

NOTICE OF  
CHANGE

METRIC

MIL-STD-1472E  
NOTICE 1  
31 March 1998

DEPARTMENT OF DEFENSE  
DESIGN CRITERIA STANDARD

HUMAN ENGINEERING

TO ALL HOLDERS OF MIL-STD-1472E:

1. THE FOLLOWING PAGES OF MIL-STD-1472E HAVE BEEN REVISED AND  
SUPERSEDE THE PAGES LISTED:

NEW PAGE	DATE	SUPERSEDED PAGE	DATE
vii	31 October 1996	vii	Reprinted without change
viii	30 January 1998	viii	31 October 1996
137	31 October 1996	137	Reprinted without change
138	30 January 1998	138	31 October 1996
139	30 January 1998	139	31 October 1996
140	31 October 1996	140	Reprinted without change

2. RETAIN THIS NOTICE AND INSERT BEFORE TABLE OF CONTENTS.

3. Holders of MIL-STD-1472E will verify that the page changes indicated above have been entered. This notice page will be retained as a check sheet. This issuance, together with the appended pages, is a separate publication. Each notice is to be retained by stocking points until the standard is completely revised or canceled.

Custodians:  
Army - MI  
Navy - AS  
Air Force - 11

Preparing activity:  
Army-MI  
(Project HFAC-0085)

Review activities:  
Army - AR, AT, AV, CR, EA, GL, MD1, PT, TE, TM  
Navy - EC, MC, OS, PE, SH, TD  
Air Force - 13, 19

Industry associations and professional societies:  
AAMI, AIA, ASTM, EIA, HFES, SAE

Civil Agency Coordinating Activities:

DOT - FAA  
NASA - MSFC  
AMSC N/A

AREA HFAC

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5.10.4.5 Coding. For television viewing, symbol-or pattern-coding should be used in preference to color-coding.

5.10.4.6 Lettering. Letters, numbers, and important details that must be viewed by television shall be light against a dark background. Glazed or reflecting surfaces shall be avoided.

5.10.4.7 Stereo viewing. The two images produced by a stereoscopic periscope shall not differ more than 2% in magnification or 0.50 prism diopter in vertical imbalance. Horizontal imbalance shall be not greater than 0.50 prism diopter so as not to be fatiguing. Light transmittance of the two optical paths should be within 10% of each other.

5.10.5 Illumination.

5.10.5.1 Reflected light. Unless otherwise specified by the procuring activity, reflected light from remote work areas, as measured at the operator's work station (in direct viewing), shall conform to the requirements of this standard.

5.10.5.2 Threshold viewing. Monochromatic lighting should be provided when viewing conditions are near threshold, when high magnification powers are required, or when the operator is required to view the work at high angles of incidence through refractive materials.

## 5.11 Small systems and equipment.

5.11.1 Portability and load carrying. Individual portions of equipment shall be designed so that, when carried, the weight of the load will be distributed through as many muscle groups as possible. Pressure should be avoided or minimized on sensitive areas, including large blood vessels, nerves and areas lacking muscular padding. Design of load-carrying systems shall be compatible with the weight and distribution of individual items to be carried by the user. (The weight of the items to be carried varies according to the climatic zone, mission to be performed, and occupational specialty. See MIL-HDBK-759 for weights of representative individual items that an infantry rifleman carries in temperate hot weather areas.) Load carrying systems shall be provided with a quick-release capability. In general, portable refers to an item that is carried a distance of not more than 2 km (1.24 miles). For items to be carried up to 10 meters (33 ft.), see 5.9.11.3.5 - 5.9.11.3.7.

### 5.11.1.1 Portability.

5.11.1.1.1 Weight. Individual portions of equipment may weigh up to 16 kg (35 lb) if the load is balanced and is distributed over many muscle groups and it is not necessary for the individual carrying the load to maintain the pace of an infantry movement.

5.11.1.1.2 Lifting aids. When necessary, lifting aids shall be provided to permit a second person to assist the porter in placing the load on the body.

5.11.1.1.3 Configuration. The load should be designed to permit freedom of movement. The shape of the load should be free of sharp edges or projections that may be harmful to the porter or snag on undergrowth. The shape and weight of the load should not interfere with (a) the length of step, (b) movements of the head, (c) the ability to raise and lower the load when going over obstacles, (d) the ability to see where the feet are placed when walking, (e) the ability to squat, (f) regulation of body temperature, or (g) the maintenance of normal posture.

5.11.1.1.4 Carrying by two persons. Where the load is designed for carrying by two persons, a combination of stretcher type handles and shoulder support should be used, if feasible.

5.11.1.1.5 Standardization. Maximum use should be made of standard load carrying systems or components.

### 5.11.1.2 Transportability by personnel.

5.11.1.2.1 Weight. Individual portions of equipment should weigh as little as possible if the system is to be manually transported by an individual on foot while maintaining pace with an infantry movement.

5.11.1.2.2 Load carrying. The total load carried by an individual, including clothing, weapons and equipment for close combat operations, should not exceed 30% of body weight and, for marching, 45% of body weight. Where personnel with 5th percentile body weight must be accommodated, the total load for close combat operations should not exceed 18.5 kg (41 lb) and, for marching, 27.7 kg (61 lb).

5.11.1.2.3 Lifting aids. Units for which no back-packing aids are required shall be equipped with handles suitable for two-handed lifting and carrying. If handles are provided, they shall conform to 5.9.11.5.1, 5.9.11.5.3, and 5.9.11.5.5. One-person back-packed loads over 20 kg (44 lbs) shall be designed (and, if necessary, provided with lifting aids) to permit a second person to assist the porter in placing the load on the body.

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Table XXVI. Typical fighting and existence loads (temperate zone)

LOAD	APPROXIMATE WEIGHT	
	KILOGRAMS	POUNDS
<b>FIGHTING LOAD</b>		
<b>CLOTHING:</b>		
PASGT Helmet	1.36	3.00
Battle Dress Uniform	1.73	3.81
PASGT Vest	3.86	8.50
Underwear (Summer) and Socks	0.27	0.60
Belt; waits, web with buckle	0.09	0.20
Boots, leather (DMS)	<u>1.52</u>	<u>3.36</u>
	8.83	19.47
<b>EQUIPMENT:</b>		
Rifle M16A1 with 30 round magazine and sling	3.59	7.91
Ammunition pouches (2 each) with 180 rounds in 6 magazines	3.21	7.07
Hand grenades 2 each	0.91	2.00
LAW 2 each or ILAW 1 each	3.86	8.50
Canteen 1 quart filled with cup and cover	1.63	3.60
Water purification tablets	0.03	0.06
Individual equipt belt, first aid packet with case and suspenders	0.72	1.59
Entrenching tool with carrier	1.14	2.52
Bayonet M7 with scabbard	0.59	1.30
Mask CB Protective with hood	1.35	2.97
Poncho	<u>0.77</u>	<u>1.70</u>
	17.80	39.22
<b>EXISTENCE LOAD</b>		
ALICE Pack medium with straps	1.12	2.46
Chemical Protective overgarment with gloves and boots	2.61	5.75
Cap, utility	0.10	0.22
Underwear and socks, 2 each	0.54	1.20
Personnel Hygiene Kit	1.20	2.64
Rations MRE 3 each	1.33	2.94
Bag, Sleeping, intermediate cold	3.40	7.50
Mattress, pneumatic insulated	1.59	3.50
Jacket Field, 1 each with gloves, leather with wool insert 1 pair	1.94	4.28
Bag, waterproof 1 each	<u>0.34</u>	<u>0.75</u>
	14.17	31.24

5.11.1.2.4 Back-packing aids. Back-packing aids shall distribute the load over as many muscle groups as possible by means of buttock and hip supports in addition to padded shoulder straps. Backpacking aids shall bring the center of gravity of the load as close to the porter's spine at the waistline as possible without any part of the load contacting the body. Load-carrying design shall minimize pressure or compression to the chest or armpits and shall eliminate local strain by transmitting weight to the ground through bone. Aids shall not produce laterally unbalanced loads, interfere with normal head movements, limit squatting, interfere with walking or climbing over low obstacles, interfere with movements of the shoulder girdle, produce strain on the shoulder muscle, or interfere with regulation of body temperature.

5.11.1.2.5 Projections. Load design should minimize projections to prevent injury to personnel or entanglement in undergrowth. Covers or cases may be provided to meet this requirement, as specified by the procuring activity.

### 5.11.2 Tracking.

5.11.2.1 Gunner environment. Where applicable, obscuration, shock and vibration should be sufficiently minimized to permit resumption of tracking rapidly after firing.

5.11.2.2 Crank size and speed. The size of tracking cranks, where used, shall be a function of rotation speed required: Within the parameters of Figure 10, crank speed should be 140 - 200 rpm and radius should be 55 - 115 mm (2.2 - 4.5 in). Smaller crank radii should be used for high rpm requirements and the converse.

5.11.2.3 Two-dimensional tracking. A single control (rather than separate controls for each dimension) should be used for two-dimensional tracking.

5.11.2.4 Supports. Where a joy stick is used for tracking, a hand, wrist, or forearm support (as appropriate) should be provided.

5.11.2.5 Compatibility. Movement of the tracking control shall be compatible with expected or conventional control movements.

### 5.11.3 Optical instruments and related equipment.

5.11.3.1 General. This section pertains only to direct-view, visual optical systems.

5.11.3.2 Visual accommodation. Any adjustment of the eyes beyond normal functional ability shall not be required.

5.11.3.3 Viewing angle. Optical instruments shall be oriented so that they are presented to the operator at a comfortable viewing angle.

#### 5.11.3.4 Magnification.

5.11.3.4.1 General. Instrument magnification shall be sufficiently high to permit performance of the required application (e.g., detection, recognition, identification, weapon laying).

5.11.3.4.2 Unstabilized, unsupported handheld sights. Because of hand tremors and body motion, magnification of unstabilized, unsupported, handheld rifle and pistol sights should be not more than 4 power; magnification of unstabilized, unsupported, handheld monoculars or binoculars should be not more than 8 power.

5.11.3.4.3 Multiple magnification requirements. If more than one magnification is required, two or more discrete magnifications should be provided for optimum image quality and boresight integrity. Varifocal (zoom) systems should be considered for use only in systems where sighting accuracy is relatively unimportant and it results in overall simplification.

5.11.3.6 Entrance pupil. The entrance pupil shall be equal to the product of the magnification and the exit pupil diameter and, therefore, defined by these parameters.

#### 5.11.3.7 Exit pupil.

5.11.3.7.1 General. The diameter of the exit pupil should be consistent with intended use and size/weight limitations.

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