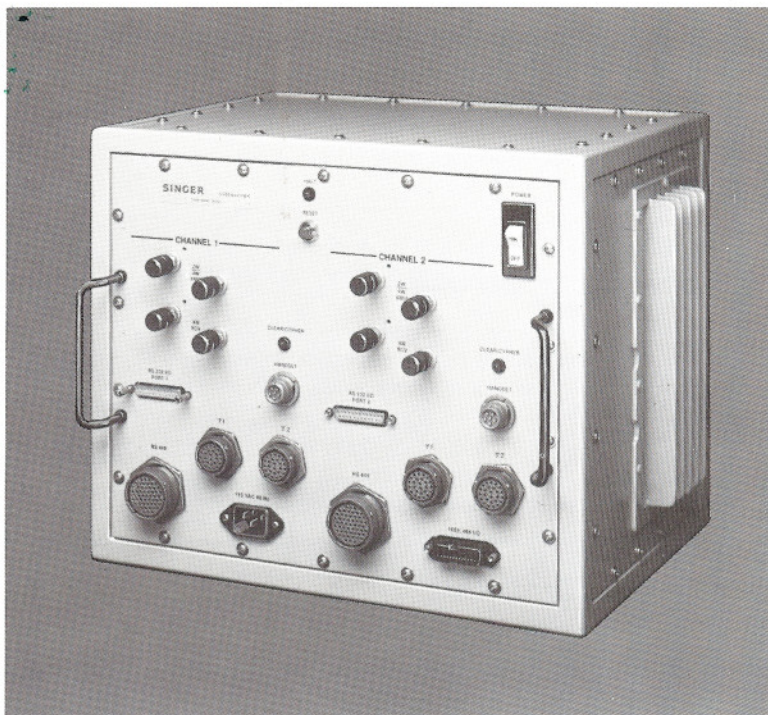


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Programmable Communications Interface Unit (PCIU)



PCIU SYSTEM DESCRIPTION

The Programmable Communication Interface Unit (PCIU) is a device which provides hardware and software interfaces between commercial host computers along with their local terminals and Army tactical and strategic communications networks. It contains all of the specialized hardware which is required to provide an electrical interface to a wide variety of Army communications devices. This hardware is under complete control of software programs which are downloadable from the host computer(s). These programs not only control the interface hardware but also provide the protocols required by the specific media.

The interface hardware, which is fully qualified and proven in the field, is identical to that used in the Tactical Computer Terminal (TCT) AN/UYQ-30 which is presently in full scale production for the Maneuver Control System (MCS). Much of the MCS applications software is also presently available for use in the PCIU. However, due to the great flexibility of the PCIU, software programs can be written so that they are tailored to a specific application.

PCIU SYSTEM ARCHITECTURE

The PCIU is a lightweight, ruggedized, dual or single channel multipoint data and voice interface device containing a set of MC68000 microprocessor-based printed circuit cards. The unit provides a wide variety of reconfigurable hardware interfaces and modulation types all of which are under software control. The internal bus structures, connectors, and modular card nest design provide rapid access, flexibility, expandability,

and ease of use for a wide choice of command, control, and communications applications in a fixed or mobile environment.

The PCIU communicates over one or two channels each of which have a wide selection of physical interfaces and operational modes for use with wirelines, MIL STD 188-114 devices, encryption devices, CMOS devices, remote radios, RS-449 devices and commercial telephone systems. Many network and link protocols are available in the initial configuration such as the Army's Maneuver Control System, TACFIRE, automatic dialing and answering, Communications Mode Selector Control (CMSC), Carrier Sense Multiple Access (CSMA), CCITT Recommendation X.25, Standard Packet Switching Interface, AUTODIN Modes I, II, IV and VI. Additional protocols are planned for future applications and will be available as downloadable software modules. Modulation types are NRZ, FSK at 1200/2400 HZ or MIL STD 188C and conditioned diphase. Signal data rates are supported at 75 x 2ⁿ to 9600 kbps and 8, 16 or 32 kbps. Users may also develop their own software to use with the PCIU.

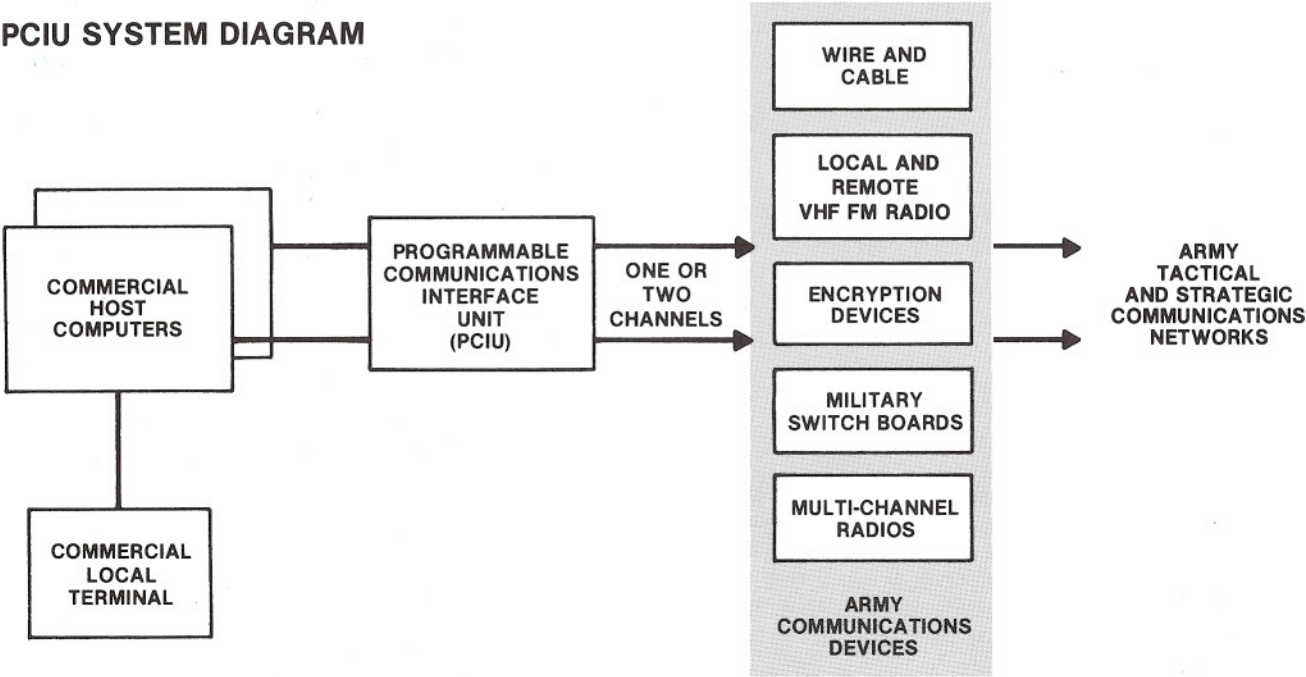
Host computer systems access the PCIU through one or two of the standard RS-232-C interfaces or via an optional IEEE 488 standard bus. Initialization of the communications channels may be accomplished from the local computer terminal using menu prompted formats. The PCIU message handling/communications include reception, transmission, automatic acknowledgement and retransmission, and processing for up to 1280 contiguous ASCII 8 characters including error control, time dispersion coding, and message protocols. A handset or headset may be used for voice communications over each channel.

FEATURES

COMMUNICATIONS CAPABILITIES:

- Provides hardware and software interfaces between computers and Army tactical and strategic communications networks
- Downloadable software programs for initialization, operation, and control
- MC68000 based control and modems; 688 kilobytes CMOS Random Access Memory storage
- Provided in commercial or ruggedized configurations, each including a power supply, standard connectors, and military or commercial signal rates to 32 kilobits per second
- Extra card slot in modular card nest to accommodate additional control/interface capability requirements
- Voice or data
- Wire and cable
- Secure and remote VHF FM radios
- Encryption devices
- Automatic dial-answer
- CMOS and low level data devices
- Commercial modems
- Handset/headset
- Tactical multichannel
- Message processing, transmission, reception, and accountability
- Variable formats, protocols
- Multiple local terminals with peripherals

PCIU SYSTEM DIAGRAM



TYPICAL SET OF COMMUNICATIONS PARAMETERS

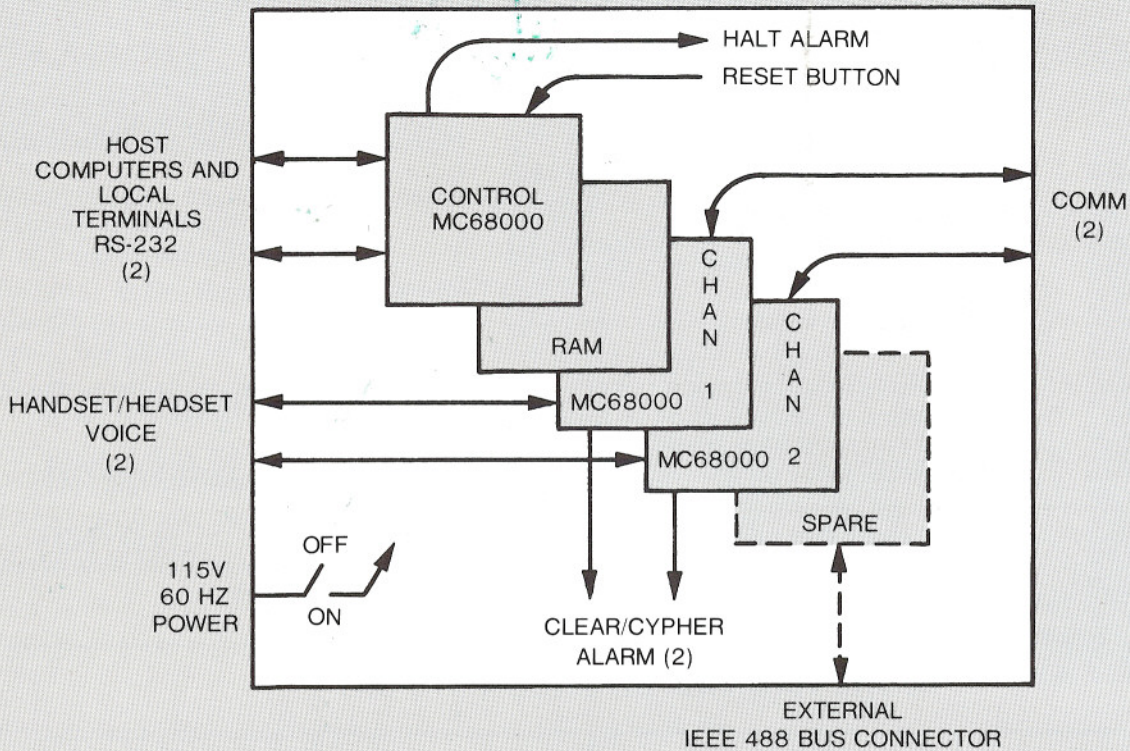
At initialization the PCIU communications parameters are selectable:

- 5 preset configurations
- 4 device types
- 2 data rates
- Delay return to voice after data message transmissions
- Full or half duplex
- Net sensing before transmission and 0.1 or 1.5 second wait (or 0.1 to 9.9 seconds)
- Protocol(s)
- Preamble keylength up to 6.0 seconds
- Output level 0, +12 dBm (-6, -13 dBm)
- Error control 7/12 hamming (or other)
- 3 retries
- 16, 20, 22 second retry interval (or 1 - 60 seconds)
- 5 modulation types

The message format, code, and content are software controllable and include:

- Alternate ONE's/ZERO's preamble
- Message synchronization
- 16 character header, 7 bit ASCII
- ASCII 128 symbol set, 7 + 1 odd parity
- 7 bit ASCII text characters
- 4 to 20 EOT characters, 7 bit ASCII
- 7/12 Hamming Code, and / or Time Dispersion Coding

PCIU ARCHITECTURE



PCIU SOFTWARE OPERATION

COMMUNICATIONS PROCESSING

The PCIU provides for message reception, message transmission, and data communications processing.

RECEPTION

In a typical application the message reception software processes all messages received, including those to a local terminal. Types of received messages include messages for local terminal review and PCIU system messages (e.g. ACK). Once a message has been received the message reception software determines if the message is valid by checking for a message header. The message reception software also determines if the message is addressed to a local terminal.

The message reception software checks for data errors. If a message contains one or more characters in error which cannot be corrected, the message is not ACKed and the reception software empties the receive message memory.

Messages for a local terminal are placed in the received message storage area and automatic acknowledgment (ACK) is provided on a link basis. If the receive memory area is full and a local terminal is available, incoming messages are sent to a local terminal.

TRANSMISSION

The operator at a local terminal can transfer a currently displayed/edited message to the PCIU for transmission under

software control. Message transmission is based on the contents of the filled-in communication header portion of the message.

The PCIU automatically retransmits the message if no acknowledgement is received within a specified retry time interval. If a message is not acknowledged, after a predesignated number of retransmissions, it is "aborted," and the local terminal notified. Messages on separate channels can be transmitted simultaneously.

As well as processing incoming and outgoing messages, the data communications function can also provide the following capabilities:

- EDC/TDC is applied to messages as specified by the local terminal during communications initialization. A single bit error appearing in the 12 bit character (7 bit ASCII code plus 5 parity bits) can be detected and corrected. A received message containing detected but uncorrectable errors is purged.
- When the local terminal provides the ability to request an End-to-End (ETE) Acknowledgment (ACK) of a message in the message header, the ETE ACK is not acknowledged but treated as a regular message and transferred to the local terminal.
- ETE ACKs are triple blocked to ensure their receipt.

PCIU DESIGN CHARACTERISTICS

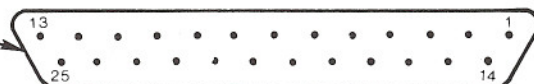
Control PC Card:	MC68000 and 16K bytes RAM, 8 MHz clock; Two RS-232-C I/O interfaces, 2.4, 4.8, 9.6 and 16 kbps; Halt alarm and reset control; ROM 32K bytes		2 each 2w/4w Binding Posts 2 each 6 pin Handset or Headset 2 each 25 pin RS-232-C Type D 1 each 24 pin IEEE 488 1 each 3 pin 118v AC 60 Hz Power
RAM PC Card:	512K bytes	Signal Data Rates:	75, 150, 300, 600, 1200, 2400, 4800, 8000, 9600, 16000, 32000 bits per second
Modem PC Cards (2)	MC68000 and 16K bytes dual ported RAM, 64K bytes dedicated RAM, clock; clear/cypher alarm; ROM 32k bytes; asynchronous or synchronous communications to 32 kbps	Operating Temperature Range:	Commercial 0°C to +50°C Military -54°C to +71°C ambient, without the use of fans or heaters
Spare PC Card Slot:	Can be used to install a Peripheral Bus Controller card, or an IEEE 488 interface card, or a breadboarding card with 108 square inches of space	Storage Temperature Range:	Commercial -62°C to +85°C
Connectors:	2 each 55 pin RS-449 or GFE 2 each 26 pin Radio or GFE 2 each 26 pin CMOS GFE	Input Power:	115V, 1.5 amps at 60 Hz unregulated, fused
		Unit Size:	13 in. H x 16¾ in. W x 12½ in. D.
		Unit Weight:	Approximately 35 pounds including PC cards

LOCAL TERMINAL INPUT/OUTPUT PORT

SIGNAL RS - 232 - C DESIGNATION	SIGNAL DESCRIPTION	I/O PORT PIN NO.	SIGNAL DIRECTION
AA	PROTECTIVE GROUND	1	—
AB *	SIGNAL GROUND	7	—
BA *	TRANSMIT DATA	2	→ OUT
BB *	RECEIVE DATA	3	← IN
CA	REQUEST TO SEND	4	→ OUT
CB	CLEAR TO SEND	5	← IN
CF	DATA CARRIER DETECT	8	← IN
CD	DATA TERMINAL READY	20	→ OUT
DA	TRANSMIT CLOCK	15	→ OUT
DD	RECEIVE CLOCK	17	← IN

* CURRENTLY OPERATIONAL
WITH WICAT, EXORMACS AND
INTELLIMAC 7000M AT 9.6
KILOBITS PER SECOND.

CONNECTOR



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For additional information write or telephone:
Librascope Division, The Singer Company
833 Sonora Ave., Glendale, CA 91201-0279
Telephone 818-244-6541
TWX: 910-497-2266 • Telex: 67-4912