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CONTROL OF BROADCASTING STATIONS AND THE BROADCASTING NODES IN CIVIL DEFENSE WARNING SYSTEM

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УПРАВЛІННЯ СТАНЦІЯМИ ЕФІРНОГО МОВЛЕННЯ ТА РАДІОТРАНСЛЯЦІЙНИМИ ВУЗЛАМИ У СИСТЕМАХ ОПОВІЩЕННЯ ЦИВІЛЬНОГО ЗАХИСТУ

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Abstract. *The article deals with elements of hardware notification – Terminal Notification Means Control Unit (TNMCU) used to control stations broadcasting (SEM) and the Broadcasting Nodes (BN).*

Анотація. *В статті розглянуто елемент комплексу технічних засобів оповіщення – пристрій управління кінцевими засобами оповіщення (ПУКЗО), який використовується для управління станціями ефірного мовлення (СЕМ) та радіотрансляційними вузлами (РТВ).*

INTRODUCTION

According to Law of Ukraine "On protection of population and territories from emergency situations of technogenic and natural character" [1] provided timely notification and constant public information [2] of the threat of technogenic emergencies and natural disasters.

This defines the relevance of the problem that must be dealt when creating and maintaining a constant readiness, and during the replacement and maintenance of old and introduction and maintenance of new warning systems .

Modern warning system (WS) [3] and dataware are created to perform tasks of Civil Defense (CD) based on the automated systems of centralized notification, communication networks, radio.

Next Consider the principle of construction terminal notification means control unit (TNMCU) to control stations broadcasting (SEM) and the Broadcasting Nodes (BN).

MAIN PART

Structure procurement system should be a combination of telecommunications and individual workstations (AWS), end-user's device, devices of endpoint management tools TNMCU [4] that are combined with distributed network connection through their various communication channels.

On Fig. 1 a block diagram of radio TNMCU-01R designed to alert public using the sirens (electronic, electromechanical) and radio broadcasting network node wired broadcasting is shown.

Block diagram of wire TNMCU-01P differs from TNMCU-01R by absence of radio station, instead if it the appropriate modem, which connects directly to the wire line is installed.

To protect TNMCU from pulse switching and lightning overvoltage and phase distortion JAVA-BOP is used in the power supply 220/380 V 50 Hz.

The structure of TNMCU-01 hardware for management of radio transmission nodes includes the following hardware:

- Radio or Modem Connection of Appropriate Standard;
- UI interface;
- Power Supply Unit (PSU 220/12);

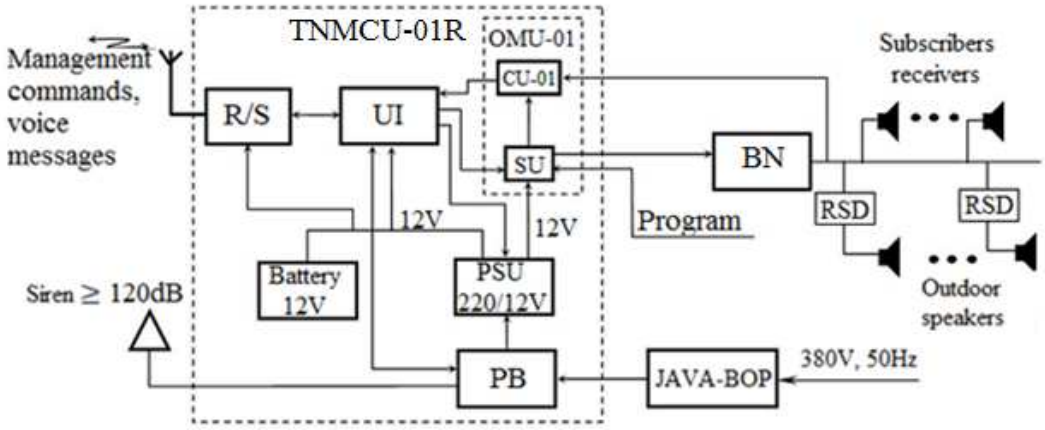

Figure 1 – Block Diagram of TNMCU-01R

- Power Block (PB);
- Sealed 12V battery;
- Antenna-Feeder Devices (for TNMCU-01R);
- Operation and Maintenance Unit OMU-01 consisting of: switching unit (SU) and control unit (CU-01);
- Remote Switching Device (its amount is determined at the design stage).

TNMCU-01 is operated by the encoded signals of individual and group commands if NMCP via communication network. Number TNMCU-01 in the group is set while determining of alerting zone.

Execution of each command is confirmed with TNMCU-01 by encoded signal of confirmation (failure) of each command.

Emergency commands of TNMCU-01 initial state violations (including unauthorized access) are by formed by TNMCU-01 automatically and transmitted to the NMCP through the network connection.

Built-in battery allows TNMCU-01 to perform all its functions while the power supply is disconnected. Battery life of TNMCU-01 is determined by battery capacity.

To ensure battery performance at low temperatures automatic engaging of the heater is performed.

Encoded signal of BN engaging command is decrypted in UI that gives out a command to switch on 12V for switching unit (SU). SU gives out power on the BN execution devices or confirms their engaging if BN was enabled, switches the broadcasting node amplifier input from broadcasting program to the broadcasting of the NMCP alerting signal.

After BN engaging control unit CU-01 performs control of BN output parameters up to its attainment to the nominal mode.

After the RTV parameters attainment the nominal mode, the control unit CU-01 generates the BN ready signal and transmits it to UI where it is encrypted and transmitted to the NMCP via communication channel.

After BN readiness response was received by NMCP, outdoor speakers engaging command encoded signal is transmitted from NMCP that is decrypted in UI. It transmits the packet of encrypted signals through BN to remote switching devices (RSD) that connect outdoor speakers to transmission network feeders for reproduction of information that will be transferred from the NMCP.

For sure engaging of RSD, package of coded signals is transmitted three times from UI.

After connecting of outdoor speakers to transmission network feeders, engaging of sirens in discontinuous, continuous and other modes encoded signal is transmitted from NMCP. Sirens alarm sound is formed in UI and transmitted to BN for translation via broadcasting cable network. Type of alarm siren is determined by the NMCP operator by corresponding coded signal injection to TNMCU.

While reproducing of siren signal, CU-01 gives out command execution confirmation signal on UI that is transmitted through the communication channel to the NMCP.

To stop the siren signal reproduction, NMCP transmits sirens disabling encoded signal, UI disables the siren alarm signal on BN, while this BN remains enabled and ready to reproduce voice messages. CU-01 gives out sirens disabling command execution confirmation signal to UI that is transmitted by the communication channel to the NMCP.

For voice information transmission communication link between NMCP and TNMCU-01 is established and then notification voice information is transmitted via broadcasting cable network.

After alert signal termination "END ALERT" encoded signal is transmitted form NMCP that turns off the 12 V power from CU. CU switches input of BN to reproduction of broadcast program. While this, CB contacts of BN engaging execution devices energization are disconnect. BN disconnects from the power supply, if it was disabled and stays on if it was included. At this CU-01 gives out execution command confirmation signal of TNMCU leading to initial state.

Signal levels of siren and voice messages transmitted from TNMCU-01 on BN are in the range from 0 to 1.5 V peak value. Nominal signal level at the input of the broadcasting unit amplifier is 0.677 V.

For avoidance of noises in the work of BN, operation and maintenance unit OMU-01 in the CU and CU-01 are installed at BN at the minimum possible distance from the amplifier input circuits.

Readiness time of BN after powering time varies for different types of BN from a few seconds to three minutes (for tube BN).

By this reason it is recommended to give out BN engaging command before notification starting.

Priority of siren or voice alarm signaling is determined by operator.

While usage of a certain communication types as a backbone network the appropriate terminals connection are set with universal interface and software. This does not change the algorithm of TNMCU-01.

On the Fig. 2 block diagram of radio-controlled TNMCU-02R intended to people notification by broadcasting stations and television broadcasting is shown.

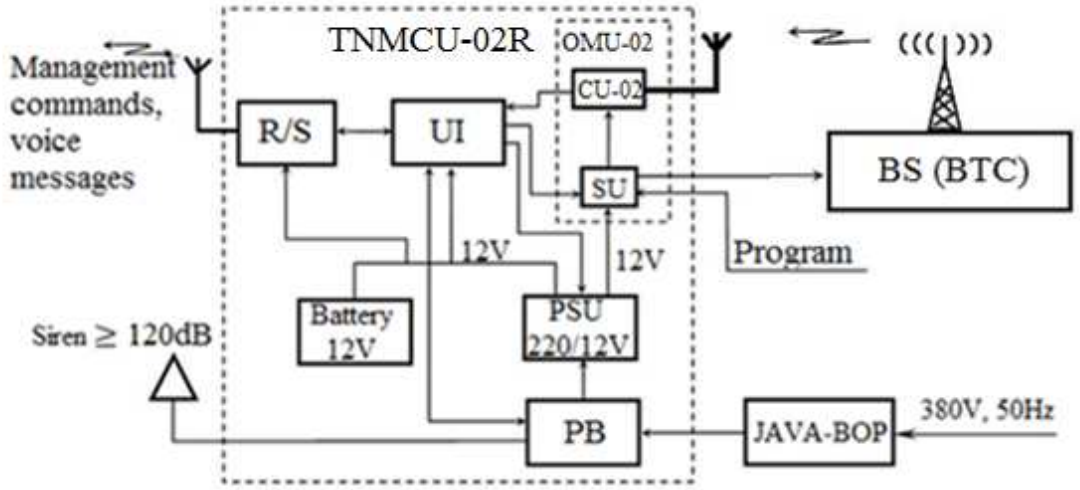

Figure 2 – Block Diagram of Radio-controlled TNMCU-02R

Block diagram of wire TNMCU-02P differs from TNMCU-02R by absence of radio instead of which the appropriate modem is set that connects directly to the wire line.

To protect TNMCU from pulse switching and lightning overvoltage and phase distortion JAVA-BOP is used in the power supply 220/380 V 50 Hz.

The structure of TNMCU-02 for broadcasting station and television sounds management includes the following hardware:

- Radio or Modem Connection of Appropriate Standard;
- UI interface;
- Power Supply Unit (PSU 220/12);
- Power Block (PB);
- Sealed 12V battery;

- Antenna-Feeder Devices (for TNMCU-02R);
- Antenna-Feeder Devices SU-02;
- Operation and Maintenance Unit of broadcasting stations and television sounds OMU-02 (composition of SU + CU-02).

TNMCU-02 is managed from NMCP by individual and group commands coded signals over a network connection. Quantity of TNMCU-02 in a group is programmed determined by the operator in determined alerting zone.

Execution of each command is confirmed with TNMCU-02 by command confirmation (failure) encoded signal.

Emergency commands of TNMCU-02 initial state violations (including unauthorized access) are by formed by TNMCU-02 automatically and transmitted to the NMCP through the network connection.

Built-in battery allows TNMCU-01 to perform all its functions while the power supply is disconnected. Battery life of TNMCU-01 is determined by battery capacity.

To ensure battery performance at low temperatures automatic engaging of the heater is performed.

Encoded signal of BS engaging command is decrypted in UI that gives out a command to switch on 12V for switching unit (SU). SU gives out power on the BS execution devices or confirms their engaging if BS was enabled, switches it from the broadcasting program to the broadcasting of the TNMCU-02 alerting signal.

At readiness of BS and carrier frequency appearance CU-02 takes this signal and generates a BS readiness to receiving of voice messages signal response and sends it to UI.

UI encrypts this signal and sends it by encoded signal via communication channel to the NMCP.

After communication link was established TNMCU-02 receives a notification information message that is going to the BS and transmitted to people.

After finishing of voice message transmission and reception of "END ALERT" code signal from the NMCP, UI generates a power disabling signal from SB, while SB toggles BS input to its original state of programs broadcasting or shutdown it, if it was off.

After de-energization of the SU, CU-02 generates a transition to the initial state confirmation signal that goes to the UI and further to the NMCP through the channel.

When the TNMCU-02 container lid is opened signal of unauthorized access is generated automatically by UI and sent to the NMCP via communication channel.

It is allowable to distantly put it on signaling and take it off while receiving of corresponding encoded commands signals.

While usage of a certain communication types as a backbone network the appropriate terminals connection are set with universal interface and software. This does not change the algorithm of TNMCU-02.

CONCLUSION

Such a way proposed construction terminal notification means control unit that provides remote control (with commands received from NMCP) stations broadcasting (SEM) and the broadcasting nodes (BN) to control their entry into the receive mode alert notification communications followed by bringing them to the initial state after the transfer of information.

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