VALIDITY AND SAFETY OF BANK OF STATISTICAL DATA OF THE PASSIVE PHYSICAL EXPERIMENT

A. Z. MURADALIYEV, Y. Z. FARZALIYEV
ASRI of Power and Power Design,
Baku, Zardabi ave., 94

The methods of protection retrospective given are considered about reliability and efficiency Power Station Blocks as from full or partial destruction database, so and undeliberate mistake. In base of the system of the checking are found methods, using surplus information, logical methods, recommended matrix method

One of the basic directions to increase of efficiency of the automated information systems analysis and control of reliability of the equipment and devices of electro power systems is the increase of validity of the retrospective data. The information support of the personnel at the decision of operational tasks connected to a problem of reliability of the equipment should be objective. The infringement of objectivity of results of the analysis and control of reliability occurs as a result of complete or partial destruction of a database, and as a result of inadvertent mistakes.

In [1] was shown that the complete or partial destruction of a database occurs in case of submission of inadvertent, casual teams from the keyboard, fluctuation of a voltage in a network and failures in the COMPUTER. The prevention of destruction of a database, maintenance of its safety is achieved by creation of the duplicate of objects of a database with the closed access, automatic control of their integrity and restoration at failure. The special procedures of systematic updating of the duplicate objects of a database are developed. It is necessary to consider inadvertent mistakes at input of the information in a database not only possible, but also inevitable. The visual monitoring system of reliability at all efficiency is not capable to prevent all inadvertent mistakes and furthermore to protect a database deliberate distortions.

The description of technical methods of protection retrospective data on reliability and efficiency Power Station Blocks from possible mistakes is resulted below.

The data include: monthly importance of manufacture of the electric power (W), specific charge of fuel (b), charge of the electric power in system of own needs (W_{sc}), date both time of a beginning and end of non-working condition, kind of switching-off, type of a condition, type of the damage equipment, type of unit of the damage equipment, character of damage [2].

Let's remind, that as against system methods of the protection which is carried out within the framework of accepted DBASE (in our case, accepted, PARADOX), the technical methods should be developed and to be based on the account of interrelation of the separate data.

1. Control of mistakes at entering given about the basic productively parameters of power blocks.

The protection of these data is carried out by a method of input of the superfluous information, what the data on the basic production parameters Power Blocks are. It is obvious, that these parameters can be calculated on production parameters Power Blocks. Just in this sense it is considered superfluous. After input of this block of the data the automated monitoring system and elimination of mistakes carries out:

- the control of reliability of the data about manufacture of the electric power by a method of the control sums under the formula:

$$\left| 1 - \sum_{i=1}^{n} W_I \Big/ W_\Sigma \right| \le 10^{-3} \qquad (1)$$

where n - number PB; W_i - manufacture of the electric power i - st PB; W - manufacture of the electric power on POWER BLOCKS as a whole.

The accounts will be carried out with accuracy 0,1%, practically sufficient for the subsequent analysis of these data. If a condition is carried out, the control is transferred to the subsequent stage of the control. Otherwise system requests about an opportunity of correction of the statistical data. The user, by checking up conformity entered statistical given and data in the initial document, can correct a mistake.

If by the reason of input was the mistake in the initial document and the time for the analysis of these data is necessary for the User, he presses the appropriate key, the attribute of unauthenticated of the data is entered and the control is transferred to data input about non-working condition, having a place, power block;

- the control of reliability of the data about the specific charge of fuel and charge of the electric power in system of own needs will be carried out accordingly under the formulas:

$$\left| b_\Sigma - \sum_{i=1}^{n} b_i W_i \Big/ W_\Sigma \right| \le 0{,}5 \qquad (2)$$

$$\left| 1 - \sum_{i=1}^{n} W_{CH,i} \Big/ W_{CH,\Sigma} \right| \le 10^{-3} \qquad (3)$$

where b_i - specific charge of fuel i - in PB; b - specific charge of fuel on Power Station Blocks; W_{sc}, i - charge of the electric power in system of own needs i- in PB; W_{SCi}, - charge of the electric power of system of own needs Power Station Blocks

The algorithm of the control and elimination of mistakes of the data about bi and W_{SCI}, i with i = 1, n is similar to the considered above algorithm for W_i with i =1,n.

2. Control of reliability at data input about date both time of a beginning and end of a condition and its duration.

The algorithm includes consecutive input and control of reliability: dates (day, month, year) beginning j- st of a

condition *i*- st PB - $T_{i,j}^{H}$; dates of the end j- st of a condition *i*- in PB - $T_{i,j}^{K}$; time (hour, mines.) beginning *j*- st of a condition *i*- in PB - $t_{i,j}^{H}$; time (hour, mines.) end *j*- st of a condition *i*- st PB - $t_{i,j}^{K}$; duration *j*- st of a condition *i*- st PB - $\tau_{i,j}$.

The control of reliability of a beginning of a condition will be carried out by logic methods by a way:

– comparison to the moment of the end previous (m_i) of a condition *i*- st PB – ($T_{i,j-1}^{K}$). It is obvious, that $T_{i,j-1}^{K} \le T_{i,j}^{H}$. A case, when the data about are absent however $T_{i,j-1}^{K}$ is possible. For example, PB in one of the previous periods was deduced in emergency repair (in a reserve, or in scheduled repair), which was completed in current (in one of subsequent) accounting periods. On this marked comparison the check of presence of date precedes $T_{i,j-1}^{K}$. If the items of information about $T_{i,j-1}^{K}$ for any reason are absent, the User is notified on it and the opportunity of entering is requested $T_{i,j-1}^{K}$. If the answer positive (*Y*), on the screen of the monitor *j*-1 a condition *i*- st PB of the appropriate accounting period is allocated, is entered $T_{i,j-1}^{K}$ and further control is transferred to repeated input $T_{i,j}^{K}$. If PB still is in a condition of emergency repair (reserve or scheduled repair), or item of information about $T_{i,j-1}^{K}$ are absent, the User is notified on inadmissibility of data input about a technical condition it PB and opportunity of data input about the HARDWARE of the following PB. If there are items of $T_{i,j-1}^{K}$ information about, the condition is checked $T_{i,j-1}^{K} \le T_{i,j}^{H}$.

- comparison $T_{i,j}^{H}$ to dates started (T_{Π}^{H}) and end (T_{Π}^{K}) accounting period.

It is obvious, that the beginning of each of i=1,m of condition should be satisfied to conditions $T_{i,\mathrm{j}}^{H} \ge T_{\Pi}^{H}$ and $T_{i,j}^{H} \le T_{\Pi}^{K}$. It is uneasy to notice, that the entered control parities exclude an opportunity of mistakes in months and years and limit a mistake in days of a date started of a condition. Feature of the control of date of the end of a condition ($T_{i,j-1}^{K}$) is the opportunity of its absence and registration in the subsequent accounting periods.

The algorithm of the control of reliability of date of the end of a condition is reduced to the following to procedure:

- checks conformity to conditions $T_{i,j}^{K} \ge T_{i,j}^{H}$ (block 3) $T_{i,j}^{K} \ge T_{\Pi}^{H}$ and $T_{i,j}^{K} \le T_{\Pi}^{K}$.

On analogue with the control $T_{i,j}^{H}$ the entered control parities exclude an opportunity of mistakes in months and years of date and limit size of a possible mistake in days of date of the end of a condition. After input of time of a beginning of a condition the automatic control checks:

- $t_{час,i,j}^{H} \le 23$ not excess of number of hours (block 2);

- $t_{мин.i,j}^{H} \le 59$ not excess of number of minutes (block 3);

- $t_{i,j-1}^{K} \le t_{i,j}^{H}$ not excess of time of the end of a previous condition, where $t_{i,j}^{H} = t_{час,i,j}^{H} \cdot 60 + t_{мин.i,j}^{H}$ provided that $T_{i,j-1}^{K} = T_{i,j}^{H}$.

The control of reliability of time of the end a condition practically is similar to the control $t_{i,j}^{н}$, with that difference, that this information at the uncompleted condition will be absent. The control thus is transferred to the block of the control of presence of the data $T_{i,j}^{K}$. If the data about $T_{i,j}^{K}$ are absent, the User is warned about inadmissibility of data input $t_{i,j}^{H}$, the data are automatically erased also control is transferred on a route to the block of data input about a kind of switching-off.

As was perfectly above, the entered control parities allow definitely to prevent mistakes of data, input and as a matter of fact concern to a method using “internal reserves” of the data. The possible mistakes of the data describing year and month of occurrence and the termination of condition and partially - of the item of information on day and hour of month of year are completely eliminated. To ensure reliable protection of these data, the superfluous information on duration of a condition (in hours) is entered. A condition of the control is not the excess of unit of a difference of the duration, entered into a computer memory, of a condition $\tau_{i,j}$ and settlement size $\tau_{i,j}^{0}$. The size $\tau_{i,j}^{0}$ is calculated as a difference of the calendar moments of time of the end and beginning of a condition. And if this condition is not carried out, the management is transferred to algorithm of liquidation of a mistake, the principle of which action was considered earlier.

3. Experience of application of the automated monitoring system of reliability.

The monitoring system of reliability of the initial data was test on a database, which earlier repeatedly was used at the decision of many operational tasks [2]. As was marked [1], the mistakes of the data came to light and during the analysis of reliability power blocks. Thus, not only the concrete mistakes were corrected, but all statistical material was analyzed.

The opportunity of reception of erroneous results of the analysis required the labor-consuming visual control of reliability of the data, and the experience of work has learned more skeptically concerns to the first accounts and to the recommendations, following from these accounts. Therefore, the application of the monitoring system of the data has not revealed serious mistakes. However number of discrepancies was found out. They were caused, as by mistakes in primary carriers of the information, and at input of the information in the COMPUTER. Is noticed, that the mistakes most frequently arise in numbers containing many of marks (“manufacture of the electric power”, date started and end of

condition, charge of the electric power in system of own needs). The application of qualifiers of the textual information has allowed essentially to lower probability of mistakes, which were shown now in an inadvertent choice of adjacent codes. Not less probable the mistakes in carriers of the initial data improved have refused at the visual control or arisen at formalization and entering of the data in the special tables.

At entering the initial data and automated control of their reliability the deliberate attempts were automatically warned to deform the information, and the registration of admitted mistakes has allowed to open the basic reasons of their occurrence and to accept the appropriate measures. Essential result has appeared also protection of integrity of a database [1], which earlier repeatedly was broke and required significant efforts for the restoration.

Conclusions:

1. The system of automatic protection of the information, entered in THE COMPUTER, about reliability and efficiency Power Station Blocks is developed. In a basis of the monitoring system there are methods using the superfluous information, logic methods recommended matrix method. The matrixes of interrelation of versions of attributes essentially simplify algorithm of the control of occurrence of possible mistakes.

2. The practical approbation of the automated system of protection of integrity, safety and faultlessness of a database testifies to its high efficiency.

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A.Z. Muradəliyev, Y.Z. Fərzəliyev

PASSİV FİZİKİ EKSPERİMENTİN STATİSTİK VERİLƏNLƏRİ BANKININ DÜRÜSTLÜYÜ VƏ TƏHLÜKƏSİZLİYİ

DRES-in enerji bloklarının etibarlığı və səmərəliliyinin baza verilənlərinin tam və ya qismən dağılmasından, həm də verilənlərdə təsadüfi səhvlərdən mühafizə üsullarına baxılmışdır. Nəzarət sistemi əsasında əlavə informasiyadan istifadə edən üsullar, məntiqi üsullar, təklif olunan matris üsulu tapılır.

А.З. Мурадалиев, Ю.З. Фарзалиев

ДОСТОВЕРНОСТЬ И БЕЗОПАСНОСТЬ БАНКА СТАТИСТИЧЕСКИХ ДАННЫХ ПАССИВНОГО ФИЗИЧЕСКОГО ЭКСПЕРИМЕНТА

Рассмотрены методы защиты базы данных о надежности и эффективности энергоблоков ГРЭС как от полного или частичного ее разрушения, так и непреднамеренных ошибок. В основе системы контроля находятся методы, использующие избыточную информацию, логические методы, рекомендуемый матричный метод.

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