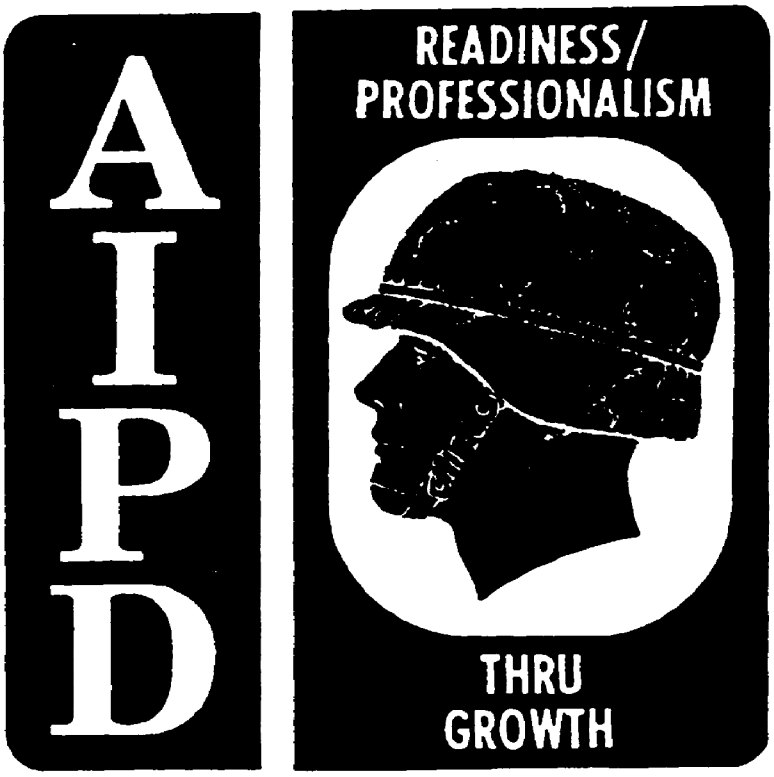
SUBCOURSE
QM5086

EDITION
2

VERIFY INSTALLATION OR COMMAND PETROLEUM REQUIREMENTS



THE ARMY INSTITUTE FOR PROFESSIONAL DEVELOPMENT

ARMY CORRESPONDENCE COURSE PROGRAM

VERIFY INSTALLATION OR COMMAND PETROLEUM REQUIREMENTS
(101-519-5102)

Subcourse QM 5086
Edition 2

2 Credit Hours

United States Army Combined Arms Support Command
Fort Lee, VA 23801-1809

CONTENTS

INTRODUCTION

This subcourse is designed to train a 76W50 soldier on how to verify installation or command petroleum requirements. We will cover each part of the text and what your responsibilities are when verifying installation or command petroleum requirements.

Supplementary Training Materials Provided: None.

Material to be Provided by Unit Supervisor: None.

Two credit hours will be awarded for successful completion of this subcourse.

LESSON

TASK: 101-519-5102. Verify Installation or Command Petroleum Requirements. As a result of successful completion of this subcourse, you will be able to perform the following performance measures:

1. Confirm petroleum requirements submitted.

2. Reallocate petroleum products according to command policies to meet operational requirements of the supported units.

CONDITIONS: You are assigned to a joint petroleum office. You know the operational requirements of supported units. The petroleum requirements have been received and you must verify them.

STANDARD: You must answer 70 percent of the written exam questions correctly to receive credit for this subcourse.

CREDIT HOURS: See page ii, Introduction.

REFERENCE: FM 101-10-1, Staff Officers' Field Manual: Organizational, Technical, Unclassified Data and Logistical Data, chapter 3.

LESSON TEXT

1. ESTIMATING BILK PETROLEUM REQUIREMENTS. There are several methods used to compute bulk petroleum requirements. A unit may have used any one of these methods in preparing its petroleum requirements. Your job is to verify these petroleum requirement submissions.

2. UNIT HISTORICAL DATA. The most accurate method of estimating petroleum requirements is based on unit historical data which reflects the variables of weather, terrain, organizational strength, and operational vehicles and equipment. This data can be obtained from past moves, the Army Maintenance Management System (TAMMS) information, and other sources.

3. DATA IN FM 101-10-1. If unit historical data is not available, requirements can be determined using data in FM 101-10-1. This data is based on experience in World War II, the Korean War, and Vietnam, and has been validated to the greatest extent possible, using subsequent experience, such as data from the 1973 Mideast War, and gaming and simulation models. While the planning data in FM 101-10-1 is the best available, this computation method is still not as accurate as unit historical data.

4. GALLONS PER MAN PER DAY. The gallons-per-man-per-day method of estimating petroleum requirements is used in the early planning stages when information is not available on the numbers and types of vehicles. Because organizational composition varies, this method is never used below corps level; however, once the figure is established for a given theater, it may be used for requisitioning purposes by smaller units. The gallons-per-man-per-day method is to be used only as a guide and not as a substitute for more exact computation. The consumption in gallons-per-man-per-day in various theaters varies with terrain, climate, ratio of land to amphibious operations, and the number of units using special vehicles and equipment.

5. EQUIPMENT CONSUMPTION DATA. FM 101-10-1 provides consumption data for various types of Army equipment, including aircraft, vehicles, and generators. Extracts of the tables containing this data appear on the following pages as figures 1 through 6. The data may be used at unit level for determining both bulk and packaged requirements. Equipment density by type is required when using this method. Although this method is considerably more accurate than the gallons-per-man-per-day method, it is not as accurate as using unit historical data.

a. Table 3-15, Army Aircraft-Fuel Data. Aviation fuel requirements (fig. 1) are computed separately for each type aircraft. The formula is:

$$\text{Gal. required} = \frac{N \times gph \times dist}{speed}$$

where: N = number of aircraft by type
gph = gallons of fuel consumed each hour by 1 aircraft (RATE)
dist = miles to be flown by 1 aircraft
speed = average flight speed in knots

LIN	NSN	Description	Fuel	Rate (GPH)
A30053	1510-00-929-1012	Airplane, flight trainer: T-41B	AVGAS	6.10
A30221	1510-00-715-9379	Airplane, observation, STOL: OV-1B	JP-4	190.00
A30271	1510-00-715-9380	Airplane, observation, STOL: OV-1C	JP-4	190.30
A30296	1510-00-869-3654	Airplane, observation, STOL: OV-1D	JP-4	190.30
A30465	1510-00-945-9998	Airplane, reconnaissance, util: RU-8D	AVGAS	31.43
A30585	1510-00-804-3641	Airplane, reconnaissance, util: RU-21D	JP-4	80.00
A30586	1510-00-453-9451	Airplane, reconnaissance, util: RU-21E	JP-4	80.00
A30596	1510-00-872-7908	Airplane, trainer: instrument T-42A	AVGAS	27.60
A30721	1510-00-574-7938	Airplane, utility: U-8D	AVGAS	31.43
A30821	1510-00-701-2233	Airplane, utility: U-8F	AVGAS	30.00
A30831	1510-00-912-4084	Airplane, utility: U-8G	AVGAS	31.43
A30946	1510-00-933-8223	Airplane, utility: U-21A	JP-4	80.00
A30953	1510-00-140-1627	Airplane, utility: U-21G	JP-4	107.00
A30971	1510-00-964-9780	Airplane, utility: U-10A	AVGAS	17.00
K29660	1520-00-999-9821	Helicopter, attack: AH-1G	JP-4	97.00
K29762	1520-00-804-3635	Helicopter, attack, trainer: TH-1G	JP-4	97.00
K30378	1520-00-633-6836	Helicopter, cargo, transport: CH-47A	JP-4	452.00
K30383	1520-00-990-2941	Helicopter, cargo, transport: CH-47B	JP-4	452.00
K30449	1520-00-871-7308	Helicopter, cargo, transport: CH-47C	JP-4	450.00
K30515	1520-00-964-9601	Helicopter, cargo, transport: CH-54A	JP-4	470.00
K30516	1520-00-113-5776	Helicopter, cargo, transport: CH-54B	JP-4	445.00
K30645	1520-00-918-1523	Helicopter, observation: OH-6A	JP-4	29.00
K31042	1520-00-169-7137	Helicopter, observation: OH-58A	JP-4	29.00
K31153	1520-00-758-0289	Helicopter, primary, trainer: TH-55A	AVGAS	10.00
K31759	1520-00-713-9912	Helicopter, utility: UH-1B	JP-4	97.00
K31767	1520-00-997-8862	Helicopter, utility: UH-1C	JP-4	97.00
K31786	1520-00-859-2670	Helicopter, utility: UH-1D	JP-4	97.00
K31795	1520-00-087-7637	Helicopter, utility: UH-1H	JP-4	97.00
K31804	1520-00-809-2631	Helicopter, utility: UH-1M	JP-4	97.00

Figure 1. Table 3-15 Aircraft

For example, if 3 CH-47C (Chinook) helicopters were going to fly 250 nautical miles at an average cruising speed of 129 knots, the total fuel required would be:

$$\frac{3 \times 450 \times 250}{129} = 2616.28 \text{ gallons of JP-4.}$$

b. Table 3-14, Vehicles and Vehicular Equipment. Fuel requirements for the equipment listed in table 3-14 (fig. 2) are computed using this formula:

Gal required = dist X gpk X N

where: dist = distance in kilometers vehicles will move
gpk = gallons per kilometer (RATE)
N = number of vehicles

Note: 1 mile equals 1.6 kilometers.

When multifuel equipment is used, requirements are based on the data given for diesel fuel.

For example, if 3 1/4 ton ambulances and 2 light armored cars were going to travel 100 kilometers, the total fuel required would be:

(100 X .031 X 3) + (100 X .181 X 2)
= 9.3 + 36.2
= 45.5 gallons of MOGAS

c. Table 3-6, Watercraft and Amphibious Equipment, Table 3-7, Construction Equipment, Table 3-8, Generators, and Table 3-11, Stationary Equipment. Fuel requirements for the equipment listed in these four tables (figs. 3 through 6) are computed by the following formula:

Gal required = t X gph X N

where: t = time in hours equipment will operate
gph = gallons of fuel consumed each hour (RATE)
N = number of pieces of equipment

LIN	NSN	Description	Fuel	Rate
D06124	2320-00-163-2620	Car, armored: light, 4 x 4, WE	G	K00.181
D09579	2320-00-593-9608	Cargo, transporter, off-road, train: high mobility, 45 ton cap	D	K00.469
D14593	6675-00-526-4719	Cartographic section topographic mapping set, trk mtd: (Army)	D	K00.106
F13075	6675-00-526-4824	Copy and supply section topographic mapping set: trk mtd (Army)	D	K00.190
L45534	All NSN	Launcher, rocket: 762-mm trk mtd WE (Honest John)	G	K00.156
M07888	3610-00-294-7830	Map layout section topo repro set, trk mtd: 190-in wheelbase (Army)	D	K00.106
M08025	6675-00-526-4788	Map revision section topographic mapping set, trk mtd: (Army)	D	K00.106
M83242	6675-00-526-4836	Multiplex section topographic mapping set, trk mtd: (Army)	D	K00.106
N87460	6675-00-526-4631	Photomapping section topographic mapping set, trk mtd: (Army)	D	K00.106
N87960	3610-00-691-1707	Photomechanical process section topo repro set, trk mtd: (Army)	D	K00.106
P03804	3610-00-294-7829	Plate process section topographic repro set, trk mtd: (Army)	D	K00.106
P50041	3610-00-204-3137	Press section topographic repro set, trk mtd: (Army)	D	K00.106
R52776	6675-00-526-4629	Rectifier section topographic mapping set, trk mtd: (Army)	D	K00.106
U68809	6675-00-649-8273	Surveying control section, trk mtd: (Army)	D	K00.106
X38839	All NSN	Truck, ambulance: ¼ ton, 4 x 4, WE	G	K00.031
X38776	All NSN	Truck, ambulance: ¾ ton, 4 x 4, WE	G	K00.062
X38913	2310-00-835-8517	Truck, ambulance: ¾ ton, 4 x 4, w/winch, WE	G	K00.062
X38951	2310-00-921-6369	Truck, ambulance: 1¼ ton, 4 x 4, WE	G	K00.075
X38961	2310-00-832-9907	Truck, ambulance: 1¼ ton, 6 x 6, WE	D	K00.062
X39050	2320-00-937-0840	Truck, bolster: 2½ ton, 6 x 6, w/winch WE	G	K00.100
X39187	All NSN	Truck, bolster: 5 ton, 6 x 6, w/winch, WE	D	K00.113
X39461	All NSN	Truck, cgo: ¼ ton, 4 x 4, 5,000 GVW	G	K00.050
X39598	H 1201	Truck, cgo: ¾ to ¾ ton, 4 x 2, 3,500–5,800 GVW	G	K00.069
X39735	All NSN	Truck, cgo: ¾ ton, 4 x 4, WE	G	K00.062
X39872	All NSN	Truck, cgo: ¾ ton, 4 x 4, w/winch, WE	G	K00.062
X29877	H 1205	Truck, cgo: 1 ton, 4 x 2, 7,000 GVW	G	K00.088
X39883	2320-00-921-6365	Truck, cgo: 1¼ ton, 4 x 4, WE	G	K00.075
X39906	2320-00-921-6466	Truck, cgo: 1¼ ton, 4 x 4, w/winch, WE	G	K00.075
X39940	2320-00-873-5407	Truck, cgo: 1¼ ton, 6 x 6, WE	D	K00.081
X40009	2320-00-077-1616	Truck, cgo: 2½ ton, 6 x 6, WE	G	K00.094
	2320-00-542-5633		D	K00.638
	2320-00-834-4507		G	K00.106
	2320-00-835-8463		G	K00.131
X40077	2320-00-926-0873	Truck, cgo: 2½ ton, dropside, 6 x 6, WE	D	K00.131
X40146	All NSN	Truck, cgo: 2½ ton, 6 x 6, w/winch, WE	D	K00.094
X40214	2320-00-926-0875	Truck, cgo: 2½ ton, 6 x 6, dropside, w/winch, WE	D	K00.131
X40263	2320-00-077-1618	Truck, cgo: 2½ ton, 6 x 6, XLWB, WE	D	K00.094
	2320-00-391-0569		G	K00.131
X40420	2320-00-077-1619	Truck, cgo: 2½ ton, 6 x 6, XLWB, w/winch, WE	D	K00.094
	2320-00-647-0505		G	K00.131
X40557	2320-00-200-1368	Truck, cgo: 2½ ton, 6 x 6, XLWB w/acq ant trans kit, WE	G	K00.131
X40694	2320-00-200-1369	Truck, cgo: 2½ ton, 6 x 6, XLWB w/winch, w/acq ant trans kit, WE	G	K00.131
X40794	All NSN	Truck, cgo: dropside, 5 ton, 6 x 6, WE	D	K00.131
X40831	2320-00-086-7481	Truck, cgo: 5 ton, 6 x 6, LWB WE	D	K00.118
	2320-00-835-8348		G	K00.225
	All others		D	K00.125
X40968	2320-00-086-7482	Truck, cgo: 5 ton, 6 x 6, LWB, w/winch	D	K00.118
	2320-00-835-8335		G	K00.225
	All others		D	K00.125
X41105	2320-00-073-8476	Truck, cgo: 5 ton, 6 x 6, XLWB WE	G	K00.144
	All others		D	K00.125
X41242	All NSN	Truck, cgo: 5 ton, 6 x 6, XLWB w/winch WE	D	K00.125
X41310	2320-00-903-0883	Truck, cgo: 5 ton, 8 x 8, WE	D	K00.169
X41327	2320-00-999-8414	Truck, cgo: 5 ton, 8 x 8, w/winch, WE	D	K00.169
X41653	2320-00-873-5422	Truck, cgo: 8 ton, 4 x 4, w/winch, WE	D	K00.300
X41790	2320-00-219-7340	Truck, cgo: 10 ton, 6 x 6, w/winch, WE	G	K00.413
	2320-00-740-0493		D	K00.206
X43297	2320-00-077-1643	Truck, dump: 2½ ton, 6 x 6, WE	D	K00.094
X43434	All NSN	Truck, dump: 2½ ton, 6 x 6, w/winch, WE	D	K00.094
X43708	2320-00-005-9262	Truck, dump: 5 ton, 6 x 6, WE	G	K00.144
	2320-00-835-8336		G	K00.144
	All others		D	K00.125
X43845	2320-00-055-9263	Truck, dump: 5-ton, 6 x 6, w/winch, WE	G	K00.144
	2320-00-835-8337		G	K00.225
	All others		D	K00.125
X44735	4210-00-236-8260	Truck, fire fighting: brush pumper, crash type, water and foam, 750 GPM	G	H05.000

Figure 2. Table 3-14 Wheeled Vehicles.

LIN	NSN	Description	Fuel	Rate
B31197	1930-00-375-2972	Barge, deck or liquid cgo, nonprop	D	H05.000
B31745	1935-00-375-2991	Barge, refrigerated, nonprop	D	H24.000
	1935-00-375-2990		D	H10.000
B83445	1940-00-272-6400	Boat, bridge erection, inboard eng, aluminum, gas driven, 19 ft long	G	H07.000
B83582	Gas models	Boat, bridge erection, inboard eng, aluminum, 27 ft long	G	H15.000
	1940-00-417-0526		D	H12.500
B83719	1925-00-593-9587	Boat, fire	D	H25.600
B83993	1940-00-268-9952	Boat, pax and cgo	D	H18.000
B84007	1940-00-109-3313	Boat, patrol, fiberglass w/o eng, 16 ft 7 in long	G	H03.330
B84130	All NSN	Boat, picket, 36 to 47 ft	D	H10.000
B84267	1940-00-294-2470	Boat, picket, 52 to 65 ft	D	H52.500
	1940-00-268-9955		D	H24.200
F35953	All NSN	Crane, barge, 60 ton	D	H20.000
F36090	All NSN	Crane, barge, 89 to 250 ton	D	H45.000
L36602	1905-00-153-6695	Landing craft, mech, 50 to 56 ft	D	H25.000
L36739	All NSN	Landing craft, mech, 69 ft	D	H35.000
L36876	1905-00-217-2293	Landing craft, util, 115 ft	D	H40.000
L67234	1930-00-710-5728	Lighter, amph, SP, 5 ton	D	H20.000
L67371	1930-00-710-5729	Lighter, amph, SP, 15 ton	D	H28.000
L67508	1930-00-392-2981	Lighter, SP, amph stl, 60 ton, 61 ft	D	H33.000
L67645	All NSN	Lighter, beach discharge	D	H65.000
N34334	All NSN	Outboard motor, gas, 25 BHP	G	H02.500
N90665	1945-00-999-7900	Pier, barge type, self-elevating, nonprop, stl, 150 ft long 60 ft wide	D	H12.000
N90785	1945-00-999-7899	Pier, barge type, self-elevating, nonprop, stl, 300 ft long 80 ft wide	D	H12.000
X70772	1925-00-375-3001	Tug, 200 to 440 HP	D	H11.200
	1925-00-651-5685		D	H25.600
X70909	1925-00-216-1848	Tug, 600 to 650 HP	D	H59.800
	1925-00-375-3002		D	H52.000
	1925-00-604-3442		D	H52.000
X70146	1925-00-216-1844	Tug, 1,200 to 1,530 HP	D	H12.445
	1925-00-216-1845		D	H12.445
	1925-00-375-3003		D	H25.000
Y00039	All NSN	Vessel, freight, supply	D	H49.700
Y00176	All NSN	Vessel, liquid, cargo	D	H49.700

Figure 3. Table 3-6. Watercraft and Amphibious Equipment.

LIN	NSN	Description	Fuel	Rate
S11616	3895-00-255-5054	Roller, motorized, gas, 3 whl, 10 ton, w/sprink	G	H05.000
	3895-00-965-0072		G	H03.750
	3895-00-997-6089		G	H03.750
S34508	All NSN	Saw, abrasive disc, masonry, gas driven, 18 in blade	G	H01.060
S37385	3220-00-837-9926	Saw, circular table, gas driven	G	H01.060
U11083	All NSN	Sprayer, insecticide, aircraft mtd	G	H00.250
U11426	3740-00-069-9002	Sprayer, insecticide, skd mtd, fog, gas driven, 40 GPH	G	H01.000
U12200	All NSN	Spreader, concrete, gas driven, 25 ft	G	H03.000
U58881	5420-00-877-8679	Spr superstructure transporter, MAB	D	H10.000
U76871	All NSN	Sweeper, rotary, towed, gas driven, 8 ft long 30 in diameter, adj brush	G	H03.000
W76268	All NSN	Tractor, ftrac, low speed, dsc lt dbp sectionalized, air transportable, w/ATT	D	H05.000
W76302	2420-00-434-5309	Tractor, whl ind, dsl driven, 5,089 dbp, w/backhoe, w/loader, scoop type	D	H07.000
W76336	2410-00-935-0714	Tractor, ftrac, low speed, dsl, lt dbp, w/buldoz scarif	D	H06.000
W76816	All NSN	Tractor, ftrac, low speed, dsl, mdm dbp, w/buldoz scarif winch	D	H06.000
W77364	2410-00-806-1851	Tractor, ftrac, low speed, dsl, hv dbp, w/buldoz scarif	D	H08.000
	2410-00-542-4882		D	H07.800
	2410-00-542-2338		D	H08.200
W80378	2410-00-926-0910	Tractor, ftrac, low speed, dsl, lt dbp, w/buldoz scarif, teth pc	D	H07.000
W80515	2410-00-542-4206	Tractor, ftrac, low speed, dsl, lt dbp, w/buldoz scarif, pcu hydraulic	D	H04.300
	2410-00-837-4224		D	H04.000
	2410-00-983-8024		D	H04.000
W80789	All NSN	Tractor, ftrac, low speed, dsl, mdm, w/angledozer scarif	D	H07.300
W83255	All NSN	Tractor, ftrac, low speed, dsl, mdm dbp, w/angledozer scarif winch	D	H07.300
W83529	2410-00-078-6484	Tractor, ftrac, low speed, dsl, mdm dbp, w/buldoz w/scarif ripper	D	H08.000
W90447	2420-00-902-3084	Tractor, whl ind, dsl driven, 24,000 dbp, w/buldoz w/backrip scarif	D	H08.000
W90790	All NSN	Tractor, whl ind, dsl driven, mdm dbp, w/buldoz w/backrip scarif	D	H10.000
W90927	2420-00-792-6183	Tractor, whl ind, dsl, lt dbp, w/buldoz scarif	D	H08.000
W91064	2420-00-806-0031	Tractor, whl ind, dsl, mdm bdp, w/buldoz scarif	D	H10.000
Y46234	3431-00-903-5647	Welding machine, arc, genr gas drvn, 300 AMP DC skid mtd, CC CP	G	H02.600
Y86199	2320-00-262-3984	Wrench, trk, gas eng, 1 cyl 36 39-3/8 42 56-1/2 60 63 66 in ga	G	H00.330
	2320-00-356-7427		G	H00.330
	2320-00-356-7427		G	H00.100

Figure 4. Table 3-7. Construction Equipment-CE.

LIN	NSN	Description	Fuel	Rate
J42685	6115-00-889-1212	Genr set, gas eng: 0.3 kw, AC 115V, 1 ph, 400 hz, DC 24 to 35V	G	H00.200
J42822	All NSN	Genr set, gas eng: 0.4 kw, AC, 1 ph, 400 cy, 115V, 0.08 kw, DC 28V, shock, PU 422U	G	H00.210
J42856	6115-00-940-7867	Genr set, gas eng: 0.5 kw, 28V, skid-shock, tac util	G	H00.250
J42959	All NSN	Genr set, gas eng: 0.5 kw, 60 cy, 1 ph, AC 120V, shock	G	H00.250
J42976	All NSN	Genr set, gas eng: 0.5 kw, 60 hz, 1 ph, AC 120/240V, shock mtd, tac util	G	H00.250
J43027	All NSN	Genr set, gas eng: 0.5 kw, 400 hz, 1 ph, AC 120/240V, skid shock, tac util	G	H00.250
J42333	6115-00-635-6636	Genr set, gas eng: 0.5 kw, 2 wire, DC 28V, shock	G	H00.250
J43918	All NSN	Genr set, gas eng: 1.5 kw, DC 28V, 2 wire, AC 120V, shock, tac util	G	H00.600
J44055	All NSN	Genr set, gas eng: 1.5 kw, DC 28V, shock, tac util	G	H00.600
J44123	6115-00-456-9790	Genr set, gas eng: 1.5 kw, 400 hz, AC 120/240 120/208V, 1 ph, shock, tac util	G	H00.540
J44329	6115-00-075-9123	Genr set, gas eng: 2 kw, DC 12V, shock	G	H00.700
J45493	6115-00-075-1638	Genr set, gas eng: 3 kw, AC 120V, 1 ph, 120/240 120/208V, 3 ph, 400 cy, skid	G	H00.840
J45699	All NSN	Genr set, gas eng: 3 kw, 60 hz, 1–3 ph, 120/240 120/208V, skid, tac util	G	H00.840
J45836	All NSN	Genr set, gas eng: 3 kw, 400 hz, 1–3 ph, AC 120/208/240V, tac util	G	H00.840
J46110	All NSN	Genr set, gas eng: 3 kw, DC 28V, skid-shock, tlr frame mtd, tac util	G	H00.840
J46252	6115-00-873-3915	Genr set, gas eng, tlr mtd: 3 kw, 60 hz, 2 ea mtd on M101 PU 625	G	H00.840
J46255	6115-00-087-0972	Genr set, gas eng, tlr mtd: 3 kw, 60 hz, 2 ea, mtd on M101 PU 626	G	H00.840
J46258	6115-00-087-0873	Genr set, gas eng, tlr mtd: 3 kw, 60 hz, 2 ea, mtd on M101 PU 628	G	H00.840
J46265	6115-00-485-9207	Genr set, gas eng, tlr mtd: 3 kw, 28V DC, mtd on M101 PU 666	G	H00.840
J46384	6115-00-738-6335	Genr set, gas eng, tlr mtd: 3 kw, 60 hz, 2 ea, mtd on M101 PU 617	G	H00.840
J46392	6115-00-937-5555	Genr set, gas eng, tlr mtd: 5 kw, 60 hz, 2 ea, mtd on M103 PU 629	G	H01.400
J46396	6115-00-059-5172	Genr set, gas eng, tlr mtd: 5 kw, 60 hz, 2 ea, mtd on M103 PU 631	G	H01.400
J46692	6115-00-456-9792	Genr set, gas eng: DC, 5 kw, 28V, frame-shock mtd, tac util	G	H02.000
J47068	All NSN	Genr set, gas eng: 5 kw, 60 hz, 1–3 ph, AC 120/240 120/208V, skid, tac util	G	H01.400
J47343	6115-00-738-6338	Genr set, gas eng, tlr mtd: 5 kw, 60 hz, mtd on M101 PU 409	G	H01.500
J47480	6115-00-738-6337	Genr set, gas eng, tlr mtd: 5 kw, 60 cy, 1–3 ph, AC 120/240 120/208V, PU 618/M	G	H01.400
J47617	6115-00-738-6340	Genr set, gas eng, tlr mtd: 5 kw, 60 hz, 2 ea, mtd on M116 PU 620	G	H01.400
J48713	All NSN	Genr set, gas eng: 5 kw, 400 hz, 1–3 ph, AC 120/240 120/208V, skid, tac util	G	H01.500
J49055	All NSN	Genr set, gas eng, 7.5 kw, DC 28.5V, whl mtd	G	H01.500
J49261	All NSN	Genr set, gas eng: 10 kw, 400 cy, 1–3 ph, AC 120 120/208V, skid	G	H02.400
J49398	All NSN	Genr set, gas eng: 10 kw, 60 hz, 1–3 ph, AC 120/240 120/208V, tac util	G	H02.400
J49466	6115-00-937-1793	Genr set, gas eng: 10 kw, 400 hz, 1–3 ph, AC 120/240 120/208V, tac util	G	H02.400
J49809	6115-00-738-6336	Genr set, gas eng, tlr mtd: 10 kw, 60 hz, mtd on M101 PU 332	G	H02.000
J49946	6115-00-738-6341	Genr set, gas eng, tlr mtd: 10 kw, 60 hz, mtd on M105A2 PU 564	G	H02.400
J50083	6115-00-889-1367	Genr set, gas eng, tlr mtd: 10 kw, 60 cy, 1–3 ph, AC 120/240 120/208V, PU-564/G	G	H01.400
J50151	6115-00-989-3296	Genr set, gas eng, tlr mtd: 10 kw, 400 hz, 2 ea, mtd on M103 PU-656	G	H05.000
J50185	6115-00-937-8468	Genr set, gas eng, tlr mtd: 10 kw, 400 hz, 2 ea, mtd on M116 PU-678	G	H02.400
J50195	6115-00-789-3656	Genr set, gas eng, tlr mtd: 10 kw, 400 hz, mtd on M101 PU 681	G	H02.400
J50205	6115-00-789-3655	Genr set, gas eng, tlr mtd: 10 kw, 400 hz, mtd on M101 PU 684	G	H02.400
J50220	All NSN	Genr set, gas eng: 10 kw, AC 120/208V, 33 ph, 400 cy, slide rail, precise power	G	H02.400
J50254	6115-00-456-9793	Genr set, gas eng: DC, 10 kw, 28V, frame-shock mtd, tac util	G	H02.000
J51418	6115-00-016-2356	Genr set, dsl eng, tlr mtd: 45 kw, 400 hz, mtd on M200 PU 614	G	H04.500
J51453	All NSN	Genr set, gas turbine eng: 30 kw, AC 120/208V, 3 ph, 400 cy, skid mtd	JP-4	H09.500
J51472	6115-00-075-1639	Genr set, gas turbine eng: 45 kw, AC 210/208V, 3 ph, 400 cy, skid mtd	JP-4	H14.000
J51480	6115-00-967-7005	Genr set, gas turbine eng, tlr mtd: 30 kw, AC 120/208V, 3 ph, 400 cy (sgt)	JP-4	H14.000
J51487	6115-00-054-0190	Genr set, gas turbine eng, tlr mtd: 45 kw, AC 120/208V, 3 ph, 400 cy (sgt)	JP-4	H14.000
J51505	6115-00-758-5492	Genr set, gas turbine eng: 60 kw, AC 120/240 208/416V, 3 ph, 400 cy, skid mtd	JP-4	H14.000

Figure 5. Table 3-8. Generators-G.

LIN	NSN	Description	Fuel	Rate
P95592	4320-00-063-7363	Pump, recp, power drvn: diaphragm, gas, whl, in 100 GPM, 10 ft suc lift	G	H02.000
	4320-00-829-8434		G	H01.000
P96503	All NSN	Pump, assembly, deep well: gas drvn, 50 GPM, 250 ft hd	G	H04.000
P96640	All NSN	Pumping assembly, flammable liquid, bulk trans	G	H01.000
P97051	4320-00-691-1071	Pumping assembly, flammable liquid, gas, whl: 4 in outlet, 350 GPM, 275 ft hd	G	H02.500
R62393	All NSN	Refrigerator, mechanical, commercial	G	H01.000
R65544	All NSN	Refrigeration unit, mechanical, panel type: gas drvn	G	H01.500
R65681	All NSN	Refrigeration unit, mechanical, panel type: gas drvn	G	H01.500
R65818	4110-00-391-3207	Refrigeration unit, mechanical, panel type: gas drvn	G	H01.500
S35741	All NSN	Saw, chain: gas drvn	G	H01.000
S37248	3220-00-287-8722	Saw, circular, table type: skid mtd, 16-in blade, gas drvn	G	H02.000
S71613	All NSN	Stir refrigerator, 7½ ton, w/unit	G	H01.500
T08819	All NSN	Shoe repair shop, tlr mtd	G	H02.500
U11015	3740-00-772-0090	Sprayer, insecticide, frame mounting: gas drvn, mist & solid stream, 180 GPH	G	H01.000
U11289	3740-00-930-9383	Sprayer, insecticide, push cart mtd: mist type, gas drvn, GPH	G	H01.000
Y35143	All NSN	Water purif equip and diatomite filter, 420 GPH	G	H00.750

Figure 6. Table 3-11. Stationary Equipment S.

For example, four 7.5-kw generators (LIN J49055, fig. 5), one 30-kw generator (LIN J51453, fig. 5), and 10 commercial refrigeration units (LIN R62393, fig. 6) are to operate 20 hours a day for three days. The fuel requirements would be:

7.5-kv generators
20 (hours) X 1.5 (gph) X 4 (generators) X 3 (days)
= 360 gallons of MOGAS

30-kw generator
20 (hours) X 9.5 (gph) X 1 (generator) X 3 (days)
= 570 gallons of JP-4

Refrigeration units
20 (hours) X 1.0 (gph) X 10 (units) X 3 (days)
= 600 gallons of MOGAS

Totals: MOGAS 960 gallons (360 + 600)
JP-4 570 gallons

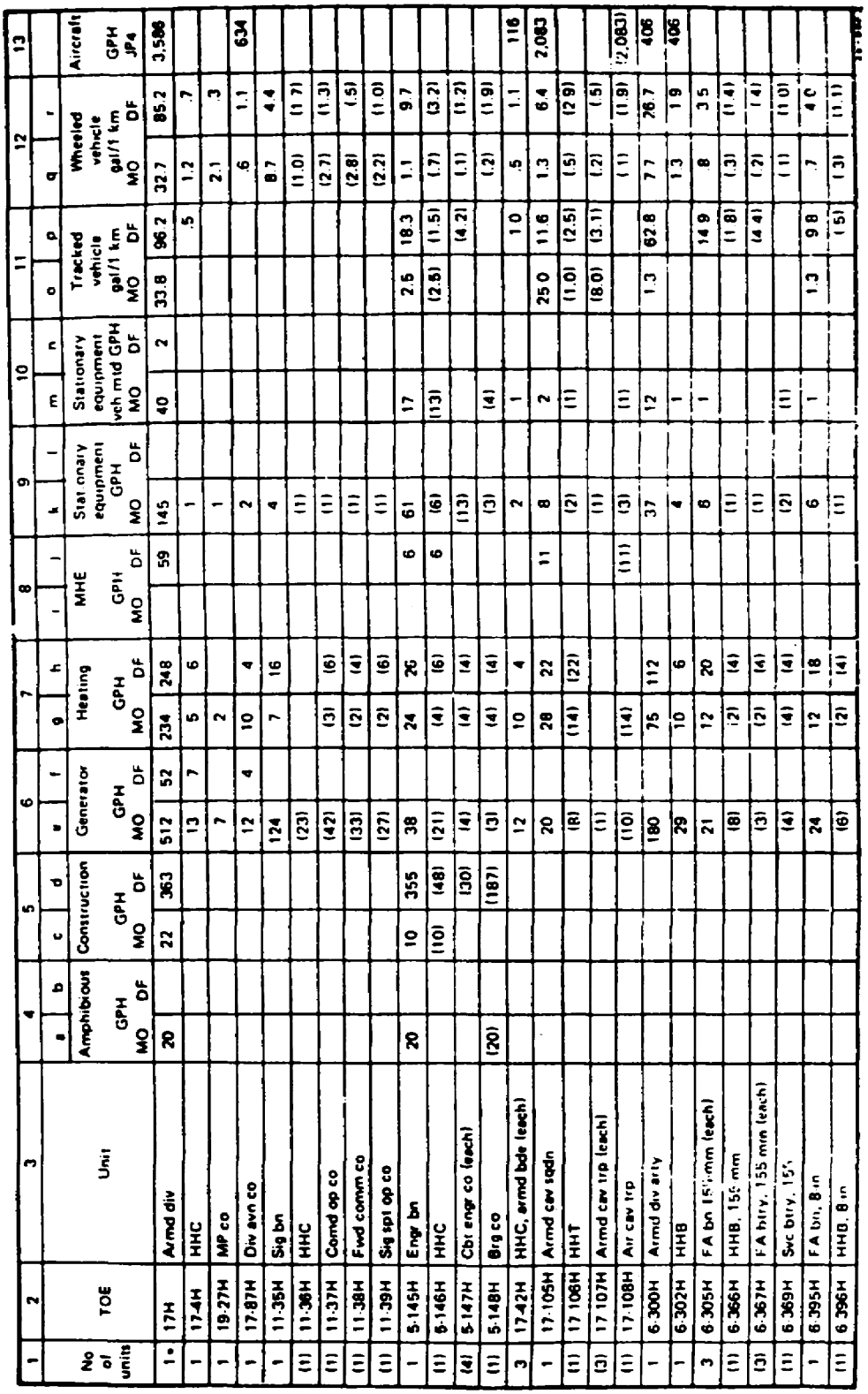
6. GALLONS PER KILOMETER RATIO (GAL/1 RN). Gal/1 km represents the amount of gasoline required to move all vehicles 1 kilometer. This method of forecasting requirements relies on the figures in table 3-6 through 3-20 in FM 101-10-1. Table 3-16 (fig. 7) is used in this lesson text. Columns 11 and 12 give the gal/1 km ratio for vehicles in each unit listed in column 3. The gal/i km method provides a reasonably accurate method for determining bulk fuel requirements at unit level, but its use is not recommended when historical unit data is available. Several important factors are considered in calculating unit fuel requirements.

a. Displacement. The average distance in kilometers (km) each vehicle moves is determined by measuring the distance that the center of mass is moved. The center of mass is the center of the area occupied by the force in bivouac. In figure 8, the center of mass was moved 60 kilometers. Displacement over roads equals the movement distance (MD) times gal/1 km ratio. Less gasoline is needed to move an organization over roads than to move it across country. The cross-country consumption rate is 2.5 times that for road movement. Therefore, displacement across country equals MD times gal/1 km ratio times 2.5.

b. Supply. Certain vehicles of an organization must make round-trip supply hauls during a displacement. Since the trips are made to supply points located at varying distances from the organization, an average round-trip supply distance must be determined. Experience indicates that daily requirements for supply hauls are equal to approximately 10 percent of the total organizational consumption per kilometer multiplied by the average round-trip supply distance (ARTSD). Therefore, the supply factor equals ARTSD times 10 percent of the gal/1 km ratio. When the organization is not on the move, supply requirements are included under housekeeping requirements.

c. Service. Daily supplemental requirements exist for moving vehicles in bivouac areas, for reconnaissance, for engine warmup, and for long periods of low-gear operations. These are service requirements. Fuel consumption depends on the nature of the operation, weather, roads, and terrain. Under average conditions, requirements can be estimated by using the consumption necessary to move all vehicles in the organization 16 kilometers over roads. Therefore, service equals 16 times the gal/1 km ratio.

d. Housekeeping. Additional daily requirements exist for administrative vehicles, kitchens, gasoline-powered equipment, and for maintaining and testing engines. When the organization is not on the march, these requirements are noted under each fuel data table in para e, page 3-8, FM 101-10-1. When the organization is on the move, the requirements for administrative vehicles (not supply hauls) and gasoline-powered equipment are absorbed by maintenance and the testing factor is absorbed by the service factor.



1	2	3	4		5		6		7		8		9		10		11		12		13
No of units	TOE	Unit	a Amphibious GPH MO	b DF	c Construction GPH MO	d DF	e Generator GPH MO	f DF	g Heating GPH MO	h DF	i MHE GPH MO	j DF	k Stationary equipment GPH MO	l DF	m Stationary equipment veh mtd GPH MO	n DF	o Tracked vehicle gal/1 km MO	p DF	q Wheeled vehicle gal/1 km MO	r DF	Aircraft GPH JP4
1•	17H	Armd div	20		22	363	512	52	234	248		59	145		40	2	33.8	96.2	32.7	85.2	3,586
1	17-4H	HHC					13	7	5	6			1					.5	1.2	.7	
1	19-27H	MP co					7		2				1						2.1	.3	
1	17-87H	Div avn co					12	4	10	4			2						.6	1.1	634
1	11-35H	Sig bn					124		7	16			4						8.7	4.4	
(1)	11-36H	HHC					(23)						(1)						(1.0)	(1.7)	
(1)	11-37H	Comd op co					(42)		(3)	(6)			(1)						(2.7)	(1.3)	
(1)	11-38H	Fwd comm co					(33)		(2)	(4)			(1)						(2.8)	(.5)	
(1)	11-39H	Sig spt op co					(27)		(2)	(6)			(1)						(2.2)	(1.0)	
1	5-145H	Engr bn	20		10	355	38		24	26		6	61		17		2.5	18.3	1.1	9.7	
(1)	5-146H	HHC			(10)	(48)	(21)		(4)	(6)		6	(6)		(13)		(2.5)	(1.5)	(.7)	(3.2)	
(4)	5-147H	Cbt engr co (each)				(30)	(4)		(4)	(4)			(13)					(4.2)	(.1)	(1.2)	
(1)	5-148H	Brg co	(20)			(187)	(3)		(4)	(4)			(3)		(4)				(.2)	(1.9)	
3	17-42H	HHC, armd bde (each)					12		10	4			2		1			1.0	.5	1.1	116
1	17-105H	Armd cav sqdn					20		28	22		11	8		2		25.0	11.6	1.3	6.4	2,083
(1)	17-108H	HHT					(8)		(14)	(22)			(2)		(1)		(1.0)	(2.5)	(.5)	(2.9)	
(3)	17-107H	Armd cav trp (each)					(1)						(1)				(8.0)	(3.1)	(.2)	(.5)	
(1)	17-108H	Air cav trp					(10)		(14)			(11)	(3)		(1)				(1)	(1.9)	(2,083)
1	6-300H	Armd div arty					180		75	112			37		12		1.3	62.8	7.7	26.7	406
1	6-302H	HHB					29		10	6			4		1				1.3	1.9	406
3	6-305H	FA bn 155 mm (each)					21		12	20			8		1			14.9	.8	3.5	
(1)	6-366H	HHB, 155 mm					(8)		(2)	(4)			(1)					(1.8)	(.3)	(1.4)	
(3)	6-367H	FA btry, 155 mm (each)					(3)		(2)	(4)			(1)					(4.4)	(.2)	(.4)	
(1)	6-369H	Svc btry, 155					(4)		(4)	(4)			(2)		(1)				(.1)	(1.0)	
1	6-395H	FA bn, 8 in					24		12	18			6		1		1.3	9.8	.7	4.0	
(1)	6-396H	HHB, 8 in					(6)		(2)	(4)			(1)					(5)	(.3)	(1.1)	

LEGEND
MO MOGAS) DF (DIESEL)

Figure 7. Table 3-16. Armored Division (TOE 17H).

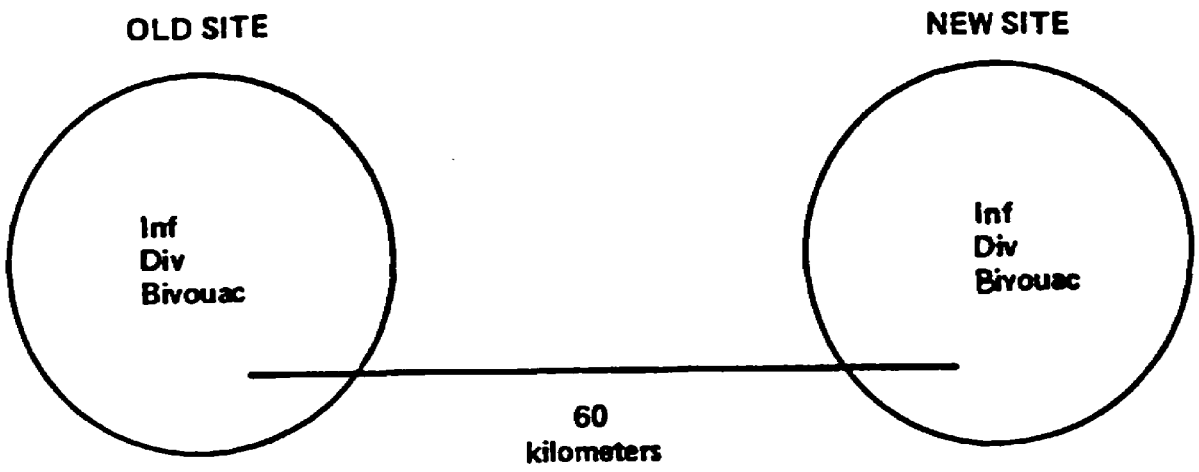


Figure 8. Movement distance.

e. Waste. Waste covers evaporation, spills, and small combat losses. It is computed only when a unit is moving over roads in the combat zone. It is not included in the bulk estimate when the unit is moving over roads in the communications zone (COMMZ) or cross-country. Waste is computed as 10 percent of the sum of all other consumption figures.

f. Stationary Equipment. This factor applies to fuel-consuming equipment which does not provide its own power to move. Generators, air compressors, and refrigeration units are examples of such equipment. It can be estimated that this type equipment will operate 20 hours a day.

g. Total Fuel For Move. The formulas for computing the total fuel requirements for a move over roads in a combat zone and for a move across country are given below. The formulas are applied in examples given in subparagraphs (1) and (2). Total quantities for a movement are rounded off to the next higher 5 gallons.

OVER ROADS IN COMBAT ZONE

Displacement	=	D X gal/1 km ratio
Supply	=	ARTSD X 10 percent X gal/i km ratio
Service	=	16 x gal/1 km ratio
Waste	=	10 percent X (displacement + supply + service)
Total gallons	=	Displacement + supply + service + waste

CROSS COUNTRY

Displacement	=	HD X gal/1 km ratio X 2.5
Supply	=	ARTSD X 10 percent X gal/1 km ratio
Service	=	16 X gal/i km ratio

Total gallons	=	Displacement + supply + service

(1) Computing fuel requirements for an over-roads move in a combat zone. The following example demonstrates the use of the factors for computing fuel requirements (both diesel and MOGAS) for a move over roads in a combat zone. Use figure 7, page 11 for this example. Headquarters and Headquarters Company (HHC), Armored Division, (line 2 of figure 7) will move forward on roads in the combat zone to a new position 24 kilometers away. Average round-trip supply distance for all classes of supply will be 21 kilometers, and the move requires only one day to complete. The total amount of fuel required for the move is computed as follows: Find the gal/1 km ratio for the company for both MOGAS and diesel (col 11o, l1p, 12q, and 12r). The gasoline gal/1 km ratio for the HHC is 1.2 (col 12q). The diesel ratio is also 1.2 (col lip and 12r, (.5 + .7)). This information can now be used in formulas for each of the four factors. Since the two figures for gal/1 km ratio are the same, only the MOGAS will be shown. (The diesel will be the same.)

MOGAS

a. Displacement	=	MD X gal/1 km ratio
	=	24 km X 1.2
	=	28.8 gal
b. Supply	=	ARTSD X 10 percent X gal/1 km ratio
	=	21 X 10 percent X 1.2
	=	2.52 gal
c. Service	=	16 X gal/1 km ratio
	=	16 X 1.2
	=	19.2 gal
d. Waste	=	10 percent X (displacement + supply + service)
	=	10 percent X (28.8 + 2.52 + 19.2)
	=	5.05 gal

e. Total = Displacement + supply + service + waste
= 28.8 + 2.52 + 19.2 + 5.05 - 55.57 rounded to next higher 5 gallons
= 60 gallons

120 gallons of fuel (60 gallons of MOGAS, 60 gallons of Diesel) are required to move the company.

(2) Computing fuel requirements for a cross-country move. The HHC of an Engineer Battalion (line 11) is moving forward across country in the combat zone to a new position 18 kilometers away. Average round-trip supply distance for all classes of supply will be 15 kilometers. The move will require just one day to complete. Compute the total fuel requirement as you did in subparagraph (1) above. Compute the requirements for MOGAS and diesel.

MOGAS

a. Displacement = MD X gal/1 km ratio X 2.5
= 18 X 3.2 X 2.5
= 14 gal

b. Supply = ARTSD X 10 percent X gal/1 km ratio
= 15 X 10 percent X 3.2
= 4.8 gal

c. Service = 16 X gal/i km ratio
= 16 X 3.2
= 51.2 gal

d. Total = Displacement + supply + service
= 144 + 4.8 + 51.2
= 200 gallons

DIESEL

a. Displacement = MD X gal/1 km X 2.5
= 18 X 4.7 X 2.5
= 211.5 gal

b. Supply = ARTSD X 10 percent X gal/i km ratio
= 15 X 10 percent X 4.7
= 7.05 gal

c. Service	=	16 x gal/l km ratio
	=	16 X 4.7
	=	75.2 gal
d. Total	=	Displacement + supply + service
	=	211.5 + 7.05 + 75.2 - 293.75 rounded to next higher 5 gallons
	=	295 gallons

REMEMBER: A waste allowance is not computed for a cross-country move.

7. ALLOCATION OF PETROLEUM SUPPLIES. Commanders have to project their petroleum requirements at the earliest possible date, since procurement may require a long lead time. The Joint Petroleum Office compiles these projections from supported units and computes the overall petroleum requirements. The end result is a petroleum allocation for each unit. These allocations are subject to review and sometimes a reallocation may be necessary. Fuel supplies may be lost, contaminated, or destroyed by enemy action. Operational requirements may change, requiring a unit to perform a specific additional task. This could mean the unit would have additional, unallocated petroleum requirements. These changes could require the senior commander to establish a list of priorities and cause petroleum supplies to be reallocated to meet the needs of the highest priority missions. A reallocation means the petroleum requirements have to be recomputed to meet the new needs. Unless additional supplies can be received, units with lower priorities would have their allocations cut to provide the extra petroleum for the new operational requirements. The reallocations will be in accordance with the policies established by the command to meet the operational requirements of the command and supported units.

REVIEW EXERCISES

The questions in this review exercise give you a chance to see how well you have learned the material in the lesson. The questions are based on the key points covered in the lesson.

Read each question and write your answer on the line or lines provided for it. If you do not know or are not sure what the answer is, check the paragraph reference that is shown in the parentheses right after the item; then go back and study or read once again all of the referenced material and write your answer.

After you have answered all of the questions, check your answers with the solution sheet at the end of this exercise. If you did not give the right answer to a question, erase it and write the correct solution. Then, as a final check, go back and restudy the lesson reference once more to make sure that your answer is the right one.

1. Columns 11 and 12 of table 3-16 (fig. 7) give the number of gallons of fuel required to move all the vehicles of a specific unit _____ _____. (para 6)

2. When bulk requirements are estimated by the gal/1 km ratio method, displacement under cross-country conditions is equal to the movement distance (MD) times the gal/i km ratio times _____. (para 6a)

3. The gal/i km ratio for MOGAS for the HHC given in figure 7 is 1.2. Using the figure on page 16 and the gal/i km ratio given, compute the displacement over roads for the HHC. (Remember, the formula is MD tines gal/1 km ratio.) _____ gallons. (para 6a)

4. Service requirements (daily supplemental requirements) may be estimated by the gal/1 km method. Service is computed by multiplying the gal/1 km ratio by _____ kilometers. (para 6e)

5. To compute the stationary equipment requirement, all hourly figures are multiplied by a factor of _____. (para 6f)

6. Compute waste for a road movement when the sum of all other requirements (displacement, supply and service) is 155 gallons. _____ _____(para 6c)

7. The Diesel gal/1 km ratio for a combat engineer company of an armored division is _____ gallons. (Refer to figure 7, table 3-16.)(para 6)

SITUATION: The Headquarters and Headquarters Company of a signal battalion of an armored division has been directed to move 40 kilometers to a new position in a combat zone. The average round-trip supply distance will be 32 kilometers. The move will be made in 1 day. Exercises 8 through 15 are based on this situation. (Use figure 7, page 11.)

8. Displacement (for MOGAS) for this over-roads move is _____ gallons. (para 6a)

9. If this movement were to be made cross-country, displacement (for MOGAS) would be _____ gallons. (para 6a)

10. The service requirement for this over-roads move is _____ gallons of MOGAS. (para 6c)

11. Displacement (for diesel) for this over-roads move is _____ gallons. (para 6a)

12. If this movement were to be made cross-country, displacement for diesel would be _____ gallons. (para 6a)

13. Waste for this over-roads movement is _____ gallons of MOGAS and _____ gallons of diesel. (para 6e)

14. The total MOGAS needed for this over-roads move is _____ gallons. (para 6g)

15. If the move %as made cross-country, the total diesel needed is _____ gallons. (para 6g)

16. The Joint Petroleum Office computes petroleum requirements based on requests from _____. (para 7)

17. _____, _____ or _____ fuel supplies or a change in _____ _____ could cause a reallocation of petroleum requirements. (para 7)

DO YOU UNDERSTAND EVERYTHING IN THIS REVIEW EXERCISE? HAVE YOU CHECKED YOUR RESPONSES, MADE CORRECTIONS, AND RESTUDIED THE TEXT, IF NECESSARY? IF YOU HAVE, GO ON TO THE EXAMINATION.

EXERCISE SOLUTIONS

EXERCISE	SOLUTION
1.	one kilometer
2.	2.5
3.	42 (35 x 1.2)
4.	16
5.	20
6.	15.5 (155 X 10 percent)
7.	5.4 (col lip (4.2) + col 12r (1.2))
8.	40 (40 X 1.0)
9.	100 (40 X 1.0 X 2.5)
10.	16 (16 X 1.0)
11.	68 (40 X 1.7)
12.	170 (40 X 1.7 X 2.5)
13.	5.92 MOGAS 10 percent X (40 + 3.2 + 16) 10.06 Diesel 10 percent X (68 + 5.44 + 27.2)
14.	70 (40 + 3.2 + 16 + 5.9) = 65.12 rounded to next higher 5 gallons
15.	205 (170 + 5.44 + 27.2) = 202.64 rounded to next higher 5 gallons
16.	supported units
17.	Lost, contaminated, destroyed; operational requirements