

Television Technology Demystified

A Non-technical Guide

Aleksandar Louis Todorović



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Introduction

We experience the world around us by seizing its sights and sounds. Science has proven that sight is possible because our eyes are able to capture and our brains to decipher the electromagnetic radiation that is light, at certain frequencies. In the same way, we hear sounds, which are the vibrations of air particles whose frequencies are within the sensing abilities of our ear-brain combination. Since the dawn of civilization, humanity has desired to fix, transport, and recreate these sights and sounds. However, for millennia the only way to pass along this information was to transform it into spoken or written words. These had the power to ignite our imaginations but could not offer the benefit of direct experience that a virtual replica of the sounds and sights witnessed by a narrator or author could provide.

By the end of the nineteenth and the beginning of the twentieth century we had discovered how to transmit sounds over long distances, then how to record sound and then visual information, and eventually, with television, how to transport sights and sounds instantly over great distances. A television system can be simply described as a complex device that transforms light and sounds into electrical signals, transports those signals over very long distances, and transforms them back into light and sounds. Over the last 60 years, televised moving images have grown into the most powerful system of transmission of ideas, concepts, and thoughts, but also into the most powerful entertainment medium the world has ever known. Just as the nineteenth could be defined as the century of steam power, the omnipresence and influence of television makes it legitimate to define the twentieth century as the century of television.

Digital technology facilitates the creation of new production tools that are more reliable and simpler to operate than analog tools. Gone are the long and tedious daily alignments of myriad parameters. Present-day equipment can be safely used without the permanent presence and devoted care of skilled engineers. At the same time, those digital and computer-based tools offer considerably more creative possibilities than their analog predecessors. But all these capabilities can

only be fully exploited if users know the basic operating principles of how the equipment works, which should then help them understand its power as well as its limitations.

The aim of this book is to help all current and future nontechnical members of a production team become familiar with the technical fundamentals of analog and digital television, the operation of essential elements of a television production chain, and the possibilities and limitations of these production tools. All descriptions and explanations in this book will be nonmathematical, and essential concepts and parameters will be easy to understand without the need to call upon previous scientific or engineering knowledge. The author hopes that this book will prove to be particularly useful for all students in communications, film, and television departments, for all those future program creators and media professionals who should acquire during their education process a good insight into the modus operandi of modern television production tools.

The reader will notice that this book covers mainly the video aspect of television production. Such a focus was purposefully selected not only because covering all aspects of audio production would require many additional chapters but also because that subject is already very well described in a number of excellent and easily understandable books. However, since compressed audio signals determine a number of important aspects of digital recording, file-transfer mechanisms, and media asset-management systems, it proved necessary to dedicate one chapter to digital audio and digital audio compression.

The development of television production technology is moving at an increasingly rapid pace. Not only new pieces of equipment but also new concepts and technologies appear daily on the market. Therefore, the reader should note that all references to “modern” or “current” solutions or systems correspond to the state of the art in the year 2005.