

SW-4836 ASI Changeover Controller 1.00

**Device controller software for the
CW-4836 ASI Changeover Duo,
CW-4837 ASI Changeover Quad,
CW-4838 ASI Changeover and Timer Duo,
CW-4839 ASI Changeover and Timer Quad.**

Instruction guide

The SW-4836 ASI Changeover Controller is the control software for the CW-4836, CW-4837, CW-4838 and CW-4839 ASI Changeovers. Besides setting the switching parameters it offers many possibilities for controlling the transfer parameters.

The connection between the device and the controller computer is established by the CW-Net.

CW-Net is a 100 Mbit/s Ethernet network, which due the use of a special instruction set is referred to as CW-Net. The computer and the device communicate under Internet Protocol, in UDP/IP packets. The device and the computer can be interconnected directly through crossover cable, or indirectly via switch or other sophisticated switching unit through straight cables.

Technical literature about establishing and using the CW-Net:

CW_Net_.pdf	Basic knowledge of the structure and operation of the CW-Net.
CW_Net2.pdf	General description and block diagram of the CW-Net.
Using_CW_Net.pdf	First steps in putting into operation the CW-Net, configuring and testing the computer.
SW-4800	CW-Net Principal: software for setting IP addresses of the devices and checking up the function of CW-Net.
SW-4890	Computer Performance Tester: software for checking up the computer's set-up and performance.

Prior to starting the work with the device study the general instructions for putting into operation the devices in the Using_CW_Net.pdf description, and then read the instruction manuals delivered along with the device. The instruction manuals are available at the CableWorld web site, too.

Installing the SW-4836 software is simple, running setup_SW_4836.exe.

Steps of installing the software and establishing connection with the device, in the simplest case:

- Install the software on the computer by running SW_4836.exe.
- Set the computer to the 10.123.13.201 fix IP address.
- Connect the device to the computer with a crossover cable (100Base-T).
- Switch on the device.
- Note: All devices are shipped set to the 10.123.13.101 IP address.
- Run the software by clicking the icon on the desktop.
- Set the IP address in the software's CW-Net Connection panel to 10.123.13.101 (< and > buttons) and click 'Query'.
- If everything is right, the software immediately displays the name and type number of the device.
- The existence of communication between the computer and the device is indicated on the device by the 'LINK' green LED on the front panel; in case of data traffic the 'ACT' yellow LED blinks.

In case of error consult the Using_CW_Net.pdf description. For changing the IP address of the devices and for establishing and checking up the CW-Net, use the CW-Net Principal software (SW-4800). Until the connection between the computer and the device functions properly, the work cannot be started. The structure and the partial operation of the software can be studied even without the device but no operation effects will be produced.

1. Monitoring the errors in the transport stream

The safe transmission of digital television programs requires continuous monitoring and evaluation in order to change over to a standby device if necessary.

Contrary to the analogue television technology there are no test lines for monitoring the quality of the transmission. To decide if the Transport Stream is correct, a few important parameters of the transmitted signal should be examined.

The Transport Stream is not simply the continuous transmission of the digitised (and compressed) television signal. It is a complex signal with header, error correcting codes and tables defining the structure of the signal. It allows the transmission of video, audio, teletext and other data of several programs in one bouquet simultaneously.

The Transport Stream is transmitted in 188 byte data packets, which can be completed by the 16-byte error correcting code (Reed - Solomon) to 204 bytes. Every packet starts with a 4-byte header, where the first byte is the sync byte (hexadecimal 47). For receiving the Transport Stream and evaluating the content of the packets the correct reception of the sync byte is absolutely necessary. In the lack of this the incoming data cannot be divided into packets and the coherent data cannot be identified.

When digital television signals are transmitted to a long distance (via satellite, cable or terrestrial) they are provided with different error correction codes for correcting the errors caused by the transmitting media. When the signal cannot be restored correctly at the reception side, the 'transport error indicator' bit in the header of the faulty packet will be set to logic '1' by the demodulator, signalling the imperfection. (This is the 8th bit in the second byte of the header, the first bit just after the sync byte.) These faulty data can be discarded so they will be missing from the program signal. At video and audio transmission in general the use of these marked packets causes less visible and audible errors than discarding them.

For sorting the data from the stream the PAT (Program Association Table) describes the structure of the Transport Stream. In the lack of this and other standardised tables the digital data stream cannot be understood and the coherent data cannot be assembled. The PAT table should be repeated at a given frequency in the Transport Stream. The repeated tables are provided with a cyclically incrementing number (Continuity Counter), so the missing of the tables can be detected. The infrequent forwarding of the PAT table or the erratic incrementing of the Continuity Counter refer to a defective transmission.

Many other kinds of error detections are possible. But by monitoring the signal parameters mentioned above a device can decide whether the Transport Stream is defective or not. Because of the great number of possible errors, a complete examination is almost impossible. Similarly it is not the task of this device examining the picture quality of the digitised television signal with complicated, quasi-objective methods.

2. Setting the working parameters of the ASI Change-over

The ASI Changeover and its managing software have been designed for use in large complex systems too, therefore without the operator's instruction the device and the computer does not communicate with each other, except for the communication conveyed by the Windows Network Manager.

The ASI Changeover has been designed for professional applications, where the device operates in 24 hours continuous run, and changing the working parameters should not cause any perceivable disturbance in the output signal of the device.

On clicking the Chover' icon on the desktop, first the user interfaces of the four ASI Changeovers appear beside each other.

Query

Click the Query button to ascertain the working connection between the device and the computer. The connection can be considered working if the name and type number of the device are displayed correctly.

On the query of the CW-4836 and the CW-4837 the settings of the ASI Changeover units and the state of the Output Selector are displayed in the Comment field.

The CW-4838 and the CW-4839 versions, which are equipped with a timed switch, are more complex. Here the timer takes over the control so the settings of the ASI Changeover units and the Output Selector can be queried by pushing the 'Read Settings from Device' button.

For query of the Changeover settings for all versions the use of the 'Read from Device' button is suggested.

Read Settings from Device

On pushing this button the software reads out the settings of the device. At the Timer versions the switching times and the settings of the clock will be read out as well.

Reset

From the computer a global Reset instruction can be sent out to the devices, on which except for a single microcontroller controlling the procedure, all FPGAs and microcontrollers receive a reset instruction, their program will be loaded again, and the device starts operation quite as if it would have been switched on now.

If the user would like to make sure about the mode the device starts working after a voltage break and the procedure of recovery, it can be tried out with a Reset instruction sent out from the computer. Since in this case the power supply does not need to recover, the recovery time of 5 ... 6 seconds can be expected.

During switched-off state, voltage break and Reset time the main inputs (Main – ASI A) are switched to the outputs.

About

On clicking the 'About' button the version number of the SW-4836 ASI Changeover software appears in a separate box.

ASI ChangeOver unit selector (ASI Changeover – x)

With clicking this tab the user can select the ASI Changeover unit to be programmed and checked.

Adjustable parameters:

Output Channel Selector

- **Auto:** It automatically switches to the reserve input (Reserve / ASI B) when the main input (Main / ASI A) is wrong.
- **Main (ASI A):** The output is switched to the main input. In the case of faulty input signal the front panel 'ERROR' LED blinks, indicating the wrong output signal.
- **Reserve (ASI B):** The output is switched to the reserve input. The front panel 'ERROR' LED (lights continuously) indicates the faulty input signal.

Switch Back Time

In case of 'Auto' setting the main input signal should be faultless for so long time at least before switching back. (So at frequent errors the unit will not switch to and fro)

- **10 sec after Error:** 10 sec waiting for switching back after the termination of the error
- **30 sec after Error:** 30 sec waiting for switching back after the termination of the error

Search Data Error

- **Yes:** In 'Auto' setting the Transport Error Indicator in the main input signal is under monitoring. If the MSB in the 2nd byte of the header goes to logic '1' more than twice during 256 successive packets, the Transport Stream is qualified as faulty.
- **No:** The above parameter in the main input signal is not examined.

Search PAT Error

- **Yes:** In 'Auto' setting the repetition time of the PAT table and the Continuity Counter in the main input signal are under monitoring. If the repetition time of the PAT table is longer than 0.5 sec or the Continuity Counter does not increments steadily, the Transport Stream is qualified as faulty.
- **No:** The above parameters in the main input signal are not examined.

Loading the program to the device

The changes on the screen are not saved in the device automatically and do not modify the operating program. The new data have to be written in the device's EEPROM. In this case the device will operate with the new settings after power switch off/on, too.

The settings can be written with the 'Load Setting to Device' button in the EEPROM of the selected ASI Changeover unit. The EEPROM can be rewritten more than 1,000,000 times.

The CW-Net system allows the direct monitoring of the Main input transport stream in the four ASI Changeover units by the PC. One of the four Main (ASI A) input signals will be transmitted according to the selected 'Visual Tester Source Selector' buttons.

The input signal to be converted to IP environment can also be selected with the 'Visual Tester Source Selector' buttons.

Get Sample from Main Input

On pushing the 'Get Sample from Main Input' button the ASI Changeover gets a 5 Mbyte sample from the Transport Stream and analyses its structure. The result of the analysis can be read in the 'Comment' field.

The data in the Comment field appear as follows:

- IP address of the device
- Number of the communication port
- Size of the sample (5 Mbyte)
- Number of faulty, discarded packets, in %
- Packet format (188 / 204 byte)
- Number of PAT tables in the sample

Then the PAT and PMT tables will be analysed.

The sample cannot be analysed when too many packets are lost and there are very few PAT and PMT tables for an efficient analysis.

In case of enough correct samples on analysing the PAT table the Transport Stream identifier appears in the Comment field and then the services (programs) are listed in increasing order of the service numbers. Beside the services the adherent PMT PIDs are displayed.

During the PMT analysis in the order of the service identifiers the adherent parts of the services are listed as follows:

- PMT PID
- Stream type (e.g. it is '2' for video stream, '4' for audio)
- Elementary Stream PID (as many times as many elementary streams are there in the service)

The data of this list (the first 16 services) will be rewritten in the pull-down list under the 'Visual Tester on the Main Input of ASI Changeover – x' as well (service identifier, video PID and audio PID). When the service does not contain video or audio data, those PIDs will be displayed as '0' values. The data in the pull-down list can be edited manually too, by using a text editor for modifying the Program.ini file in the SW_4836 \ Settings \ library. The modified .ini file can be loaded by pushing the 'Load Pgm.Ini' button.

Visual Tester on the Main Input of ASI Changeover – x

On clicking the selected line in the pull-down list its Video and Audio PID data will be rewritten to the corresponding boxes of the Program Selector. In these boxes the data can be changed on demand. The PIDs have to be given in decimal format in range of 0 ... 8191. On modifying the boxes go yellow. The altered value can be validated by pushing the 'Enter' key, then the boxes go grey again. The program considers the decimal characters only and links them. The numbers greater than 8191 will be modified to 8191. In the lack of decimal numbers the PID will be '0'.

The visual test of the program with the selected PID can be started and stopped with the 'Play' and 'Stop' buttons under the Visual Tester screen, respectively. In changing the visual parameters the play stops automatically. The start and stop commands are certified in the Comment field as well.

Timer Programmer

The 'Timer Programmer' button is active only during programming the CW-4838 ASI Changeover & Timer Duo and the CW-4839 ASI Changeover & Timer Quad devices.

When quitting the SW-4836 ASI Changeover Controller program, the device data (IP address, type number, etc.) can be saved in the CW4836a.ini file of the program library. When starting the program next time it will already use these new data.

3. Special features

With the wide use of the Internet Protocol and spreading of IP TV, more and more user would like to use the CableWorld devices outside the 10.123.13.x address range, as used by the CW-Net. The devices are able for being used in this way just from the beginning, but upon our users' wish the usability of arbitrary IP addresses also with the software will be introduced now.

In case of the SW-4836 software, with checked Use CW-Net checkbox the commands will be sent out in the 10.123.13.x address range, thus the IP addresses of the devices must be in this address range.

If the Use CW-Net checkbox is unchecked, the commands will be sent out in the address range defined by the user. The user can freely type in the box the first three bytes, and the fourth byte is set further on with the stepping buttons. The value of the three bytes must be given in decimal format, and the points must be included, too. Unnecessary characters must not be in the box the whole address is displayed below the box.

The IP address of the device can be changed to addresses outside the CW-Net's range using the SW-4841 software. Erratic or forgotten addresses can be reset to the factory setting using this software, too.

4. Programming the Timer

The **Timer Programmer** button can be used only at the programming of the CW-4838 ASI Changeover & Timer Duo and the CW-4839 ASI Changeover & Timer Quad devices; the other versions have no Timer module.

The switching times will be set by filling in the table. The data of the table can be saved in file and can be loaded from file. The file can be modified with a text editor and the programmed data can be read back from the device to the table. Up to four several switching moments can be set in a day. The switch-on times can be set in the green field and switch-off times in the red field. The switching times have to be given in hours (0 to 23) and minutes (0 to 59) separated with a colon. The software arranges the data and demonstrates the processed and stored data in a diagram. The switch-on period is marked with green color and the switch-off period is marked with red color in the diagram. The processing of the preset data starts on pushing the **Enter** button. The **Refresh Time Data Grid and Diagram** procedure fills in the table and the diagram according to the effectively processed and stored data.

In the upper pull-down menu the table can be deleted by **Clear Time Data Grid** (by this time the bar graph under the table goes yellow indicating the lack of time data). Here the Monday data can be automatically set for all days of the week (**All Days = Monday**).

When **Timer** state is programmed but there is no useful time data, the device switches the signal of the Main (ASI A) input to the output.

In the **Internal Clock Settings** box the following parameters can be set:

- Right time (**Time**) in hours (0 to 23) and minutes (0 to 59), separated with a colon,
- Day (**Day**), selecting from the pull-down list,
- The accuracy of the device clock IC (**Crystal Offset:**) can be corrected with the up and down buttons in the range of ± 180 ppm.

The software allows programming the switching times, clock settings and modifications of the clock accuracy separately. The user can select in the lower pull-down box (Do not change internal Clock settings, Modify the Clock settings (Time and Day only), Modify only the Clock adjust (-180 ... +180 ppm)), which data are to be programmed. At loading the demand for the alteration have to be verified specially.

Changing the clock accuracy (Clock adjust) is suggested in reasonable cases only.

When the **Battery – Low** warning can be seen, in the red field in the right lower corner, change the CR2032 type 3V lithium battery soon!

From the Timer programmer the user can go back to the basic settings with the **Go Back** button.

5. General information

Dear User!

With designing the CW-Net system we wished to give a tool to your hands, which permits you to be as familiar with the digital television technology as you were earlier in the analogue technology. With developing the Quad receiver family we offer advanced and economic receivers for receiving, monitoring and changing-over the DVB-S, DVB-C and DVB-T signals.

With our software we aspire to go to meet your demands. The pieces of CableWorld software constitute a large system and nearly any of them can be used with any device. After you finished setting up the QPSK Demodulator and the transport stream has just appeared at an output, run the SW-4811 TS Analyzer software and analyze the TS, reproduce the picture or examine the PCR. If you feel like, run the TS Remultiplexer software and using its analyzer part make a protocol of the TS.

We hope to have succeeded in arousing your interest in our system and we will meet and work together in more fields in the near future. If you feel like to write own software for controlling CableWorld products, you can reckon with our utmost support. Your questions, ideas and suggestions are always welcomed at cableworld@cableworld.hu.

The CableWorld team.