NV1023 Instruction Manual

SDIF-2 Distribution Amplifier

CONTENTS:

Manual Part No. MI1023-01
April, 1996

Table 1 - NV1023 Performance Specifications

Input	
Impedance:	Jumper configurable for 75 ohms or high impedance.
Level:	TTL
Data Rate:	SDIF-2 Word Clock, 28 kHz - 54 kHz (typical)
Outputs	
Number:	4
Impedance:	Low
Level:	TTL
Mechanical	
Size:	90 mm x 25 mm x 370 mm (3-1/2" x 1" x 14-1/2")
Power Source:	NV1000 Rack Frame (Assembly FR1000)
Power Consumption:	3 Watts
Backplane(s):	SDIF-2 BNC Backplane Assembly EM0104

1. GENERAL DESCRIPTION

1.1 OVERVIEW

The NV1023 SDIF-2 Distribution Amplifier provides a low-cost solution for the distribution of SDIF-2 digital audio word clock to multiple destinations.

The NV1023 comprises a plug-in active module and a BNC connector backplane, Assembly EM0104. This backplane, mounted in the rear of any of the 12 active module slots in an NV1000 terminal equipment frame (Assembly FR1000), provides the connection interface for external signal cables.

Figure 1 illustrates the NV1023 interface and connections. Table 1 lists NV1023 performance specifications.

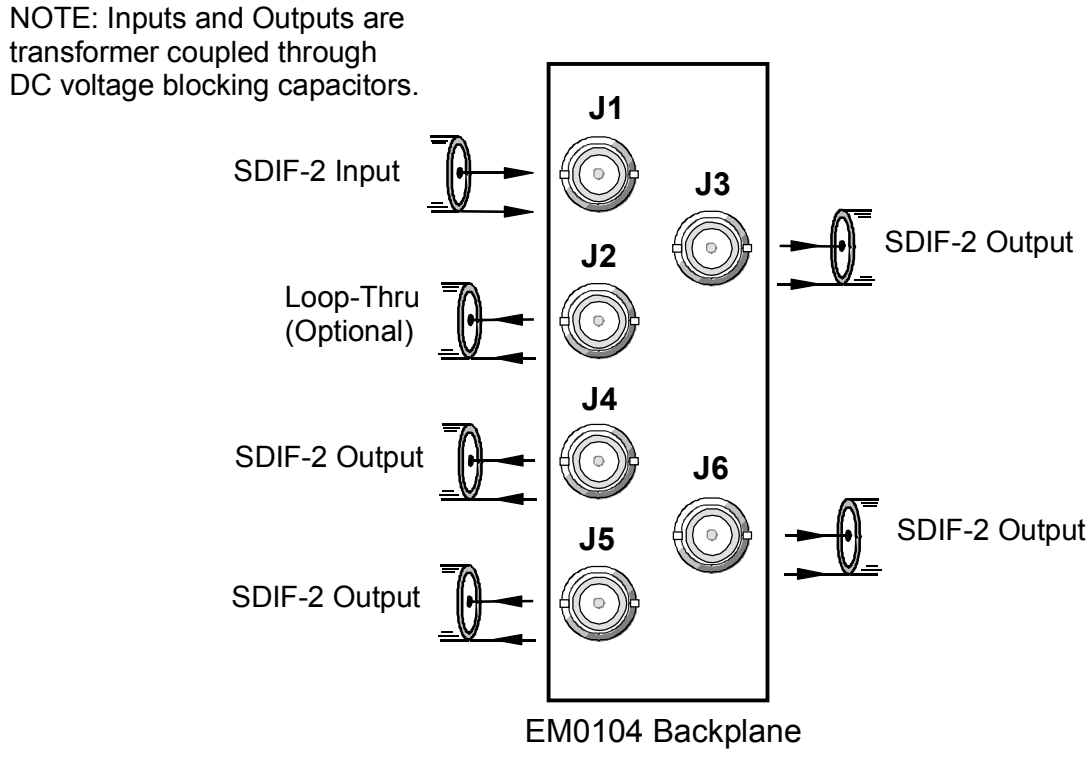

Figure 1 - NV1023 Input/Output Connection (SDIF-2 BNC Backplane)

1.2 SIGNAL DISTRIBUTION APPLICATIONS

The NV1023 is a signal distribution amplifier for sending SDIF-2 digital audio word clock to multiple destinations from a single source. It expands the number of possible destinations for a single source from one to as many as four.

With its input loop-through capability, several NV1023 amplifiers can be configured to drive many more destinations. This cost-effective topology is especially attractive when used for distributing SDIF-2 word clock to a large number of locations. However, greater attention must be given to good transmission-line engineering when connecting distribution amplifiers in this manner.

It is vital that:

1. Coaxial cables have a characteristic impedance of 75 ohms.
2. The cable is terminated at the far end with 75 ohms. Connections within the daisy chain must loop through equipment that has low input return loss and whose input impedances are high relative to the cable's characteristic impedance. NVISION SDIF-2 signal distribution and processing equipment meets this criteria when configured for high input impedance.
3. Cable lengths are minimized, and the legs of the chain past the first connection are short and of roughly equal length.

Figure 2 illustrates a poor technique for looping a signal through multiple pieces of equipment. The distance between devices is longer than the distance from the source to the first device. A better topology is illustrated in Figure 3.

The theoretical limit for the number of connections in a chain of NV1023 distribution amplifiers is 18. The practical limit is between six and eight, depending on cable length and quality.

Figure 4 illustrates the preferred topology for configuring multiple NV1023 DAs for use in high fanout applications.

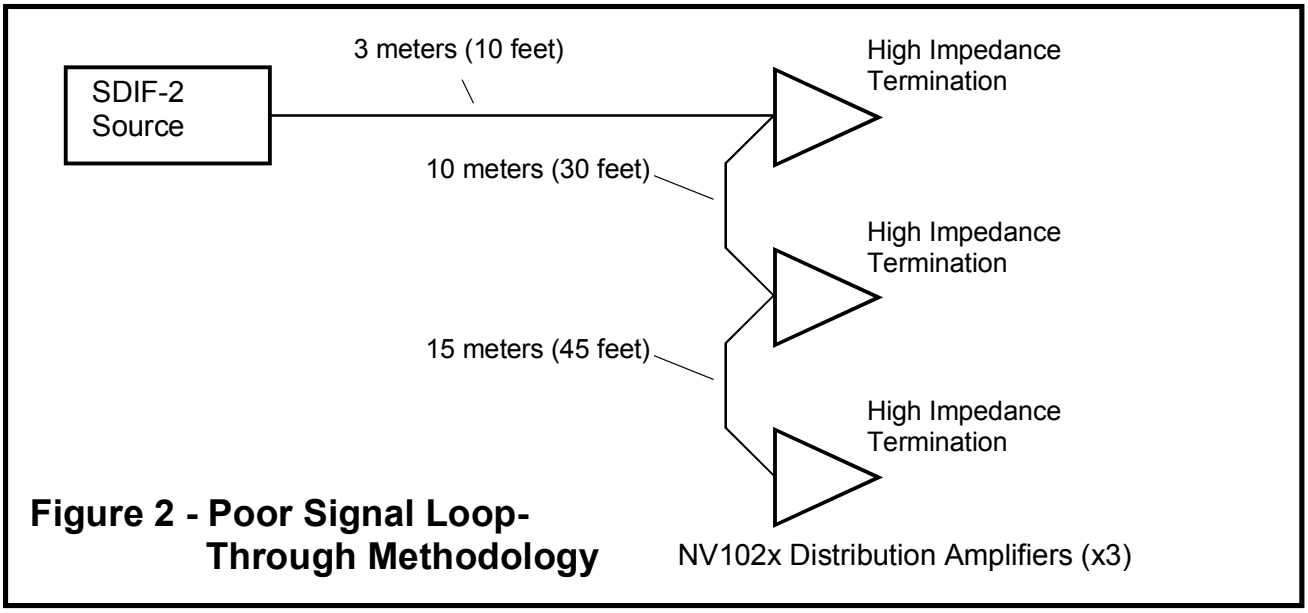

Figure 2 - Poor Signal Loop-Through Methodology

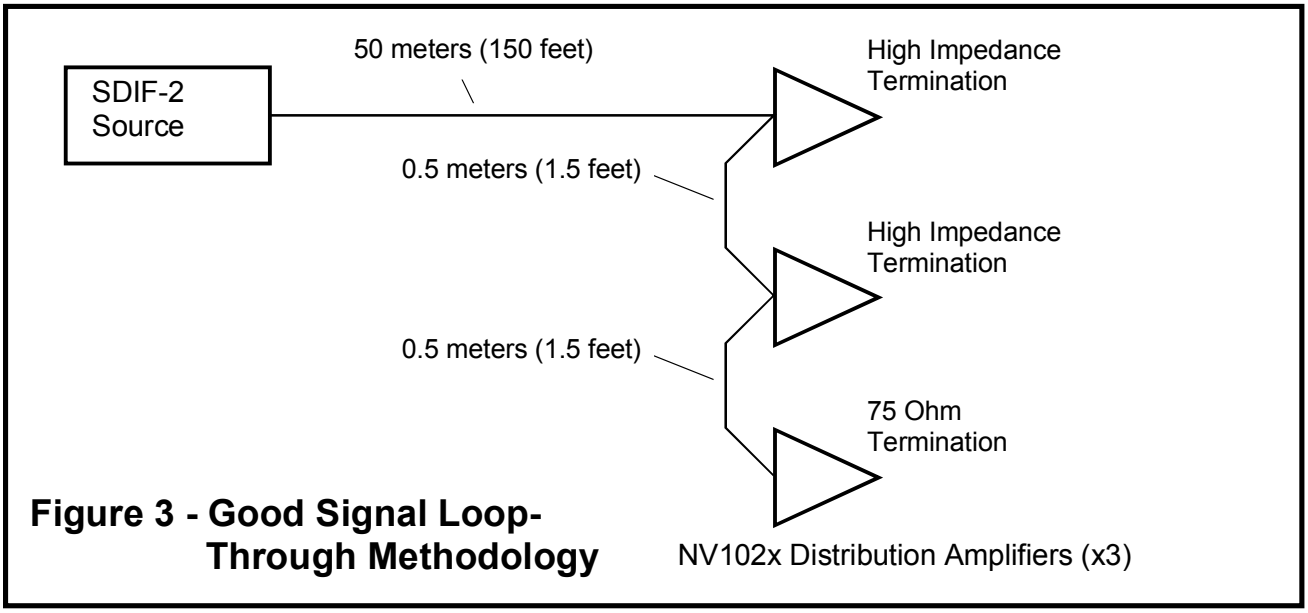

Figure 3 - Good Signal Loop-Through Methodology

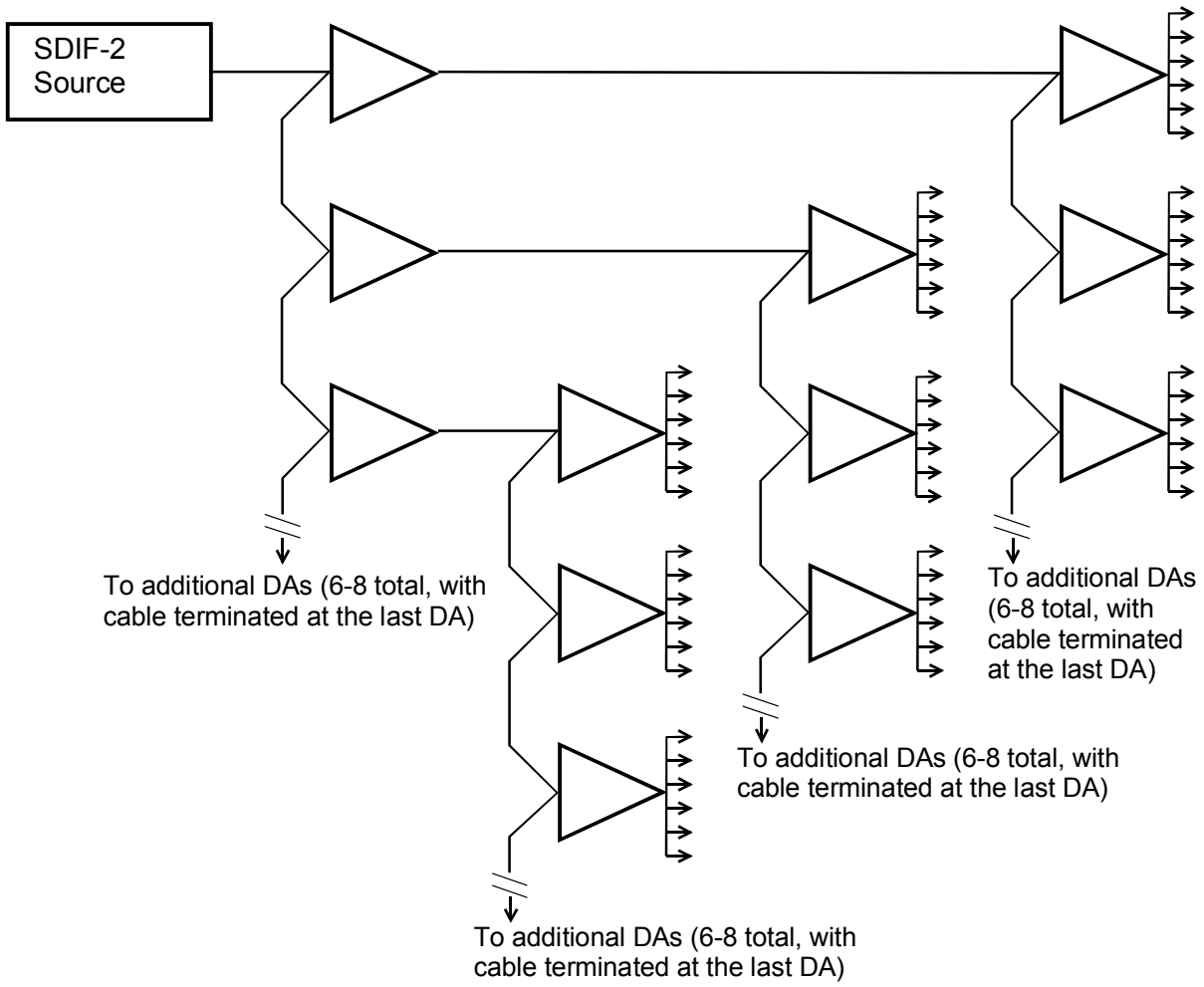

Figure 4 - Increasing Signal Fan-Out Capability Using Multiple DAs

Table 2 - NV1023 Jumper Settings

Jumper No.	Setting	Function
J1	1 - 2	Configures NV1023 for high input Z for loop-through applications.
	2 - 3	Configures NV1023 for 75 ohm input impedance.
	3 - 4	Configures NV1023 for high input Z for loop-through applications.

2. CONFIGURATION AND INSTALLATION

CAUTION:	**IF YOU ARE INSTALLING FR1000 FRAMES AND PS2001 POWER SUPPLIES IN ADDITION TO NV1023 DISTRIBUTION AMPLIFIERS AT THIS TIME, YOU SHOULD FOLLOW THE SYSTEM-LEVEL INSTALLATION PROCEDURES FOUND IN THE NV1000 TERMINAL EQUIPMENT OPERATIONS INSTRUCTION MANUAL (MANUAL PART NO. MI1000-01) LOCATED IN THE FRONT OF THIS BINDER.**

CAUTION:	**REMOVE POWER FROM THE FRAME IF THE INSTALLATION INCLUDES THE CONNECTOR BACKPLANE.**

1. Replace the blank cover plates on the rear of the intended slot in the NV1000 frame with the backplane assembly for the NV1023 distribution amplifier. The FR1000 frame is supplied with a 2.5 mm Allen wrench for this purpose. Ensure proper alignment of the active module to the backplane with the following procedure:

    a. Install the EM0104 backplane with the screws loose.

    b. Plug the active module into the loose backplane.

    c. With the active module inserted, tighten the screws securing the backplane.

    d. Remove the module and reinsert it to make sure it is properly aligned with the backplane and the card guides in the frame. If the alignment is not good, repeat the above procedure. When a satisfactory fit is obtained, remove the module and continue with the installation.

2. Make cable connections to the rear panel per the drawings included in the Applications section (See Section 1.2).

3. Set the input termination jumper on the active module as required by the application. Refer to Table 2 - NV1023 Jumper Setting and the Component Location drawing in Section 6 for information on the jumper location and setting.

4. Apply AC line power to the frame and insert the PS2001 power supply if it is not already in place.

5. Insert the active module with power applied to the frame.

3. OPERATION

Once configured for a particular application, the NV1023 SDIF-2 Distribution Amplifier needs no further attention. Refer to Section 5 - Maintenance and Troubleshooting for recommendations on periodic maintenance and performance checks.

4. FUNCTIONAL DESCRIPTION

Refer to the schematic diagram for the NV1023 active module (Assembly EM0103) and the backplane drawing for Assembly EM0104 during the following discussion.

The single-ended input to the NV1023 is a passive loop-through connection, while the outputs are single-ended. While there are six identical outputs on the active module, the BNC backplane assembly. (EM0104) limits the number of available output connectors on the rear panel to four.

4.1 INPUT CIRCUIT

Refer to page 1 of Schematic Diagram EM0103.

The signal enters the active module from the connector backplane through interface connector J3 and is coupled to the input circuitry through R4, a zero-ohm jumper in a resistor-like package. Jumper J1 provides a means for selecting the input termination resistance: 75 ohms for terminating coaxial cables or high-impedance for loop-through applications. Resistor R5 and voltage reference diode U5 bias the inverting input of the RS-422 receiver integrated circuit (IC) U1 to +1.2 VDC. This provides a threshold for slicing the input signal and ensures adequate noise rejection. Capacitor C5 provides a low-impedance bypass for the reference diode at high frequencies.

4.2 OUTPUT CIRCUITS

See Schematic Diagram EM0103, page 2, and Schematic Diagram EM0104.

The single-ended output of IC U1 is fed to six identical output circuits comprising RS-422 driver ICs U2 and U3 and their associated circuitry. One output circuit (Output #1) is described here; the others operate in identical fashion.

SDIF-2 word clock data from pin 3 (output) of receiver IC U1 feeds pin 9 of quad RS-422 line driver IC U3. One side of the differential output of U3C (non-inverting output, pin 10) is connected through zero-ohm jumper/resistor R42 to input/output interface connector J3. From interface connector J3, the single-ended signal enters SDIF-2 BNC backplane EM0104, passes through zero-ohm resistor R4 and connects

to output BNC J3.

4.3 POWER

Refer to Schematic Diagram EM0103, page 3.

Pre-regulated power from the frame (+17 VDC) enters the module via connector J2. Capacitors C18, C19 and inductor L2 filter the +17 VDC power. Monolithic voltage regulator IC U4 provides regulated +5 VDC for the active components on the NV1023 module. Schottky diode D1 catches the flyback voltage developed across the choke L2 when the pass transistor in the switching regulator turns off. Capacitor C21 filters residual noise on the +5 VDC to acceptable levels.

5. MAINTENANCE AND TROUBLESHOOTING

CAUTION:	**THE FOLLOWING PROCEDURES SHOULD BE PERFORMED BY QUALIFIED SERVICE PERSONNEL ONLY.**

The NV1023 requires no electrical maintenance, although it is wise to check periodically to ensure that the NV1000 equipment frame is properly ventilated for cooling and that any optional fan assemblies are free of dirt and obstructions.

Should an electrical problem arise, the following steps will help isolate or eliminate it.

1. Assure normal NV1000 system power distribution as follows:

    a. Observe the green LED on the PS2001 power supply module. If illuminated, the line side of the supply connection is in order. If it is not illuminated, ensure that the line cord is connected, that the power-entry module fuse on the frame is intact, and that the line voltage is correctly selected on the PS 2001 power supply.

    b. Confirm that the voltages at the test points on the front of the PS2001 power supply match the values shown in Table 3 - Acceptable Test Point Voltages for PS2001 Power Supplies. If not, remove the active modules one at a time. If the removal of one of the modules causes a restoration of the nominal supply voltage, return that module to NVISION for repair. If removal of all of the cards fails to restore the supply voltage, it is likely that the power supply itself is at fault and should be replaced.

2. To determine if the NV1023 or the external equipment is at fault:

    a. Where possible, replace the NV1023 with a known-good module. If the fault remains, check the source equipment to ensure a good signal is present at its output. Check all signal

cables for continuity or short circuits.

b. If the steps above indicate that the fault is in the NV1023 module or backplane, place the active module on an NVISION extender module (Model Number NV10XX) for further testing. Otherwise, return the module to NVISION for testing and repair.

c. With an oscilloscope or a hand-held digital voltmeter, check first for +5 VDC on test point TP2 using TP3 as a ground reference point. If the indicated voltage is not present, ensure that +17 VDC ± 10% appears on the right side of capacitor C18 when viewed from the component side of the module with the front edge of the card to your left. If these voltages are not present, find the faulty component or connection and replace or repair it.

d. If the proper voltages are present on the module, trace the digital audio signal through the module using an oscilloscope and probing test point TP1, the signal pins of U2 and U3, and other components in the signal path. Isolate the faulty component and replace it, or return the module to NVISION for repair if you find that it is faulty.

NVISION Technical Support can be reached in California at +1 (916) 265-1000 between the hours of 8 am and 5 pm Pacific Standard Time.

6. DRAWINGS AND SCHEMATICS

Table 3 - Acceptable Test Point Voltages for PS2001 Power Supplies

PS2001 Test Points	Loaded Frame (One or More NV1000 Modules Installed)	Unloaded Frame (No NV1000 Modules Installed)
±7 VDC	6 < IVI < 8.5	7 < IVI < 10*
±17 VDC	16 < IVI < 18.5	17 < IVI < 22*

* When unloaded, the upper voltage limit may exceed the value shown.

7. APPENDICES AND CHANGE INFORMATION

Applicable technical data, Application Notes and Field Modification Notes that pertain to the NV1023 SDIF-2 Distribution Amplifier are located here. Additional system information may be found in the Appendix at the rear of the NV1000 Operations Manual. Reviewing these materials will ensure that you are familiar with any product or system-level information that may have changed or been added since this Manual was printed.