# *FD300 Board*

# Hardware Setup

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ForwardT Software 4.0.0

SoftLab-NSK, Ltd.

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### FCC ID:

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- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

Shielded cables and I/O cards must be used for this equipment to comply with the relevant FCC regulations. Changes or modifications not expressly approved in writing by SoftLab-NSK, Ltd. may void the user's authority to operate this equipment.

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# 1 Specification

***Video formats:***

PAL, SECAM: 720x576, 25 frames/sec

NTSC: 720x480, 29.97 frames/sec

***Internal video processing:***

YUV 4:2:2 or YUVα 4:2:2:4, 8 bits per component

***Video inputs:***

Two independent video channels with connection of:

- up to 12 composite sources
- up to 6 S-video sources
- up to 3 component sources (YUV, YUVS, RGB, RGBS)
- SDI (optional)

Two channels of time-base correction.

***Video outputs:***

Possible combinations (SECAM is optional):

- Y/C + CVBS
- YUV + CVBS
- YUVS/RGBS
- YUV + Key/α
- SDI (optional)

***Synchronization:***

Video output genlock to one of video inputs.

***Audio:***

- inputs: 6 mono or 3 stereo;
- outputs: 6 mono or 3 stereo;
- format: uncompressed (PCM), 16 bits, from 8 to 48 kHz;
- microphone amplifier for 2 stereo channels;
- configured audio delay (independent for each input channel);
- mixing of any input channel to any output channel with controlled volume level;
- synchronization of audio with the reference video signal;
- balanced XLR connectors (optional).

## 1.1 System requirements

| | *Minimum* | | | *Recommended* | | |
|---|---|---|---|---|---|---|
| | Processor (GHz) | Memory (MB) | Network | Processor (GHz) | Memory (MB) | Network |
| ForwardT | P3 – 0.8 | 256 | 100 Mb | P4 – 2.4 | 256 | 1 Gb |
| ForwardTA | P3 – 1.4 | 512 | 100 Mb | P4 – 3.0 (HT) | 512 | 1 Gb |
| ForwardTP | P4 – 2.4 | 512 | 100 Mb | 2 x P4 – 2.4 | 1024 | 1 Gb |

Disk: the recommended disk size is defined by the task requirements on the basis of 15 GB/hour (at data rate of 4 MB/sec).

When using disks larger than 100 GB, it is strongly recommended to provide one extra MB of memory for every one GB of disk space (in addition to the numbers specified in the table above).

# 2 Installing an FD300 board

This section describes the procedure of installing an *FD300* board of the *ForwardT* package.

**Make sure that your PC power supply is off! It is recommended that you physically unplug the PC power cord from the socket!**

Install an *FD300* board (Fig. 3) into a free PCI slot of your computer and reliably attach it to the system unit with a screw. Otherwise the board can dislodge from its connection at moving the computer or connecting a cable to the board.

Switch on the computer. At start the system will find out the new hardware device and request to specify a driver for it (Fig. 1).


**Fig. 1. *Found New Hardware Wizard* dialog window**

In this dialog window press the **Cancel** button.

## 2.1 Available video inputs

The position of the **J1** and **J2** jumpers (Fig. 2) is set according to the type of a video signal on the input: YUV or YUVS (S-video). The first pin is marked red in the figure; the pins are counted top-down.

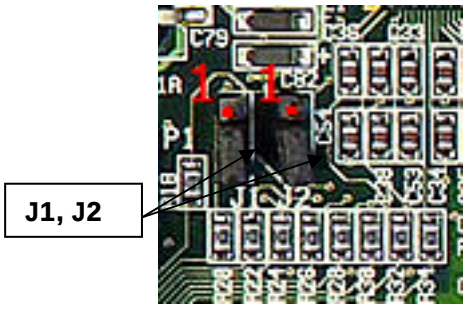



**Fig. 2. J1, J2 jumpers on an *FD300* board**

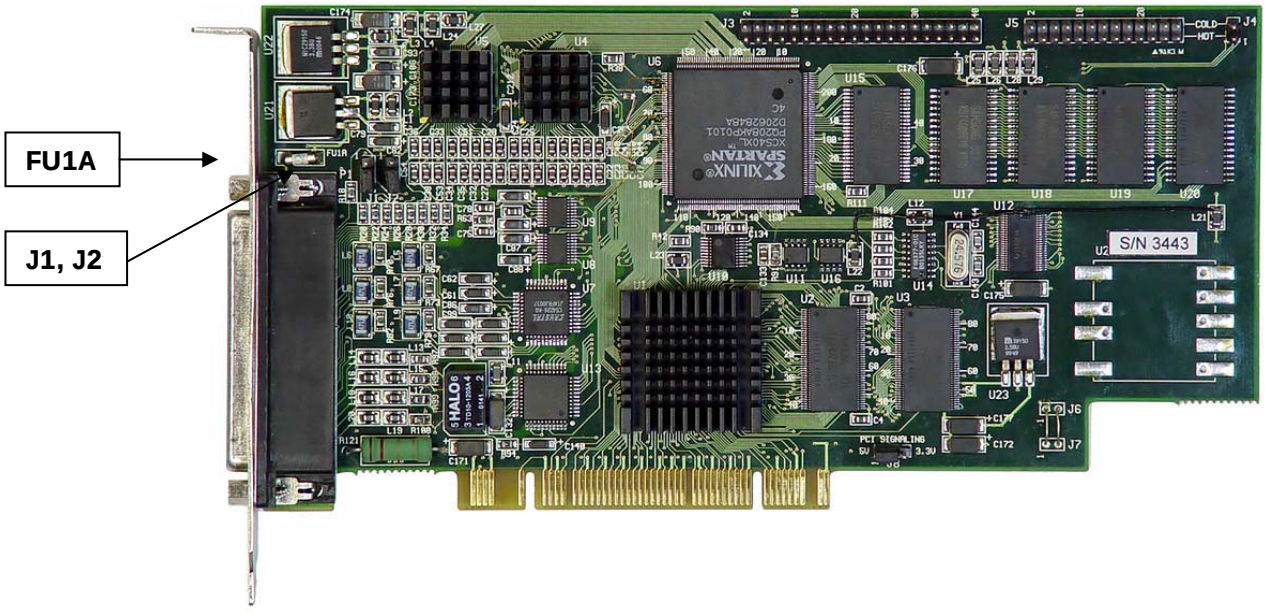



**Fig. 3. An *FD300* board**

Depending on the position of jumpers some of the inputs are not available:

| Signal types | Pins 1-2 are closed | Pins 2-3 are closed |
|---|---|---|
| CVBS1 (1D) | + | + |
| CVBS2 (2D) | + | + |
| CVBS3 (3D) | + | + |
| CVBS4 (1C) | + | + |
| CVBS5 (2C) | + | + |
| CVBS6 (3C) | + | + |
| CVBS7 (1B) | + | + |
| CVBS8 (2B) | + | + |
| CVBS9 (3B) | + | + |
| CVBS10 (1A) | + | + |
| CVBS11 (2A) | not available | + |
| CVBS12 (3A) | not available | + |
| YC4 (1AB) | + | + |
| YC1 (1CD) | + | + |
| YC5 (2AB) | not available | + |
| YC2 (2CD) | + | + |
| YC6 (3AB) | not available | + |
| YC3 (3CD) | + | + |
| YUV1 (1BCD) | + | + |
| YUV2 (2BCD) | + | not available |

| | | |
|---|---|---|
| YUV3 (3BCD) | + | not available |
| RGB1 (1BCD) | + | + |
| RGB2 (2BCD) | + | not available |
| RGB3 (3BCD) | + | not available |
| YUVS1 (1BCDA) | + | + |
| YUVS2 (2BCDA) | not available | + |
| YUVS3 (3BCDA) | not available | + |
| RGBS1 (1BCDA) | + | + |
| RGBS2 (2BCDA) | not available | + |
| RGBS3 (3BCDA) | not available | + |

The active **BREAKOUT BOX** feeding requires the voltage of 12 volt, which is provided by the *FD300* board. An *FD300* board has the **FUSE (FU1A)** resettable fuse (Fig. 3) provided for safety; it is restored to the operation condition by switching the computer off for 30 seconds.

☝ ***IMPORTANT:*** *According to the technical requirements, all the video outputs demand 75 Ohm termination. Therefore, when connecting* ***Sony*** *monitors to the system, it is necessary to set matching load on the 75 Ohm input for the purpose of receiving a correct S-video* ***chroma*** *signal, since the monitors have no termination on the input.*

## 2.2 Registration

The registration key is required for normal operation of the *ForwardT* hardware/software package. The key is created by the serial number of a particular *FD300* board. The registration key should be specified in the register of your computer. Usually the registration key is delivered as a REG file on the *ForwardT* software CD. To initialize the registration key, enter it into the register of the computer, launch the file as usual, for example with a double click on the REG file name in the *Explorer* program.

# 3 Using the SDI option

The SDI option implemented on the basis of an *SDI-I/O* board (Fig. 4) and connected to an *FD300* board is intended for using SDI digital video signals in the *ForwardT* products line.

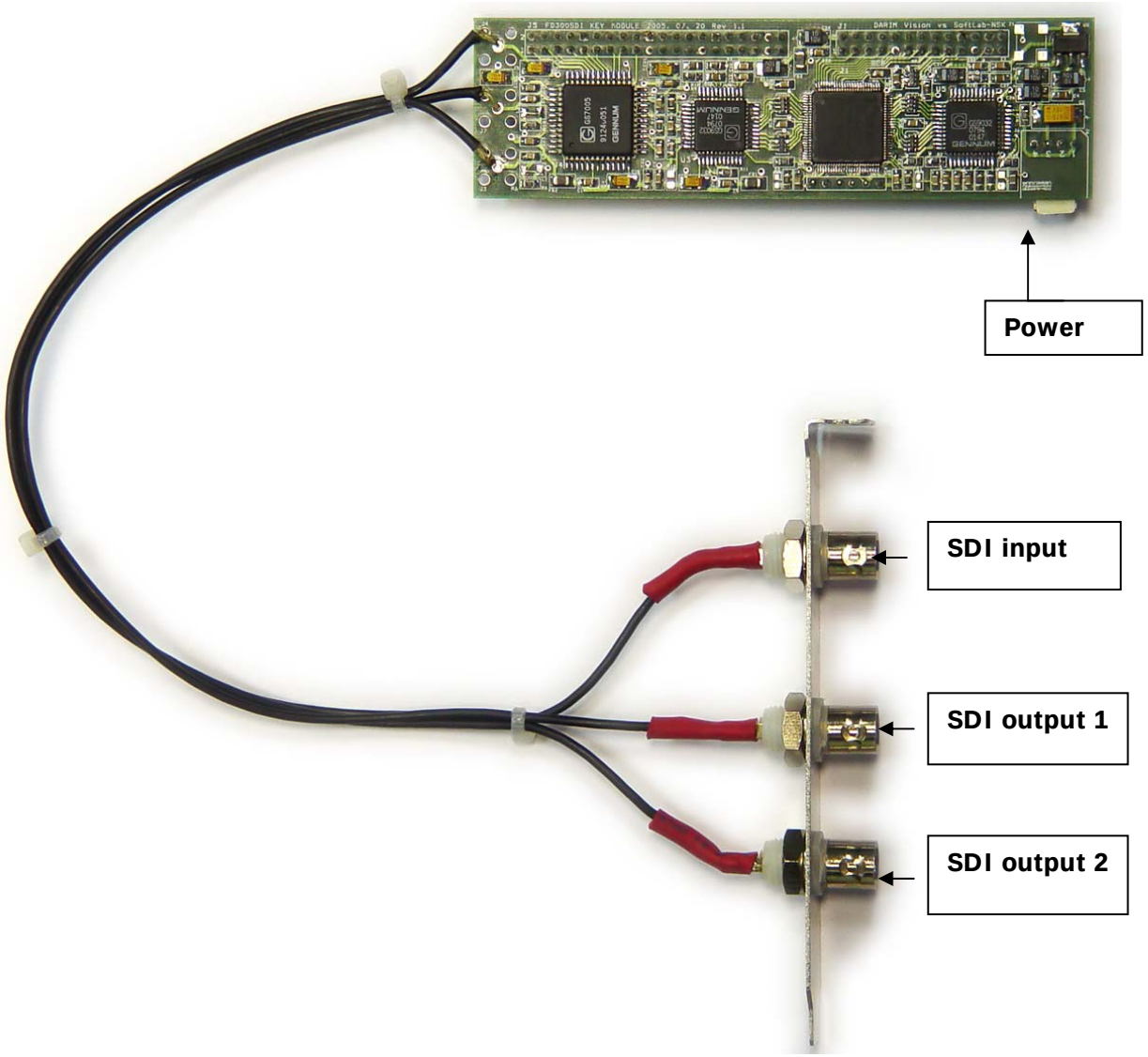



**Fig. 4. An SDI-I/O board**

An SDI-I/O daughter board is connected to the special expansion connectors of the *FD300* board. Three BNC connectors are intended for SDI signals input and output: **SDI input** is the SMPTE-259M-C receiver providing receive of a digital video signal in the ITU-R-601 format; **SDI outputs 1, 2** are the SMPTE-259M transmitters providing transfer of a digital video signal in the ITU-R-601 format. When using an *FD300* board for the purpose of mixing on an external mixer, the **Fill** signal goes to the **SDI output 1** and the mask signal (**Key**) goes to the **SDI output 2**. In all the other modes both the outputs receive the same signals.

A standard connector (like one for the floppy disk drive) is used for the purpose of providing power supply.

There are two parallel connectors on an SDI-I/O board: a 40-pin connector for controlling and transferring 8-bit parallel video stream in the **CCIR656** format to the *FD300* board input, and 26-pin connector for receiving 8-bit parallel video stream in the **CCIR656** format from the *FD300* board output.

It is necessary to configure an *FD300* board in order to provide correct work of the SDI option along with the *ForwardT* package.

In the *FDConfiguration* application dialog (see the the *FDConfiguration User's Guide* to ) should be specified the following settings:

- In the **Selected Board Info** window of the dialog it should be displayed whether the SDI option is supported in the current configuration: **SDI I/O supported (if present)**.
- Select the **Digital** parameter in the **Input** drop-down list of the **Line A/Line B** panel.
- Specify the **Internal->Analog Output+Digital bus** parameter in the **Switching** field of the **Output** panel.
- Select **Mode 6** in the **Video Conversion** list of the **DVM** panel of the dialog.
- Specify the **Single Digital In** parameter on the **Sound** panel.

☝ ***Note:*** *For the external mixing mode it is necessary to select a component signal (**YUV+ sKey, ns (Key on Y) UV+sY** or **nsRGB + Key**, for more details about the signals see Fig. 9) in the **Analog Video Output** drop-down list of the **Output** panel. In the FDOnAir application settings specify the **External mixer (used with YUV/RGB+ Key modes)** mode in the **Configuration** page.*

**Specification**

**SDI input**

- 270Mbit/sec SMPTE 259M-C unidirectional input
- ITU-R-601 component digital video signal
- one BNC connector

**SDI output 1, 2**

- 270Mbit/sec SMPTE 259M-C two unidirectional outputs
- ITU-R-601 component digital video signal
- two BNC connectors

# 4 Connections of an FD300 board to external devices

Connect the switching devices (allowing the user to switch input/output audio and video signals) to the *FD300* board connector. Usually the device presents a ***BREAKOUT BOX,*** which can be passive (Fig. 7) or active (Fig. 10). Their description is given below.

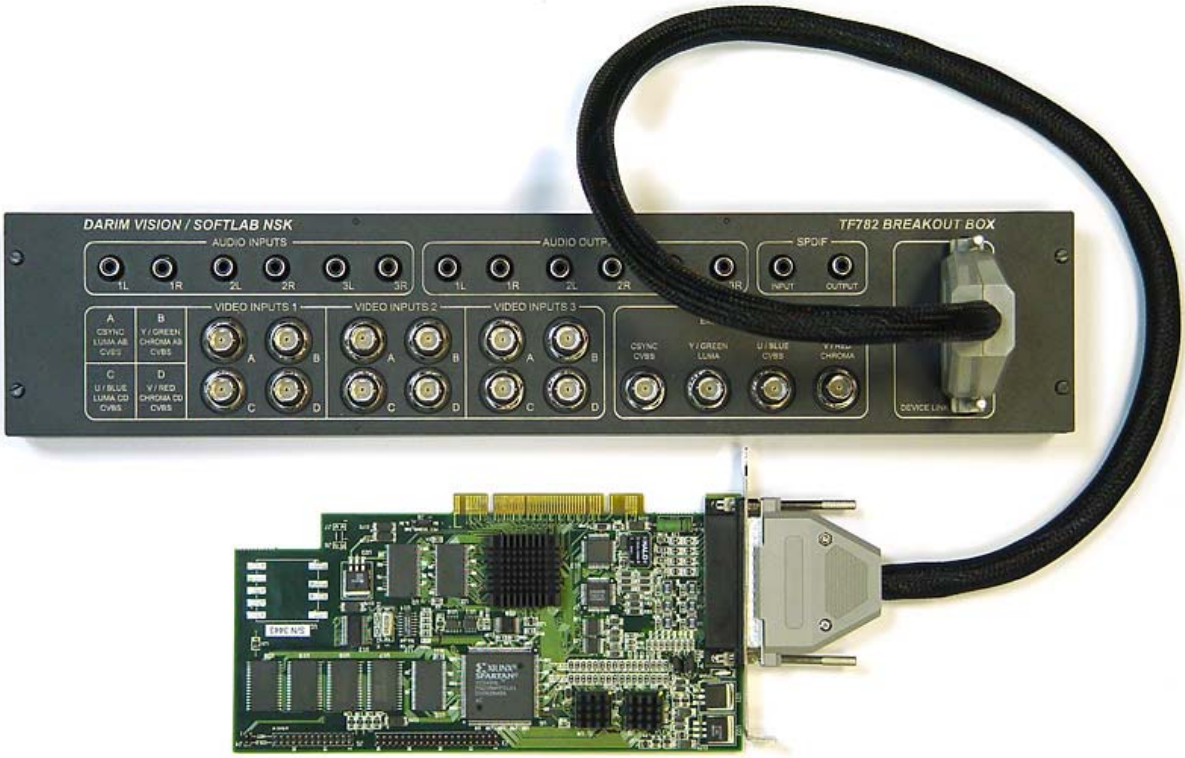



**Fig. 5. Connection of an *FD300* board to the BREAKOUT BOX**

An *FD300* board can be connected to external devices by a special cable (Fig. 6).

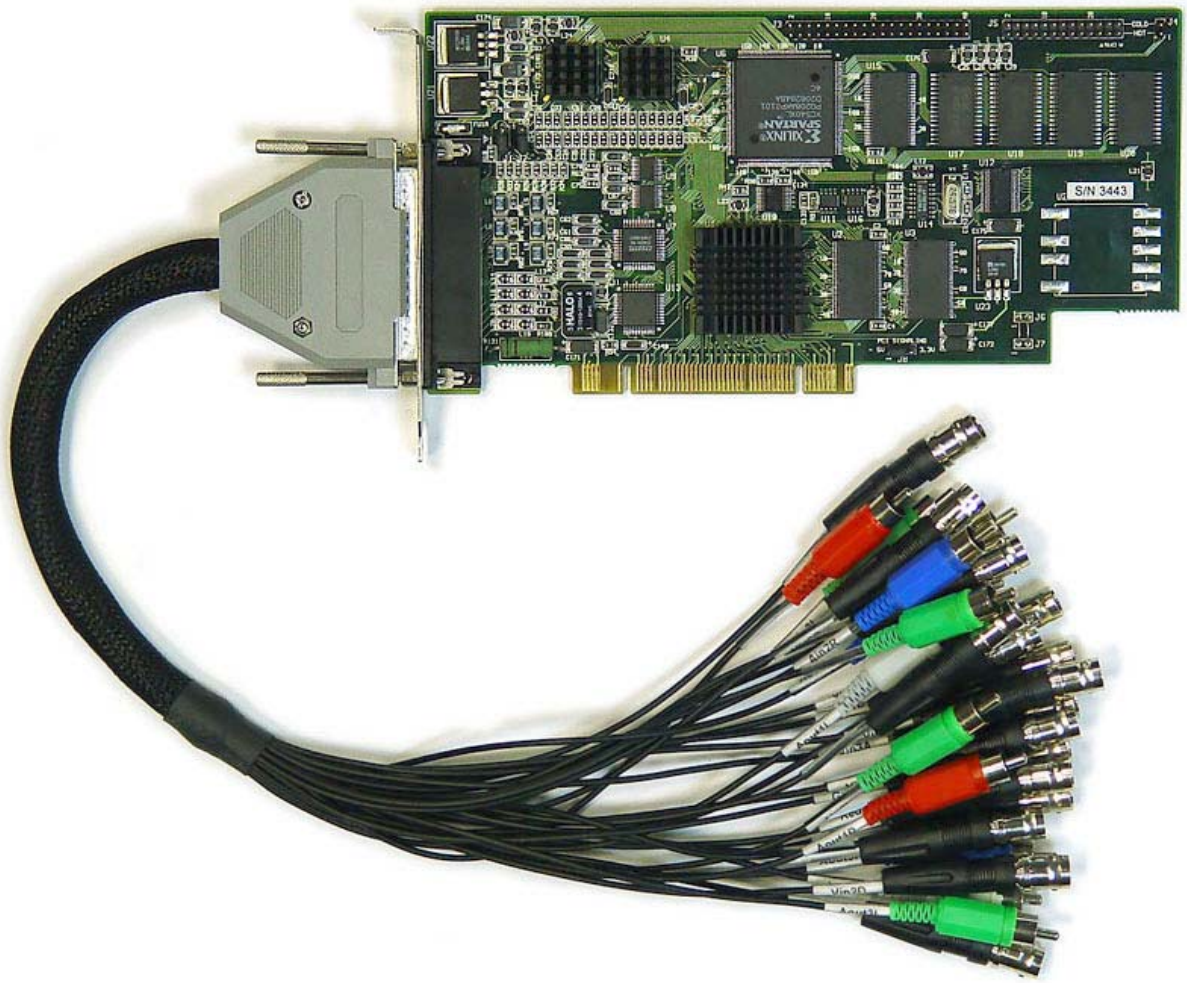



**Fig. 6. Connection of the cable to an *FD300* board**

The switching cable has 28 connectors corresponding to the ones of the passive breakout box except for SPDIF. All the connectors are marked.

All the video inputs are divided into 3 identical groups for serviceability. Each of them has the **Vin** inscription and the input group number. Each group contains 4 coaxial connectors (**A**, **B**, **C**, **D**). Depending on the device operating mode the following signals can be received on the video inputs:

- on input **A** (**Vin1A, Vin2A, Vin3A**) – CVBS, Luma, SyncYNC;
- on input **B** (**Vin1B, Vin2B, Vin3B**) – CVBS, Chroma, Y, sY, G, sG;
- on input **C** (**Vin1C, Vin2C, Vin3C**) – CVBS, Luma, U,B;
- on input **D** (**Vin1D, Vin2D, Vin3D**) – CVBS, Chroma, V, R;

where:

- CVBS – composite video signal;
- Luma, Chroma – S-video signal components;
- Y, U, V –YUV signal components;
- R, G, B –RGB signal components;
- Sync – synchro signal;
- sY, sG – synchro impulse is contained in the Y or G component of the component signal, respectively.

At simultaneous processing of two Y/C signals, one should be received on the **A** (Luma) and **B** (Chroma) inputs and the other one on the **C** (Luma) and **D** (Chroma) inputs.

If a synchro impulse is received separately at component signal processing, the **A** input is used for the one. Otherwise, if the synchro impuls is a part of the Y component (for a YUV signal) or G component (for an RGB signal), it is received on the **B** input along with the corresponding component.

The **Blue**, **Red**, **CVBS**, **Green** video output connectors correspond to the RED/V/C, GREEN/Y, BLUE/U/CVBS and CVBS/CSYNC video outputs. Possible combinations are listed in the table (Fig. 9).

The audio inputs are marked **Ain1L**, **Ain1R**; **Ain2L**, **Ain2R**; **Ain3L**, **Ain3R**.

The audio outputs are marked **Aout1L**, **Aout1R**; **Aout2L**, **Aout2R**; **Aout3L**, **Aout3R**, where **L** is the left channel of stereo signal, **R** is the right channel.

# 5 Passive Breakout box

The passive breakout box (Fig. 7) is intended for the purpose of connecting analog video and audio sources and signal receivers. It is connected to a connector on the *FD300* board with a special cable (Fig. 5) supplied along with the box.


**Fig. 7. Passive breakout box appearance**

The front appearance of the passive breakout box is shown schematically in Fig. 8. All the video inputs are divided into three identical groups, each of them has a frame with the **VIDEO INPUT** inscription and a number of the input group. Each group contains 4 coaxial connectors (A, B, C, D). Depending on the device operating mode the following signals can be received on the video inputs:

- to input A – CVBS-A, LUMA-AB, CSYNC;
- to input B – CVBS-B, CHROMA-AB, Y, YS, G, GS;
- to input C – CVBS-C, LUMA-CD, U,B;
- to input D – CVBS-D, CHROMA-CD, V, R.

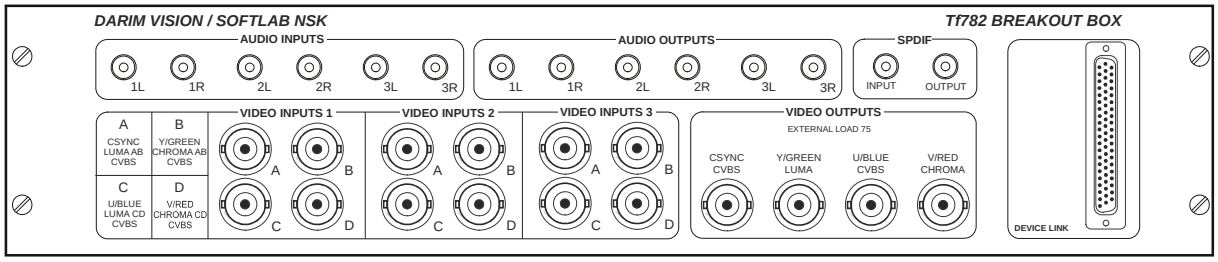



**Fig. 8. Passive breakout box scheme**

Video outputs are presented by the **VIDEO OUTPUTS** group, where four outputs (RED/V/C, GREEN/Y, BLUE/U/CVBS and CVBS/CSYNC) are located. Possible combinations are presented in the table below (Fig. 9).

| **Video signals** | **Video outputs** | | | |
|---|---|---|---|---|
| | **RED** V/C | **BLUE** U/CVBS | **GREEN** Y | **CVBS** CSYNC |
| **Y/C+CVBS** Y/C signal (Luma / Chroma) and 2 composite signals | Chroma | CVBS | Luma | CVBS |
| **YUV+CVBS** YUV component signal and composite signal | V | U | sY | CVBS |
| **YUV+Sync** YUV component signal with synchronous impulse on a separate cable | V | U | Y | Sync |

| Video signals | Video outputs | | | |
|---|---|---|---|---|
| **nsRGB+Sync**<br>RGB component signal with synchronous impulse on a separate cable | R | B | G | Sync |
| **YUV+sKey**<br>A mask and a fill are displayed.<br>Fill signal in YUV component signal format without synchronization in Y<br>Mask signal in composite signal format | V<br>Fill | U<br>Fill | Y<br>Fill | SKey mask<br>(Key) |
| **ns(Key onY)UV+sY**<br>A mask and a fill are displayed.<br>Fill signal in YUV component signal format with synchronization in Y<br>Mask signal in composite signal format without synchronous impulses | V<br>Fill | U<br>Fill | Key<br>Mask<br>(Key) | sY<br>Fill |
| **nsRGB+Key**<br>A mask and a fill are displayed.<br>Fill signal in RGB component signal format without synchronization in G<br>A mask signal in composite signal format | R<br>Fill | B<br>Fill | G<br>Fill | sKey<br>mask<br>(Key) |
| **ColorBarY/C+CVBS**<br>A color bars table is displayed.<br>Y/C signal (Luma / Chroma) and 2 composite signals | Chroma | CVBS | Luma | CVBS |
| **ColorBar YUV+CVBS**<br>A color bars table is displayed.<br>YUV component signal and composite signal | V | U | sY | CVBS |
| **ColorBar nsRGB+Sync**<br>A color bars table is displayed.<br>RGB component signal with synchronous impulse on a separate cable | R | B | G | Sync |

**Fig. 9. Video output combinations table**

Notes:

- Luma, Chroma – Y/C (S-video) signal components;
- Y, U, V –YUV signal components;
- R, G, B – RGB signal components;
- Sync – synchronous signal;
- s – synchronous impulse is present in the corresponding component;
- ns – synchronous impulse is absent in the corresponding component.

☝ ***IMPORTANT:*** *It is impossible to receive the Y/C (S-video) signal simultaneously from the miniDIN-4* ***S-VIDEO*** *connector, and the* ***GREEN*** *(Y – brightness signal) and* ***RED*** *(C – color signal) connectors. The chroma signal (C) should be loaded at 75 ohms. Some SONY equipment (monitors, video tape recorders) do NOT have such load and it should be provided.*

The audio signals are divided into two groups: output signals – **AUDIO OUTPUTS**, input signals – **AUDIO INPUTS**. Each group contains six patchholes in three L-R stereo pairs.

# 6 Active Breakout box


**Fig. 10. Active breakout box appearance**

There are 3 identical channels of **VIDEO INPUTS** on the active breakout box (Fig. 11). Each channel contains four pairs of parallel-connected through-pass BNC coaxial connectors (A, B, C, D), and also 2 MiniDIN4 connectors for connection to sources of S-video (inputs AB and CD). The connectors used are selected with the **COAXIAL/S-VIDEO** switches. The **OFF/ON** switches are intended for connecting/disconnecting 75 ohm terminal resistors of the corresponding coaxial video input.

Depending on the device operating mode the following signals can be received on the video inputs:

- on input **A** – CVBS, Luma, Sync;
- on input **B** – CVBS, Chroma, Y, sY, G, sG;
- on input **C** – CVBS, Luma, U,B;
- on input **D** – CVBS, Chroma, V, R,

where:

- CVBS – composite video signal;
- Luma, Chroma –S-video signal components;
- Y, U, V –YUV signal components;
- R, G, B –RGB signal components;
- Sync – separate signal of synchronous impulse;
- sY, sG – synchro is contained in the Y or G component of the component signal, respectively.

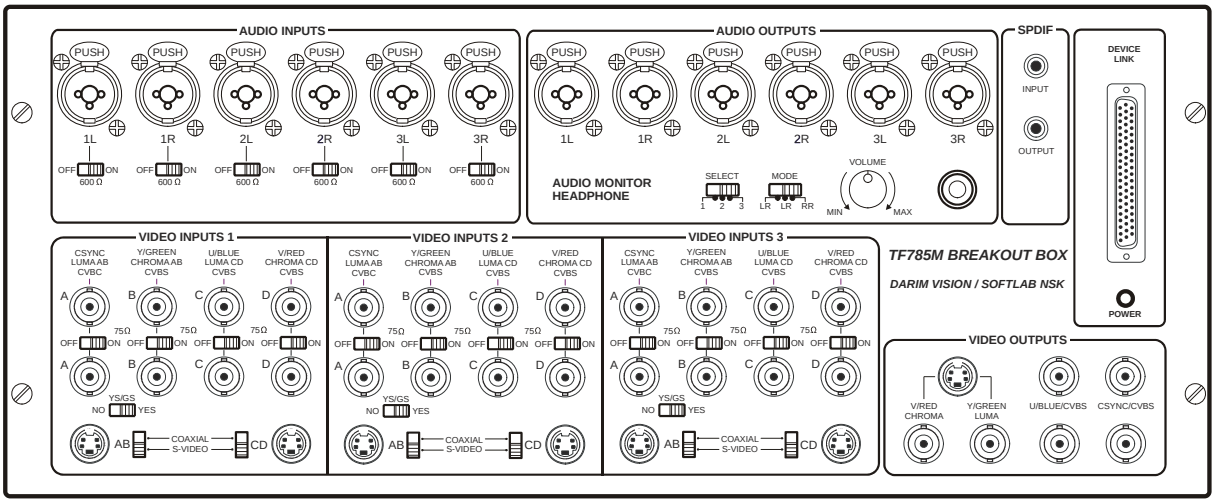



**Fig. 11. Active breakout box scheme**

When a component signal with the YS or GS constituent is sent to the channel video input, the **YES/NO** switch should be in the **YES** position. In all other cases it should be in the **NO** position (normal position).

There are also four video outputs (RED/V/C, GREEN/Y, BLUE/U/CVBS, CVBS/CSYNC) on the box combined into the **VIDEO OUTPUTS** functional group. Each video output is duplicated, which allows connecting a preview monitor simultaneously with the working signal.

Six patchholes grouped in three L-R stereo pairs form the **AUDIO INPUTS** functional group. All the audio inputs are balanced, for which three-pole stereo plugs are used. The **OFF/ON** switches are intended for connecting/disconnecting 600 ohm terminal resistors of the corresponding audio input.

The **AUDIO OUTPUTS** functional group is formed by six balanced audio outputs. They can be used as unbalanced ones with the earth connection of one balance line, the same way as audio inputs.

There is a patchhole for stereo headphone connection in the **AUDIO MONITOR HEADPHONE** group. The output level can be specified by the **VOLUME** controller. The number (1, 2 or 3) of an audio output for listening is selected by the **SELECT** switch. The **MODE** switch allows setting the necessary mode: LR – stereo, LL – left channel only, RR – right channel only.

The **POWER** light-emitting diode indicator shows the power supply availability.

***Note:*** *If the* ***POWER*** *LED indicator is not alight after an FD300 board is connected to the active breakout box, apply to the technical support service.*

# 7 Breakout box protective grounding

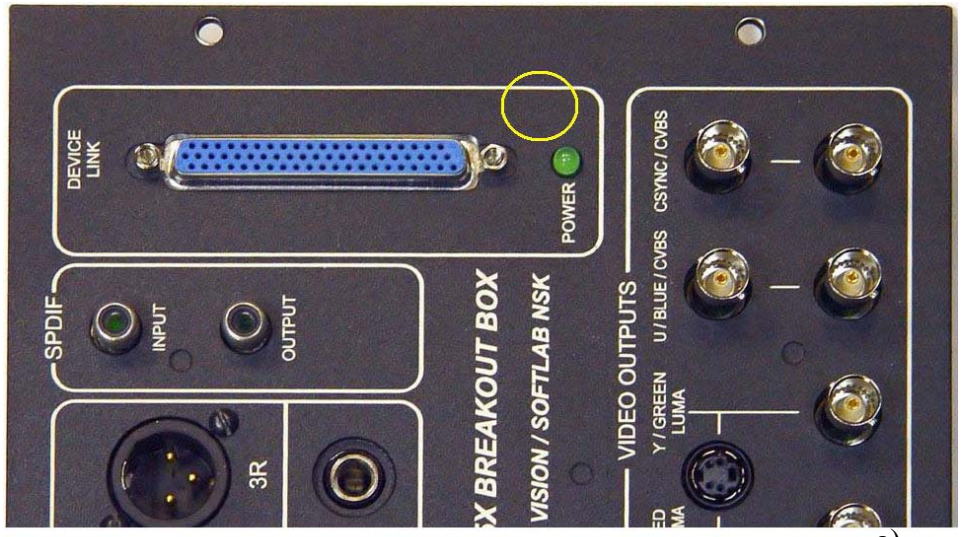
The way of grounding a particular breakout box depends on whether it is located separately or in the rack along with other equipment.

When placing the device on a desk separately from other equipment, it should have independent grounding. There are pins inside the box case intended for this purpose. The pin locations on the passive and active breakout boxes are displayed in Fig. 12 and Fig. 13, respectively. Closing contacts with a jumper (Fig. 14) enables the device protective grounding.

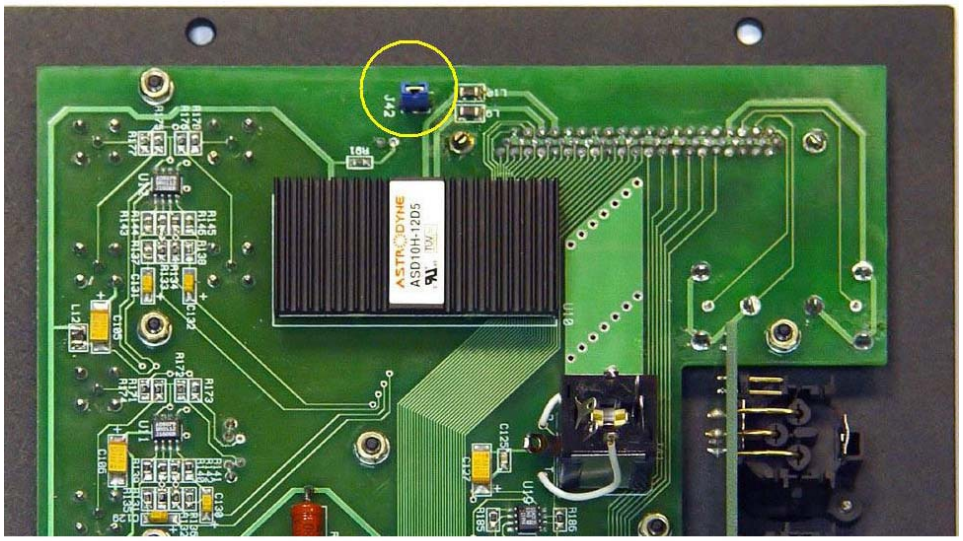
When mounting a breakout box in the rack, the independent protection is not required since in that case the rack common grounding is used.

☝ ***Note:*** *At mounting a breakout box in the rack it is strongly recommended to withdraw the grounding jumper in order to avoid noise at the device operation.*


**Fig. 12. Location of the grounding contacts on the passive breakout box**




a)




b)

**Fig. 13. Location of the grounding contacts on the active breakout box: a) view from the outside; b) view from the inside.**

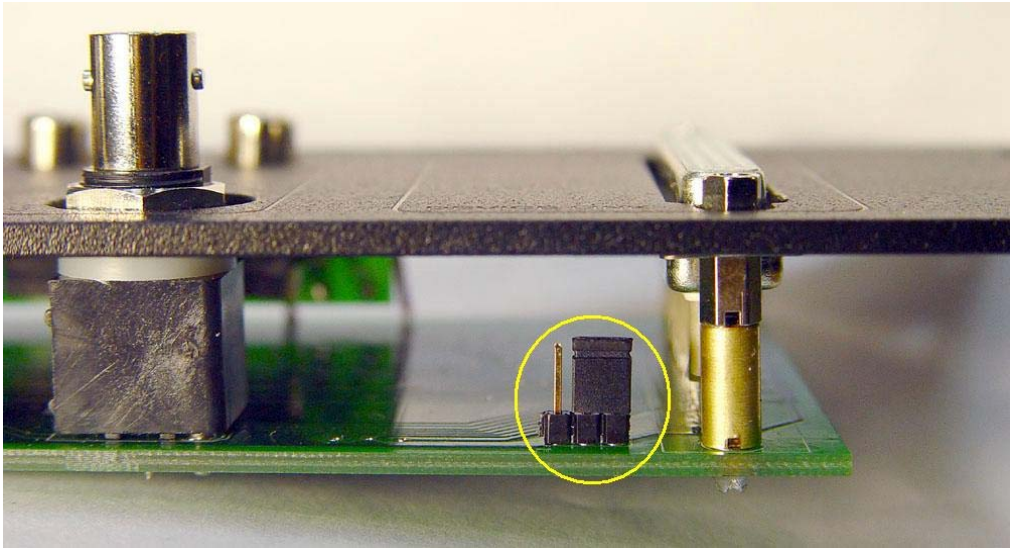


**Fig. 14. Independent grounding of a breakout box is enabled**