(1) ILLUS	(2) NATIONAL STOCK NUMBER	(3) DESCRIPTION CAGEC AND PART NUMBER	USABLE ON CODE	(4) U/M	(5) QTY
	8125-00-174-0852	BOTTLE, SCREW CAP: PLYETHYLENE; RD; COLORLESS; 6 IN. DIA;GAL; W/PLASTIC CAP FOR STD NECK; MIL-B-26701		EA	2
	5999-00-549-0997	CLIP, ELECTRICAL: .31 IN.ALLIGATOR JAW OPENING; INSULATED 2.38 IN. LG;RED; 1 SCREW TYPE;W-C-440, TYPE CCI		EA	10
	6640-00-244-9478	DETECTOR KIT,AUTOMOTIVE-AVIATION FUEL WATER AND SOLID CONTAMINATION; W/W COUPLER QUICK DISCONNECT: 1/4 IN. INTERNAL 4730-00-978-8760 (32218)GTP 323 III SERIES III		EA	1
	6640-00-688-7882	DISPENSER, FILTERING SOLVENT: FOR ASTM TEST D-2276;(08071) XX602500		EA	2
	6640-00-522-1885	FILTER ASSEMBLY FOR ASTM TEST D-2276; (08071) NO.XX60-000-01		AY	1
	6640-00--522-1883	FILTER ASSEMBLY FOR ASTM TEST D-2276; (08071) NO.XX60-000-02		AY	1
	6630-00-764-5761	FILTER UNIT,CONTAMINATION ANALYSIS: (08071) MAWP037PM		PG	1

SECTION III. BASIC ISSUE ITEMS

(1) ILLUS	(2) NATIONAL STOCK NUMBER	(3) DESCRIPTION CAGEC AND PART NUMBER	USABLE ON CODE	(4) U/M	(5) QTY
	5120-00-240-5328	WRENCH, OPEN END ADJUSTABLE: SINGLE HEAD; GGG-W-631, TYPE 1, CLASS 1; 0 TO 5/16 IN. JAW OPENING; 8 IN.LG		EA	1

APPENDIX D

ADDITIONAL AUTHORIZATION LIST

NOT APPLICABLE

APPENDIX E

EXPENDABLE/DURABLE SUPPLIES AND MATERIALS LIST

Section I. INTRODUCTION

E-1. **Scope.** This listing is for informational purposes 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).

E-2. **Explanation of Columns.**

a. *Column (1) - Item Number.* This number is assigned to the entry in the listing and is referenced in the narrative instructions to identify the material (e.g., Use cleaning compound, item 5, appendix C).

b. *Column (2) - Level.* This column identifies the lowest level of maintenance that requires the listed item.

C - Operator/Crew
O - Unit Maintenance
F - Direct Support Maintenance
H - General Support Maintenance

c. *Column (3) - Nationa/ Stock Number.* This is the National stock number assigned to the item; use it to request or requisition the item.

d. *Column (4) - Description.* Indicates the Federal item name, and, if required, a description to identify the item. The last line for each item indicates the Commercial and Government Entity Code (CAGEC) in parentheses followed by the part number.

e. *Column (5) - Unit of Measure (U/M).* Indicates the measure used in performing the actual maintenance function. This measure is expressed by a two-character alphabetical abbreviation (e.g., EA, IN, PR), If the unit of measure differs from the unit of issue, requisition the lowest unit of issue that will satisfy your requirements.

Section II. EXPENDABLE/DURABLE SUPPLIES AND MATERIALS LIST

(1) Item Number	(2) Level	(3) National Stock Number	(4) Description	(5) U/M
	C	6810–00–753–4990	PETROLEUM ETHER, ACS: LIQUID; 30 INITIAL TEMP; 60 FINAL TEMP; 90% MIN DISTILLED; 1 PT BOTTLE; MIL–STD–1218; O–C–265	PT
	C	61	WIRE, ELECTRICAL: COPPER; SOFT MATERIAL; SOLID CONDUCTOR; RD NO. 16 AWG; UNCOATED; 875.2 OHMS PER MILE–1 20°C; QQ–w–343, TYPE S	LB

By Order of the Secretary of the Army:

CARL E. VUONO
General, United States Army
Chief of Staff

Official:

THOMAS F. SIKORA
Brigadier General, United States Army
The Adjutant General

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RECOMMENDED CHANGES TO EQUIPMENT TECHNICAL PUBLICATIONS

SOMETHING WRONG WITH THIS PUBLICATION?

FROM: (PRINT YOUR UNIT'S COMPLETE ADDRESS)
PFC JOHN DOE
COA, 3d ENGINEER BN
FT. LEONARDWOOD, MO 63108

DATE SENT

PUBLICATION NUMBER	PUBLICATION DATE	PUBLICATION TITLE
TM 10-6630-230-13&P	28 Sep 1990	Gammon Mini-Monitor Fuel Sampling Kit

BE EXACT PIN-POINT WHERE IT IS

PAGE NO	PARAGRAPH	FIGURE NO	TABLE NO
6	2-1 a		
B1		4-3	
125	line 20		

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

In line 6 of paragraph 2-1a the manual states the engine has 6 Cylenders. The engine on my set only has 4 Cylenders. Change the manual to show 4 Cylenders.

Callout 16 on figure 4-3 is pointing at a bolt. In key to figure 4-3, item 16 is called a shim - Please correct one or the Other.

I ordered a gasket, item 19 on figure B-16 by NSN 2910-00-762-3001. I got a gasket but it doesn't fit. Supply says I got what I ordered, so the NSN is wrong. Please give me a good NSN

PRINTED NAME, GRADE OR TITLE, AND TELEPHONE NUMBER
JOHN DOE, PFC (268) 317-7111

SIGN HERE John Doe
JOHN DOE

DA FORM 1 JUL 79 2028-2

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DRSTS-M Overprint 1, 1 Nov 80

P.S.--IF YOUR OUTFIT WANTS TO KNOW ABOUT YOUR RECOMMENDATION MAKE A CARBON COPY OF THIS AND GIVE IT TO YOUR HEADQUARTERS.

TEAR ALONG PERFORATED LINE

REVERSE OF DA FORM 2028-2
REVERSE OF DRSTS-M OVERPRINT 2,
1 NOV 80

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FILL IN YOUR
UNIT'S ADDRESS

FOLD BACK

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OFFICIAL BUSINESS

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U.S. ARMY TROOP SUPPORT COMMAND
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4300 GOODFELLOW BOULEVARD
ST. LOUIS, MO 63120-1798

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The Metric System and Equivalents

Linear Measure

.entimeter = 10 millimeters = .39 inch
1 decimeter = 10 centimeters = 3.94 inches
1 meter = 10 decimeters = 39.37 inches
1 dekameter = 10 meters = 32.8 feet
1 hectometer = 10 dekameters = 328.08 feet
1 kilometer = 10 hectometers = 3,280.8 feet

Weights

1 centigram = 10 milligrams = .15 grain
1 decigram = 10 centigrams = 1.54 grains
1 gram = 10 decigram = .035 ounce
1 dekagram = 10 grams = .35 ounce
1 hectogram = 10 dekagrams = 3.52 ounces
1 kilogram = 10 hectograms = 2.2 pounds
1 quintal = 100 kilograms = 220.46 pounds
1 metric ton = 10 quintals = 1.1 short tons

Liquid Measure

1 centiliter = 10 milliters = .34 fl. ounce
1 deciliter = 10 centiliters = 3.38 fl. ounces
1 liter = 10 deciliters = 33.81 fl. ounces
1 dekaliter = 10 liters = 2.64 gallons
1 hectoliter = 10 dekaliters = 26.42 gallons
1 kiloliter = 10 hectoliters = 264.18 gallons

Square Measure

1 sq. centimeter = 100 sq. millimeters = .155 sq. inch
1 sq. decimeter = 100 sq. centimeters = 15.5 sq. inches
1 sq. meter (centare) = 100 sq. decimeters = 10.76 sq. feet
1 sq. dekameter (are) = 100 sq. meters = 1,076.4 sq. feet
1 sq. hectometer (hectare) = 100 sq. dekameters = 2.47 acres
1 sq. kilometer = 100 sq. hectometers = .386 sq. mile

Cubic Measure

1 cu. centimeter = 1000 cu. millimeters = .06 cu. inch
1 cu. decimeter = 1000 cu. centimeters = 61.02 cu. inches
1 cu. meter = 1000 cu. decimeters = 35.31 cu. feet

Approximate Conversion Factors

To change	*To*	*Multiply by*	*To change*	*To*	*Multiply by*
inches	centimeters	2.540	ounce-inches	newton-meters	.007062
feet	meters	.305	centimeters	inches	.394
yards	meters	.914	meters	feet	3.280
miles	kilometers	1.609	meters	yards	1.094
square inches	square centimeters	6.451	kilometers	miles	.621
square feet	square meters	.093	square centimeters	square inches	.155
square yards	square meters	.836	square meters	square feet	10.764
square miles	square kilometers	2.590	square meters	square yards	1.196
acres	square hectometers	.405	square kilometers	square miles	.386
cubic feet	cubic meters	.028	square hectometers	acres	2.471
cubic yards	cubic meters	.765	cubic meters	cubic feet	35.315
fluid ounces	milliliters	29,573	cubic meters	cubic yards	1.308
pints	liters	.473	milliliters	fluid ounces	.034
quarts	liters	.946	liters	pints	2.113
gallons	liters	3.785	liters	quarts	1.057
ounces	grams	28.349	liters	gallons	.264
pounds	kilograms	.454	grams	ounces	.035
short tons	metric tons	.907	kilograms	pounds	2.205
pound-feet	newton-meters	1.356	metric tons	short tons	1.102
pound-inches	newton-meters	.11296			

Temperature (Exact)

°F	Fahrenheit temperature	5/9 (after subtracting 32)	Celsius temperature	°C