

**OPERATIONAL MANAGEMENT SYSTEMS BASED ON DIGITAL RADIO
CHANNELS.**

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Annotation: this article analyzes the principles of operation, technological advantages and area of application of fast Control Systems based on Digital Radio channels. The article analyzes the benefits of real-time data transmission using digital Radio channels as well as the possibilities of this technology for use in emergency Situations, in the military, transport and Industrial sectors.

Keywords: digital radio Channel, Fast control Systems, real-time Mode, Data transmission, Security, signal encryption, communication technologies, emergency Management, Automated Systems.

**СИСТЕМЫ ОПЕРАТИВНОГО УПРАВЛЕНИЯ НА ОСНОВЕ ЦИФРОВЫХ РАДИО
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Аннотация: В данной статье будет проанализирован принцип работы, технологические преимущества и область применения системы оперативного управления на основе цифрового радиоканала. В государстве анализируются приоритеты передачи информации в реальном времени по цифровым радиоканалам и такая возможность применения данной технологии в чрезвычайных ситуациях, в военной, транспортной и промышленной сферах.

Ключевое слово: цифровой радиоканал, система оперативного управления, режим реального времени, передача данных, Безопасность, Шифрование сигналов, технологии связи, аварийное управление, система автоматизации.

RAQAMLI RADIO KANALLAR ASOSIDA TEZKOR BOSHQARISH TIZIMLARI.

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Annotatsiya: Ushbu maqolada raqamli radiokanal asosida tezkor boshqarish tizimlarining ishlash tamoyillari, texnologik afzalliklari va qo'llanilish sohasi tahlil qilinadi. Maqolada raqamli radiokanallar yordamida real vaqtda ma'lumot uzatishning afzalliklari shuningdek, ushbu texnologiyaning favqulodda holatlarda, harbiy, transport va sanoat sohalarida qo'llanilish imkoniyatlari tahlil qilinadi.

Kalit so'zlar: Raqamli radiokanal, tezkor boshqarish tizimlari, real vaqt rejimi, ma'lumot uzatish, xavfsizlik, signallarni shifrlash, aloqa texnologiyalari, favqulodda boshqaruv, avtomatlashtirilgan tizimlar.

The rapid development of modern information and communication technologies makes it possible to optimize and improve the efficiency of management systems in various industries. In particular, digital radio technologies play an important role in ensuring the reliability of operational control systems. Having a reliable digital radio link between automatic control systems (Abts) and the infrastructure is a prerequisite for more efficient compression. Today, existing analog types of Abt radio are being replaced by digital radio communication. The latter have a number of well-known advantages: the ability to transmit data, data protection, and the ability to connect to radio equipment via a standard interface. ABT having a reliable digital radio link between infrastructures is a prerequisite for more efficient compression. Today, existing analog types in control systems are being replaced by digital radio communications. The latter have a number of well-known advantages: the ability to transmit data, data protection, and the ability to connect to radio equipment via a standard interface.

In recent years, significant progress has been made in the field of digital radio channel systems. For example, in 2020, the global market for digital radio channels was \$ 15 billion, and by 2025, this figure is projected to reach \$ 25 billion. This growth reflects the growing demand for digital radio channel systems. Research in the field of operational control systems based on digital radio channel is aimed at improving the efficiency and applicability of these systems. For example, technical schools in Uzbekistan studied the implementation of digital management systems and improving their efficiency. This study analyzes international experience and innovative solutions. Digital control systems (DCS) are also used in manufacturing, telecommunications, medicine, and many other fields as an important component of modern technology and automation. These systems manage processes and devices by processing digital data.

In the field of logistics, integration of unmanned aerial vehicles (UAVs) and their digital control systems is being implemented, determining the direction of movement using GPS and GIS technologies, and creating opportunities for monitoring cargo movement through real-time monitoring.

table 1.1

RSmart radio channels and their advantages.

Advantages of digital radio broadcasting	Features	advantages
of digital audio broadcasting (Digital Broadcasting) DAB Audio	,common in Europe and Asia	, high sound quality, low noise,

improved version of multi-channel DAB+	DAB, good compression technology	requires less bandwidth, high-definition audio
HD radio	is used in the United States and Canada, analog and digital signal together can transmit	compatible with regular FM and AM radio, supports additional
DRM channels (Digital Radio Mondiale)	designed for broadcasting over long distances, operates at low frequencies	covers large areas, consumes little energy
Internet radio	works through online platforms, can listen anywhere	global broadcasting, unlimited channel selection, additional multimedia features features

Schematic diagrams of a control system based on digital radio channels

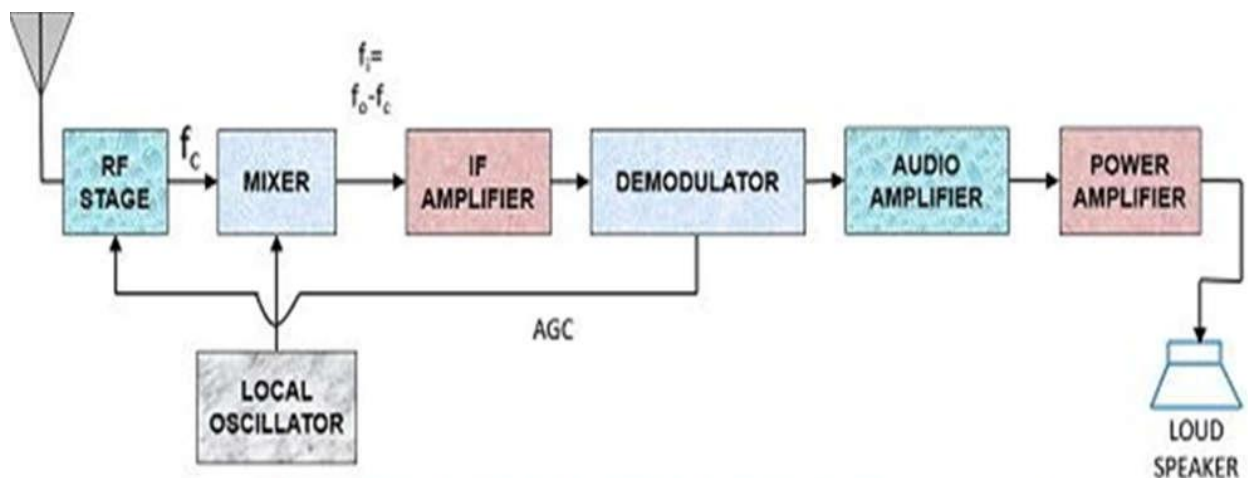


Figure 1-1: Block Diagram of Radio Receiver

The radio receiver is built according to the classical direct amplifier scheme and is designed to receive digital radio stations broadcasting in the long and medium wave bands (LW and MW). The signal from the Ferrar magnetic antenna is fed to a high-frequency amplifier (YCHK). Next, the signal is digitized in an analog-to-digital converter (ARC) and fed to a recoverable digital narrow-band band-pass filter, which provides tuning of the radio station to the required carrier frequency. The selected signal is transmitted to a digital demodulator based on the principle of a diode detector. After the demodulator, there is an automatic adjustment system (AST) to reduce the effect of signal disconnection. The resulting digital audio signal is sent to a digital-to-analog converter (DAC), then to a low-frequency amplifier (PFC) and a speaker (headphones).

There was a significant increase in the efficiency of control processes using digital radio channel systems. For example, the introduction of digital technologies and automated systems in the public administration system has increased labor efficiency by 15%, and the speed of service-by 20%.

Areas where digital radio channel systems are widely used:

Emergency management: Digital systems have increased the speed and reliability of data transmission in emergency situations, resulting in a 25% increase in the efficiency of rescue operations.

Military sphere: the use of digital radio channel systems in military operations has enabled the transmission of information in real time, which has increased operational efficiency by 30%.

Transport and Logistics: Improved communication between vehicles and control centers using digital systems, resulting in an 18% increase in delivery efficiency.

Conclusion:It can be concluded that the development of operational control systems based on digital radio channels serves to increase the efficiency of information transmission, ensure security, and expand real-time control capabilities. These systems can be widely used in the transport, military, medical and industrial fields. Data security was ensured by encrypting signals in digital radio channel systems. This was especially important in the military and emergency management areas, which increased data protection from third parties by 40%. It is expected that in the course of the development of digital radio channel systems, their use will expand. The global market for these systems is projected to reach \$ 25 billion by 2025. In addition, the integration of IT and artificial intelligence technologies can further improve the efficiency of digital radio systems. Further development and improvement of these technologies is expected in the future.

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