

This paper describes a universal medium speed packet interface for the Isa. (IBMPC) bus. The system consists of one or more 4 channel Isa bus boards and external modems. Multiple boards can be interconnected to form one single interface with a single interrupt vector and daisy chain interrupt priority logic. General software can be used. There are no special initialization actions required. The connections between the Isa bus boards and the external modems are opto isolated.

Introduction

Many packet stations take an interest in the use of more speeds and frequencies. However addition of an extra TNC for each mode and frequency used simultaneously is necessary. Over four TNCs the async ports of the **IBMPC** will be not standardized and costly. There is an other solution: direct HDLC **AX.25** interfaces. But, it is difficult to find cheap HDLC boards with more than two HDLC channels. Otherwise the number of available Isa. slots define in large stations the channel limit. A few years ago **PEICHL** has designed his own multichannel Atari AX.25 packet interface (ref 1). The design described below is based on the experience with the PEICHL interface.

The OptoPcScc Interface

The OptoPcScc is a short size Isa interface board equipped with 2 8530 SCC chips, offering four channels on a board. Small stations operate with one board and larger stations with multiple boards. Those multiple boards can be coupled to a single multichannel interface with one common interrupt and interrupt vector fetch mechanism. The 8530 chip handles asynchronous and synchronous formats. Each channel has its own external clock divider for full duplex synchronous operation. An OptoPcScc board is interfaced to the IO port space of the Isa bus, mapping both SCCs to 8 ports. The base IO port of the first SCC control port is 0x150. The address of the adjunct data port is the next IO port. Each following SCC channel control port is adjacent to the data port of the SCC channel. For the second OptoPcScc board a jumper adds 8 to the board base IO port. In the few situations that more than 8 SCC channels are required, the flexibility of the ISA bus decoder PAL can be used to address the adjunct ranges of IO ports. One large multichannel SCC interface can be constructed from multiple OptoPcScc boards by daisy chaining the INC to the

OUTC connectors with short 5 wires cables. The first board in the chain has a free INC connector and is automatically the master of the chain. All other boards are slaves and the last one has a free OUTC connector. The master OptoPcScc board generates the Isa bus interrupt for all the boards. Each OptoPcScc board has a latch for the generation of the intack signal. All the intack latches are set by writing to port **0x170**. The intack signal indicates an active interrupt acknowledge cycle. During this cycle, the interrupt vector select chain settles. A read command to port '170 places the SCC interrupt vector on the Isa bus and resets afterwards the intack latches. The interrupt vector read cycle selects only one single board databuffer by monitoring the board IEI1 (Interrupt Enable In) for HIGH and the board IE02 (Interrupt Enable Out) for LOW. A single 8530 SCC on a board can be used by interconnecting IEO pin 6 and IEI pin 7 of the absent 8530. When your software doesn't support the intack latch interrupt fetch mechanism, it can apply the general but slower method of polling each 8530 chip for interrupt.

Opto Isolated Modem Interface

Most multiple transmitter packet stations have groundloop problems. In practice this results in whipping the TNC settings when you are working on the HF bands, or PC noise radiated by the modem cables. Opto isolators, introduced in an 8 channel backbone switch for the Dutch packet network, are applied at the OptoPcScc board to minimize these effects. The PC847 opto couplers are cheap and support maximum 20K baudrate. Higher speeds can be supported by using surface mount opto couplers on a small surface mount DIL board. The high speed Rx and Tx opto couplers are to expensive for general use. An Isa interface board has a limited space for back side connectors. This is one of the reasons to reduce the number of modem signals, to a minimum: Rx, Tx, DCD and RTS. Some modems require a synchronous Tx clock. Only

phase and the frequency are not standardized. For half duplex operation you can generate the modem transmit clock from a small interface. The SCC receiver phaselock is used to synchronize the SCC transmitter clock to the interface clock. To play this trick, the SCC channel must be placed in the external loopback mode and an HDLC synchronize flag signal, generated from the interface clock, must be applied to the SCC Rx input. The same interface can be used to convert the current loop signals to RS232 or TTL signals. A common 37 pin Male D connector is used for the modem connections of the OptoPcScc board. The modems have a 9 pin female D connector. The connection between the OptoPcScc and the modems can be made of a single flatcable which is spliced at the modem side in four cables. In most situations it is much safer to use shielded cables to minimize noise radiation and RF pickup. The shield of the modem cables must be only on one side connected to one of the ground pins of the 9 pin modem cable D connector, the other side must not be connected to the 37 pin D connector and isolated from each other.

External V202 Modem with Opto Interface

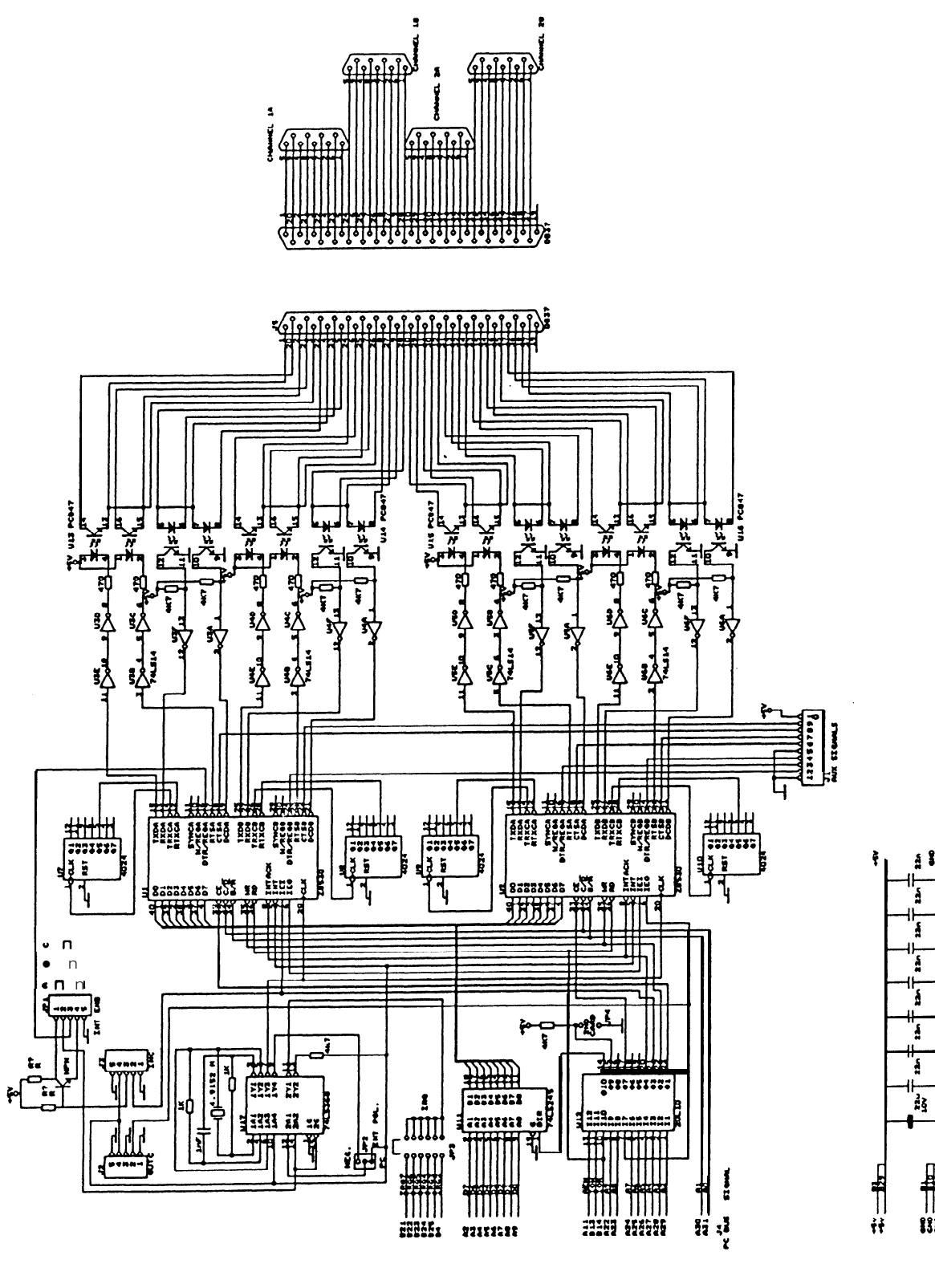
This TCM3105JL modem design is included in this paper to show that is simple, to realize a currentloop modem interface. You must have currentloop V202 modems for the most frequencies which you are using the OptoPcScc board. The number of necessary components is low making it is easier to realize a new modem instead of interface an existing one. The modem is made on an 4 by 7cm single sided printed circuit board. On one short side the 9 pin female D connector for currentloop data is mounted and on the other side an 5 pin audio DIN for the transceiver connection. The transceiver cable also connects the + 12V power supply. The modem uses internally +5V supply. The + 12V supply only has to meet the specifications of the 78L05 regulator. The low power consumption of the modem can be supplied by nearly any transceiver or portofoon. In the preferred mode of operation (J1 closed), this modem generates only audio with RTS active. In this mode more modems can be operated in parallel by wiring the modem transceiver sides parallel. An transmit audio switch is not necessary. The modem can also generate continuous audio output with J1 open. A 30 second watchdog timer is incorporated. The PTT switch is a BS170 mosfet protected by a 47V zener diode. The on resistance is low enough to key nearly any transceiver.

Practical experience

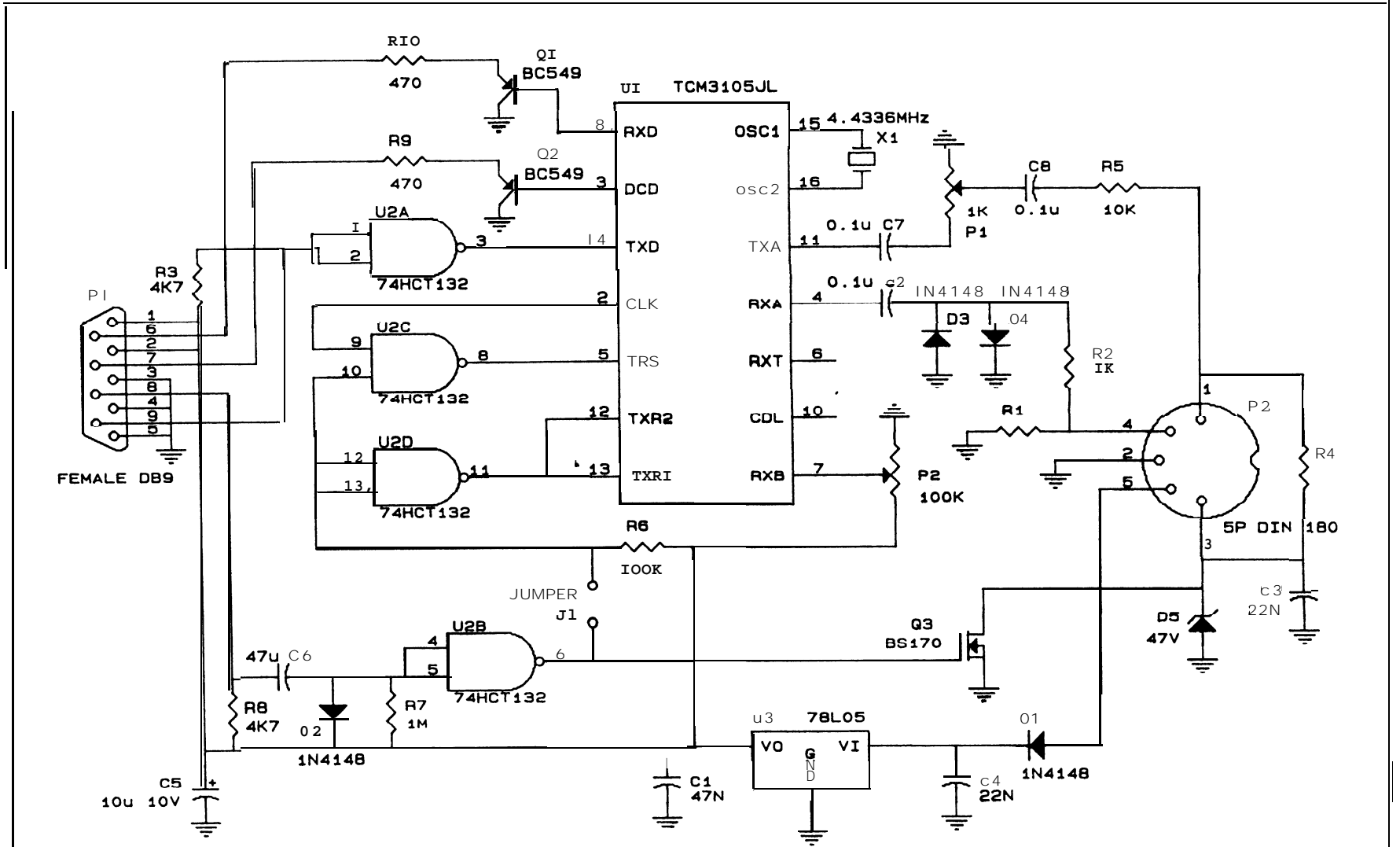
This project is build on Printed Circuit Boards. At the time of writing (20 August 1989) a few boards are running. Series of double sided plated-through printed circuit boards with gold plated edge connector fingers will be made. Contact the author for availability.

Acknowledgments

Thanks to Rob Janssen PE1CHL for the long discussions which started this design, for the SCC packet driver, and for the schematics of his Atari modem design.



Model Z. Peak, P400P
 PB 223, 1500 pin Diagram, The Multichannel
 Interface, 4 channel ADC Interface
 Design Number: 910024
 C
 1
 1



© Henk Z Peak, PA0HZP		
PB 329, 1440 AH Purmerend, The Netherlands		
Title		
Current loop V202 modem		
Size	Document Number	REV
A	890517	I
Date:	August 20, 1989	Sheet 1 of 1