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R E S T R I C T E D

ELECTRICAL AND MECHANICAL  
ENGINEERING REGULATIONS  
(By Command of the Army Council)

TELECOMMUNICATIONS  
A 303

LUBRICANTS, PAINTS, PRESERVATIVES, ADHESIVES AND SIMILAR MATERIALS  
USED IN CONJUNCTION WITH TELECOMMUNICATIONS EQUIPMENT

Erratum

*Note: This Page 0 will be filed immediately in front of Page 1 of Issue 4, dated 18 Feb 53.*

1. The following amendment will be made to this Regulation:-  
Page 1018, Table 9, insert this additional item

Item No	Designation or description	VAOS No or supplying Service	EMER refs	Equipments	Applications and/or descriptions
22	Oil, switch, 6-oz bottle	H1(c) HA 13683		General	Cleaning, lubrication and protection of switch contacts, etc, contains:- Oil of lanolin (acid free) 10% Carbon tetrachloride 25% White spirit 65% Preferable to Items 1 and 6 for wafer switches

57/Maint/3866

Issue 1, 13 Mar 56

Distribution - Class 800. Code No 2

Page 0

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ERRATA

Note: These Pages 01-02, Issue 1, will be filed immediately in front of Page 1, Issue 4 dated 18 Feb 53.

The following amendments will be made to the regulation.

Page 1001, Table 1 - Oils

(a) Item 5, column 7

Delete: 'and small refrigerators (up to 2 h.p.)'

(b) Item 8, column 7

Delete: 'and refrigerators (over 2 h.p.)'

(c) Insert new item in the appropriate columns

Issue 1, 7 Dec 64

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TELECOMMUNICATIONS  
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R E S T R I C T E D

ELECTRICAL AND MECHANICAL  
ENGINEERING REGULATIONS

1	2	3	4	5	6	7
10A	Oil OM 70	A refined mineral oil	R.A.S.C.	E & M G 583 G 584 G 604	Radar, No 1, Mk 1 AA, No 3, Mk 7 AA, No 4, Mk 7	In all Service refrigerators except certain Naval units

HQ/TGR

LUBRICANTS, PAINTS, PRESERVATIVES, ADHESIVES AND SIMILAR MATERIALSUSED IN CONJUNCTION WITH TELECOMMUNICATIONS EQUIPMENT

Note: This issue supersedes Pages 1 to 3 of Issue 3, dated 21 Mar. 1946. It has been amended throughout.

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GENERAL

1. This regulation lists the oils, greases, paints, varnishes, adhesives, sealing compounds, preservatives, cleaning and thinning agents used in the maintenance, tropicalization, and care and preservation of telecommunications equipment. The tables give both the new and old nomenclatures. Where possible, changes in catalogue numbers and designations up to June 1951 have been incorporated.

2. If it is found that any material relevant to this regulation has been omitted from the tables, information concerning the material will be forwarded through the normal channels to the D.M.E. War Office in accordance with Tels. A 009. Errors will be notified similarly.

3. The nomenclature of greases and lubricants used in the three Services has recently been rationalised (the War Office pamphlet 'Nomenclature of Lubricants and Similar Products - W.O. Code No. 2224' gives details). An explanation of the rationalised nomenclature is given in paras. 6 to 13.

4. This regulation has been made more specific than previous issues with regard to the uses of the various materials listed, and reference has been made to some of the equipments on which they are used, with the corresponding E.M.E.R. references. Materials without a specific application to telecommunications equipment, but which may have to be used under certain circumstances, have also been included. Many of

the materials listed are inflammable, a few give off poisonous fumes and others are harmful to the skin. Suitable precautions must be taken when using such materials.

5. When referring to the tables the following points should be noted:-

- (a) Responsibility of supply of most oils and greases has recently been transferred from R.A.O.C. to R.A.S.C.
- (b) R.A.S.C. do not use V.A.O.S. numbers. Hence when an item is an R.A.S.C. supply no number is shown.
- (c) Where two V.A.O.S. numbers are entered for one item, it is due to the fact that a material may bear different numbers if issued in different sizes of container, e.g., the V.A.O.S. number of Grease PX-6 is HA 13540 when in half lb. containers, and HA 13541 when in 28 lb. kegs.
- (d) The information in the tables given under the headings E.M.E.R. REFS. and EQUIPMENTS gives a reference to the E.M.E.Rs. and the corresponding equipments which, in general, give a typical illustration of the use of the item. When an equipment is referred to as 'A.A.', 'F.A.' or 'C.A.', it is to be understood that the reference is to radar equipments bearing these designations.
- (e) The references in E.M.E.Rs. to the materials listed in these tables, sometimes give designations and catalogue numbers which have been superseded.
- (f) Some items, having more than one field of application, may be found in more than one table. The items within each table have been listed in alphabetical order of designation.
- (g) All items which are designated 'Lead free' in the V.A.O.S. are intended for use only with materials which may come into contact with nitro-phenolic explosives. These items, which have their non-lead free counterparts, have been omitted from this E.M.E.R. They must not be demanded when required for other uses.
- (h) A number of commercial items have been given in the tables that do not exist as service stores. Indents should not be submitted for these items, which are noted only as possible alternatives when Ordnance stores are not available.

#### EXPLANATION OF NOMENCLATURE: OILS, GREASES AND PRESERVATIVES

##### Object

6. The object of the system of nomenclature is to achieve:-

- (a) A rational nomenclature which indicates the nature of the products designated.
- (b) Uniformity between the Services.

##### Description

7. For the purpose of nomenclature the materials have been divided into three groups - Oils, Greases and Miscellaneous Products. A symbol which is to be used as

a name, has been allotted to each material within these groups. Each symbol consists of two parts:-

- (a) Letters: The general nature of the material is indicated by a group of two of three letters, e.g.,

OM	..	..	..	..	Oil mineral
LG	..	..	..	..	Lime-base grease
OMD	..	..	..	..	Oil mineral detergent

- (b) Numbers: The numbers distinguish the material to which they refer from other materials in the same general class.

### Oils

#### Significance of letter groups

8. (a) OM .. .. Oil mineral

This covers both plain mineral oils and those containing additives which do not alter their general behaviour as plain mineral oils, although they may be important in certain other aspects.

- (b) OMD .. .. Oil mineral detergent

This class consists of internal combustion engine oils which have a general mineral character but which contain detergent and anti-corrosion additives which alter their behaviour sufficiently to require distinction from plain mineral oils.

- (c) OC .. .. Oil compounded

This class consists of mineral oils compounded with fatty oils of animal or vegetable origin.

- (d) OEP .. .. Oil extreme pressure

This is a class of oils containing additives enabling them to withstand extreme gear tooth pressure.

- (e) OF .. .. Oil fatty

This term applies to plain fatty oils without mineral oils, but, in some cases, containing solvents e.g., brake fluids.

- (f) OX .. .. Miscellaneous

This class contains all oils with widely modifying additives which do not fall into any of the aforementioned classes.

#### Significance of numbers

9. The numbers are actually an indication of the viscosity of the oil. In this nomenclature, the numbers in the symbol refer to the approximate viscosity of the oil at 100°F., measured in centistokes, which are internationally recognized.

GreasesSignificance of letter groups

10. (a) LG .. .. Lime-base grease

This includes all greases which consist primarily of a lime (calcium) soap and a mineral oil. Such greases are generally water resistant.

(b) SG .. .. Soda-base grease

Greases in this class are primarily a mixture of soda (sodium) soap and a mineral oil. They are not generally water resistant, but are more suitable for use at higher temperature than lime-base greases.

(c) XG .. .. Miscellaneous grease

This covers greases made from the less common soaps (aluminium, lithium, etc.) unspecified soaps, or mixtures of soaps. It also includes all the types of grease to which graphite, fatty oils or other materials have been added, but which do not fall into groups (a) and (b).

Significance of numbers

11. The numbers are an indication of the consistency of the grease. Consistency, i.e. the degree of softness, is the most obvious physical characteristic which can be used to distinguish one grease from another. This is measured by the distance that a standard cone will penetrate the grease in a specified time under fixed conditions of temperature, as in the Institute of Petroleum Standard Method. A specification for a grease generally fixes upper and lower limits of penetration. The number in the symbol is either the mean of the specification limits or some equivalent value.

Note: In the case of oils the symbol number increases as the oils become thicker, i.e., more viscous, whereas in the case of greases, the symbol number increases as the greases become softer, i.e., of greater penetration value.

Miscellaneous ProductsSignificance of letter groups

12. These products consist of a small group of substances of predominantly petroleum origin which have no common characteristics that can be represented numerically. For the purpose of nomenclature they have been divided into two classes, as follows:-

(a) PX .. .. Protective miscellaneous

This class consists of a number of fluids and semi-solids used for temporary protection of equipment in transit or storage.

(b) ZX .. .. Speciality miscellaneous

This series at present includes products which cannot properly be included in other groups. Examples of these are cutting oils, certain pastes, and oils used for special lubricating and hydraulic purposes.

Significance of numbers

13. The number in this case is merely a serial number.



## GENERAL INFORMATION ON OPERATING RANGES OF OILS AND GREASES

OilsLow temperature limit

14. The pour point of an oil is a guide to the ambient temperature below which an oil will not flow without the application of external pressure. At such a temperature and just above it, an oil is extremely viscous and whether or not a mechanism in contact with the oil can be started up at or about this temperature depends upon the power that is available to overcome the resistance offered by the oil. Once movement has started, there may be sufficient heat generated by the movement to raise the temperature at the working surfaces so that viscous drag is not serious.

Upper temperature limit

15. Provided an oil has been suitably chosen as regards its duty in the first place, the upper limit of ambient temperature is not likely to present any problem and is generally not critical. In equipments which normally develop high temperatures, the bearing temperatures are not influenced very much by ambient temperatures as far as the difference between temperate and tropical climates are concerned e.g., in an I.C. engine main bearing and piston temperatures do not rise proportionally with ambient temperatures because of the cooling systems incorporated with the equipment. In instrument bearings which normally operate under light loads, the decrease in viscosity brought about by rise in ambient temperature will not be sufficient to bring about lubrication failures i.e. metal to metal contact.

Greases

16. As a general rule, lubricating greases (not mineral jelly based materials) are satisfactory for continuous use at temperatures up to about 400°F. below their softening points. Low temperature points, given in Table No. 2 as a guide on low temperature limits, are the lowest temperatures at which consistency tests are quoted in the specification governing the grease.

## USE OF OILS IN THE PRESENCE OF RUBBER

17. In general castor oil based fluids and greases should be used in conjunction with natural rubber, and mineral oils in conjunction with synthetic rubber. Particular care should be taken to ensure that only the correct grade of oil is used in hydraulic systems.

Note: The next page is Page 1001

Table 1 - Oils

Item No.	Designation	Former designation or description	V.A.O.S. No. or supplying Service	E.M.E.R. refs.	Equipments	Applications and/or description
1	Oil, OC-600	Oil, C-600	R.A.S.C.	Tels. 0 133	A.A., No. 3, Mk. 2	For use at ambient temperatures above 32°F., for the transmission of certain 'A' and 'B' vehicles, all worm gears and chassis of 'B' vehicles. NOT for hypoid gears. Pour point = +30°F. Flash point = +460°F.
2	Oil, OEP-110	Hypoid 80 (GO 80)	R.A.S.C.			Used for hypoid gears in back axles of vehicles and general gear lubrication at ambient temperatures from 0° to +32°F. NOT for worm gears
3	Oil, OEP-220	Hypoid 90 (GO 90)	R.A.S.C.			As Item No. 2, but for use at normal and tropical temperatures
4	Oil, OF-22	Oil, marine, animal for Fuzes, time, mechanical	R.A.S.C.			Lubrication of very light gearing and bearings, e.g. mechanical time fuzes, watches. This oil will function satisfactorily, well below its pour point of +5°F.
5	Oil, OM-13	Oil, mineral, hydraulic buffer	R.A.S.C.	Tels. 0 373 0 133 0 193	I.F.F., Mk. 3 A.A., No. 3, Mk. 2 A.A., No. 3, Mk. 7	General purpose, anti-freezing, high-speed spindle lubricant and buffer oil. Used for plain bearings, hydraulic couplings, clocks, dashpots, oil motors, instrument mechanisms and small refrigerators (up to 2 h.p.). Pour point = -50°F. Flash point = +290°F.
6	Oil, OM-16	Oil, insulating	R.A.S.C.	Tels. 0 603 0 193	Radar, N.T. 277A A.A., No. 3, Mk. 7	Insulating oil for transformers, oil-filled potentiometers etc. It meets the requirements of B.S.S. 148/51 ('Insulating Oils for Electrical Purposes'). Electrical strength = minimum of 40,000V (across 4 mm. gap). Pour point = -25°F. Flash point = +295°F. Replaces LDN 19317 for Modulator No. 17 (A.A., No. 3, Mk. 7)
7	Oil, OM-35	Oil, hydraulic	R.A.S.C.			Miscellaneous hydraulic and instrument purposes and for A.R.L.oil units. OM-35 will be replaced by OM-33. Pour point = -40°F. Flash point = +300°F.
8	Oil, OM-36	Oil, M 65	R.A.S.C.	Tels. A 434/1	Uniselectors (G.P.O. type)	General purpose lubricant for miscellaneous machinery, searchlights and refrigerators (over 2 h.p.). Pour point = -40°F. Flash point = +325°F.
9	Oil, OM-42	Oil for maglips, R 304	R.A.S.C.			Maglip lubrication only
10	Oil, OM-52	Oil, M 80	R.A.S.C.	Tels. 0 133 0 123	A.A., No. 3, Mk. 2	General purpose spindle oil and light machinery lubricant. Pour point = +23°F. Flash point = +330°F.

Table 1 - (contd.)

Item No.	Designation	Former designation or description	V.A.O.S. No. or supplying Service	E.M.E.R. refs.	Equipments	Applications and/or description
11	Oil, OMD-60	Lubricating oil for I.C. engines. H.D. oil within the SAE 20 range	R.A.S.C.			Winter grade heavy duty crankcase oil for I.C., C.I. engines. It will replace oil, engine 10 H.D. As a detergent oil its use should be restricted to I.C. and C.I. engines when possible. When this oil is specified for general lubrication in Tels. E.M.E.Rs. its nearest equivalent grade of non-detergent oil (OM-52) should be used if climatic conditions permit. Pour point = -50°F. Flash point = +360°F.
12	Oil, OMD-110	Oil, engine, 30 HD	R.A.S.C.	Tels. O 193 O 103	A.A., No. 3, Mk. 7 A.A., No. 3, Mk. 5	As Item No. 11: Summer grade heavy duty crankcase oil for use at ambient temperatures up to approximately 90°F. It is also used as a general gearbox and general lubricant since a non-detergent oil equivalent to this grade is not available; therefore use as specified in E.M.E.Rs. Pour point = +5°F. Flash point = +375°F.
13	Oil, OMD-260 (obsolescent). Oil, OMD-330.	Oil, engine, 50 HD	R.A.S.C.			As Item No. 12 but for use at ambient temperature consistently above 90°F. OMD-260 is being replaced by OMD-330.
14	Oil, OX-13	Oil, low cold test No. 2	R.A.S.C.			Low temperature preservative cleaning agent and lubricant for instruments except where brass occurs.
15	Oil, OX-320	Oil, graphited, concentrate	R.A.S.C.	Tels. A 434/1	Uniselectors (G.P.O. type)	Ratchet lubrication. Pour point = +32°F.
16	Oil, ZX-7	Oil, open gear	R.A.S.C.			Lubrication of open gearing (as found on concrete mixers and winches) and wire ropes.
17	Oil, ZX-8	Oil, open gear light	R.A.S.C.			As Item No. 16; for winter use.
18	Penetrating oil		Not supplied			An ad hoc mixture of used oil and kerosene is an effective penetrating oil for loosening rusted nuts and bolts, and can replace proprietary brands.

Table 2 - Greases

Item No.	Designation	Former designation or description	V.A.O.S. No. or supplying Service	E.M.E.R. refs.	Equipments	Applications and/or description
1	Graphite, colloidal, aqueous	Graphite, colloidal, Colygraph	R.A.S.C.	Tels. O 133	A.A., No. 3, Mk. 2	For friction clutches. This item, although once designated as a grease, in V.A.O.S., is not in fact a grease.
2	Grease, LG-280	Grease, G.S.	R.A.S.C.	Tels. O 133	A.A., No. 3, Mk. 2	General purposes, including general lubrication of trailer chassis including wheel bearings and lubrication of low and moderate speed ball bearings. See also Table 3. Suitable for application by smearing. Low temp. test = 0°F. Softening point = +212°F.

Item No.	Designation	Former designation or description	V.A.O.S. No. or supplying Service	E.M.E.R. refs.	Equipments	Applications and/or description
3	Grease, IG-320	Grease, No. 1	R.A.S.C.	Tels. 0 103 0 193	A.A., No. 3, Mk. 5 A.A., No. 3, Mk. 7	General lubrication of trailer and vehicle chassis. Low temp. test = +32°F. Softening point: About +190°F.
4	Grease, IG-380	Grease, No. 0	R.A.S.C.	Tels. 0 133 0 193 0 403 0 373	A.A., No. 3, Mk. 2 A.A., No. 3, Mk. 7 I.F.F. No. 1C I.F.F. Mk. 3	For general low temperature lubrication, including fire-control instruments, trailer chassis and bearings. Low temp. test = -58°F. Softening point = +194°F.
5	Grease, SG-240	Grease, H.M.P. No. 3	R.A.S.C.	Tels. 0 173 0 193 0 603	A.A., No. 3, Mk. 2 A.A., No. 3, Mk. 7 Radar, N.T. 277A	General purposes, and lubrication of high speed ball and roller bearings in magnetos, electrical equipment etc. Low temp. test = +14°F. Softening point +283°F. Item No. 6 is now being used instead of Grease, SG-240.
6	Grease, XG-271		R.A.S.C.			Magneto bearings, high-speed ball and roller bearings and general high-speed/high temperature applications. Low temp. test = -40°F. Softening point = +300°F.
7	Grease, XG-280	Grease, G.S., graphited	R.A.S.C.	Tels. 0 173 0 193	A.A., No. 3, Mk. 4 A.A., No. 3, Mk. 7	General purposes requiring a graphited grease: leaf springs, tank turret races, chain drives etc. Low temp. test = 0°F. Softening point = +212°F.
8	Grease, XG-340	Grease, graphited, RD 1179	R.A.S.C.	Tels. T 243/1	Teleprinter 7B (W.D.)	Although intended primarily for use on L.M.Gs. and light automatics, it also has uses where the ability of a grease to adhere and remain in position is important, e.g. on knife edges and clutches on teleprinters. It is the nearest service equivalent to Creed Grease No. 5.

Table 3 - Preservatives

Item No.	Designation	Former designation or description	V.A.O.S. No. or supplying Service	E.M.E.R. refs.	Equipments	Application and/or description
1	Beeswax		HA 12326			Preservative for string and cord used in binding cable-forms. Also used in acid etching and as a flux for lead soldering. Its use should be avoided in tropical climates with non-metallic electrical and tels. components.
2	Composition, PX-2	Composition, rust preventative	HA 13500	Gen. J 015 Tels. A 871	General	Tropic and temporary preservation of iron and steel articles such as tools, external and internal metal surfaces which can subsequently be reached to allow the preservative to be removed before the preserved item is to be put into use. It can be applied cold by dip, spray or brush and produces a hard tough protective film. It is not suitable for use on parts containing fine oilways, fine internal threads, ballraces, rubber, parallel surfaces and laminated assemblies. It is soluble in white spirit, petrol, kerosene. Its solvent gives off a toxic vapour; 'NO SMOKING' and adequate ventilation is necessary when being used.
3	Composition, PX-4	Composition, preservative, spraying	HA 13501	Gen. J 015	General	Preservation of external surfaces of mechanical assemblies prior to packing in boxes or crates and of internal surfaces of mechanical assemblies generally e.g. enclosed gearboxes. It can be applied cold by spray, dip or

Table 3 - (contd.)

Item No.	Designation	Former designation or description	V.A.O.S. No. or supplying Service	E.M.E.R. refs.	Equipments	Applications and/or description
3 (contd.)						brush or flush and drain and need not be removed unless dirty. Residues dissolve in lubricating oil. It is not suitable for use on parts which are directly exposed to adverse weather conditions.
4	Chalk, pulverized		HA 12420			For application by dusting or by hand for the general protection of rubber surfaces. It need not be removed.
5	Desiccant		HA 12480 to HA 12488	Gen. N 691	General	<p>These substances have the characteristics of absorbing moisture from the atmosphere i.e. to act as de-hydrating agents providing they themselves are not saturated. By their use in confined areas, the moisture content of that area is reduced and corrosion and mould growth, which may occur as a result of the moisture content, is inhibited. One type of desiccant, silica gel, is sometimes impregnated with cobalt chloride which acts as an indicator of the desiccant condition. In the dry state, it is coloured pale purple and turns to pink as its moisture content increases. The soluble chloride present in impregnated silica gel can be an objectionable feature since it will corrode metals.</p> <p>Desiccants are used principally for:-</p> <p>(a) Protection of optical and tels. equipment by desiccation of the air in individual units or other confined areas.</p> <p>(b) The protection of packed stores by the absorption of moisture from the materials used, and the provision of moisture-vapour barriers, in packaging.</p> <p>Desiccants are supplied in the Army in quantities equivalent in effectiveness to definite quantities of silica gel basic. The desiccant actually supplied by R.A.O.C. may be either silica gel or activated alumina. These items have similar characteristics. Gen. N 691 gives further information on silica gel.</p>
6	Grease, LG-280	Grease, G.S.	R.A.S.C.	Gen. J 015	General	Used as a general, thick film, temporary protective for metals (requiring individual treatment) in tropical and temperate climates. It can be applied by brush or smearing and gives better protection than Item Nos. 7, 8, 9 and 10, particularly in the tropics. It must not be heated and thinning by solvents must not be attempted. It is not suitable for use on long runs of similar parts (due to limitations of brush application) and on parts containing natural rubber.
7	Grease, mineral jelly, yellow		HA 13586			As PX-7 but may be more suitable for use at higher temperatures since its softening point is higher at about 100°F.
8	Grease, PX-6	Mineral, jelly, high melting point	HA 13540 HA 13541	Gen. J 015 Tels. A 871		This material is of fairly stiff consistency and has a fairly high melting point. Its principle use is as an ingredient of PX-11. Softening point (when item is supplied to specification CS 2485A) = 140°F.

LUBRICANTS, PAINTS, PRESERVATIVES, ADHESIVES AND  
SIMILAR MATERIALS USED IN CONJUNCTION WITH  
TELECOMMUNICATIONS EQUIPMENT

Cancellation

1. The information given throughout this regulation is now contained in Wksp G 490.
2. All copies of Issue 1, Pages 0-02, and Issue 4, Pages 1-5, 1001- 1018, dated Feb 53, are hereby cancelled and are to be destroyed.
3. This instruction must be retained until the publication of an amended A 001 when it is to be destroyed.

END