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CHARACTERISTICS OF MARINE ELECTRICAL ENGINEERING TERMINOLOGY

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***Abstract**: The marine electrical engineering terminology, as part of the engineering terminology, shares the characteristics of the main scientific field. In this paper we will try to depict some individual lexical traits of the electrical terminology applied to the maritime environment, more precise the electrical and electronic equipment used on boardships.*
***Keywords**: marine electrical engineering, terminology, ships.*

Introduction

The terminology is a part of vocabulary that is used in a certain field of activity. The linguists are still classifying terms into scientific, technical, non-technical etc. Some researchers (Baker, 1988; Cowan, 1974; Flowerdew, 1993; Trimble, 1985), however, distinguish another category made of so-called sub-technical vocabulary, a class of words that stand between technical and non-technical words. These are words that can be used with the same meaning in more technical disciplines. As Baker (1988, p. 91) noted, the term sub-technical covers ''a whole range of items that are neither highly technical andspecific to a certain field of knowledge nor obviously general in the sense of being everyday words which are not used in a distinctive way in specialised texts''. Some of these lexical items will be identified in our research.This paper is trying to depict some traits of the marine electrical vocabulary lexical structure after having taken samples of texts (approximately 300 pages) from the marine electrical engineering field.

Lexical structure

The classification of the words will be done according to several characteristics, the most important ones are: form, lexical structure and meaning. The single terms or one-word terms will be analyzed separately and considered as derivative forms or simple ones, letter symbols and abbreviations will be also analyzed according to the frequency they appear in the texts and the affiliation to sub-technical vocabulary. Nouns are those that give the specificity of a certain terminology therefore we will classify them according to the form of the noun phrase depicting their characteristics.

The Noun

We have found out the following single word nouns that identify the electrical terminology: *accumulator, alternator, ammeter, ampere, amplifier, apparatus, arc, armature, armor, arrangement, automation, auxiliaries, battery, blackout, braid, breaker, brush, bulb, cable, cadmium, casing, cell, circuit, clip, coil, commutator, conductor, conductance, conduit, connection, contactor, contact, control, converter, cooler, cooling, copper, cord, corrosion, crane, current, derrick, detector, diameter, diode, duct, electrolysis, electrolyte, emergency, enclosure, equipment, excess, excitation, exciter, exit, failure, fan, fault, figure, filter, fitting, fixing, fixture, flow, flux, frequency, fuse, ground, hanger, harmonic, hatch, heater, hull, impeller, indicator, inductance, induction, inductor, input, insulation, insulator, joint, label, lamp, lead, light, line, load, loss, magnetism, mains, marine, mica, motor, nut, ohm, oscillation, paint, phase, pipe, plant, plastic, plates, pliers, plug, pointer, polarity, pole, power, protection, puller, pump, radar, reactor, refrigeration, relay, resistor, resistance, ring, rotor, scissors, screw, section, series, shade, shaft, sheath, shelf, shock, signal, slot, socket, source, spark, spring, starter, stator, stud, switch, tapes, tapping, temperature, thermograph, thyristor, tool, torch, torque, tracking, trip, trunking, turbine, ventilation, voltage, volt, watt, winch, wire, wiring, wrench*.

According to the **frequency** they appear in the studied marine electrical engineering texts, the following words can be found the most frequent and they will be placed in order according to the rate: *voltage, circuit, batteries, fuse, motor, conductor, current, cable, alternator, insulation, cell, lamp, volts, ammeter, switch, wire, apparatus, commutator, rotor, resistance*. They can be considered the core of the vocabulary if we refer to single words. The percentages for this segment of the terminology are expressed in the following chart:

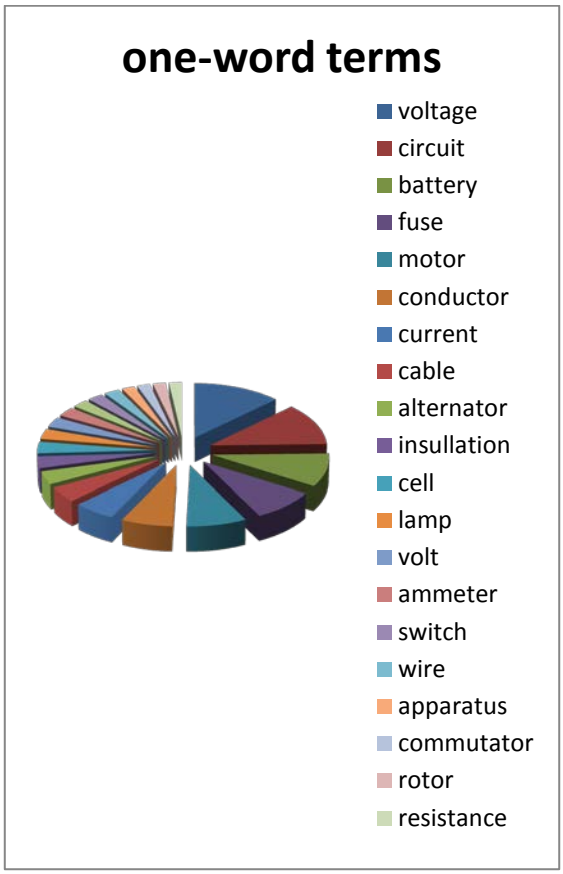

Figure 1

If we take into consideration the form, about a third of the nouns in Figure 1 are formed with suffixes:

- -or: conduct + or; alternate + or; commutate + or = verb +or;
- -age: volt + age = noun + age;
- -ion: insulate + ion = verb + ion;
- -ance: resist + ance = verb + ance.

The term *ammeter* is at origin a compound formed of *ampere* and *meter* and not a term derived with a suffix as we would expect according to its ending, but it is used now as a single-word term.
The word that is specific to this terminology and is missing from the chart is *'electric'*. It is not included into the list of the most frequent terms because it appears especially in phrases or compounds formed with two, three or more terms. The other reason way the term *'electric'* does not appear in the chart is the simple fact that it is an adjective, not a noun, although it is very productive and the word family is well represented.
For the other one-word terms that cannot be found so frequent in the studied texts of marine electrical engineering the percentage of the words formed with suffixes is maintained at a third exactly like the percentage for the most frequently used words.

The suffixes are:

- **-er** (something that does something) usually verb + er: amplify + er; break + er; convert + er; cool + er (adjective + er); excite + er; hang + er; heat + er; impel + er; point + er; pull + er; start + er; ply + er;
- **-or** (denoting the person or the object doing the action): contact + or; detect + or; indicate + or; induct + or; insulate + or; react + or; resist + or; state + or; arm + or;
- **-ment**: arrange + ment; equip + ment;
- **-ion/ -tion** (noun suffix denoting the act, state or result of doing something): automate + ion; induct + ion; connect + ion; corrode + ion; excite + tion; oscillate + ion; protect + ion; ventilate + ion; refrigerate + ion;
- **-ing**: case + ing (used for countable nouns here); cool + ing (adjective + ing); fit + ing; fix + ing; tap + ing; track + ing; trunk + ing; wire + ing;
- **-ance** (the action, state or quality of doing something) verb + ance: conduct + ance; induct + ance; resist + ance;
- **-ure** (used to make nouns that show actions or results): enclose + ure; fail + ure; fix + ture (verb + ure)
- **-cy** (the state or quality of being something) adjective + cy: frequent + cy;
- **-ism** (the state of being like something, or having a particular quality) noun + ism: magnet + ism;
- **-ity** (the state of having a particular quality, or something that has that quality): polar + ity;

We can note that the most productive suffixes are*:* ***–er***, ***-or***, ***-ion*** and ***–ing*** with the most derivative words formed. On the other hand the most productive word of the marine electrical terminology seems to be the verb ***induct***, that has formed three nouns: *inductance*, *induction*, and *inductor*.
Among the selected terms several are uncountable: *automation*, *induction*, *cadmium*, *mica*, *apparatus,* and *equipment*. Some words are used only in the plural: *pliers* and *scissors* denoting tools, and '*the mains*' used especially in British English with the meaning "the place on the wall where you can connect something to a supply of electricity" or "gas, water, or electricity supplied through a pipe or wire" (Longman Dictionary). There is one word that forms the plural by changing the final consonant 'f' into 'v' and adding –es and this is *shelf* with the plural *shelves*.
There are few terms formed with prefixes. The

most important prefixes used in the marine electrical terminology, according to the terms selected, are:

- *electro-* a technical prefix with two meanings "1 relating to electricity or made to work by electricity 2 electric and something else" (Longman Dictionary): *electro + lysis, electro + lyte*;
- *thermo-* a technical prefix relating to heat: *thermo + graph*.

If we refer to the meaning of the one-word terms, according to the classification into technical words and sub-technical words, the last category is well represented. There are about 140 words that have synonyms and can be used in more than one technical domains in comparison to the total of 164 one-word terms, so we can draw the conclusion that the vocabulary of the marine electrical engineering is mainly sub-technical: *accumulator, amplifier, apparatus, arc, armature, armor, arrangement, automation, auxiliaries, battery, blackout, braid, breaker, brush, bulb, cable, casing, cell, circuit, clip, coil, commutator, conductor, conduit, connection, contact, control, converter, cooler, cooling, copper, cord, corrosion, crane, current, derrick, detector, diameter, duct, electric, emergency, enclosure, equipment, excess, excitation, exciter, exit, failure, fan, fault, figure, filters, fitting, fixing, fixture, flow, flux, frequency, fuse, ground, hanger, harmonic, hatch, heater, hull, impeller, indicator, input, insulation, insulator, joint, label, lamp, lead, light, line, load, loss, magnetism, mains, marine, mica, motor, nut, oscillation, paint, phase, pipe, plant, plastic, plates, pliers, plug, pointer, polarity, pole, power, protection, puller, pump, radar, reactor, refrigeration, relay, resistance, ring, rotor, scissors, screw, section, series, shade, shaft, sheath, shelf, shock, signal, slot, socket, source, spark, spring, starter, stud, switch, tapes, tapping, temperature, tool, torch, torque, tracking, trip, trunking, turbine, ventilation, winch, wire, wiring, wrench*. If we compare the technical terms with the sub-technical ones the percentage of technical ones is about 15%.

Abbreviations and symbols

When someone studies the marine electrical terminology, the multitude of symbols and abbreviations cannot be ignored. The technical and scientific language is characterized by precision and concision and the letter-symbols and abbreviations make the texts more concise.

The letter symbols are used for quantities and units and in electrical engineering there are specific symbols for this particular terminology, although many other letter-symbols from related technical domains can be found. In the studied texts we found out the following letter symbols that will be given according to the frequency: V= volt; Ω = ohm; A = ampere; W =watt; Hz =hertz; kV = kilovolt; kVA = kilovolt ampere; kW =kilowatt; ˚C= degree Celsius; μΩ =micro-ohm; mA = milliamperes; μA = microampere.

Abbreviations are short forms of words and expressions that can be found in great number in the marine electrical terminology mainly because it is a crossroad between the electrical and electronic vocabulary and the maritime terminology. The abbreviations we could find in the studied texts are*: "dc V" selector; "V" connection; "true-rms" meter; 3-phase a.c.; 4-wire LV supply; a.c, equipment; a.c. component; a.c. distribution system ; a.c. network; a.c. power system; a.c. shore supply; a.c. systems ; a.c. wiring; AC generators; amps; automatic voltage regulator (AVR); continuous Maximum Rated (CMR) machines; current transformer (CT); current transformers (CTs); d.c. breaking current rating; d.c. current ; d.c. distribution systems; d.c. exciter; d.c. motors; d.c. shore supply; d.c. system; d.c. voltage; d.c. voltage range; DFDE (Dual Fuel Diesel Electric Propulsion); direct current (d.c.) system; direct current (D/C); distribution fuse-board (d.f.b.); earth fault (E/F); earth fault (E/F) relay; earthed HV system; embedded temperature detector (ETD); full electric propulsion (FEP); high voltage (HV) systems; HRC (high rupturing capacity) cartridge-type fuse; HRC fuse will blow; INMARSAT ship earth station; insulation resistance (IR); integrated electric propulsion (IEP); integrated full electric propulsion (IFEP); kVAr load; LED; low-voltage d.c. supply; main a.c. generators; egger type IR tester; MF radio installation; MF/HF radio installation; miniature (MCB) type of circuit-breakers; moulded-case (MCCB); neutral earthing resistor (NER); normally-closed (NC) contact; OCIDMT (overcurrent inverse and definite minimum time) relay action; OCIT (over- current inverse time; open-circuited CT; overcurrent relay (OCR); polyphase a.c. induction motors; polyphase a.c. synchronous induction motors; polyphase a.c. synchronous motors; PVC; r.m.s. value ; residual current circuit breaker (RCCB); Shipboard main LV systems; similar d.c. voltages; TFDE (Tri-Fuel Diesel Electric Propulsion); undervoltage (U/V) release mechanism; VHF radio installation; Voltage transformers (VTs).*

A part of the context is also maintained from the main text, because in most situations the explanation or the long form is given for each abbreviated phrase or word. For some of the abbreviations that are not explained in the text, the meaning is: kVAr = kilovolt amperes reactive; LV = low voltage; rms = root mean square; HRC = high resistance circuit; LED = light –emitting diode; INMARSAT = International Maritime Satellite Organization; VHF = very high frequency.

According to their occurance, we can notice that the abbreviations EF, a.c., IR and d.c. are the

most frequent. If we want to visualize the percentages on a chart, taking into consideration only the abbreviations that occur at least three times, the pie chart will look like the one in Figure 2.

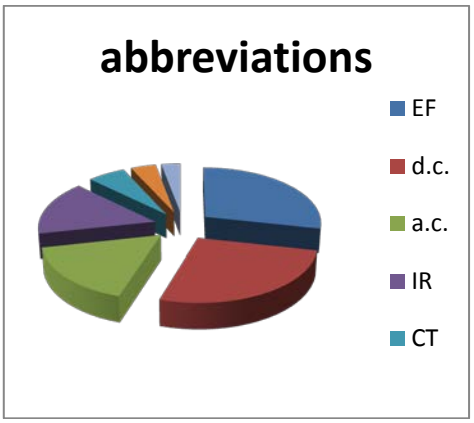

Figure 2

If we take into consideration the letter-symbols and the abbreviations to include the marine electrical vocabulary into the sub-technical category, we can notice that the situation is different from what we have found out about the single terms. The letter-symbols are learned in school, but people who do not work in the field of engineering might not know them, or cannot remember them. The abbreviations seem to be more complicated and we believe that they are used and known by specialists working in this domain of electric and electronic engineering.

CONCLUSIONS

For the part of the marine electrical terminology taken into consideration, the one-word nouns and the letter-symbols and the abbreviations, we can draw the following conclusions:

- there are certain one-word nouns that identify the marine electrical terminology, which means that a text where the mentioned words appear can be identified as being a technical one even if we do not know exactly the field of activity;
- a characteristic of the marine electrical vocabulary are the abbreviations and the letter-symbols both from the electrical and the maritime domain;
- the marine electrical terminology cannot be considered of being part of the sub-technical vocabulary because of the letter symbols and the abbreviations, although the one-word terms are used in other technical domains and can be understand by non-specialists on a rate of 85%.

Only the further study of the marine electrical terminology can confirm its affiliation to a technical or sub-technical vocabulary.

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