

Installation Guide for BALDER-8S, Rev. 2.0

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2. Introduction

Balder-8S is an Integrated Services Digital Network (ISDN) interface card for IBM-PC compatible computers. A PC equipped with one or more Balder-8S boards can be connected to ISDN Basic Rate S/T-interfaces. The Balder-8S board contains eight, full duplex, ISDN 2B+D transceivers which comply with the ITU-T ISDN Layer 1 specifications (I.430). Each transeiver is connected to a digital signal processor (DSP) which can be used for B-channel or D-channel processing. Additionally, two analog interface circuits provide analog-to-digital and digital-to-analog conversion. The Balder-8S therefore contains a full implementation of two ISDN digital phones.

The intended usage of the Balder-8S board is in advanced ISDN traffic generator and protocol analyzer applications. It can operate either as a generator on eight ISDN Basic Rate Accesses or as a monitor on four accesses. The switching between the generator and monitor modes can be performed with software. If desired, individual transceivers can be used in NT mode, allowing Balder-8S to operate as a switch line card to drive ISDN terminals. It is recommended that Balder-8S be used in a PC with at least a 80486 processor for single board configurations or a Pentium or faster processor for multiple board configurations.

This document describes how to install the Balder-8S board into a PC, how to connect it to the ISDN S/T interface, and how to connect accessories to the Balder-8S board.

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4. PC Requirements

It is recommended that Balder-8S be used in a PC which satisfies the following requirements:

- Industry Standard Architecture (ISA) Bus with at least one free 16-bit slot.
- An Intel 80486 processor. A Pentium or Pentium Pro processor is recommended.
- 1 Free IRQ (3 - 15)
- At least 32 Free I/O -addresses

5. Configuring Balder-8S

5.1 Handling Instructions

The Balder-8S board has been packaged in a sealed anti-static bag for protection during shipping and handling. Follow precautions regarding handling of electrical equipment while configuring the board and while installing it into a PC expansion slot. ***Be aware of the possibility of damage to the sensitive electrical devices on Balder-8S from static electricity discharge. Please wear anti-static protection devices such as a ground strap connected to a grounded equipment frame while handling the Balder-8S board.*** To configure the board, remove it from the anti-static bag and place it on to a flat and properly grounded anti-static mat.



5.2 General

The Balder-8S board is configured by setting jumpers (JP) and switches (SW) on the board. The locations and names of the jumpers and switches can be found from Figure 1.

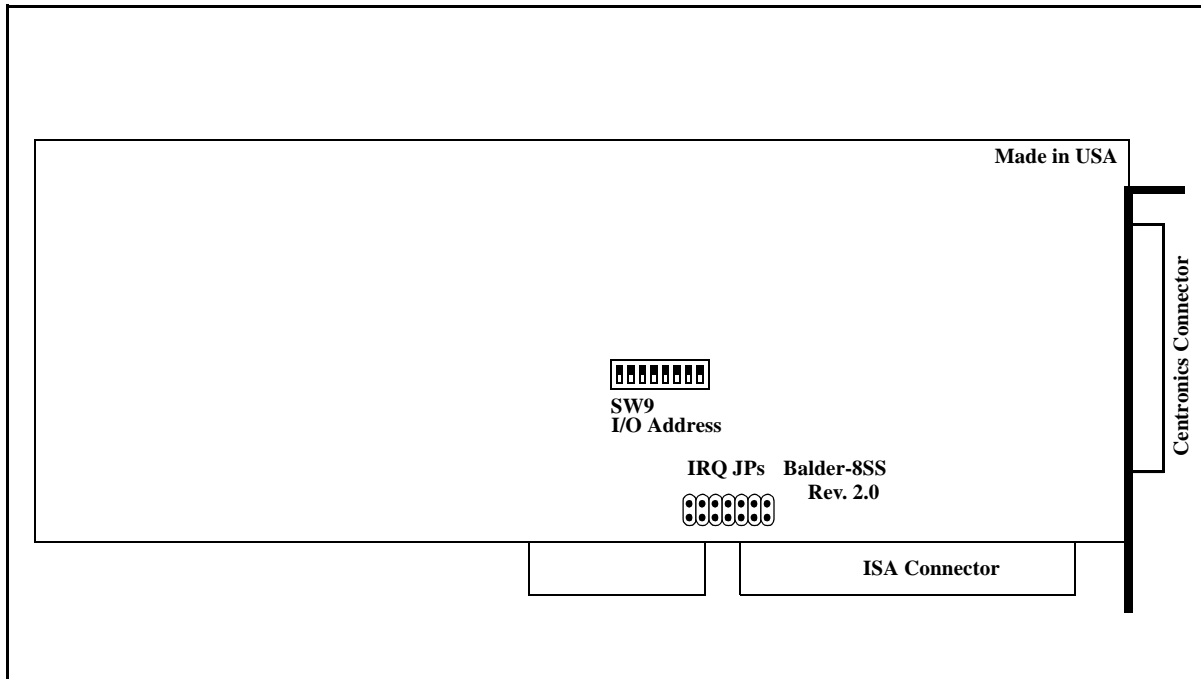


Figure 1. Balder-8S Switches and Jumpers

5.3 Setting the Board Number

More than one Balder-8S board can be installed in one PC. Each board has to be assigned a unique board number. The board number is set with switches S5-S7 in dip-switch SW1. The possible different board number settings are listed in Table 1.

TABLE 1. Board number settings

Board #	S7	S6
0	On	On
1	On	Off
2	Off	On
3	Off	Off

The boards should be numbered sequentially, starting from 0 (i.e. if two boards are used they should be numbered 0 and 1. Three boards should be numbered 0, 1 and 2, and so on).



5.4 Setting the I/O Base Address

Balder-8S requires access to a 32-byte long I/O address space, the base address of which can be set to any even 32-byte boundary within the range 0000h - 03FFh. Since different PCs are equipped with different hardware, the address space that should be selected is PC specific. The factory default for the Balder-8S board is I/O base address 0280h (i.e. Balder-8S will use 32 bytes in I/O ports 0280h through 029Fh). This needs to be changed if the PC already contains hardware (e.g. LAN adapters, drive controllers, or serial port boards) which use this address area. Consult the documentation for the corresponding hardware to determine what I/O addresses are free for use by the Balder-8S board (see also Table 2, "IO base address settings.," on page 7)

If more than one Balder-8S is installed in one PC, the different boards should be set to the same I/O address. The board number then determines in which 1024 (400h) byte segment the board places its I/O address space. For example, if a board is set to number 3 and I/O address 280h the board will occupy I/O address $(3 * 400h + 280h)$ to $(3 * 400h + 280h + 31)$. There is normally no need to worry about these calculations unless the PC is equipped with boards that use I/O addresses beyond 400h, which is uncommon. In virtually all cases it is sufficient to choose an I/O address that does not conflict with the I/O address of other boards and then set each board to have unique board numbers (Section 5.3 on page 6).

The I/O base address is set with switches S1-S4 in dip-switch SW1, as listed in Table 2.

TABLE 2. IO base address settings.

IO Base Address	S5	S4	S3	S2	S1	Comment
0200H	Off	On	On	On	On	Not recommended ¹
0220H	Off	On	On	On	Off	
0240H	Off	On	On	Off	On	
0260H	Off	On	On	Off	Off	Not recommended ²
0280H	Off	On	Off	On	On	Balder-8S default
02A0H	Off	On	Off	On	Off	
02C0H	Off	On	Off	Off	On	
02E0H	Off	On	Off	Off	Off	Not recommended ³
0300H	Off	Off	On	On	On	Default for most other boards
0320H	Off	Off	On	On	Off	
0340H	Off	Off	On	Off	On	
0360H	Off	Off	On	Off	Off	Not recommended ⁴
0380H	Off	Off	Off	On	On	
03A0H	Off	Off	Off	On	Off	Not recommended ⁵
03C0H	Off	Off	Off	Off	On	Not recommended ⁶



TABLE 2. IO base address settings.

IO Base Address	S5	S4	S3	S2	S1	Comment
03E0H	Off	Off	Off	Off	Off	Not recommended ⁷

1. 02001H: Game control adapter
2. 0278H-02F7H: Second printer port (LPT2)
3. 02F8H-02FFH: Second serial port (COM2)
4. 0378H-037FH: First serial port (COM1)
5. 03B0H-03B7H: Monochrome and printer adapter
6. 03D0H-03DFH: Color/Graphics adapter
7. 03F0H-03F7H: Floppy disk drive adapter card
- 03f8H-03FFH: Serial port adapter card.

The footnotes for Table 2 describe some commonly used PC hardware and their corresponding I/O port addresses. ***Do not use any of these I/O ports for Balder-8S if you have any of this hardware installed.*** Note that this list is not complete—your particular PC manufacturer may have used other I/O ports than those mentioned here. Also, note that different boards use different number of I/O address following the base address. The I/O addresses above only indicate the start address of a range of addresses used (e.g. the Balder-8S board uses 32 bytes following the I/O base address). Make sure there are no overlaps or erratic operation may result.

5.5 Setting IRQ

Every PC board requires an IRQ number. ***The Balder-8S cannot share IRQs with any other hardware installed in the PC.*** However, if more than one Balder-8S board is installed in one PC, these boards ***must*** share an IRQ number.

The IRQ is set with jumper JP1. The possible IRQs for Balder-8S are listed in Table 3.:

TABLE 3. IRQs supported by Balder-8S.

IRQ	Comment
3	Normally used by COM2 (if installed)
4	Normally used by COM1 (if installed)
5	Normally used by LPT2 (if installed)
6	Normally used by the diskette controller (if installed)
7	Normally used by LPT1 (if installed)
9 (2)	Normally free. Sometimes used by LAN adapters (if installed)
10	Normally free. Balder-8S factory default
11	Normally free
12	Normally free



TABLE 3. IRQs supported by Balder-8S.

IRQ	Comment
14	Normally used by the fixed disk controller (if installed)
15	Normally free



6. Connecting Balder-8S to the S/T-Interface

The back panel of Balder-8S contains a connector with 50 contacts. Balder-8S is delivered with a telco-type connector cable and two Harmonica connectors with 12 RJ-11 connectors each. One of the Harmonicas is intended to be used with generator applications and the other with monitor applications.

6.1 RJ-11 Connector

The Balder-8S board is connected to the S/T interface using an RJ-11 connector. The RJ-11 pin-outs for the S/T line interfaces are shown in Figure 2. The pinout is a standard ISO/IS 8877 TE pinout. The pinout does not change if the Line Interface is configured in NT mode.

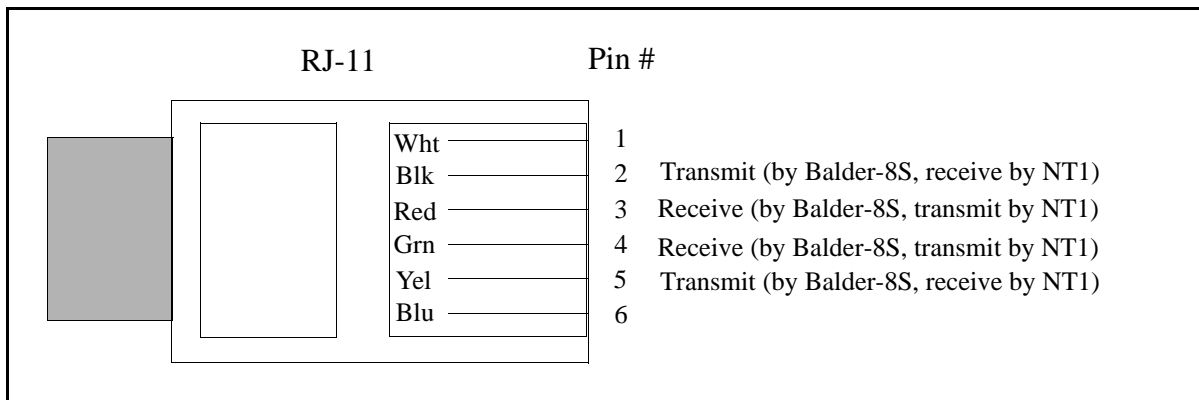


Figure 2. RJ-11 Connector for the ISDN BRI S/T Interface



6.2 Generator Application

When used as a generator, Balder-8S can be used to generate ISDN traffic on eight separate S/T interfaces. A connection diagram is illustrated in Figure 3.

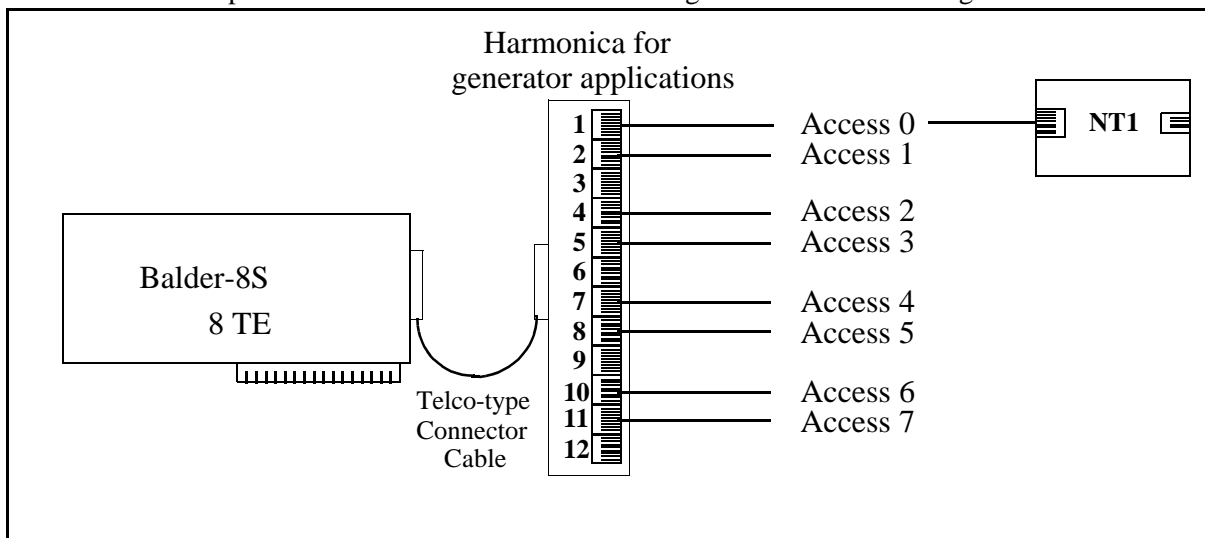


Figure 3. Using Balder-8S in with Generator Applications

The Harmonicas are clearly labeled. The labeling of the generator Harmonica is shown in Figure 4.





Label:											
 Aux 1	Access 7	Access 6	 Aux 0	Access 5	Access 4	 Hs 1	Access 3	Access 2	 Hs 0	Access 1	Access 0
Connector											
#: 12	11	10	9	8	7	6	5	4	3	2	1

Figure 4. Labeling of the Generator Harmonica

6.3 Monitor Application

When used as a monitor, Balder-8S can be used to monitor ISDN Basic Rate traffic on 4 S/T interfaces. In the Harmonica for monitoring, two adjacent connectors form a T-connector that can be used to gain access to a line. An external T-connector can be used as well. Figure 5 illustrates the two possible ways of connecting Balder-8S when used for monitoring.

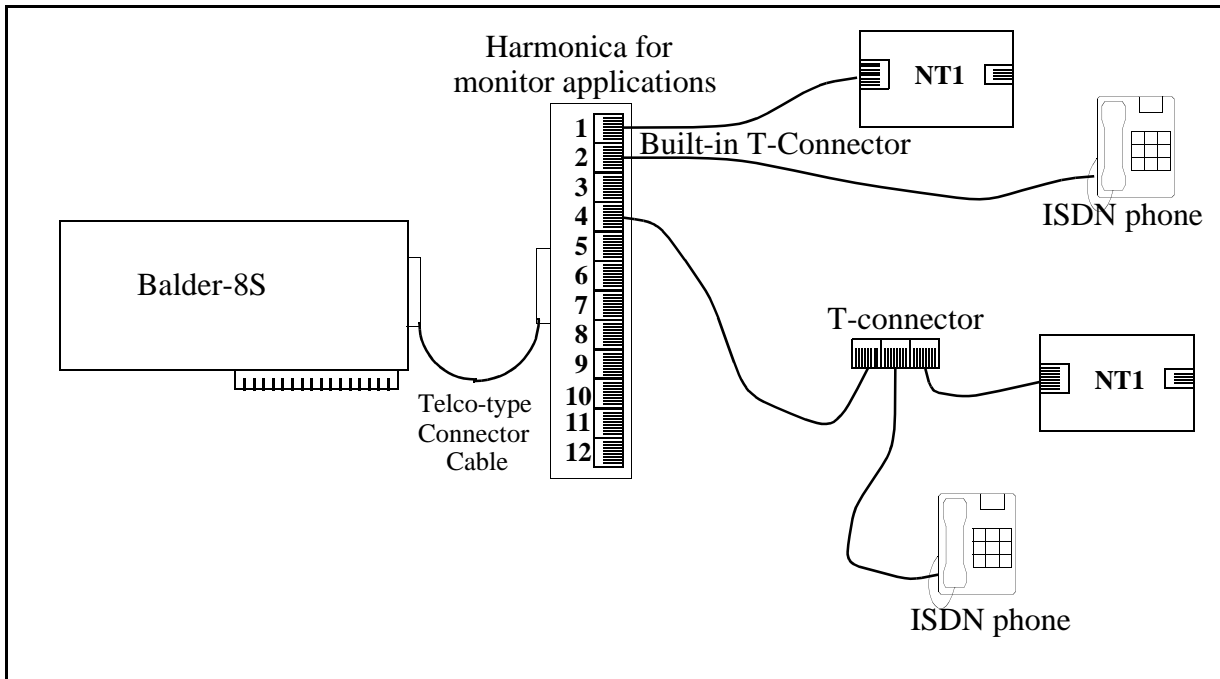


Figure 5. Using Balder-8S with Monitor Applications

The labeling of the generator Harmonica is shown in Figure 6.

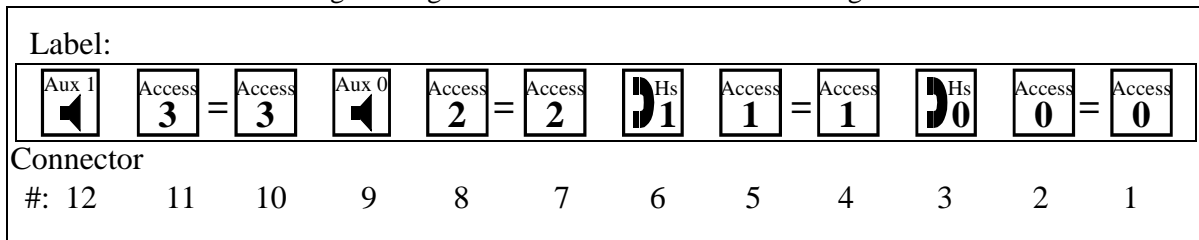


Figure 6. Labels on the Monitor Harmonica



7. Connecting Accessories to Balder-8S

Balder-8S provides a full implementation of two digital ISDN phones. The Harmonicas provide needed connectors for the accessories as illustrated in Figure 7.

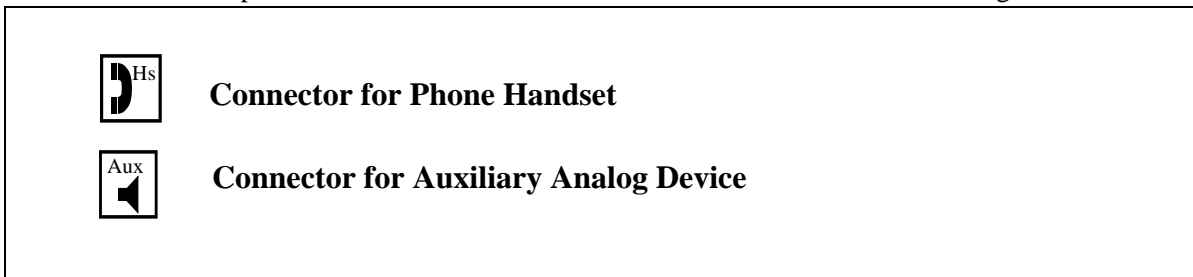


Figure 7. Connectors for Accessories

7.1 Phone Handset

Phone handsets can be connected to connectors 3 and 6 in the Harmonica. A handset can be switched to any of the sixteen B-channels with software. Please note that the handset cable must be equipped with an RJ-11 connector to fit the Harmonica. The connection of telephone handset to the RJ-11 connector is shown in Figure 8.

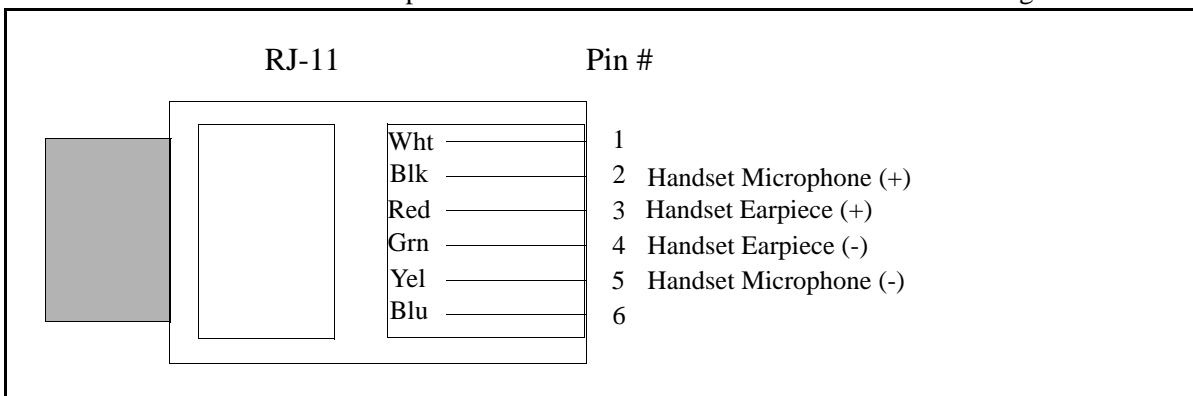


Figure 8. Connection of a handset to RJ-11

A handset accessory package (HAA-1007-1) consisting of a handset and a handset cable is available from Odin TeleSystems.

7.2 Auxiliary Analog Device

Auxiliary analog devices (e.g. compact-disc player, audio equipment) can be connected to connectors 9 and 12 in the Harmonica. An auxiliary device is used to provide a line input to or output from the Balder-8S. These devices can be switched with software to accommodate any B-channel. As with the handset, the auxiliary device



must be equipped with an RJ-11 connector. The connection of an auxiliary device to an RJ-11 connector is shown in Figure 9.

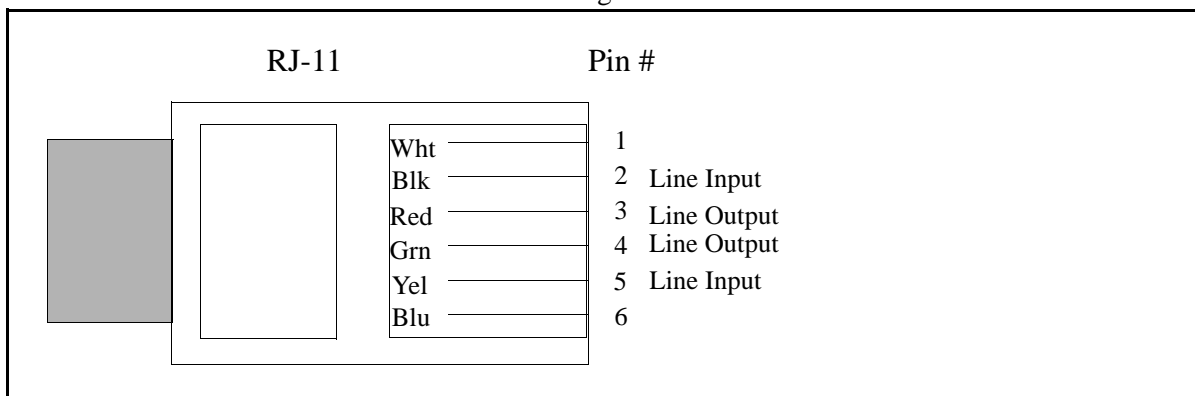


Figure 9. Connection of a speaker to RJ-11

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