INTEGRATED CIRCUITS FOR TV AND RADIO RECEIVERS

CCU2030, CCU2050, CCU2070, CCU2070OS, CCU2050PI, CCU2070PI   Central Control Units (40-Pin Plastic Package)

These devices are 8-bit one-chip microcomputers, different in their ROM and RAM capacity:

CCU2030 – 6.5 K Byte ROM and 120 Byte RAM
CCU2050 – 8 K Byte ROM and 256 Byte RAM
CCU2070 – 16 K Byte ROM and 256 Byte RAM

These types are the unprogrammed versions and are programmed during production according to the customer's specifications. For programming, an emulator board is available. The programmed versions have the type designations CCU2031, CCU2032 and so on. Combined with peripheral hardware, CCU2030, CCU2050 and CCU2070 offer the following features:

– infrared remote control
– front-panel control with up to 32 commands
– tuning by frequency synthesis (PLL) and band switching
– non-volatile program storage
– LED display for channel indication, max. 4 digits, directly driven
– storage of alignment information during production
– generation and recognition of various signals
– control of the digital signal processors for video, audio, Teletext and deflection via a serial bus (IM bus)

The CCUs are produced in N-channel HMOS technology and contain on one chip the following functions:
– 8049 8-bit microcomputer
– remote-control decoder
– Ports P2 and P3 for connecting a maximum of 32 keys and 4-digit seven-segment LED channel indication
– PLL tuner circuit for VHF and UHF
– IM bus interface for inputting and outputting control signals and for inputting alignment instructions
– crystal-controlled clock oscillator which also serves as reference for the PLL circuit
– mains flip-flop and reset circuit

Functional Description

The CCU2030, CCU2050 or CCU2070 provides an efficient interface between user and TV set. Due to their programmability, different set makers are able to design receivers according to their own specifications. The CCUs have two main functions:
– processing of user's settings
– control of the digital signal processors for video, audio, deflection, Teletext etc.

By means of the MDA2062 non-volatile memory (EEPROM) which has a capacity of 8 × 128 bits, the CCU controls storage and output of factory alignment values that have been programmed during production of the TV set.

All user settings such as channel selection, station search, adjustment of volume, brightness, color saturation, etc. are fed to the CCU either by infrared remote control (transmitter IC SAA1250 or IRT1250) or by means of the local keyboard (direct input, up to 32 keys).

The tuning system is designed as a frequency synthesizer using a PLL with a resolution of 62.5 kHz. It requires a predivider with a fixed ratio of 64:1. Station keys can be programmed for selected channels, the tuning information being stored in the MDA2062 EEPROM. Its capacity is sufficient to store
– 30 TV channels
– preferred user's settings for volume, brightness, contrast, etc.
– information on factory alignments

Channel information is put out via ports P2 and P3 in seven-segment code and is indicated directly on a 2-digit (optionally 4-digit) LED display without the need of an interface. A number of programmable I/O ports provides additional inputs and/or outputs which can be used to realize various features such as automatic station search, indicators other than seven-segment displays, muting, AFC, VCR control etc.
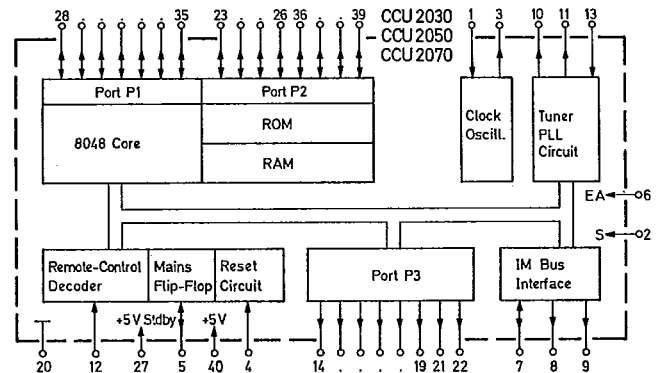
CCU2030, CCU2050 or CCU2070 Block Diagram

For communication between the parts forming the DIGIT2000 system is provided the serial IM bus which is bidirectional but controlled solely by the CCU. All other parties on the bus are slaves. This IM bus is also used for inputting the factory alignments mentioned later. User settings such as volume, tone, brightness, etc., are transferred over the bus, as are internal control signals, e.g. automatic color control (ACC), east-west parabola, cushion correction, etc.

The MDA2062 EEPROM is accessed during set production via the serial IM bus. An assembly line computer is linked to the CCU via the bus and feeds alignment information to the memory. This information is stored and is applied to the respective parts of the TV set whenever the set is switched on.

A standby mode is provided for power-saving continuous operation. In this mode, only the remote-control decoder, the reset circuit, the mains flip-flop, certain RAM addresses and the clock oscillator are powered, and only after receipt of a switch-on command, does the CCU go into full operation.

CCU2070OS

This version of the CCU2070 is equipped with an on-screen display facility. Two lines of six characters each can be displayed on the screen. Display of channel No., time or, in general, similar information available inside the CCU, is possible. No external components are required for synchronizing the display with the main picture. All other specifications of this particular CCU are as with the basic type. The following features are offered:
– 32 different characters, size and color optional
– character shape 7 by 5 dot matrix
– fringing and rounding functions fully available, fringe color and background color settable
– display duration selectable

CCU2050PI, CCU2070PI

As a special feature, these versions of the CCU2050 and CCU2070 have a programmable remote-control decoder which enables matching to any infrared remote-control system on the market. By program mask, it is possible to adapt the decoder to the respective requirements. All other specifications of these CCUs are as with the basic types.