



Rev A

## User's Manual

# ANC-6023

## RS232/RS422/Video Sync Interface Adapter



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## Features

- True EIA RS232 and RS422 interfaces
  - Full duplex operation
  - Baud rates to 1 MBaud
  - Uses DB-9 connector on PC serial port by 6' DB-9MF cable (included)
  - Powered from 9v external power supply (included)
  - Latest surface mount technology (SMT) for low power and small size
  - Pin connections on converted signal side mate directly to many professional multimedia units (SMPTE interface for Sony, Panasonic, Grass Valley, Ampex, etc.)
  - BNC input for composite video to [detect vertical sync](#)
- 

## Overview

The ANC-6023 adapter convert the RS-232C level signals input and output on a personal computer (PC) or compatible into bipolar-current RS-422 type signals. The interface voltage levels produced are *true* RS232 and RS-422 type signals. These adapters find wide use in high-speed long distance serial communications, or to interface a PC with equipment that uses an RS-422 type input/output. The adapter is powered by an external +5v to 12v DC supply. For *some* installations, the adapter may be powered using the serial interface only. Extended cable runs and/or terminated RS-422 connections require more current than the serial port power can provide. The RS-422 connector can accept +5v to +12v *regulated* DC at 150 milliamps to provide the added power to the adapter. The ANC-6023 allows the designer to apply composite video sync that is readable on the serial port's Data Carrier Detect (DCD, referred to as RLSD on some systems) or Ring Indicator (RI) line. Our [ANC-6090](#) RS232/RS422 adapter uses the same electronics as the [ANC-6023](#). There are several additional modes of RS422 and limited RS485 operation available. See the [ANC-6090 User's Manual](#) for information on jumper settings for other application modes.

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## Mechanical Specifications

### Adapter case size:

- ANC-6023 = 2.2" X 2.1"

### Connectors:

- Female DB9 to PC (6' DB-9MF cable to PC is included)
  - Female DB9 to RS-422 equipment
  - Video Input by BNC type connector
-

## Electrical Specifications

- Power requirements = 18 ma for short cable, non-terminated applications 150 ma for long and/or terminated cable applications
  - RS-422 output drive = short proof output, non-terminated operation to 150 feet, terminated operation with external power supply to 4000 feet.
  - RS232 output drive = short proof output, under worse case conditions, 5v switching to exceed 3v EIA RS232 specification
- 

## ANC-6023 Installation

Turn off the personal computer and any other remote equipment before performing the adapter installation. ***Never install or remove the adapter with the power applied to the PC or any of the attached equipment. This could result in permanent damage to the adapter due to static discharge.***

The adapter is plugged into the serial port male DB-9 jack on the back of the PC using a 1-for-1 pin DB9 extension cable (6' DB-9MF cable included). ***Be sure to look at the label on the adapter to identify and insure that the proper DB9 is plugged into the PC's serial jack.*** The ANC-6023 would be difficult to connect incorrectly as the RS422 side has the BNC connector also. The user should screw the 2 cable mounting screws into the serial port's hex nuts for permanent installations to assure good long-term connection. The ANC-6023 may *require* the mounting screws be used as both a DB-9 cable and coax cable will be installed at the opposite end will exert a force on the adapter. The user of the ANC-6023 should be aware of this, and take the appropriate care with cable strain relieving.

The adapter is attached to the Pc serial port by a extension cable. Remember that the signal is still RS-232C level leaving the computer and entering the adapter so keep as much of the cable rolled up as possible. ***Also note that if the designer is using a DB9 to DB25 adapter (or cable), an A-B selector box or break-out box for testing, that all 9 pins should be connected through the adapter or test setup.*** There are handshake signals that the host system may need and pins 1 and/or 9 may be driving the host with the video sync edge/frame information.

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## Video vertical synchronization interrupt

The ANC-6023 user may input and examine the video sync input to synchronize operation of command outputs to video editing equipment. The interrupt may also be used for sync time delay, type of sync determination and presence of valid video sync.

The process is as follows:

1. Enable desired interrupts under software control in initialization.
2. When interrupt is requested, save all registers upon vectored entry.
3. Input modem status register to determine F1/F2 source of interrupt

4. Do interrupt service routine.
5. Restore all registers, re-enable software interrupts and return to main program.

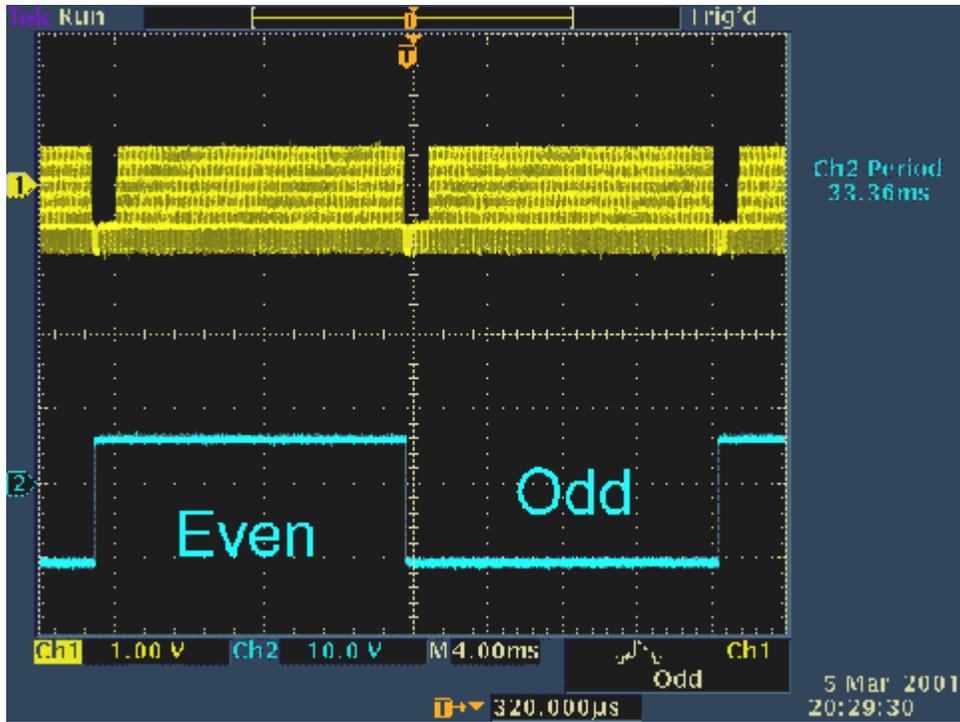


Photo shows an NTSC video signal and the RS232 output going back to the PC's DCD line.

## Serial Port

In addition to the recommended external power supply, 3 of the PC's serial port RS-232C level signals are used by the Antona adapter to derive power from; RTS, DTR and TX. The user must insure that the RTS and DTR signals from the PC's serial port are brought to a *high* output level 100 ms before communicating over the adapter. Usually this is performed once during the user's program initialization.

## Cable Termination

For installation cable lengths greater than 150 feet, resistor termination across the receive pair end of the cable may be necessary. Use a resistor value that matches the impedance of the wire being used (120 ohms). If the user wishes to DC decouple the transmit signals, thereby significantly *lowering* the current used by the adapter. It is suggested that a 1000pf capacitor be placed in series with the TX- signal on the RS-422 side of the adapter. Alternatively, an external DC power supply may be feed into pin 9 on the RS-422 connector to supply the additional current that the adapter is unable to draw from the RS-232 side of the interface. Note that some multimedia equipment has internally connected circuitry for resistor termination. So even if the separation distance is less than 150 feet, it may be necessary to provide the recommended external source of DC power. Some equipment also allows the user to disconnect the internal termination network.

# Adapter Jumper Options

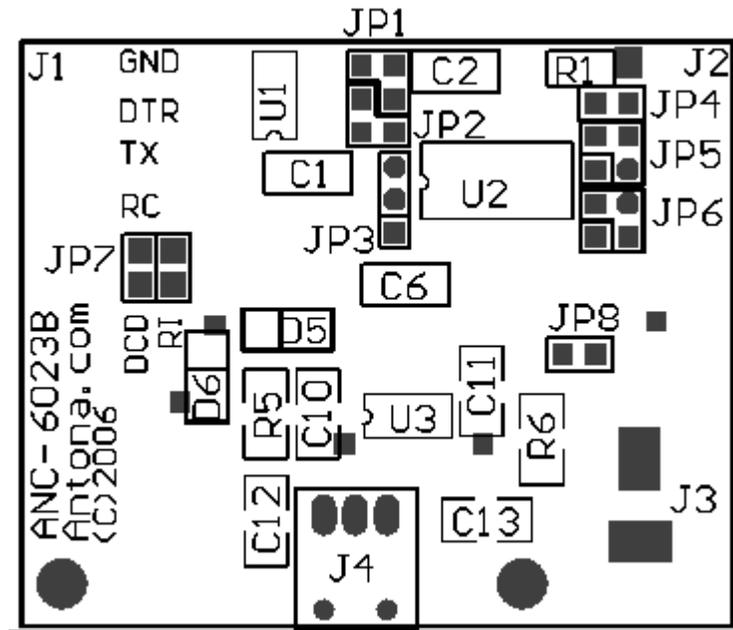


figure 1 - ANC-6023 jumper locations

When shipped, the ANC-6023 is set for transmit and receive always. The output pins are set for ‘master’, the terminating resistor is disconnected and video sync is connected to DCD (JP7).

All references to ‘horizontal’ and ‘vertical’ below are in respect to figure 1 above. The schematic gives another view of each jumper showing the settings on isolated block drawings of each jumper function.

To open the enclosure hood use a small flat blade screwdriver and carefully pry the plastic latches on one side of the enclosure and gently separate the sides slightly (about .020”). Place a paper clip or coin between the separated sides of the enclosure to keep it from re-latching shut while you repeat the process on the two plastic latches on the other side of the hood. The two sides of the hood should now come apart.

Best to leave the shell off of the adapter top while doing the initial setup. Then snap the top on after the adapter is configured and working properly.

To reassemble the enclosure hood back around the adapter electronics, place the circuit board into the enclosure half that designates signal direction with the RS-422 connector (the DB-9 connector end that shares the BNC) on the arrowed end pointed to by the small “RS-422” designation. Double check that the hood labeled with “RS-232” and “RS-422” is properly oriented before closing the sides and relatching all four plastic latches. Remember - the RS-422 end of the adapter is the end with the BNC mounted next to it.

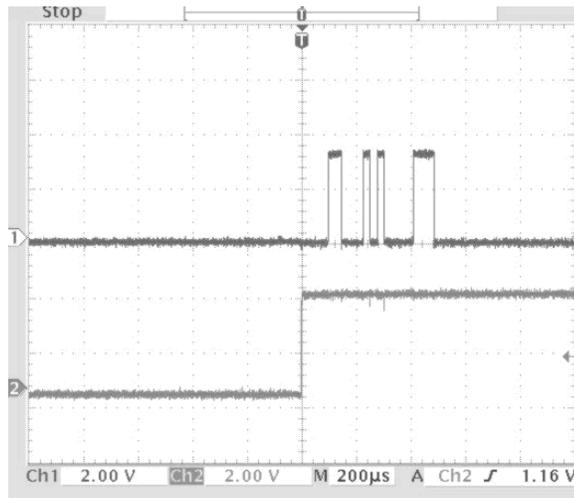
## ***Transmit Control Enable - JP1***

For single adapter, 4-wire RS422 setups where the ANC-6023 is controlling one piece of equipment (most common with this adapter) , JP1 can be set in the horizontal position, as shipped. The transmit data RS-422/485 driver lines are always asserted that way. For battery powered applications, it may be desirable to turn off the transmit drivers to save current when there is no data being transmitted. When using the RTS

signal to control driver output, the vertical position should be set. See Appendix C, the middle left hand of the schematic for the location of JP1. The photo below (photo 1 below) shows how lowering the RTS line on the RS-232 side of the adapter (lower trace - showing RTS signal after being translated to the TTL level within the adapter) precedes transmitting the data byte out the TX+ line (upper trace).

### ***Auto Transmit Source - JP2***

This jumper is really for the 'AutoXmit' feature of the [ANC-6085](#) version adapter and is just left in the horizontal position (as shipped). See Appendix C, the lower left hand of the schematic for the location of JP2.



***Photo 1 - RTS Transmit Operation***

RTS may also be used to turn on/off the receive input lines (see JP3 below). When RTS is used, asserting the signal 'low' to the adapter enables transmitting while RTS 'high' enables receiving. Note that DTR must be set high when RTS is low in order for the adapter to operate when an external power supply is not being used.

### ***Receive Enable - JP3***

This 3-pin straight vertical jumper can be set to enable receiving RS-422/485 data always (as shipped, JP3 set on the lower and middle pin), or turned off automatically whenever the transmit driver is set active by RTS (JP3 set on the middle and upper pin). See Appendix B, the middle left hand of the schematic for the location of JP3. On a 2-wire interface if data is being transmitted and the receiver is also enabled, anything transmitted will be 'looped-back' into the serial port. Since the echoed signal is the actual data that was transferred to the interface cable, being able to see the transmitted data echoed back may be of use for testing, authenticating, diagnostics of data output or determining when RTS can be lowered if used to control transmission.

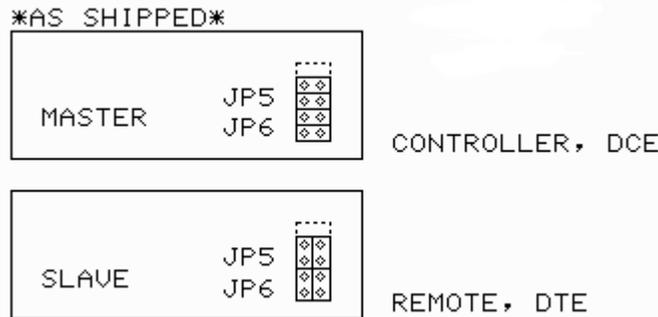
### ***Cable Termination - JP4***

For installation cable lengths greater than 150 feet, resistor termination across the remote receive pair end of the cable may be necessary. The ANC-6090 has a ½W 120 ohm termination resistor built in that can be placed across the receive wire pair by setting jumper 4 (JP4) located over the transmit/receive setting jumpers. As described above, an external DC power source may be feed into pin 9 on the RS-422/485 connector to supply the additional current that the adapter may need when terminating resistors are installed on the receive/transmit wire pairs. Note that some multimedia equipment have internally

connected circuitry for 120 ohm resistor termination. If So, then even if the separation distance is less than 150 feet, it may be necessary to provide an external source of DC. Some equipment also allows the user to disconnect the internal termination network for short cable runs. See Appendix C, the upper middle of the schematic for the location of JP4.

***Transmit/Receive Pin Reverse Jumpers - JP5/JP6***

These two jumper sets, designated JP5 and JP6 on the circuit board and schematic, allow the designer to swap the transmit and receive pairs on the RS-422/485 side of the adapter. The configuration as shipped from Antona is set for ‘master’. This configuration is for the adapter acting as a controller to multimedia type equipment with an RS-422 SMPTE interface. Figure 1 shows the jumper locations from the component side of the circuit board. The user may move all four jumper shunts on the component side of the card from the ‘horizontal’ controller configuration to the ‘vertical’ receiver configuration. All four shunts must be changed to either all horizontal or all vertical for proper adapter operation.



***figure 2 - Tx/Rc Pin Reverse Jumpers***

***JP7 - Video vertical Sync Interrupt Jumper***

The ANC-6023 is capable of generating an interrupt on NTSC, PAL or SECAM RS-170 level sync input with both odd/even field or even field detection. The Data Carrier Detect (DCD, noted as RLSD sometimes) RS-232C input signal is used for edge detection of both the odd and even video field. It may be desired in some applications to receive interrupts for field 2 (even field) only detection. The user may change the output pin from DCD to RI by changing the JP7 jumper. It is set to DCD when shipped.

***JP8 - 75 Ohm Video Terminating Resistor Jumper***

The user can terminate the video signal to ground with a standard 75 ohm resistor (as shipped), or disconnect the resistor by removing the JP8 if there is an additional video destination for the signal that is terminated.

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## External connections to ANC-6023

### DB9 RS-232C Signals

<i>Signal</i>	<i>Function</i>	<i>DB-9 Pin #</i>	<i>Comment</i>	<i>Data Direction</i>
DCD/RLSD	Data Carrier Detect	1	video sync input	input to computer
RX	RECEIVE DATA	2	RS-232 level input	input to computer
TX	TRANSMIT DATA	3	RS-232 level output	output from computer
DTR	Data Term Ready	4	+v to power adapter	output from computer
GND	GROUND	5	signal ground	I/O signal ground
DSR	Data Set Ready	6	tied to DTR (pin 4)	input to computer
RTS	Ready to Send	7	+v to power adapter	output from computer
CTS	Clear to Send	8		input to computer
RI	Ring Indicator	9	alternate video sync input	input to computer

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### DB9 to DB25 pin chart

When using the Antona adapters on a DB25 type com port an adapter can be bought or built to translate the DB9 connector to accommodate the signals from a DB25 type connector using the table below.

<i>Signal</i>	<i>Function</i>	<i>DB-9 Pin #</i>	<i>DB-25 Pin</i>	<i>Comment</i>
DCD/RLSD	Data Carrier Detect	1	8	
RX	RECEIVE DATA	2	3	RS-232 level input
TX	TRANSMIT DATA	3	2	RS-232 level output
DTR	Data Term Ready	4	20	+v to power adapter
GND	GROUND	5	7	signal ground
DSR	Data Set Ready	6	6	tied to DTR (pin 4)
RTS	Ready to Send	7	4	+v to power adapter
CTS	Clear to Send	8	5	
RI	Ring Indicator	9	22	

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### RS422 connections to ANC-6023

cable is normally used to connect from adapter to equipment. The user can hand-wire a 9-pin cable assembly from the RS-422 piece of equipment to the Antona adapter. The only difference between the master and client version is the jumper positions of JP1 and JP2 within the adapter. The *electronics* are exactly the same, only the 2 transmit and 2 receive signal lines are exchanged.

## DB9 RS-422 Signals for Master (Multimedia Controller)

DB9	FUNCTION	IDENTIFICATION
1	GROUND	ground for RS-422 and/or external power
2	RC-	RS-422 minus side input
3	TX+	RS-422 plus side output
4		<i>-not used-</i>
5	GROUND	ground for RS-422 and/or external power
6		<i>-not used-</i>
7	RC+	RS-422 plus side input
8	TX-	RS-422 minus side output
9	+V	Optional +5V to +12V DC @ 150ma

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## DB9 RS-422 Signals for Client (Receive from Master)

DB9	FUNCTION	IDENTIFICATION
1	GROUND	ground for RS-422 and/or external power
2	TX-	RS-422 minus side output
3	RC+	RS-422 plus side input
4		<i>-not used-</i>
5	GROUND	ground for RS-422 and/or external power
6		<i>-not used-</i>
7	TX+	RS-422 plus side output
8	RC-	RS-422 minus side input
9	+V	Optional +5V to +12V DC @ 150ma

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## Appendix A - Program listing

The following short BASIC program will allow the designer to quickly verify the operation of the ANC-6023 video sync input. It is assumed that the adapter is plugged into COM1: (use A=&H2FE for COM2:) with a suitable video input attached to the adapter's BNC connector input.

```
10 A=&H3FE
20 PRINT HEX$(INP(A) AND &H80)
30 GOTO 20
```

*The D7 value should toggle with proper operation.*

A test driver is also available for download for use with this adapter version. It is a windows based program and can [control a Sony VTR](#).

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## Appendix B -Troubleshooting

For more general *information on troubleshooting* an RS232 to RS422 or RS485 interface using our adapters check with the Application Note page on our website.

Here are the most common sources of interfacing problems specific to the ANC-6023 and tests you can make:

### Loopback Test

You can verify that the Antona adapter is working by doing a simple loop-back test using a male DB9 connector with pin 3 to 7 and pin 8 to 2. Use a simple terminal program to just test that characters sent out the com port are echoed back through the adapter. Make sure that your terminal program is turning on RTS and DTR to power the Antona adapter, and that the program is set to control the com port that the adapter is connected to. The adapter operation does not rely on baud rate, parity, stop bits - but the actual application program you are using with the adapter may (see PROGRAM OPERATION).

### CABLING (*most common problem*)

If one of the wires used is not connected or shorted, the whole interface will appear not to be working. Try using another cable or try the loopback test described above with the cable to verify operation. If you can not get the loopback test to work through the cable, it for sure will not work in your application.

Take a look at the manual of the RS422 equipment that you are trying to control. Be sure that the pin definitions on the RS422 equipment tells you the signal names, not what they are suppose to connect to. This sounds simple, but unless you know which direction the pinouts are defined from, you will connect TX+ to TX+ which is incorrect. Make sure that you have the TX+ on the Antona adapter connected to the RC+ on the RS422 equipment and TX- connected to RC- (same for the signal coming back from the RS422 side - make sure that the Antona adapter's RC+ is connected to the TX+ and that the RC- is connected to the TX- on the RS422 side. Pin 5 on the Antona adapter's RS422 output side should be connected to the ground of the RS422 equipment.

When shipped the Antona adapter is set for a SMPTE MASTER interface (connector pinouts are in the 6023 series manual for both MASTER and client mode, so be sure you are looking at the correct table). You may also want to open the Antona adapter up and verify the jumpers are set for the mode you desire. All 4 jumpers should be installed, they each represent one of the 4 signals being transmitted and received.

### Powering

Be sure that the external power supply is plugged in - this is the primary power source for the ANC-6023 adapter.

### Program Operation

The application program you are using may need some setup performed - selecting the com port, baud

lines high to power the adapter). Usually, for multimedia type interfaces, the baud rate is 38.4 Kbaud, Odd parity, 8 data bits and 1 stop bit. Here again, if the program is not setup right, the adapter will appear not to be working at all.

## **RS422 Equipment**

Try to verify the operation of the target RS422 equipment independent of the Antona adapter by using another setup - a different cable connected to another RS422 signal generating device would be the best. Using a different computer with the Antona adapter would also be a good test.

## **Now What?**

If none of the above seems to fix the problem, but the loopback test works, the adapter is working and you may now need to connect an oscilloscope up to examine and monitor the RS422 signals and the RS232 signals being generated by the Antona adapter with the plastic cover removed and running with your RS422 device and program. Refer to the schematic at in the ANC-6023 User's Manual you received with the adapter. It's easy to put a scope probe onto the tops of the 4 jumpers and verify that RS422 signals are coming and going to the adapter. Test the +power to the adapter by probint the +lead of the 22uf capacitor near the +5v regulator (LM2936). Look for excess noise on any of the lines that might be fouling up the transmissions.

If the loopback test does not work, check that the right comport is being addressed. Each adapter is tested prior to shipment with every bit combination of character transmitted and received at 38.4 Kbaud, but like everything, occasionally they can go bad. Of the hundreds we have shipped, there have been maybe 10 or so that arrived non-operational. Damaged in shipping or infant component burnout. We do warranty our adapters, so if it still does not work, call Antona and we will work out an adapter exchange.

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