ARMY TM 9-1240-407-12&P
MARINE CORPS TM 10291A-12&P

OPERATOR'S AND UNIT MAINTENANCE MANUAL
(INCLUDING REPAIR PARTS LIST)

BINOCULAR, M24
(NSN 1240-01-412-3128)
w/RETICLE (NSN 1240-01-430-6944)

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10 NOVEMBER 1997

ARMY TM 9-1240-407-12&P
MARINE CORPS TM 10291A-12&P

CHANGE
NO. 2

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, DC 1 May 2000

Operator's and Unit Maintenance Manual
(including Repair Parts List)
for Binocular, M24 (NSN 1240-01-412-3128)
(w/Reticle NSN 1240-01-430-6944)

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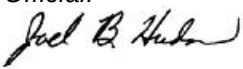

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ARMY TM 9-1240-407-12&P
MARINE CORPS TM 10291A-12&P

CHANGE
NO. 1

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, DC 4 SEPTEMBER 1998

Operator's and Unit Maintenance Manual
(including Repair Parts List)
for Binocular, M24
(NSN 1240-01-412-3 128) (w/Reticle NSN 1240-01-430-6944)

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WARNING

USE ADHESIVE IN A WELL-VENTILATED AREA.
DO NOT USE NEAR SPARKS, FLAMES AND EXPLOSIVES. AVOID PROLONGED SKIN CONTACT AND/OR BREATHING OF VAPORS.
KEEP IN COOL, DRY PLACE.

NOTE

FIRST AID

FOR INFORMATION ON FIRST AID, SEE FM 21-11

WARNING

WHEN USING THE BINOCULAR, NEVER POINT IT DIRECTLY AT THE SUN. THE HEAT GENERATED BY THE FOCUSED RAYS OF THE SUN MAY CAUSE SERIOUS DAMAGE TO YOUR EYES AND TO THE OPTICAL ELEMENTS OF THE BINOCULAR.

DON'T DO IT!

WARNING

DANGER

DO NOT LOOK
INTO LASER LIGHT

The M24 Binocular is provided with internal laser protection filters. The laser protective coated liter is contained inside the binocular. If any lens is lost or damaged the binocular is considered non-operational and must be turned in.

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ARMY TM 9-1240-407-12&P
MARINE CORPS TM 10291A-12&P

TECHNICAL MANUAL
NO. 9-1240-407-12&P
NO 10291A-12&P

HEADQUARTERS
Departments of the Army and U.S. Marine Corps
Washington D.C., 10 November 1997

OPERATOR'S AND UNIT MAINTENANCE MANUAL (INCLUDING REPAIR PARTS LIST) BINOCULAR, M24 (NSN 1240-01-412-3128) W/RETICLE (NSN 1240-01-430-6944)

REPORTING ERRORS AND RECOMMENDING IMPROVEMENT

You can help improve this publication. If you find any mistakes or if you know of a way to improve the procedures please let us know. Army users submit your DA Form 2028-2 (Recommended Changes to Equipment Technical Publications), through the internet, on the Army Electronic Product Support (AEPS) website. The internet address is http:// aeps ria army mil. If you need a password, scroll down and click on 'ACCESS REQUEST FORM'. The DA Form 2028 Is located in the ON-LINE FORMS PROCESSING section of the AEPS Fill out the form and click SUBMIT. Using this form on the AEPS will enable us to respond quicker to your comments and better manage the DA Form 2028 program. You may also mail, fax or email your letter, DA Form 2028, or DA Form 2028-2 direct to: Commander, U.S. Army Tank-automotive and Armaments Command, ATTN. AMSTALC-CIP-WT, Rock Island, IL 61299-7630. The email address Is TACOM-TECHPUBS@.ria army mil The fax number is DSN 793-0726 or Commercial (309) 782-0726.

REPORTING ERRORS AND RECOMMENDING IMPROVEMENT-Cont.

USMC users submit NAVMC Form 10772 to: Commander, Marine Corps Logistics Base, ATTN. (Code 850), 814 Radford Rd., Albany, GA 31704-5000. A reply will be furnished to you.

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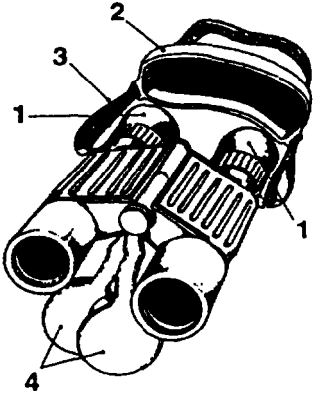
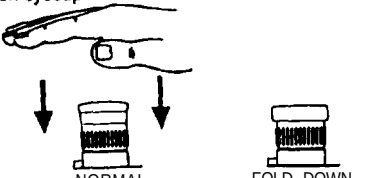


TOP VIEW

NOTE

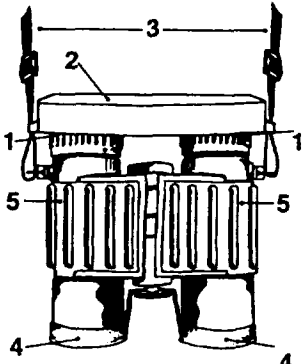
The M24 Binocular is equipped with pop-down eyecups (1) for use by personnel who wear eye glasses to shorten the distance between eyes and eyepiece. To pop-down eyecups, use the palm of your hand and push **down on eyecup.**



The M24 Binocular is a lightweight, compact instrument intended for use in general field observation.

The lens covers (2 and 4) provide protection for the binocular. The binocular is equipped with a neck strap (3) for easy portability.

DESCRIPTION & SPECIAL FEATURES (cont'd)



TOP VIEW

CAUTION

The housing assemblies (5) are optically aligned al the factory and must not be disassembled.

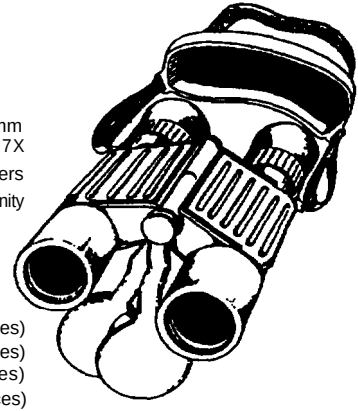
NOTE

The pop down eyecups consist of the knurled focus adjusting ring and the diopter scale.

Each binocular is comprised of pop down eyecups (1). a housing assembly (5) and objective covers (4).

By rotating the pop down eyecups (1) of the eye-pieces, you can focus each telescope to accommodate your particular optical characteristics. The reading on each diopter scale should then be noted for future reference. The eye-lens cover (2) and objective covers (4) should be placed over the eyepieces when the binocular is not in use.

GENERAL CHARACTERISTICS



Optical Characteristics

Objective Lens Diameter	28 mm
Magnification	7X
Field of View	130 meters at 1000 meters
Depth of Field	50 meters to infinity

Physical Characteristics

Height (at zero diopter)	129mm (5.1 inches)
Length (at 65mm ID)	118mm (4.0 inches)
Width	38mm (1.5 inches)
Weight	510 grams (18 ounces)

HANDLING PRECAUTIONS

DO'S

Handle the binocular with care. Dropping or jarring the binocular can damage or misalign the optics. Use the neckstrap to protect against accidental dropping of the binocular.

Keep the binocular as clean and dry as possible and always store in clean, dry place when not actually in use.

Follow the instructions outlined in this TM to obtain the best possible usage and service from the binocular.

DON'TS

Do not use a dry cloth to clean the glass surfaces of the binocular. Specific cleaning instructions are given on page 13.

Do not attempt to open or close the binocular beyond marked diopter scale readings as this may damage internal and external parts,

Do not unnecessarily expose the binocular to severe weather elements. Special precautions are noted on pages 11 and 12.

Do not force the knurled adapter rings beyond marked diopter scale readings as this may damage internal parts.

HOW TO INSTALL/REMOVE NECK STRAP

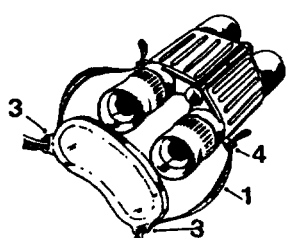
Install

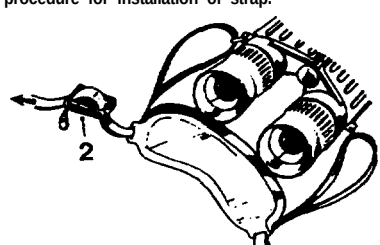
- Thread neck strap (1) through locking buckle (2).
- Install end of the neck strap (1) through eye-tens cover holding loop (3).
- Slide end of neck strap through holding loop (4) on side of binocular.
- Slide end of neck strap back through eye-lens cover holding loops (3).
- Slide end of neck strap through strap locking buckle (2) and adjust to desired length.

Repeat procedure for other end of neck strap.

Remove

- To remove strap follow the reverse procedure for installation of strap.





HOW TO REMOVE/INSTALL POP-DOWN EYECUPS

The pop-down eyecup (1) is attached to binocular with adhesive at the factory. If there is damage to the pop-down eyecup it can be removed and replaced.

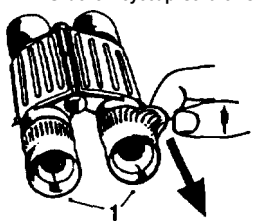
REMOVE

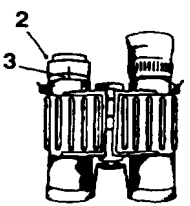
- To remove popdown eyecups, peel back the rubber at the base of the eyecup and remove from binocular.
- Remove old adhesive from eye-lens housing.

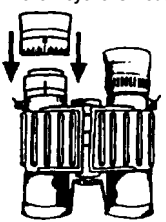
WARNING
Use adhesive only in adequate ventilated area. Avoid contact to skin and eyes. Wash skin thoroughly after use.

INSTALL

- Evenly apply adhesive (Item 3, p. 17) to outer surface of eye-lens housing (2).
- Eye-lens housing has a while line (3) which represents the 'O' diopter point.
- Slide on eyecup so the 'O" diopter point lines-up with white line on eye-lens housing.





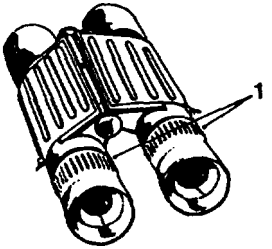


OPERATING ADJUSTMENTS

WARNING
When using binocular, never point it directly at the sun or laser light.

Interpupillary Adjustment

To obtain the proper interpupillary setting for your particular eye spacing, view a distant object through the binocular. Then, rotate the telescopes about the center of hinge until both circular fields of view have merged into one circle.



Diopter Adjustment (focus adjustment)

Each eyepiece of the binocular has a diopter scale graduated from plus 4 to minus 4 in half-diopter increments and can be adjusted to suit your eyesight characteristics. Rotate the knurled focus adjust rings (1) to obtain the sharpest focus and note the scale readings for future reference. If binocular is focused on an object at 50 meters, everything beyond 50 meters will be in focus.

NORMAL OPERATION

(1) Place neck strap about your neck.

(2) Remove eye-lens cover by first rotating binocular telescopes inward and then lifting off eye-lens cover.

(3) Unsnap objective covers from front of binocular and let them hang down from binocular.

(4) Rotate the telescopes of the binocular about the center hinge until both circular fields of view have merged into one.

(5) Rotate the pop down eyecups to obtain the proper diopter settings on the diopter scale (see page 7).

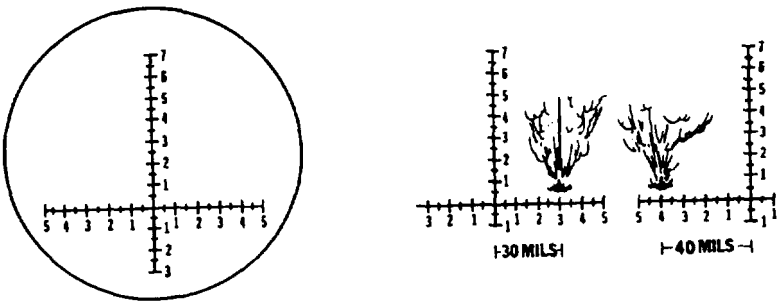
(6) When sighting through the binocular, hold it in a comfortable and stable position.

(7) Refer to pages 11 and 12 for precautions to be observed when unusual weather or atmosphere conditions prevail.

(8) Under the special conditions when direct sunlight enters the binocular a portion of this light will be reflected back producing a glint effect which may be detectable at positions in the general target field.

USE OF RETICLE

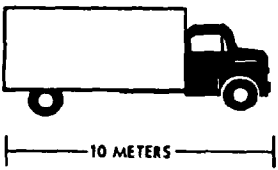
One of the telescopes of the binocular includes a horizontal and vertical scale reticle graduated in 10 mil increment unit markings (1 unit - 10 mils, 2 units - 20 mils, etc.).



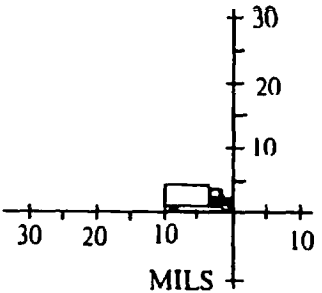
Fire corrections can be made by viewing the impact area and determining angular corrections by use of the left or right horizontal reticle scale.

USE OF RETICLE (cont'd)

In determining range, if an object fills one 10 mil unit marking on the horizontal retie scale and is known to be 10 meters wide, the object is 1000 meters away. If the same size object fills two unit markings (20 mils), it would be 500 meters away. When this formula is used, the distance will be given in the same units of measurement (feet, meters, etc.) as is used in estimating the known size of the object. The same formula can be used to determine range with the vertical reticle scale when the height of an object is known. The use of the vertical scale is preferred (especially on level terrain), since objects are often viewed obliquely along the horizontal axis.



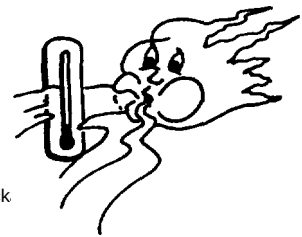
$$\text{DISTANCE} = \frac{\text{Known Size}}{\text{No. of MILS}} \times 1000$$

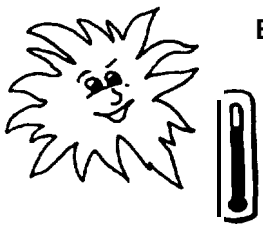


EXTREME COLD

(1) Avoid breathing directly on the optical elements of the binocular. The breath may condense and freeze.

(2) Do not expose the binocular to sudden and extreme temperature changes, such as carrying it directly from a well-heated area into subzero temperatures. Extreme temperature changes may cause the optical elements to crack.





EXTREME HEAT

(1) Do not allow the binocular lo lie unprotected in the direct rays of the sun. The intensified heat may damage the binocular mechanisms.

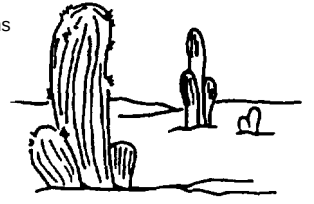
(2) Place the binocular objective and eye-lens covers on the binocular before entering an air conditioned area. This will permit the binocular to cool down gradually and prevent condensation from forming.

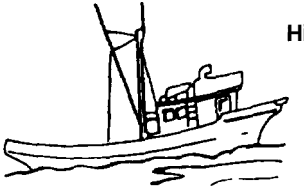
OTHER EXTREME CONDITIONS

Sand and Dust

(1) Always keep the binocular objective and eye-lens covers on when not actually in use. Sand and dust will etch glass surfaces and can penetrate through the smallest openings, thereby causing damage to adjusting mechanisms.

(2) Upon completion of operations, remove all particles of sand and dust from optical elements as instructed on page 13 before installing protective objective and eye-lens covers.





High Humidity or Salty Conditions

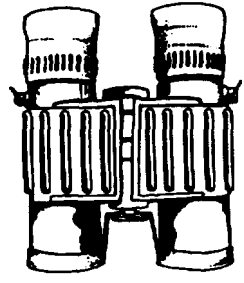
(1) Avoid exposing the binocular to direct salt spray. Salt water is extremely corrosive and can cause irreparable damage to the binocular.

(2) Always dry the binocular thoroughly after use and immediately clean lens as instructed on page 13 and install objective and eye-lens covers.

CLEANING INSTRUCTIONS

Binocular Exterior

Clean the exterior of the M24 binocular (but not the lenses) with a lint-free cloth. (Item 1, p. 17). Remove grease spots, fingerprints and other soil with soap and water and a well wrung-out lint-free cloth: then dry with a clean, lint-free cloth. Remove dirt and lint from objective and eye-lens cover interior surfaces.



Optical Surfaces

Blow as much dust and dirt as possible from the exposed lens surfaces. When all visible particles of dust and dirt have been removed, moisten a piece of lens paper (Item 2, p. 17). Gently wipe over the lens surfaces. Dry with clean lens paper.

WARRANTY

The M24 binocular is under Pioneer warranty for 5 years. The warranty period starts on the date, found in block 23, DA Form 2408-9 (Equipment Control Record), in the logbook. Report all defects in material or workmanship on an SF368 (Product Quality Deficiency Report). Mail to: Commander, U.S. Army Armament Research, Development and Engineering Center, Attn: AMSTA-AR-QAW-A (R)/ Customer Feedback Center, Rock Island, IL 61299-7300.

U.S. Marine Corps users should submit SF368 (QDR) in accordance with MCO 4855.10 to: Commander, Marine Corps Logistics Base Albany, ATTN: (Code 840), 814 Radford Rd., Albany, GA 31704-5000. We'll send you a reply which will provide further instructions.

REFERENCES

FORMS

DA Form 2028	Recommended Charges to Publications and Blank Forms.
SF 368	Product Quality Deficiency Report.

PUBLICATIONS

CTA 50-970	Expendable Items (Except: Medical Class V, Repair Parts and Heraldic Items)
DA PAM 738-750	The Army Maintenance Management System (TAMMS)
TM 9-254	General Maintenance Procedures for Fire Control Material.

U.S. MARINE CORPS PUBLICATIONS AND FORMS

NAVMC FORM 10772.	Recommended Changes to Technical Publications
MCO 4855.10.	Quality Deficiency Report
TM 4700.15/1.	U.S. Marine Corps Ground Equipment Record and Procedures.

MAINTENANCE ALLOCATION CHART

C Operator or Crew
O Organizational Maintenance

Group	Component	Maintenance Function	Category	
			C	O
00	M24 Binocular	Inspect	0.1	
		Service		0.1
		Replace		0.1
01	Pop Down Eyecups	Inspect	0.1	
		Replace		0.1
02	Eye-lens Cover	Inspect	0.1	
		Replace		0.1
03	Strap, Carrying	Inspect	0.1	
		Replace		0.1
04	Objectives-Cover	Inspect	0.1	
		Replace		0.1

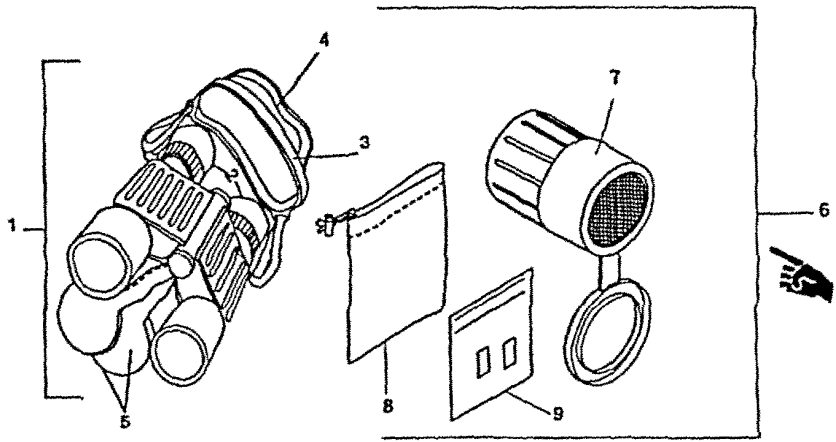
EXPENDABLE/DURABLE SUPPLIES AND MATERIALS

This list of expendable/durable supplies and materials is what you will need to operate and maintain your binoculars. Anything else you might need Is authorized to you by CTA 50970.

O .....Organizational Maintenance

Item No.	Maint Level	NSN	Description	U/M
1	O	8305-00-267-3015	Cloth, Cheesecloth (81348) CCC-440	YD
2	O	6640-00-663-0832	Paper, Lens, Type 1 (81348) NNN-P-40	BK
3	O	8040-00-221-3811	Adhesive, 2 oz. size (Mil Spec MMM-A-1617 Type 2)	EA

REPAIR PARTS

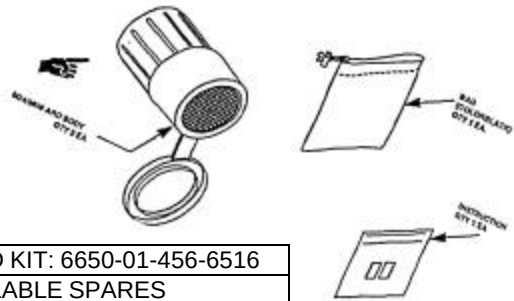


REPAIR PARTS (cont'd)

Item No.	SMR Code	NSN	Part No	Description	Qty
1	PAOOO	1240-01-430-3128		Binocular	1
1	PAOOO	1240-01-430-6944		Binocular, w/reticle	1
2	PAOZZ	6650-01-433-2892	XM24-A20	Eyecup, Popdown	2
3	PAOZZ	6650-01-433-3048	XM24-C1	Cover, Eye-lens	1
4	PAOZZ	5340-01-433-1869	XM24-A21	Strap, Webbing	1
5	PAOZZ	6650-01-433-3056	XM24-C2	Cover, Objective	2
6	PAOZZ	6650-01-456-6516	M24/MINI-	Anti-Reflection	1
			ARD-KIT	Device (ARD) Kit	
7	XAOZZ		BDY-24M	M24/Mini ARD Body	2
8			BG-SB"	Small Bag, Black	1
9			IN-24M'	Instruction Sheet	1

***For spares visit web site http://www.camouflage.com**

ADDITIONAL AUTHORIZATION ITEMS LIST



M24/MINI-ARD KIT: 6650-01-456-6516		
AVAILABLE SPARES		
2	BDY-24M	M24/MINI ARD BODY
1	BG-SB	SMALL BAG. BLACK
1	IN-24M	INSTRUCTION SHEET

For spares, please visit web site
http://www.camouflage.com

By Order of the Secretary of the Army:

DENNIS J. REIMER
General, United States *Army*
Chief of Staff

Official:

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Administrative Assistant to the Secretary of the Army
03963

DISTRIBUTION: To be distributed in accordance with the initial distribution number (IDN) 410449 requirements for TM 9-1240-407-12&P.

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THE METRIC SYSTEM AND EQUIVALENTS

'NEAR MEASURE

. Centimeter = 10 Millimeters = 0.01 Meters = 0.3937 Inches
1 Meter = 100 Centimeters = 1000 Millimeters = 39.37 Inches
1 Kilometer = 1000 Meters = 0.621 Miles

'VEIGHTS

Gram = 0.001 Kilograms = 1000 Milligrams = 0.035 Ounces
1 Kilogram = 1000 Grams = 2.2 lb.
1 Metric Ton = 1000 Kilograms = 1 Megagram = 1.1 Short Tons

LIQUID MEASURE

1 Milliliter = 0.001 Liters = 0.0338 Fluid Ounces
1 Liter = 1000 Milliliters = 33.82 Fluid Ounces

SQUARE MEASURE

1 Sq. Centimeter = 100 Sq. Millimeters = 0.155 Sq. Inches
1 Sq. Meter = 10,000 Sq. Centimeters = 10.76 Sq. Feet
1 Sq. Kilometer = 1,000,000 Sq. Meters = 0.386 Sq. Miles

CUBIC MEASURE

1 Cu. Centimeter = 1000 Cu. Millimeters = 0.06 Cu. Inches
1 Cu. Meter = 1,000,000 Cu. Centimeters = 35.31 Cu. Feet

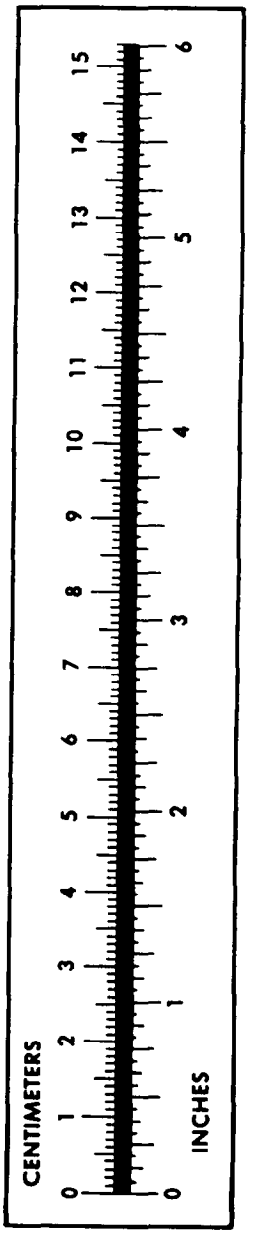
TEMPERATURE

5/9(°F - 32) = °C
212° Fahrenheit is evuivalent to 100° Celsius
90° Fahrenheit is equivalent to 32.2° Celsius
32° Fahrenheit is equivalent to 0° Celsius
9/5C° + 32 =°F

APPROXIMATE CONVERSION FACTORS

TO CHANGE	TO	MULTIPLY BY
Inches	Centimeters	2.540
Feet	Meters	0.305
Yards	Meters	0.914
Miles	Kilometers	1.609
Square Inches	Square Centimeters	6.451
Square Feet	Square Meters	0.093
Square Yards	Square Meters	0.836
Square Miles	Square Kilometers	2.590
Acres	Square Hectometers	0.405
Cubic Feet	Cubic Meters	0.028
Cubic Yards	Cubic Meters	0.765
Fluid Ounces	Milliliters	29.573
ıts	Liters	0.473
arts	Liters	0.946
allons	Liters	3.785
Ounces	Grams	28.349
Pounds	Kilograms	0.454
Short Tons	Metric Tons	0.907
Pound-Feet	Newton-Meters	1.356
Pounds per Square Inch	Kilopascals	6.895
Miles per Gallon	Kilometers per Liter	0.425
Miles per Hour	Kilometers per Hour	1.609

TO CHANGE	TO	MULTIPLY BY
Centimeters	Inches	0.394
Meters	Feet	3.280
Meters	Yards	1.094
Kilometers	Miles	0.621
Square Centimeters	Square Inches	0.155
Square Meters	Square Feet	10.764
Square Meters	Square Yards	1.196
Square Kilometers	Square Miles	0.386
Square Hectometers	Acres	2.471
Cubic Meters	Cubic Feet	35.315
Cubic Meters	Cubic Yards	1.308
Milliliters	Fluid Ounces	0.034
Liters	Pints	2.113
Liters	Quarts	1.057
'ers	Gallons	0.264
.ms	Ounces	0.035
.ograms	Pounds	2.205
Metric Tons	Short Tons	1.102
Newton-Meters	Pounds-Feet	0.738
Kilopascals	Pounds per Square Inch	0.145
lometers per Liter	Miles per Gallon	2.354
›meters per Hour	Miles per Hour	0.621



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