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THE IMPACT OF THE QUALITY OF RADIO EXCHANGE BETWEEN THE ATC DISPATCHER AND THE AIRCRAFT CREW ON FLIGHT SAFETY

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Annotation. The article presents the structure of professional speech activity of aviation operators. The essence of radio exchange in the professional speech activity of pilots and air traffic controllers is revealed. The functional, linguistic and psycholinguistic features of the discourse "Civil aviation radio exchange" are determined. The main speech genres in which the communicative interaction between the crew of the aircraft and air traffic controllers and within the crew between its members is realized are described. The topic of statements in radio exchange during the interaction of the aircraft crew with various air traffic control and maintenance services is presented. The requirements for the organization of air–to-ground communication in accordance with international and Ukrainian legislative bases are disclosed.

Key words: air traffic safety, aviation enterprise, dispatcher, air transport crew, number of violations.

Professional communication occupies a special place in the professional activity of aviation specialists. We consider the professional speech of aviation industry specialists as a special functional type of speech that serves the professional sphere of communication of aviators. The professional speech of aviation operators provides for the following components: 1) specific professional-speech communication carried out within the society "aviation operators" (between the air traffic controller and the crew of the aircraft) when performing an aircraft flight, and implemented in the form of civil aviation radio exchange (RGA); 2) communication of aviation operators with representatives of aviation personnel during the aircraft's stay on the ground in order to ensure the organization of the flight and its safety, 3) communication with passengers, which occurs indirectly as an announcement of the flight progress by the crew or directly in individual flights when situations arise that require the intervention of the aircraft crew in order to ensure flight safety. Thus, the professional speech of pilots and air traffic controllers primarily performs a communicative function, it serves the process of professional communication of aviators in preparation for the flight and in the process of its implementation [1].

A specific manifestation of the professional speech of aviation operators is the conduct of air–to-ground communication. Researchers (V.Kolosov and T.Ivanova) note that "an important element of a safe air traffic control system (ATC) is an

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effective, accurate and reliable communication between an aircraft and an ATC dispatcher" [2, 90]. The main task of the ATC is to ensure a safe, orderly and fast flow of air traffic. Air traffic controllers, each of whom has its own area of responsibility, accompany the aircraft at all stages of the flight, from the moment the engine starts on the ground to taxiing the aircraft to the parking lot after landing. Thus, it can be noted that the general principle of air control for an air traffic controller will be "I hear, I control", and for a pilot – "I hear, I perform". The safety of the flight depends on how the participants of this professional interaction understand each other.

In this regard, the aviation industry has developed special requirements for the professional speech of specialists providing professional air–to-ground communication. Let us analyze the terminological macropole "Civil aviation radio exchange", the units of which perform nominative and communicative functions during "two-way exchange of information by means of radio communication equipment between the aircraft crew and ground control services and/or other aircraft, as well as during internal radio communication between crew members" [3, 4]. The communicative environment for the terminology of the RGA is the activity of radio exchange (RO), which is applied and carried out on the aircraft during the flight and related operations performed by the aircraft on the ground. The RO sub-language, following T. Malkovskaya, is considered as "a set of phonetic, grammatical and lexical units of the language that serves the speech communication of air traffic participants (air traffic controller and pilot) during flight and is presented in the dialogues "pilot – air traffic controller" [4, 15].

The RGA is carried out so that 1) the dispatching services inform the crew of the aircraft about the situation in the flight area, the condition of the airfield, the operation of communications and radio equipment for flights and landings, about emergency situations; control the actions of the aircraft, their separation at safe intervals in order to prevent dangerous approaches and collisions of the aircraft with each other and with obstacles on the aerodrome and in flight; they requested information about the status and location of the aircraft, and 2) the crew of the aircraft informed about the flight maneuver, reported on the status of the aircraft and the situation in which the flight was carried out; received permission to perform a particular flight stage.

So, the communicative objectives of the RO are: informing (message), request, control and support of the aircraft by ground services, which are implemented in confirmation (permission) or prohibition.

According to the "Rules for conducting radiotelephone communication and phraseology of the RGA in the airspace of Ukraine", there are such categories of messages: a) emergency calls, messages about "distress" and emergency traffic; b) urgent messages, including messages preceded by a signal of medical and sanitary

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transport; c) messages regarding direction finding; d) flight safety messages; d) meteorological messages; e) messages about the regularity of flights [5].

It is customary to distinguish three main groups of speech interactions between ATC dispatchers and aircraft crews: 1) administrative forms (command, dispatch order, dispatch recommendation); 2) information forms (request, dispatch information, message crew, clarification, confirmation of receipt of information, report on the implementation); 3) unregulated forms (replicas, etc.).

During the flight, the aircraft crew interacts with various ATC services. At the first and final stages of the flight, the interaction "airfield control room – VS" is carried out. The verbal communication of the participants of this interaction takes place on the following topics: information about departure and engine start rules, towing, instructions regarding taxiing, rules for take-off, airfield flight circle, final stage of approach, departure for the second round, after landing, airfield information is important. Timely, concise and unambiguous communication is "an important factor in ensuring the rhythmic, safe and unhindered operation of the airfield. It is not only a means for dispatchers to perform their tasks, but also helps pilots to learn about other aircraft in their vicinity, especially in conditions of poor visibility" [6].

When performing a flight along the route, the crew of the aircraft interacts with radar bodies of various types, including air traffic surveillance and maintenance services, the approach control room, and district control control bodies. Interaction with surveillance services provides for the exchange of information regarding recognition and tracking, movement and deviation maneuvers, the work of pilots with receivers-transmitters, the provision of radar assistance to aircraft in case of radio communication failure, a warning about danger.

Interaction with the approach control room covers an IFR departure (a flight performed in accordance with the instrument flight rules), an IFR departure (a flight performed in accordance with the visual flight rules), an IFR arrival, an IFR arrival, a vector at the final stage of the approach, an approach on the precision approach radar on the landing.

The interaction of the aircraft with the bodies of the district dispatch control provides for the following topics: information about the location of the aircraft, flight echelon, entry / exit / intersection of aircraft airways, flight with waiting on the route, flight control over the ocean.

Ukrainian legislation clearly defines radiotelephone communication procedures, among them: 1) the transmission is conducted in a concise form, in a normal conversational tone using standard phraseology; 2) to ensure a clear and satisfactory reception of messages, the crew of the aircraft, the air traffic service authority or other relevant ground personnel must: pronounce each word clearly and clearly; adhere to a speech speed that would not exceed 100 words per minute (if the message transmitted

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on board the aircraft requires recording, the speech speed must be reduced so that such a message can be recorded); keep the speech volume at a constant level; 3) when transmitting long messages, it is necessary to make short stops in order to to make sure that the frequency at which the transmission is conducted is not busy, and to enable the operator of the station receiving such messages, if necessary, to make a request to repeat the unrecognized parts of the message; 4) messages processed in aviation mobile communications consist of the corresponding parts, which are transmitted in the following order: a) a call indicating the addressee and sender; b) text [5].

Thus, the rules defining the norms of the flow of RO are based on certain principles, such as: the speech forms used (commands, messages) should ensure a minimum of distortion and loss of information; receipt of any information, as a rule, should be accompanied by a message in response ("receipt"), the number of words in radio sessions and their duration they should be (if possible) minimal.

Speech interaction during the flight is carried out not only in the direction of the "pilot – air traffic controller", but also inside the cockpit between the members of the flight crew. The following main speech forms are distinguished in the speech interaction of crew members: 1) commands-appeals in which it is required to perform a certain specific action ("Remove the chassis", "Flaps 20"); 2) command execution, confirmation of receipt of information ("Flaps 20 released", "5 kilometers, speed 270"); 3) requests-appeals with a request (request) to provide necessary information ("Course"?); 4) replicas are appeals that do not carry command, executive or notification information: comments, objections, comments, etc. The first three forms form the necessary basis for the verbal interaction of crew members in performing joint activities, they are mainly regulated and fixed in the rules regulating the conduct of RO. The latter form (V. Kolosov) is referred to as redundant, to "noise" that goes beyond the generally accepted technological speech interaction. These are remarks, an expression of the speaker's attitude (position) to the actions, deeds, words of the partner, his condition, etc. Such replicas are usually emotionally colored, express not the interaction of partners, but their relationship.

In general, RO can be considered as a process and as a product of dialog communication. In this regard, following O. Akimova [7], we consider PO as a discourse (process), contrasting it with the text as a product of speech activity. Functionally, the text of the RGA is hierarchically organized speech acts combined into statements of a dialogical type. There are a number of linguopsychological features of dialogic speech. This speech is situational, closely related to the conditions in which communication takes place. The message in the dialogic speech is not created anew every time, but is, as it were, completed to the previously expressed or performed actions. This speech is contextual and concise due to the crew members' knowledge of communication situations and their use of special professional vocabulary, aviation

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phraseology. Dialogue as a form of verbal communication is a form of interaction that is subject to constant alternation, a relatively rapid change of actions and reactions of interacting individuals. The peculiarity of dialogues between crew members is their purposefulness and fast pace, which is associated with the time limit for communication. The longer the communication process lasts (at modern flight speeds), the less time is left to perform operations to control the aircraft, as a result, some operations are not performed, or are performed with violations and errors, which can provoke an accident. The oral-conversational dialogic speech of the RGA is built in accordance with the principle of economy. Thus, a specific feature of statements in the field of RGA is conciseness. The dialogue of the RGA does not provide for the visual perception of communicants, that is, there is no perception of facial expressions, gestures, body movements. Possible interference does not always allow us to perceive the intonation pattern of the utterance. The consequence of this is a special attention to the text and to the word as its unit.

The analysis of the works of scientists (O. Akimov, P. Korchemny, I. Lushchikhina, T. Malkovskaya, A. Pchelinov, M. Solnishkina, etc.) allows us to conclude that the linguistic features of air–to-ground communication are conciseness, unambiguity, clarity, relative freedom of utterance construction; typical "phraseology", which is aimed at maximizing the use of standard words and phrases; clear and understandable pronunciation; avoidance of verbosity in standard flight conditions, the use of non-standard language units in non-standard situations; the strict thematic orientation of the content (the content side of the texts is mainly correlated with the semantic spheres "Object", "Action", "Space, "Situation", "Time", which relate to the performance of flight and ATC. RO relative to other topics is prohibited).

Investigation of incident data for selected models with the construction of diagrams. My research will take place on the basis of data on plane crashes of several aircraft having approximately the same technical characteristics, produced only in different countries. All 3 aircraft are popular in the airliner market.

Let's analyze using a table built in Excel and diagrams based on its data.

Board	Number of accidents	Human factor	Technical factor	Natural factor	Terrorists
Boeing 737	**211**	**51%**	**25%**	**14%**	**5%**
Ил-76	**81**	**31%**	**27%**	**19%**	**17%**
Ту-154	**71**	**18%**	**48%**	**2%**	**14%**

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The documents of the International Civil Aviation Organization (ICAO) indicate that the information and instructions that are transmitted to the RO "are vital to ensure the safe and rapid operation of the aircraft" [6]. Radio exchange in aviation is oral communication carried out on the basis of lexical and terminological "blanks", speech cliches, the use of which is mandatory in accordance with the requirements of conducting radio conversations. These rules determine the procedure for conducting radio communications, the peculiarities of using special and non-special vocabulary, the nature and style of communication, the specifics of the construction of statements, as well as the topics of the latter. The rules and typical phraseology are designed to reduce the duration, streamline and improve the reliability of RO in radio networks and over the ground communication channels of ATC bodies.

The relations between the communication participants are determined by the established rules of RO. Of the two communicants, the representative of the dispatching service is the main one, since it is he who carries out the transfer of orders on board the aircraft and monitors the movement of aircraft in the airspace. Thus, the air traffic controller occupies a higher position in the hierarchical relationships of communicants compared to the crew, and communication in the RGA is mainly based on the vertical relationships of its participants.

The communicative situation caused by flight safety conditions and, accordingly, the absence of a threat to human life and health is reflected in the so-called standard radio exchange. The communicative situation caused by the occurrence of unforeseen flight conditions caused by technical and human factors (interruptions in the operation of aircraft control and navigation systems, the influence of environmental elements on the operation of aircraft, errors in piloting and air traffic coordination, etc.) lead to non-standard radio exchange. Thus, the RGA discourse presupposes the presence of texts reflecting standard and non-standard situations. The first type includes the texts of standard negotiations, characterized by a given subject (the necessary stages of the flight and the mandatory components of the PO procedure), a special construction of speech forms of statements, a general tendency to generate statements in accordance with the recommended requirements of the PO. The second type includes a discourse reflecting non-standard situations of RO. Non-standard situations and horizontal relations of communicants, noted Fr. Akimova and M.They can lead to an imbalance of the neutral, calm, unemotional state of communicants engaged in PO, which, in turn, provokes the penetration into PO of various emotionally colored, non-normalized lexical units of a colloquial nature [8]. And when conducting RO on international air routes, there will be even more such units due to the inclusion in the communicants' speech products of native language units, lexemes with ambiguous interpretation, etc.

As a result, the ICAO phraseology was created, which was developed in order to ensure maximum accuracy, conciseness and unambiguity of understanding of words

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and expressions used in conducting radiotelephone negotiations, for "effective, clear and unambiguous exchange of information during communication," with special attention being paid to "the correct use of ICAO phraseology in all cases when it should to be applied" [6].

The huge attention to the speech aspects of the professional activities of aviation operators indicates that no aircraft management activity is as vulnerable as the errors and limitations of performers associated with the transmission of messages in the air–to-ground mode.

In the first section, the features of aviation air communication were considered from the point of view of the organization of speech radio exchange and it was shown that the quality of the functioning of the channels of speech radio exchange is determined by the state of the channel-carrying equipment, the state of the transmission channel of the radio message and, importantly, the quality of the radio message itself. At the same time, it was shown that the task of improving the quality of speech radio exchange should be solved comprehensively, i.e. taking into account the unreliability of the equipment, taking into account the imperfection of the information transmission channel and taking into account the imperfection of the speech message itself.

As flight safety indicators determined by the operation of the ATC system, it was proposed to choose 2 indicators: the probability of a dangerous approach, directly related to the probability of aircraft collisions with each other. For such an analytical justification, it was proposed in the work to determine the quality of the speech radio channel by an integral characteristic in the form of probabilities of re-inquiries or in the form of an operational readiness coefficient, functionally interconnected. The corresponding analytical dependencies were obtained. They allow, with a known duration of the communication session and the presence of restrictions on the values of one of the indicators of equipment reliability, to make demands on other indicators.

List of literature

1. Kovtun, O.V. Formuvannya professiynogo movlenya u maybutnikh fakhivtsiv aviatsiynoy galuzi : monograph / O.V.Kovtun; science. ed. Doctor of Pedagogical Sciences, Prof., former member of the National Academy of Sciences of Ukraine Bogush A.M. – K. : Oswita Ukrainy, 2012. – 448 p.

2. Kolosov, V.A. Analysis of errors in speech interaction between crews and ATC dispatchers / Kolosov V.A., Ivanova T.A. // Psychophysiological problems of improving the efficiency of flight and dispatching personnel of civil aviation: mezhvuz. topic. collection of scientific work. – St. Petersburg, 2000. – pp. 90-101.

3. Olanyuk, P.V. Radio navigation devices and systems of civil aviation : textbook for universities GA / Olanyuk P.V., Astafyev G.P., Grachev V.V. – M. : Transport, 1983. – 585 p.

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4. Malkovskaya, T.A. English-Russian correspondences in the language structure of radio exchange in the mode of communication pilot-air traffic controller : dis. ... Candidate of Philology : 02/10/20 / T.A.Malkovskaya; Pyatigorsk. state. lingv. un-T. – M., 2004. – 163 p.

5. About the zatverdzhennya Rules of conducting a radiotelephone call to the phraseology of radioobminu in the interior space of Ukraine // Order of the Ministry of Transport of Ukraine No. 486 vid 10.06.2004 [Electronic resource]. – Access mode : http://zakon2.rada.gov.ua/laws/show/z0844-04

6. Doc 9432 Manual on radiotelephone communication [Electronic resource]. – Access mode : http://dcaa.slv.dk:8000/icaodocs/

7. Akimova, O.V. Term as a unit of terminological field and professional discourse in different structural languages (Based on the terminology of the macropolis "Civil aviation radio exchange" in Russian and English) : dis. ... Candidate of Philology : 10.02.20 / O.V.Akimova; Kazan State Pedagogical University. un-T. – Kazan, 2004. – 254 p.

8. Akimova, O.V. Typology of discourse in professional communication / Akimova O.V., Solnyshkina M.I. // Actual problems of the theory of communication. – M. : Publishing House of SPbGPU, 2004. - pp. 253-270.

9. Aviation telecommunications. Volume II. Communication Procedures, including teso status PANS Seventh Edition (2016)16.

10. A. Garcia, Journal of Pragmatics, 106, 57-71 (2016)https://doi.org/10.1016/j.pragma.2016.10.005