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# 6 TV channel / DVB –C Converter

Multi functional 6 TV channel converter of 6 analog TV signals with stereo sound accompaniment into the DVB-C signal format in the intermediate frequency (IF) of the cable network

User's Manual

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## 1 Description

DVB-C converter – is a universal unit for converting of the television programs into the digital signal of cable television. It makes all the necessary changes of video signal for digital TV broadcasting through the cable networks. 6 analog composite signals with stereo sound accompaniment are delivered to the unit input. The output signal - the digital signal of the cable TV (DVB-C) in the intermediate frequency.

It allows to enlarge the quantity of channels in the network in comparison with analog. It makes the quality of programs broadcasting in existing TV networks higher. Due to the high noise immunity, it allows to use distorted ranges, which is impossible for analog signals.

The Converter is manufactured in two modifications – without encoding block and with it. The Converter with encoding block operates in the system of address encoding with use of conditional access cards. Encoding info, programming info and info about CAS operation is described in separate description. Due to continuous work on improving of the unit, there are some discrepancies between description and this unit. All the software is given to the customer according to the principle «as it is». There is a possibility to receive the original program data on demand.

Clarifications and the last versions of the software are available at the seller.

### 1.1 General Information

Converting process includes the following processes: The input signal is decoded and becomes digital in the stream according to the recommendation 656. Further, it is encoded according to the MPEG-2 standard. These operations are fulfilled for each 6 inputs separately. The same operations are fulfilled for sound. Further, the signal is multiplexed into the single digital stream and it is converted according to DVB-C standard to the sub-carrier signal.

Instrumental and software maintenance for scrambling is also foreseen. Modulation parameters are chosen according to the using standard analog sub-carrier converters (as usual 38.9 MHz) after the unit to the channel frequency.

### 1.2 General functional possibilities

One block provides converting with broadcasting quality up to 6 analog programs which are transmitted on one carrier in the digital form according to DVB-C standard in range width less than 8 MHz.

Combined use of analog and digital broadcasting is possible. Receiving is done on the standard digital receiver of the cable TV. There is a possibility to add to the system closing of channels, level indication of input audio signals on the front panel. Possibility of operation with S-Video signal on the input (option). Possibility of putting a logotype on every video signal transmitted to the unit is provided.

The DVB-C converters have an imbedded system of system time synchronization. Managing computer is synchronized from the precise time signal source. A computer, connected to the converter, synchronizes the converter, it gives a synchronization signal with the help of which the receiver is synchronized. With switching off the synchronization signal, the whole system will work but it will show incorrect time. In DVBCrypt it will be shown in „magazine of service operation”.

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### 1.3 Technical characteristics

- Input video signal CCVS or S-Video
- Nominal swing video 1B,75 Ohm.  
sound 0dB balance (0.775B,600Ohm)
- Sub-carrier modulation type 64QAM
- Stream to channel 6.375Mbit/Sec
- Frequency band occupied by sub- carrier less 8 MHz
- Output signal level (IF) 20dBmW+/-5dB
- IF frequency 36,15MHz  
(which corresponds to 38.9 for analog)
- Compression standard ISO/IEC 13818 (**MPEG-2**)
- Channels of sound accompaniment to 1 video channel 2

#### General parameters

- Connectors video BNC Mini DIN.  
sound TRC
- Power supply 220V+/-20%
- Consuming power <30W
- Size 19``, 2U 480\*89\*180 mm,
- Weight 3,5 kg

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## 2 Adjustment



### 2.1 Connection to the electrical network

“220 V 50 Hz” - the network connector corresponds to the IEC standard network cable. Connecting is to be done to a socket which has the third ground connection contact. For connecting to the outlook of the ground connection a special bolt is used. It is advisable to connect the unit to a stabilized network or through a block of constant power supply to avoid effecting of distortion in the network

**Attention! It is prohibited to exploit the unit without connecting it to the outlook of defending ground connection.**

### 2.2 Connection of input signals

#### 2.2.1 Video inputs

“IN1 – IN6” Connection of 6 composite video signals PAL.

Nominal level of a full signal :1 V on 75 Ohm load

Connectors BNC.

#### 2.2.2 Inputs of sound accompaniment

“AUDIO IN1 – IN6” balanced. Connectors TRC (stereo JACK). Nominal input level 0 дБ (0.775В eff.) on 600 Ohm load.

### 2.3 Output signal

F OUT – digital output signal in the sub-carrier 36,15МГц. Connector type F.

### 2.4 Connection of the computer for operation with the system of address encoding

Connection is done with the help of adapter USB/ RS485. Unsoldering of the cable is described in the appendix.

**Attention!**

**All connections should be fulfilled having defending and technology ground connection of the unit and connecting devices as well.**

### 3 Unit operation

To operate the unit it is sufficient to give on its inputs video and audio signals, and output is to be given to input of the channel modulator, which works on input on IF of cable networks (38,9 MHz). The option of connecting of the unit to the channel modulator WISI O35 which has IF input which is not led to the external connector is described in the appendix .

When switching on the unit for some seconds all light indicators light up on the front panel. In 5-10 seconds only lights of the channels on inputs of which video and audio signals are transmitted will work



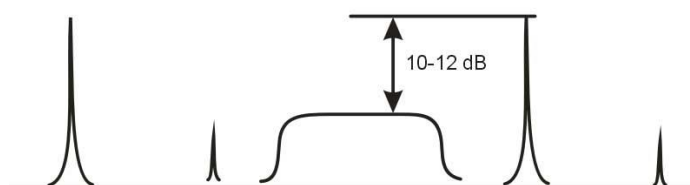
On the front panel of the unit there are 6 groups of light indicators (according to channels numbers).

Signal level is indicated with yellow-green and red lights. Green – is nominal, yellow and red – less than nominal and overloading, corresponding.

The unit is provided set for operation with video and audio signals which have nominal parameter values.

#### 3.1 Setting of digital signal level

Setting of digital signal level in group range is carried out with the help of regular means of the channel modulator. Controlling digital signal level with spectrum analyzer it is needed to set it 10-12 dB lower than level of neighbouring carrier of analog TV signal.



**Note:** Digital signal level in group range is determined as well as signal level from the DVB-C converter as adjustment position of WISI output level. If you failed to set level with WISI adjustments address your dealer for advice.

#### 3.2 Setting of DVB-C standard receiver

Setting of the receiver and its operation is fulfilled according to the user's manual of the receiver.

1. In receiver's menu Tuner& Channel the following parameter values should be set:

Frequency	F = carrier + 2,75 mHz
Demodulation	QAM
Input Symbol Rate	6375 Ms/s
Constellation	QAM64

**Please, pay attention!** Setting of the receiver isn't fulfilled on the channel carrier frequency but with a shift to 2,75 MHz to set in the middle of the digital signal band.



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## 4 Conditional Access System

*General information. The detailed description and manual on programming is given in the separate description of the conditional access system.*

Conditional access system as an option belongs to the unit. Encoding works in frames of DVB standard. It is orientated on the cable and MMDS systems with relatively not too large quantity of subscribers. The system is addressable with max quantity of subscribers- 64 thousand. Maximum supporting quantity of closed channels 32 , 4 programs, that is operator's program supports service of 128 TV programs which can be divided into packets optionally. The system is intended to operation with standard receivers DVB-C with cards, programmed by TV network operator. As a basis, FUNCARDS are widely used in different systems of the conditional access. Ideology of subscriber's shell of a program is constructed on the wish of exploiting personal, who already services the system of address encoding for analog signal like this one. Managing of up to 32 devices according to the consistent interface RS485 from one technological computer of standard complexion. The managing computer fulfills only loading and changing of parameters of the encoding system and can be occupied with another tasks after that.

For the full operation of the system, there is a possibility of developing data base, including management of subscribers registration and respective accountant operations. Initial data of program registration is also possible, which allows to adopt available on the places of data base for operation with the system.

For every subscriber the packet of allowed for watching programs are formed arbitrarily and can be changed on-the-fly.

A few programs can be broadcast in every stream changing with time. For this reason daily timetable with maximum 8 time segment are formed for every stream. Conditional program number and current status (to encode/not to encoding) is defined for every segment.

### *Emission of cards*

Protection from unauthorized access into the system, except for facilities, standard for the systems of digital TV foresees two levels of emission of cards. - at the level of production of access cards and at the level of operator. The first level - is initialising, carried out by the system supplier. The customer of the system is supplied with already initialized cards, with the data and number in them. An amount of cards at the order of the system is not of fixed amount, the customer determines the necessary amount himself and in future he has a possibility to order additional part of cards with proceeding numeration. The amount of cards in the network depends only on the amount of cards which passed initialization.

Finishing operation with cards before delivery to a client – personalisation, the operator carries out by means of a programmer, which is included in the delivery set. Thus, at this level it becomes impossible to change the number of card. The initialized card after this operation becomes unique exactly for this network, that provides independence of systems for different operators, for example in one town.

The personalized card of one network can not be personalized with the programmer of other network, except for that primary personalisation in which it was made. The subscribers of one system do not have an access to the programs of other system.

The system periodically sends the signals of confirmation of subscription for each of network cards. If there was no confirmations of subscription for a card with a concrete number– the correspondent channels are closed. At primary enter in the network, a subscriber with the received card, there is a period of expectation of subscription confirmation, during which all channels are encoded.

Duration of this period depends on the phase of signal of subscription confirmation and number of subscribers in the network and can take from units of seconds to a few minutes at the maximal amount of clients in the network. It is necessary to note that the most weak link in any system of encoding is making of the card key, and also equipment for its production. An Operator, who hasn't not provided access to these facilities by means of organizational measures, at any system of encoding can not count on successful operation of the system.

For the hotel systems of conditional access other system, operating on principle of public-call card, can be offered. In this system a client can view the programs during the set time, according to the written pre-paid amount in a card. Naturally, some part of the programs can be free-to-air.



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## 5 Technical maintenance

Properly functioning unit doesn't need any technical maintenance if during connection and exploiting of it elementary rules of exploiting of complex electrotechnical devices are obeyed ( presence of defending and technological ground connection, connecting devices which have the same bar of ground connection as the unit has, using of antistatic surfaces in the room where the unit is set, optimal temerature etc.)

When some minor problem arise you can solve them themselves but if your interference will cause damage of the unit you will lose the right for guarantee maintenance.

### Operation rules. Safety requirements

Only people acquainted with user's manual and who have passed the instruction on safety technique can operate the unit.

To provide safety of the maintenance staff, the unit has 3-pole plug with a ground connected wire, lids which cover current carrying parts with dangerous voltage. On the body of the unit there is a clamp for connecting to the outlook of the ground connection.

- The unit should be connected to power network 220V 50Hz through the devices of uninterrupted power supply (UPS) with autotransformer function
- Reliable ground bar should be present in the operating room
- All devices which have a clamp «Ground» have to be connected to the ground connection bar, for every device a separate wire should be used
- For connecting powerful electro energy consumers the separate power network should be used

When operating:

- It is prohibited to expose the unit to influence of excessive warmth and humidity
- After transportation in winter conditions before switching on in the network, the unit should be warmed during 2-3 hours
- Rooms, where the unit is set, should have antistatic surfaces
- Optimal temperature should be maintained in rooms
- Penetration of moisture, acids, alkalis, solvents is impermissible

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## **6 Guarantee obligations**

The manufacturer guarantees the efficiency of the unit according to technical requirements with condition of observing the rules of exploiting described above during 12 months from the date of selling to the final user.

During the guarantee time the owner has a right for the free technical maintenance of the unit, and in the case of break down – for free repairing or exchange. Repairing of the unit is done on owner's cost during the guarantee time in case if the unit was broken down due to incorrect exploiting.

The manufacturer receives his equipment for repairing notwithstanding where, when and by whom it was sold.

Software, which is supplied with the unit, is manufactured according to the principle «as it is» if nothing special was talked over. The firm – manufacturer isn't liable for the consequences of the program usage. Software can be used without any limits. Originals codes of programs can be send on demand.

It is supposed that in process of the issue modernisation of the unit will take place, taking into consideration the wishes of the orderer. There is a possibility of fulfilling work on the separate order.

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## 7 Appendix

### Connecting the DVB-C converter to the channel modulator WISI OV35 in IF

Medium spectrum frequency of converter output digital signal DVB-C 6K F = 36.15 MHz, which corresponds to 38,9 MHz for analog one. Output signal level in frequency 38,9 MHz +20 dBmV.

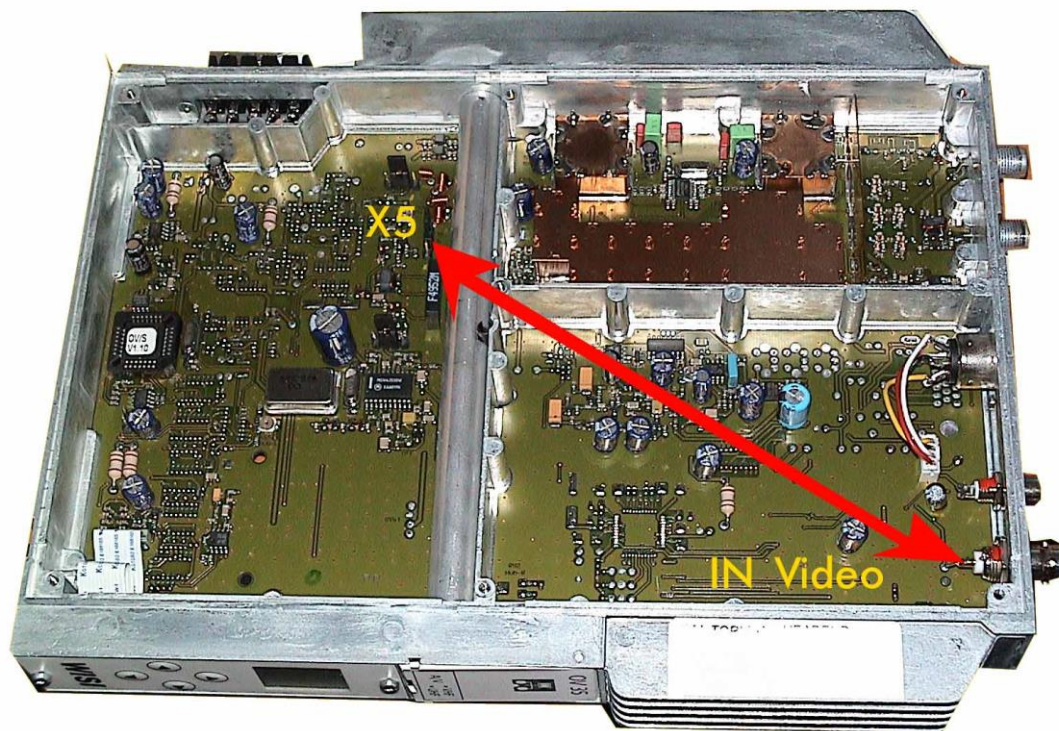
Connection of the DVB-C converter to WISI is fulfilled with the help of the coaxial cable (RG-6U type) to the videoinput (connector BNC) after alteration described below.

- 1) To take off the side walls from the modulator WISI ( Pic 1)



Pic.1

2. To prepare a thin shielded cable with length sufficient for connecting interior contacts of BNC connector (point A pic 2) and contacts of X5 connector (B pic 2).

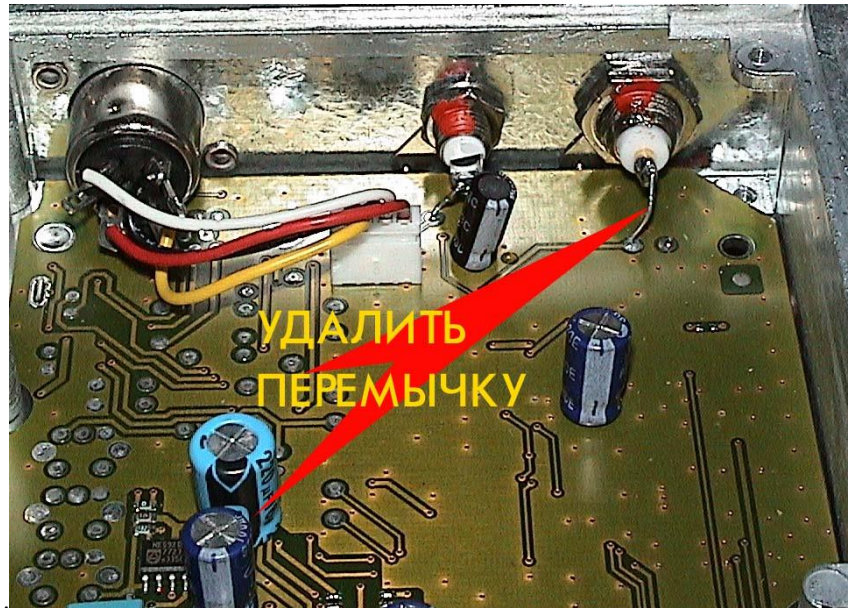




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Pic.2

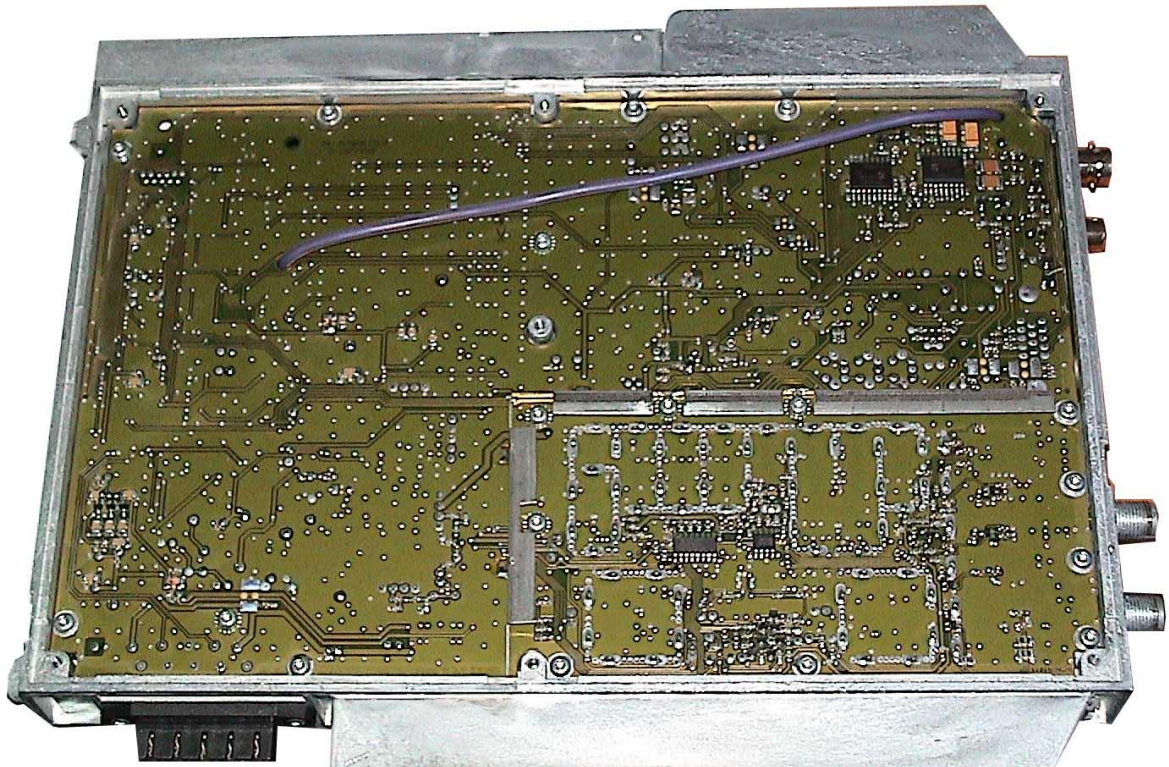
3. To remove a crosspiece which joins the central outlet of video input connector (BNC) with a chip.  
( pic 3)



Pic 3.

4. To lead out the cable Pic 4. the central thread of one cable end is soldered directly to the central BNC connector contact and the screen – to the nearest common point on the chip. (Pic 3)

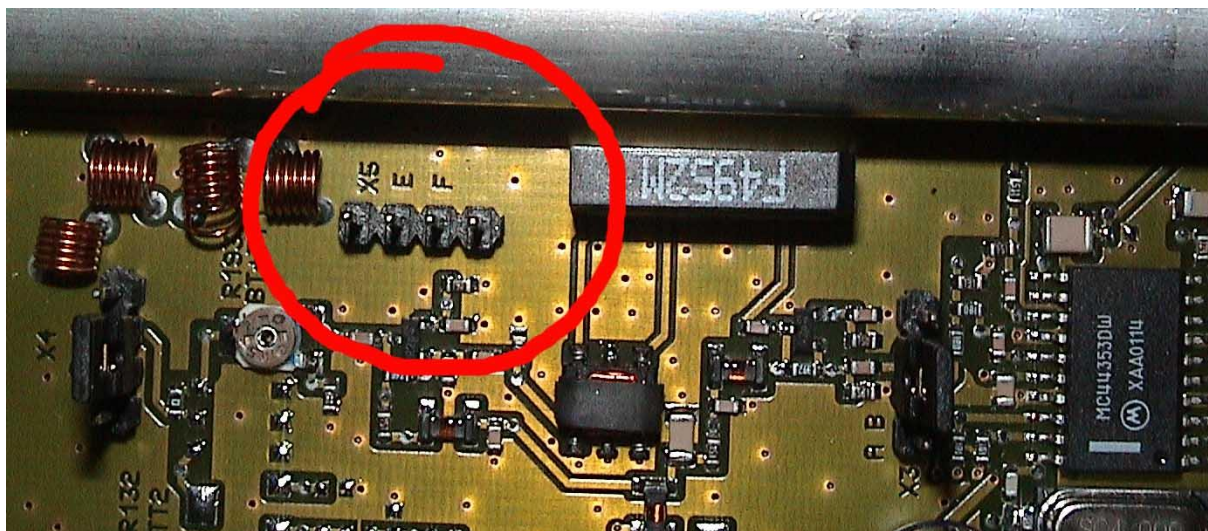
Laying out the cable is to be done from the reverse side of the chip. If you lay out the cable from the elements' side, then when setting the taken off wall back to its place there is danger of pressing the cable. The cable should be put through the existing openings on the modulator's chip. (Pic 4)



Pic 4

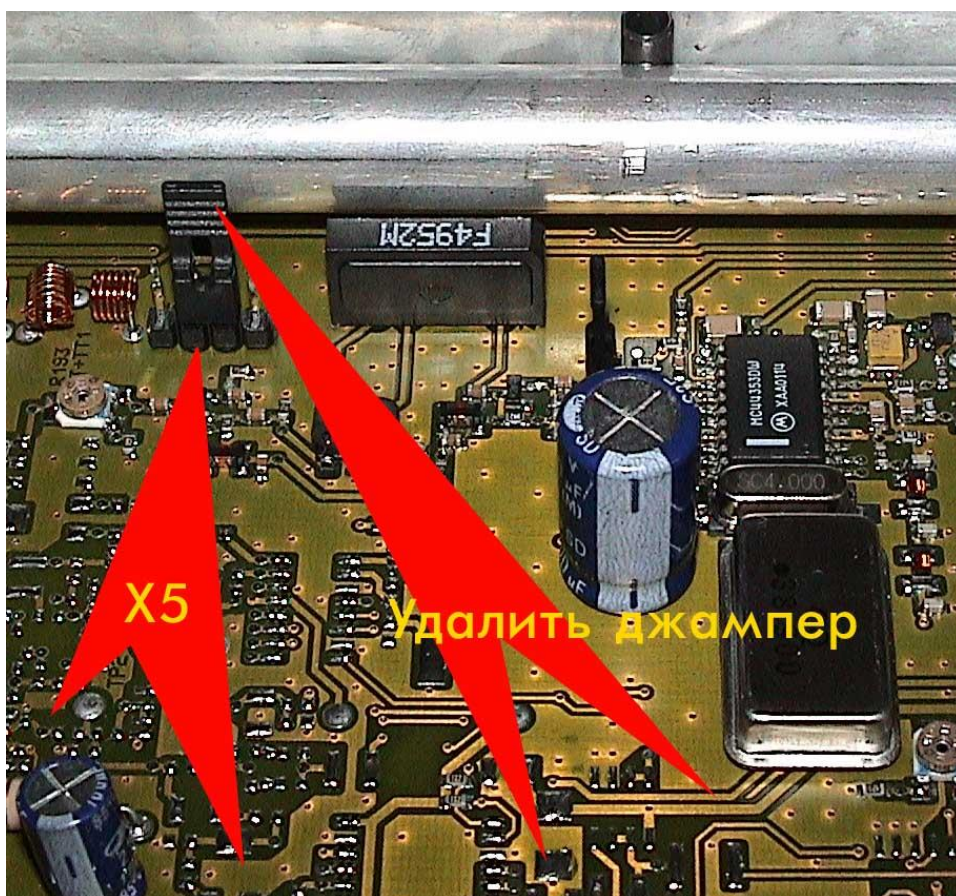


The second end of the cable should be connected to X5 (Pic 2 and Pic 5). As a reciprocal part there is a possibility(as an option) to use two contacts (female) from the panel for DIP microchips.



Pic 5.

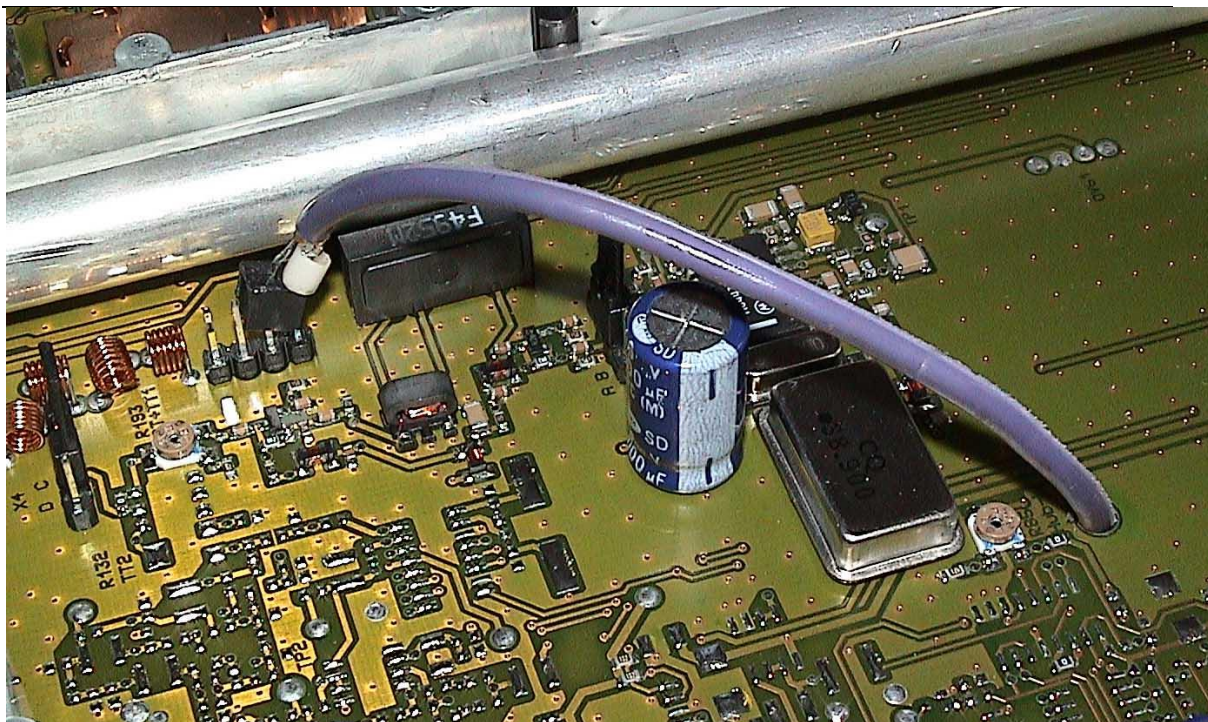
In the regular option two medium contacts (E and F) of this connector are connected with a crosspiece ( Pic 6) .



Pic.6

During the operation on IF this crosspiece can be removed and the prepared cable should be connected. At that the signal (central) thread to F contact, and to the last X5connector contact - a braid. Pic 7

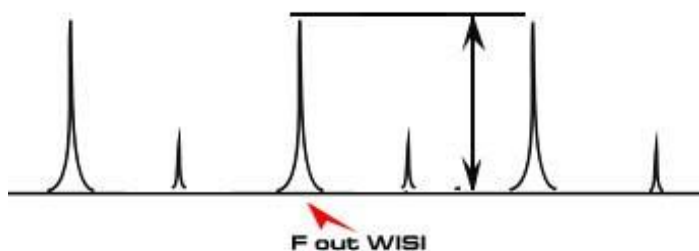




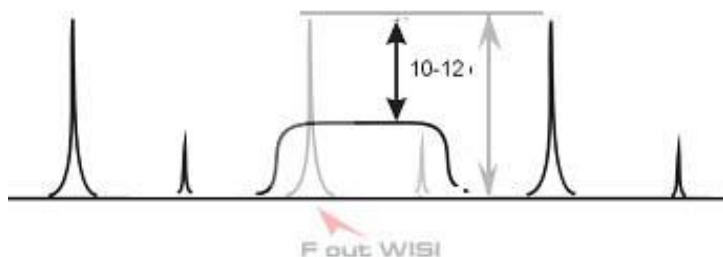
Pic.7

Setting.

1. To switch on WISI in general regime, with set crosspiece between F and E contacts of X5 connector.
2. To measure output signal level



3. To change the crosspiece for above described cable.
4. To set with the help of regulator of DVB-C 6K converter output level (the lower chip) signal level on WISI output for 10-12 dB lower, than in general regime (measured in par. 2)



Level is determined by the digital signal band medium. Look at Chapter 3.1.

We remind you that receiving device is to be set on  $F_{out} (wisi)$  frequency + 2,75 MHz.

For example, if output frequency, set on the WISI modulator 351,25 MHz, the receiver should be set on 354 MHz frequency (351,25+2,75).

According to the same reason the measurement of level with devices of MT2115 type it would be right to do not on the channel frequency but in 2,75 MHz higher.

# Подключение 6DVB-C конвертеров к компьютеру

