VoiceCollect®

Voice Recording System
VC-MDX

Interface Board
PRI / PCM30

Version 1908

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1 General

The PRI / PCM30 interface board is a development of VoiceCollect GmbH (former ATIS Uher). This board is used to receive and record voice signals and signaling data from ISDN or PCM30 telephone lines, to convert the signals into VC proprietary format and to save them on storage device

The S2M64HC board, with Motorola MPC875 processor as a core is a powerful real time audio data and digital telephony signaling protocols processing unit. It interfaces to the telephone network using 2 E1/T1 lines.

It moves audio data and commands to / from recording host CPU through the host PC PCI interface.

2 Operation

2.1. Monitor E1 PCM or ISDN S2M lines

It performs the following functions:

- inputs data and signaling channels from each direction (forward/backward or NT->TE/TE-> NT) of the line;
  - analyzes CAS (abcd bits) or CCS (ISDN D channel Q931 messages) on both directions and sends call status to the host PC CPU; optionally supports R1, R2 and SS7 protocols
  - multiplexes data on the 30/24 B(64Kbps) channels of each line direction if the lines carry audio(G.711);
  - compresses in real time the received 30/24 B(64Kbps) channels A-law or Mu-law audio digital data to compression factors: 8:5, 2:1, 8:3, 4:1 (G.726 ADPCM); to 10:1, 12:1 (G.7231.1; to 8:1 (TETRA240)
  - stores compressed/uncompressed data in a shared memory buffer and signals to the host PC CPU when the buffer is filled;
  - computes the average audio level on each received B channel and sends level information to the host PC CPU;
  - detects DTMF digits on voice channels and sends them to the host PC CPU;
  - detects line alarms and sends line status information to the host PC CPU;
  - performs remote loop-back (re-transmits transparently) on the monitored inputs;
  - performs self tests;

2.2. Full duplex transmission on two E1 PCM or ISDN S2M lines

- receives and transmits uncompressed data/voice on 60/48 full duplex B(64Kbps) channels:
- performs CAS (a b c d bits) or CCS (ISDN D channel Q931 messages) full duplex signaling;
- compresses/decompresses 30/24 full duplex B (64Kbps) channels A-law or Mu-law audio digital data to 8:5, 2:1, 8:3, 4:1 compression factors (G.726 ADPCM) or to 10:1, 12:1 (G.7231.1;
- computes the average audio level on each received B channel and sends level information to the host PC CPU;
- detects/generates DTMF digits on voice channels;
- detects/generates line alarms and sends line status information to the host PC CPU;
- performs self tests;

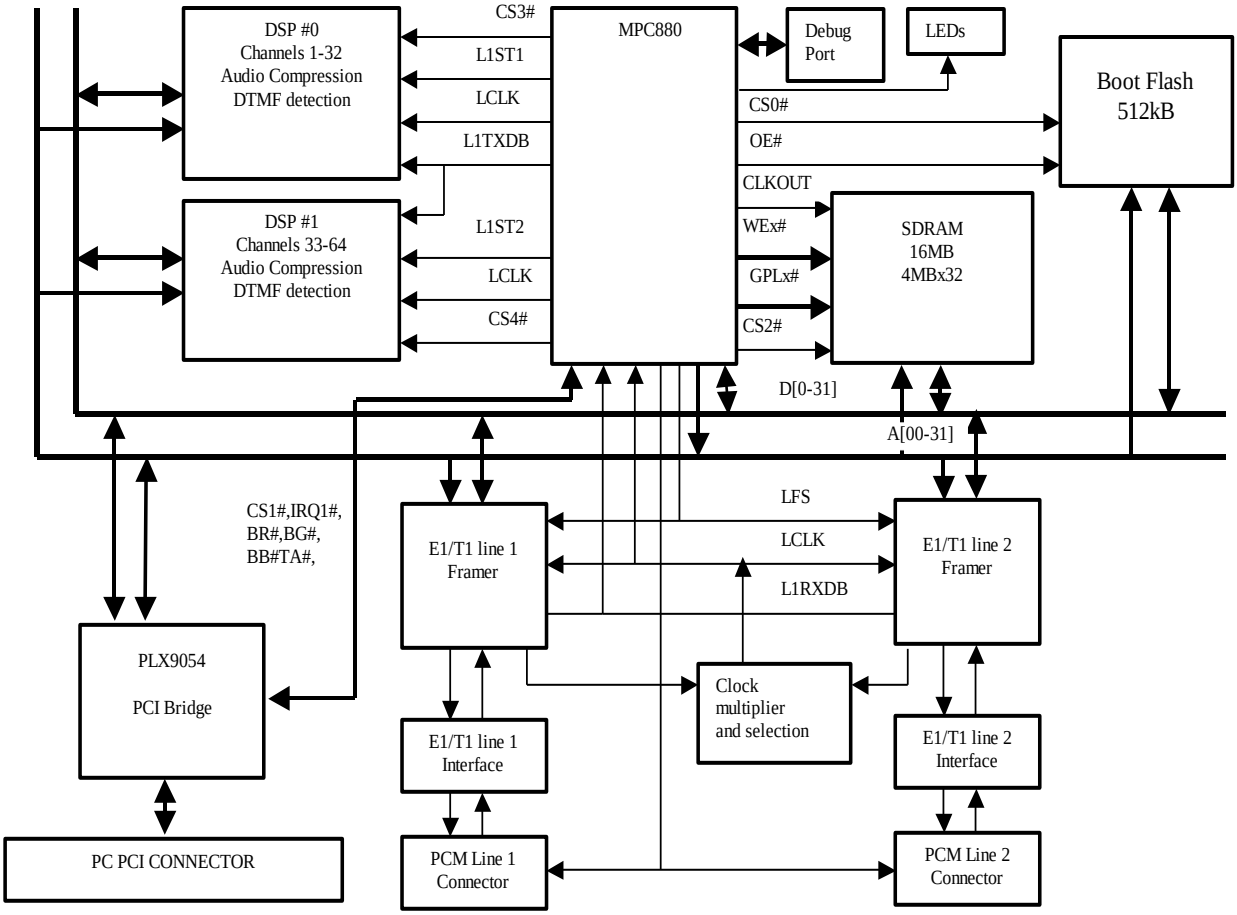
3 Functional Units

The Figure below shows the main building blocks of the S2M64HC board and the way they are connected.

The MPC875 controls all board activity. It fetches stored instructions from the SDRAM and configures the other programmable IC's on the board. It stores program variables into the SDRAM.

As a main task, it transfers data between card ports: E1 framers and host PC PCI bus. It uses Time Slot Assigner B served by SCC4 to connect directly to framers through a TDM lines (signals L1TXDB/L1RXDB). Line signaling comes along with data and the signaling protocol is also analyzed by the MPC875.

The connection to other system cards is performed using the host PC PCI bus.



3.1. Line interface

The line interface performs the following functions:

- Line impedance match.
  Resistors R1, R7 respectively R8, R4 provide the 100 Ohms impedance on the transmit lines and R2 respectively R6 provide the 100 Ohms impedance on the receive lines. The values cover also E1 120 Ohms lines. For 75 Ohms impedance their values have to be changed accordingly: R1, R7, R8, R4 to 11.8 Ohms,1% and R2, R6 to 16.9 Ohms 1%.
- Isolation. Dual transformers T1 respectively T2 separate line side by the framer side. Transformer ratio (primary/secondary) is 1:2.42CT.
- Lightning surge immunity and fire or safety hazard under AC power fault. This is provided by SiDactors U2, U1 respectively U4, U3, PTCs TR1-4 respectively TR5-8 and diode arrays U5 and U7 respectively.

4 Mechanical

The S2M64HC board is built as a small form PCI card. It is a 4-layer board with internal POWER and GROUND planes.

Most IC's, resistors and capacitors are SMD parts. On the board front panel there are two RJ45 connectors for 120/100 ohms E1 lines or four twin BNC connectors for 120 ohms E1 lines or alternatively four BNC connectors for 75 ohms E1 lines.

Two bicolor red + green LEDs are included in the RJ45 connectors and driven by the microprocessor show card status during initialization and PCM connection status during system operation.

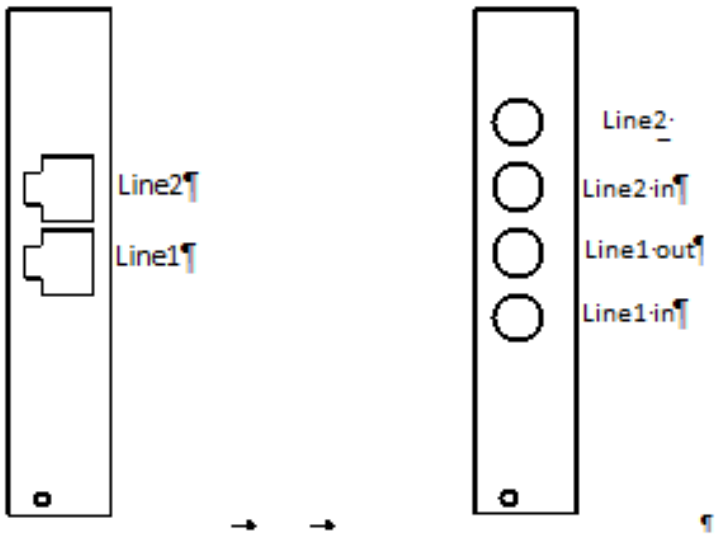


Figure 1-front panel (RJ45 option)

Figure 2-front panel (BNC option)

5 Specification

Size	224 x 107 mm PCI card
Line signaling detection	DTMF, ISDN/CAS signaling, R1(option), R2(option), SS7(option)
Modes	E1 , Passive/Active
Compression rates, encoding	64Kbps A-law or Mu-law (G.711); 40 Kbps, 32 Kbps, 24 Kbps,16 Kbps (G.726); 6.3 Kbps and 5.3 Kbps (G.723.1); 8Kbps TETRA240
Total compressed channels	64 receive only, 32 full duplex in non-TETRA mode;240 receive only in TETRA mode
PCI memory size	16MB SDRAM
PCI IO range	256 bytes

6 Installation

6.1 LEDs status

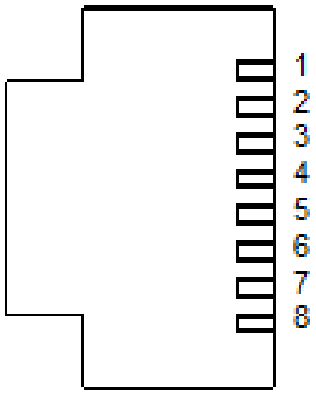
The LED's on the line input RJ45 connectors show status during MPC875 boot, during program download and during the normal operation of the card.

- at boot, when MPC875 waits for the final software the port#1 LED blinks RED about 6 times/second
- immediately after software is downloaded both LED's turn RED for .5 seconds
- then they turn STEADY GREEN
- when the host PC application starts taking audio they TOGGLE RED (line unsynchronized) or TOGGLE GREEN (line synchronized) at audio blocks rate, about .5 seconds ON/.5seconds OFF

6.2 P9, P6 and P3, P2, P5, P4 – E1 ports

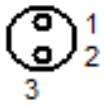
The RJ45 P9, P6 120/100 ohms E1/T1 connectors have the following pin-out:

Pin	Signal
1	Rx tip
2	Rx ring
3	Not connected
4	Tx tip
5	Tx ring
6	Not connected
7	Not connected
8	Not connected



The Twin BNC 120 ohms P5, P6, P7, P8 E1 connectors have the following pin-out:

Pin	Signal
1	RxTIP (P2, P4) or TxTIP (P3, P5)
2	RxRING (P2, P4) or TxRING (P3, P5)
3	GND

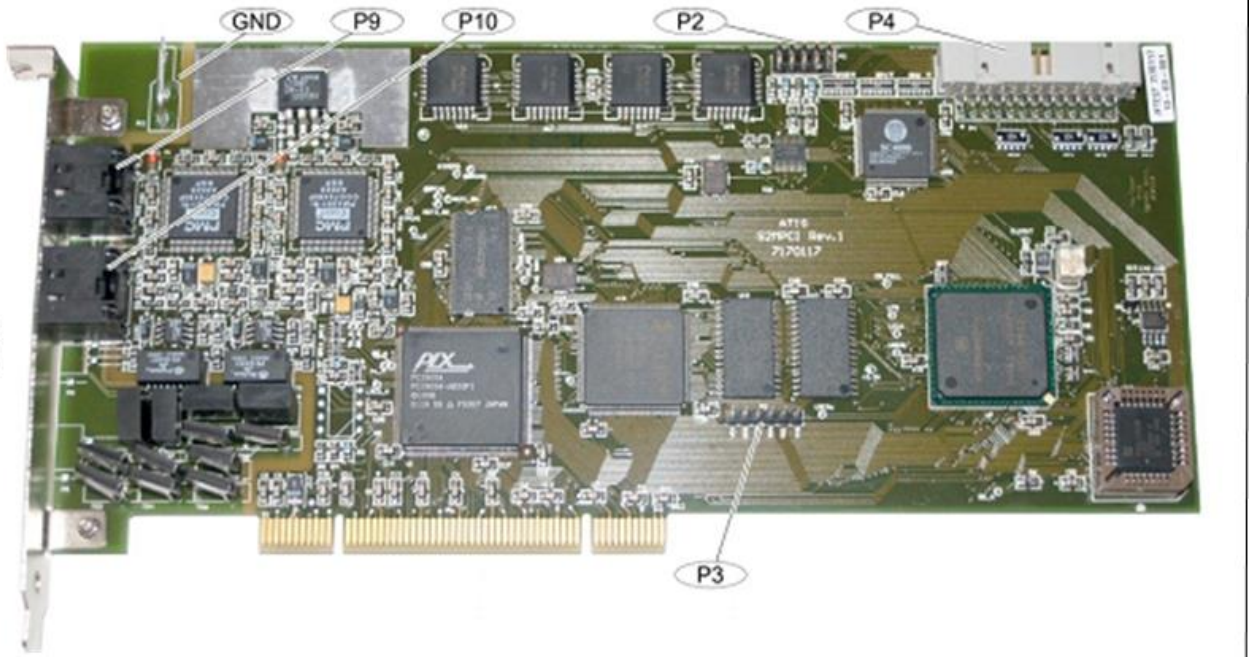


6.3 Ports location

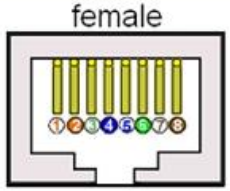
Ports for PCM 30 Mode:

First 30 channels:
L1+ (Rx ring) at Pin 1 of P9 (Line 0)
L1- (Rx ring) at Pin 2 of P9 (Line 0)

Additional 30 channels:
L2+ (Rx ring) at Pin 1 of P10 (Line 1)
L2- (Rx ring) at Pin 2 of P10 (Line 1)



Pinout of RJ45 (P9) and P10):



Pin	Function
1	Rx ring
2	Rx tip
3	Not connected
4	Not connected
5	Not connected
6	Not connected
7	Not connected
8	Not connected

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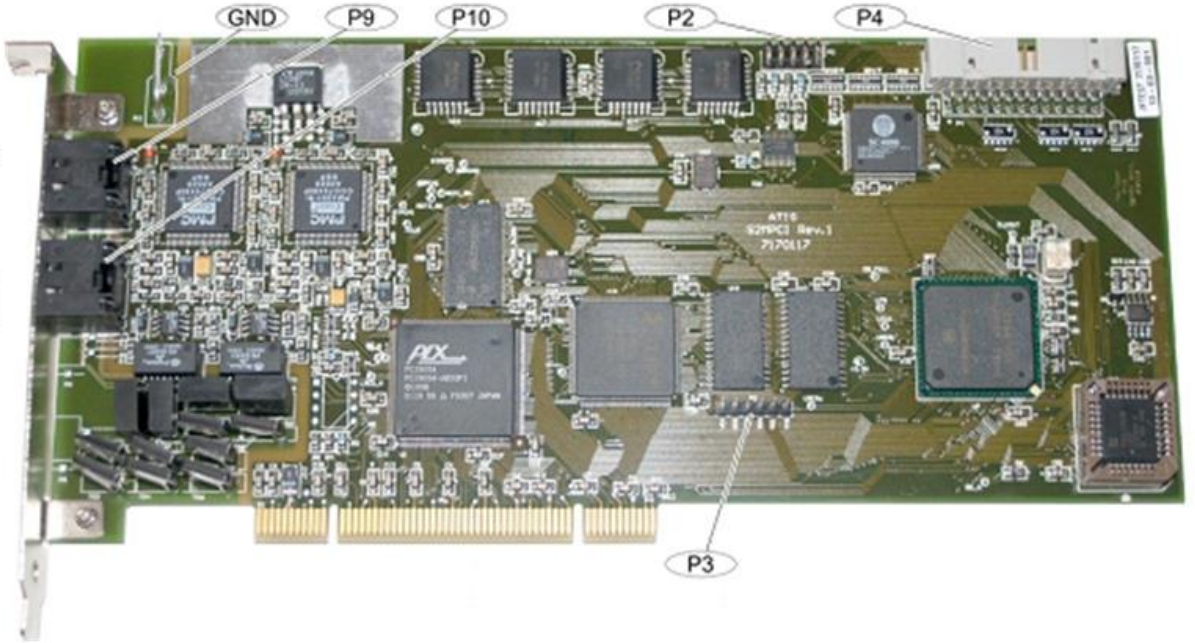
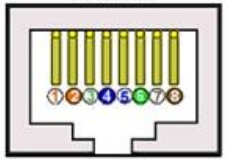
	Rev.No.	Date	Name		Replace
Release of production / Modification					Replace by

Ports for ISDN S2M (PRI) Mode:

L1+ (Rx ring) at Pin 1 of P9 (Line 0)
L1- (Rx ring) at Pin 2 of P9 (Line 0)
L2+ (Rx ring) at Pin 1 of P10 (Line 1)
L2- (Rx ring) at Pin 2 of P10 (Line 1)



Pinout of RJ45 (P9) and P10):



Pin	Function
1	Rx ring
2	Rx tip
3	Not connected
4	Not connected
5	Not connected
6	Not connected
7	Not connected
8	Not connected

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