

CONGRATULATIONS on the purchase of the RS-232 OPTION. As of now the COLECO ADAM'S POWER can be fully appreciated. With the RS-232 you may now operate a wide range of other GENERIC ACCESSORIES such as a **DOT MATRIX PRINTER** or maybe a **MODEM** or even an **EPROM PROGRAMMER**. The possibilities are now virtually endless. With a little time investment to develop some software this and much more will run with your **ADAM** or if it is more convenient simply contact **HI-TEK RESEARCH** for information on what software we can develop for you if we already don't have it.

**BE CAREFUL WHEN UNPACKING:**

INSIDE THE BOX YOU WILL FIND: 1 RS-232 UNIT  
1 PARALLEL CABLE  
1 PROGRAM DISKETTE  
1 INSTRUCTION MANUAL

The parallel cable has already been attached to the RS-232 for ease of installation. You may detach this cable but be sure it is reconnected EXACTLY as before. SERIOUS DAMAGE MAY RESULT TO YOUR COMPUTER OR ACCESSORY DUE TO INCORRECT CONNECTIONS!!!!.

TO INSTALL YOUR RS-232 UNIT PLUG THE FEMALE SOCKET INTO THE EXPANSION PORT ON THE RIGHT SIDE OF THE COMPUTER. TO EXPOSE THE EXPANSION PORT SIMPLY LIFT THE FLAP AND INSERT THE RS-232 WITH THE COMPONENT SIDE UP, THIS IS MARKED RIGHT ON THE CIRCUIT BOARD.

SECTION 1

SYSTEM REQUIREMENTS:

COLECO ADAM COMPUTER SYSTEM  
TAPE OR DISK DRIVE(S)  
SMARTBASIC SOFTWARE

SYSTEM OPTIONS:

SECOND TAPE OR DISK DRIVE  
DOT MATRIX PRINTER \*  
MODEM  
TELECOMMUNICATIONS SOFTWARE  
64K MEMORY EXPANDER  
AUTODIALER  
SERIAL DEVICE  
CUSTOMIZED CABLE FOR SERIAL DEVICE  
SUPER GAME CONTROLLERS  
RS-232 SERIAL/PARALLEL CONTROLLER  
CP/M SYSTEM SOFTWARE \*\*  
TURBO PASCAL \*\*  
MICROSOFT BASIC \*\*  
MICROSOFT MULTIPLAN \*\*  
MICROPRO WORDSTAR \*\*  
MICROPRO SPELLSTAR \*\*  
dBASE II \*\*  
SMALL "C" COMPILER \*\*  
HACKERS GUIDE TO ADAM

\*THIS PRINTER MAY BE EITHER PARALLEL (CENTRONICS PORT)  
OR SERIAL PROVIDED THAT AN INTERFACE CABLE IS MADE TO  
THE SPECIFICATIONS OF THE DEVICE USED.

\*\*THIS SOFTWARE WILL ONLY BE AVAILABLE ON A LEASED BASIS  
AND ONLY TO CANADIAN CONSUMERS. CONTACT YOUR DEALER  
FOR MORE DETAILS. PLEASE NOTE: NO MANUALS WILL BE  
PROVIDED AS THEY ARE AVAILABLE FROM MOST BOOK STORES.

CP/M IS A TRADEMARK OF DIGITAL RESEARCH  
SMARTBASIC, SMARTWRITER, COLECO, ADAM ARE TRADEMARKS OF  
COLECO INDUSTRIES INC.  
ALL OTHER TRADE NAMES MENTIONED ARE TRADEMARKS  
PROTECTED BY THEIR ORIGINAL MANUFACTURERS

## SECTION 2 INSTALLATION

BE SURE THE ADAM SYSTEM IS POWERED OFF!!!!

- 1) EXPOSE THE EXPANSION PORT BY LIFTING FLAP ON RIGHT SIDE
- 2) PLUG THE RS-232 CARD INTO THE EXPANSION PORT COMPONENT SIDE UP. THIS IS MARKED ON THE CARD, PUSH IN GENTLY UNTIL CARD IS FIRMLY IN PLACE.
- 3) THE CABLE PROVIDED WITH YOUR UNIT IS CONFIGURED FOR A CENTRONICS COMPATIBLE PARALLEL DEVICE AND IS ALREADY PLUGGED INTO THE RS-232 FOR EASE OF INSTALLATION. THE OTHER END WILL MATE TO THE PARALLEL DEVICE YOU INTEND TO CONTROL. AGAIN WE STRESS-CENTRONICS COMPATIBLE.
- 3A) units shipped to the UNITED STATES also include the serial cable option which will require some assembly READ YOUR DOCUMENTATION ON THE SERIAL DEVICE FOR CORRECT CONFIGURATION. As not all serial devices are wired the same and it would be impossible to wire all cables in advance and hope it works with the device you have purchased. A PINOUT OF THIS RS-232 IS PROVIDED AS A GUIDE TO HELP YOU OR TAKE THE CABLE TO YOUR RETAILER AND ASK IF THEY CAN DO IT FOR YOU (take along the pinout listings for reference).
- 4) WITH ALL CONNECTIONS MADE YOU MAY NOW POWER UP ADAM
- 5) CANADIAN CONSUMERS MAY CONTACT THEIR DISTRIBUTOR FOR THE SERIAL CABLE AND PROVIDE DETAILS OF THE OPTION YOU WISH TO RUN AND WE CAN CUSTOM MAKE THE CABLE FOR YOU THIS IS A \$35.00 OPTION

### SECTION 3 SMARTBASIC

The disk provided contains the "programs" required that allow the USER to reconfigure BASIC to allow direct output VIA the RS-232 OPTION in either serial or parallel formats. You will now be able to control a wide variety of other options like a DOT MATRIX PRINTER or a MODEM or an EPROM PROGRAMMER etc.

The basic programs provided use some assembly language routines for CORRECT INITIALIZATION of the RS-232. These programs SHOULD NOT BE MODIFIED AS THIS WILL VOID THE 90 DAY DISK WARRANTY. HOWEVER, if you so desire consult an experienced Z-80/8080 programmer for any custom modifications you may need as these programs are required for correct operation of your RS-232.

LOAD YOUR DISK MANAGER PROVIDED WITH YOUR DISK DRIVE  
THIS STEP MAY BE OMITTED IF YOU DON'T HAVE IT.  
LOAD SMARTBASIC  
AFTER BASIC IS LOADED PLACE RS-232 SOFTWARE IN DRIVE  
AND AT PROMPT TYPE: JCATALOG D#(D# REPRESENTS DRIVE #)  
OR SKIP D# AND ACCEPT DEFAULT DRIVE (CASSETTE 1)[RETURN]

CATALOG WILL READ: H cpmpr PRINTER DRIVER-CF/M  
H cpmser SERIAL PROGRAM-CF/M  
A siobasic (BASIC CONFIGURATION)  
A bserial (HEX PROGRAM)  
A bprinter (HEX PROGRAM)

cpmpr and cpmser are only for CP/M OPERATING SYSTEM  
DO NOT USE THEM UNDER ANY OTHER SYSTEM PROGRAMS!!!

SECTION 3 CONT'

Next, run the siobasic program while in SmartBasic  
JRUN siobasic,D# (return)

The SmartKeys are used to configure the Serial Port Parameters. This can be skipped if you are not using a Serial Device by pressing the SET SmartKey. When using the Serial Device Option CHECK THE DEVICES INSTRUCTIONS to establish what it's requirements are. Then select the SmartKeys which apply. The SET KEY will EXIT back to Basic and the RS-232 is READY FOR USE.

SELECTIONS:

PR#0----->OUTPUT TO MONITOR OR TV  
PR#1----->OUTPUT TO ADAM PRINTER  
PR#2----->OUTPUT TO PARALLEL DEVICE  
PR#3----->OUTPUT TO SERIAL DEVICE

\*\*\*\*\*  
\* SPECIAL NOTE \*  
\*\*\*\*\*

YOU DO NOT NEED TO HAVE BOTH A SERIAL AND PARALLEL DEVICE ONLINE AT THE SAME TIME NOR DO YOU NEED TO HAVE BOTH DEVICES HOOKED UP AT THE SAME TIME. BUT, IF YOU SELECT AN ILLEGAL DEVICE THE SYSTEM WILL PROBABLY LOCK UP AND REQUIRE A RESET FROM THE ADAM MEMORY CONSOLE ALSO REINITIALIZATION OF THE siobasic WILL ALSO APPLY, THIS TIME AVOIDING OUTPUT TO THE OFFLINE OR MISSING DEVICE.

If your program can take advantage of the RS-232 Device the aforementioned procedures must be undertaken. The following demonstration will cause the ADAM to OUTPUT DATA to the PR#2 or #3 printer. Follow the INSTRUCTIONS and ENTER EXACTLY AS SHOWN.

LOAD SMARTBASIC:

- note: all commands  
require the return  
key to be pressed
- 1) LOAD siobasic (return)
  - 2) LIST-siobasic will scroll on screen
  - 3) PR#2
  - 4) LIST
  - 4a the parallel printer will now be active printing the program listing and NO OUTPUT LISTED ON SCREEN
  - 5) in this mode every time RETURN IS pressed the printer will also scroll a space and there will be no monitor output.
  - 6) PR#0 will return ALL LISTINGS etc. back to the screen.
  - 7) for serial checkout use PR#3 at STEP 3 and repeat the other steps 4 to 6

\*\*\*\*\*  
\* REMEMBER \*  
\*\*\*\*\*

YOU MUST LOAD IN THE siobasic BEFORE ATTEMPTING TO USE THE RS-232 OUTPUT IN BASIC!!!!

IF YOUR APPLICATION PROGRAM OPERATES IN MEMORY ABOVE 28000 THEN YOU WON'T BE ABLE TO USE THE RS-232 WITHOUT MODIFICATIONS TO THE ASSEMBLER PROGRAMS DISCUSSED EARLIER.  
TO PROTECT THE AREA WHERE siobasic RUNS ADD THE FOLLOWING LINE INTO YOUR APPLICATION PROGRAM:

5 LOMEM:28000

SECTION 4 EOS DISK MODIFY

THE DISK SUPPLIED WITH YOUR RS-232 WILL ALLOW YOU TO  
MODIFY YOUR DISK MANAGER OR ANY OTHER DISK WITH THE  
EOS SYSTEM.

```
*****
*                                           *
* A NOTE OF CAUTION *
*                                           *
*****
```

IF YOU SELECT TO MODIFY YOUR SYSTEM DISK BE SURE IT IS  
ONLY A COPY OF THE ORIGINAL!!!! OR YOU MAY NOT BE  
ABLE TO ACCESS THE ADAM PRINTER AGAIN!!!!  
TO MAKE A COPY OF THE DISK MANAGER FOLLOW THE  
DIRECTIONS ON FORMATING A SYSTEM DISK  
THE DISK MANAGER COPY IS THE EASIEST TO WORK WITH  
AS IN MOST CASES IT WILL LOAD ANY EOS SYSTEM AND FOR  
EXAMPLE: LOADING SMARTFILER WITH THE MODIFIED DISK  
MANAGER WILL CAUSE ALL PRINTING INSTRUCTIONS TO BE  
AUTOMATIC OUTPUT TO THE RS-232 PRINTER. REMEMBER:  
THE DISK UTILITY WILL ASK IF YOU WANT A SERIAL OR  
PARALLEL DEVICE FORMAT BUT IT WILL ONLY MODIFY ONE AT  
A TIME. SO IF YOU WANT TO HAVE BOTH OPTIONS IT WILL  
REQUIRE TWO DIFFERENT SYSTEM DISK MANAGERS TO DO IT.

**DO NOT MODIFY DIRECTLY TO AN**

**ORIGINAL SYSTEM OR IT MAY**

**NEVER<<<<<<<<<<<<<<<<<<<<<<<<<<<<<<**

**AGAIN RUN THE ADAM PRINTER**

**THIS MOD IS RECOMMENDED FOR**

**DISK OPERATING SYSTEM**

## SECTION 5 CP/M PROCEDURES

THIS SECTION IS DEVOTED TO CP/M. IN IT YOU WILL BE INSTRUCTED ON HOW TO "MOVE" THE OTHER PROGRAMS ON YOUR DISK CALLED "cpmptr" and "cpmscr" INTO CP/M FOR OPERATION OF THE RS-232.

### LOAD CP/M SYSTEM DISK

WHEN THE PROMPT 'A>' FOLLOW THE INSTRUCTIONS IN YOUR CP/M MANUAL ON PAGE "B44 THE ADAM COMMAND".

- STEP 1) INSTALL THE SYSTEM DISK SUPPLIED WITH THE RS-232 INTO A DRIVE
- STEP 2) WITH CP/M SYSTEM IN THE OTHER DRIVE TYPE "ADAM" AND PRESS RETURN. THE FOLLOWING MESSAGE APPEARS  
ADAM to CP/M FILE COPY UTILITY  
ADAM TAPE/DISK IS DRIVE  
(A,B,C,D) ?
- STEP 3) TYPE IN THE LETTER WHICH CORRESPONDS WITH THE DRIVE CONTAINING THE RS-232 SYSTEM  
CP/M WILL NOW CHECK AND DISPLAY THE DIRECTORY.  
THE NEW INSTRUCTION APPEARS:  
TRANSFER ADAM FILE ?
- STEP 4) TYPE IN FILE NAME: "cpmptr" FILE TYPE "H"  
NAME CP/M FILE: "PARALLEL.COM" press RETURN  
REPEAT THE PROCESS WHEN THE PROMPT:  
"ANOTHER FILE TO TRANSFER" APPEARS AND  
USE THE FILE CALLED "cpmscr" TYPE "H"  
NAME CP/M FILE: "SERIAL.COM"  
AT THE END OF THE SECOND PROCEDURE SIMPLY  
TYPE IN "N" AND THE SESSION OF TRANSFER WILL END

### PARALLEL PORT INITIALIZATION:

AT THE "A>" PROMPT TYPE IN "PARALLEL" (RETURN)  
THE SYSTEM IS NOW CONFIGURED TO ALLOW YOU TO  
USE THE "STAT" COMMAND IN REDIRECTING THE OUTPUT  
YOU WILL NOTE THAT THE SCREEN HAS INSTRUCTIONS  
TO ENTER. TYPE THE FOLLOWING: STAT LST:= UL1:  
NOW IF YOU USE "CONTROL P" THE PRINTER WILL  
ECHO THE CONSOLE.

### SERIAL PORT INITIALIZATION: TYPE "SERIAL" (RETURN)

FOLLOW THE ON SCREEN INSTRUCTIONS TO SELECT DEVICE  
PARAMETERS.



THE PINOUT LISTINGS FOR THE RS-232.

LOOKING DOWN ON THE TOP OF THE UNIT WITH THE FEMALE CONNECTOR TO THE TOP AND THE CABLE CONNECTORS TO THE RIGHT, THE FIRST ONE IS USED FOR SERIAL OUTPUT. THE SECOND IS FOR PARALLEL OUTPUT WHICH IS PICTURED BELOW. THE PARALLEL CONNECTOR IS A 26 PIN OUTPUT AS SHOWN BELOW. THIS CONNECTOR SHOULD NOT NEED TO BE CHANGED FOR ANY REASON.

13	12	11	10	9	8	7	6	5	4	3	2	1
*	*	*	*	*	*	*	*	*	*	*	*	*
*	*	*	*	*	*	*	*	*	*	*	*	*
26	25	24	23	22	21	20	19	18	17	16	15	14

THE PINOUTS LISTED HERE ARE FOR SERIAL CONNECTION.

#1	N/C	#2	N/C	#3	TXD	#4	N/C
#5	RXD	#6	N/C	#7	RTS	#8	N/C
#9	CTS	#10	N/C	#11	DCD	#12	N/C
#13	GND	#14	DTR				

7	6	5	4	3	2	1
*	*	*	*	*	*	*
*	*	*	*	*	*	*
14	13	12	11	10	9	8

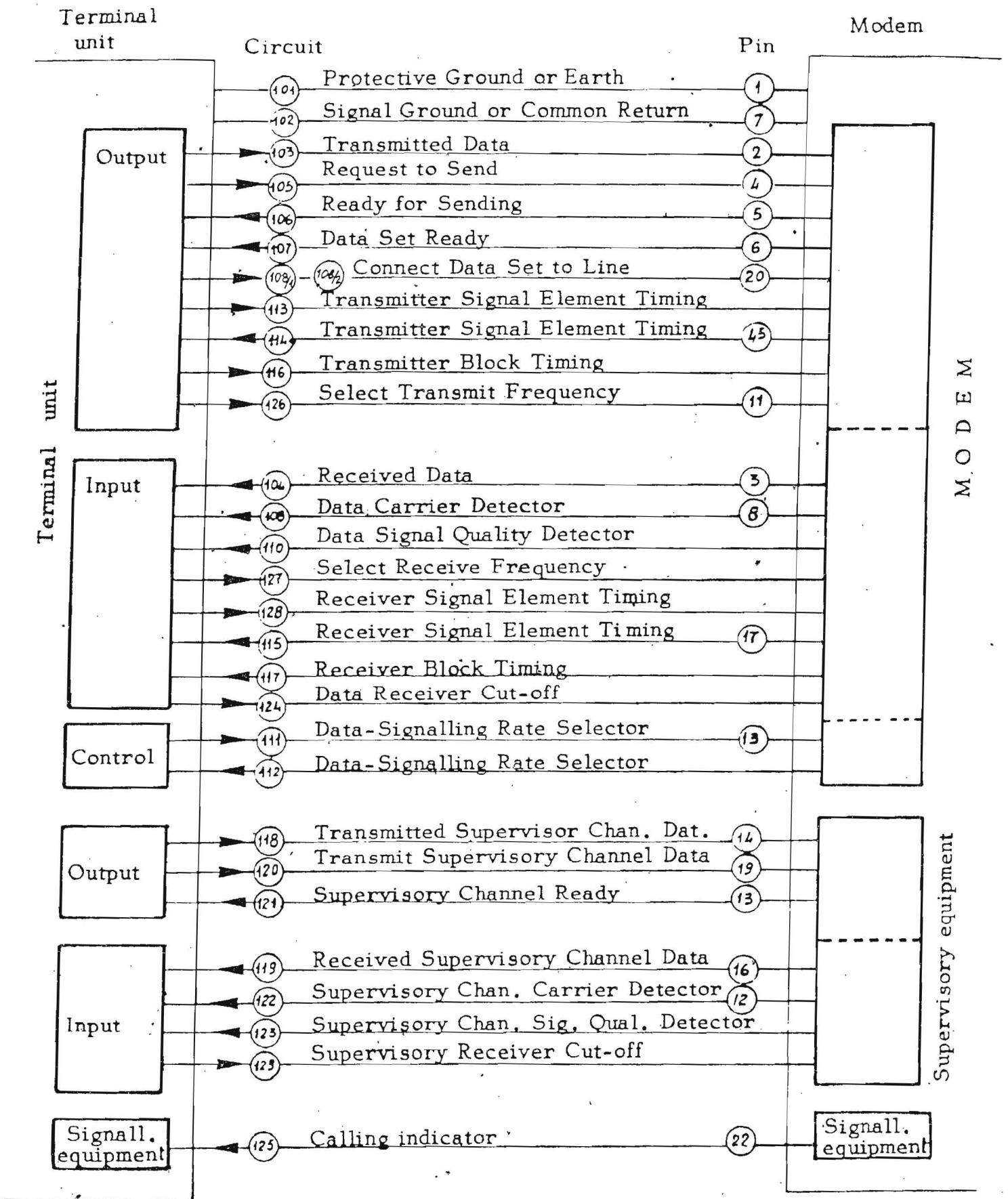
PLEASE FEEL FREE TO CONTACT US ON ANY OF YOUR CUSTOM CABLE NEEDS. IT WILL BE OUR PLEASURE TO SERVE YOU ANY WAY WE CAN.

LIMITED 90 DAY WARRANTY

\*\*\*\*\*  
\*  
\* HI-TEK RESEARCH AND MARKETING WARRANTS THE \*  
\* CONSUMER THE RS-232 AND DISK WILL BE \*  
\* OPERATIONAL FOR A PERIOD OF NINETY DAYS UNDER \*  
\* NORMAL IN-HOUSE USE. HI-TEK'S SOLE AND \*  
\* EXCLUSIVE LIABILITY FOR MATERIALS OR WORKMAN- \*  
\* SHIP SHALL BE LIMITED TO REPAIR OR REPLACEMENT.\*  
\* THIS WARRANTY DOES NOT OBLIGATE HI-TEK TO BEAR \*  
\* THE COST OF TRANSPORTATION CHARGES IN \*  
\* CONNECTION WITH THE REPAIR OR REPLACEMENT OF \*  
\* DEFECTIVE PARTS. ANY IMPLIED WARRANTIES ARISING\*  
\* OUT OF THE SALE OF THE RS-232 UNIT OR DISK \*  
\* INCLUDING THE IMPLIED WARRANTIES OF MERCHANT- \*  
\* ABILITY AND FITNESS FOR A PARTICULAR PURPOSE \*  
\* ARE LIMITED TO THE ABOVE 90 DAY PERIOD. HI-TEK \*  
\* SHALL IN NO EVENT BE LIABLE FOR INCIDENTAL, \*  
\* CONSEQUENTIAL, CONTINGENT OR ANY OTHER DAMAGES.\*  
\* THIS WARRANTY IS INVALID IF THE DAMAGE OR \*  
\* DEFECT IS CAUSED BY ACCIDENT, ACT OF GOD, \*  
\* CONSUMER ABUSE, UNAUTHORIZED ALTERATION OR \*  
\* REPAIR, VANDALISM, OR MISUSE. \*  
\* \*  
\*\*\*\*\*

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C.C.I.T.T. INTERFACE - FUNCTIONAL DIAGRAM



C.C.I.T.T. V24 INTERFACE MAIN CIRCUITS \*

The interchange circuits regarded as more important are given in this section.

1) GROUND OR EARTH CIRCUITS

Circuit 101 - Protective Ground or Earth

This conductor shall be electrically bonded to the machine or equipment frame.

It may be further connected to external grounds as required by applicable regulations.

Circuit 102 - Signal Ground or Common Return

This conductor establishes the common reference potential for all interchange circuits except the Protective Ground or Earth (Circuit 101). Within the Modem this circuit shall be brought to one point, and it shall be possible to connect this point to Protective Ground or Earth by means of a jumper inside the Modem.

This jumper can be assembled or removed during the installation according as required by applicable regulations or else in order to reduce noise to electronic circuits.

2) DATA SIGNAL CIRCUITS

Circuit 103 - Transmitted Data

Direction: to Modem.

Signals on this circuit are originated by the terminal unit and are connected to the Modem for transmission to remote terminal units.

Circuit 104 - Received Data

Direction: from Modem.

Signals on this circuit are originated by the Modem in response to data signals received from remote terminal units.

3) CONTROL SIGNAL CIRCUITS

Circuit 105 - Request to Send

Direction: to Modem.

Signals on this circuit are generated by the terminal unit to condition the Modem to transmit.

The OFF condition shall hold the Modem in the Receive-Data condition and the ON condition shall hold the Modem in the Transmit-Data condition.

The above conditions shall be established without regard to signals on Circuits 103 (Transmitted Data).

Circuit 106 - Ready for Sending

Direction: from Modem

Signals on this circuit are generated by the Modem to indicate that it is prepared to transmit data. The ON condition is a response to the ON condition on Circuit 105 (Request to Send).

\* The description of these circuits is a part of the original standard description.

Circuit 107 - Data Set Ready

Direction: from Modem.

The signals on this circuit are generated by the Modem to indicate that it is ready to operate (receive or transmit).

The OFF condition shall be used to indicate that the Modem is not connected to a communication channel.

The ON condition shall appear at all other times.

Circuit 108/1 - Connect Data Set to Line

Direction: to Modem.

Signals on this circuit are used to control switching of the Modem to the communication channel.

The ON condition causes the Modem to be connected to the communication channel.

The OFF condition removes the Modem from the communication channel.

Circuit 108/2 - Data Terminal Ready

Direction: to Modem.

Signals on this circuit are used to control the switching of the Modem to the communication channel.

The ON condition, indicating that the terminal unit is ready for operating, causes the Modem to be connected to the communication channel and holds the connection.

The terminal unit can be in the condition ON on the circuit 108/2 when it is ready for receiving or transmitting.

The OFF condition removes the Modem from the communication channel.

Circuit 109 - Data Carrier Detector

Direction: from Modem.

Signals on this circuit are used to provide an indication that the data carrier is being received.

The ON condition indicates reception of the data carrier. The OFF condition provides an indication of the end of present transmission activity or a fault condition.

Circuit 111 - Data-signalling Rate Selector

Direction: to Modem.

Signals from the data-processing terminal equipment on this circuit are used to select between the two rates in the case of dual rate synchronous modems or the two ranges of rates in the case of dual range asynchronous modems.

An ON condition shall select the higher signalling rate or range of rates.

An OFF condition shall select the lower signalling rate or range of rates.

Circuit 125 - Calling Indicator

Direction: from Modem.

Signals on this circuit indicate that a calling signal is being received from the Modem.

The ON condition indicates that a calling signal is being received.

The OFF condition shall be maintained at all other times.

Circuit 126 - Select Transmit Frequency

Direction: to Modem.

Signals on this circuit are generated by the terminal unit to provide a selection of the frequency of the transmitter Modem.

An ON condition shall select the higher transmitter frequency.

An OFF condition shall select the lower transmitter frequency.

Circuit 127 - Select Receive Frequency

Direction: to Modem.

Signals on this circuit are generated by the terminal unit to provide selection of the frequency at the receiver Modem.

An ON condition shall select the lower receiver frequency.

An OFF condition shall select the higher receiver frequency.

Circuit 120- Transmit backward line signal.

Direction : to Modem.

This circuit is equivalent to Circuit 105 ( Request to Send ) with the difference that it is used to control the carrier transmission on the backward channel.

Circuit 122- Backward channel received line signal detector.

Direction : to Modem.

This circuit is equivalent to Circuit 109 (Data channel received line signal detector) with the difference that it is used to indicate the carrier reception from the backward channel line.

4) TIMING SIGNAL CIRCUITS

Circuit 114 - Transmitter Signal Element Timing

Direction: from Modem.

Signals on this circuit are used to provide the terminal unit with signal element timing information.

The waveform shall nominally be ON and OFF equal period of time. The terminal unit shall provide a data signal on Circuit 103 (Transmitted Data) in which the transitions between signal elements nominally occur at the time of the transitions from OFF to ON condition of the signal on this Circuit 114.

Circuit 115 - Receiver Signal Element Timing

Direction : from Modem.

Signals on this circuit are used to provide the terminal unit with signal element timing information.

The waveform shall nominally be ON and OFF for equal periods of time, and the transition from ON to OFF condition shall nominally indicate the centre of each signal element on Circuit 104 ( Received Data ).

C.C.I.T.T. INTERFACE ELECTRICAL SIGNAL CHARACTERISTICS

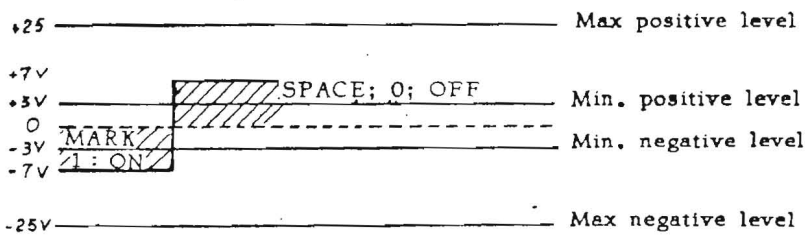
The maximum open-circuit voltage to ground on any interchange circuit shall not exceed 25 volts.

a) DATA SIGNAL CIRCUITS

For Circuit 3 (Transmitted Data) and Circuit 4 (Received Data) the signal shall be considered in the "marking" condition when the voltage on the circuit is more negative than minus 3 volts with respect to Signal Ground, and the signal shall be considered in the "spacing" condition when the voltage is more positive than plus 3 volts with respect to Signal Ground.

During transmission of data, the "marking" condition shall be used to denote the binary state "ONE" and the "spacing" condition shall be used to denote the binary state "ZERO".

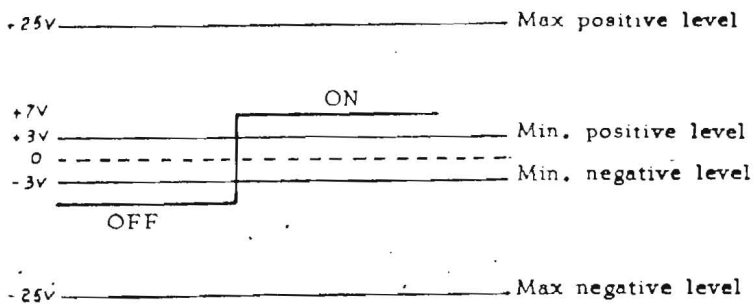
Note that "marking" is the normal condition on a data circuit when no signals are present.



b) CONTROL SIGNAL CIRCUITS

For all control circuits already shown, the control function shall be considered ON when voltage on the circuit is more positive than plus 3 volts with respect to Signal Ground, and shall be considered OFF when the voltage on the circuit is more negative than minus 3 volts with respect to Signal Ground.

For all data and timing signal circuits (Circuits N.3,4,13,14,15,28) the time during which the voltage ranges between +3Volts and -3Volts must not exceed the 3% of the nominal duration of the element signal (bit).

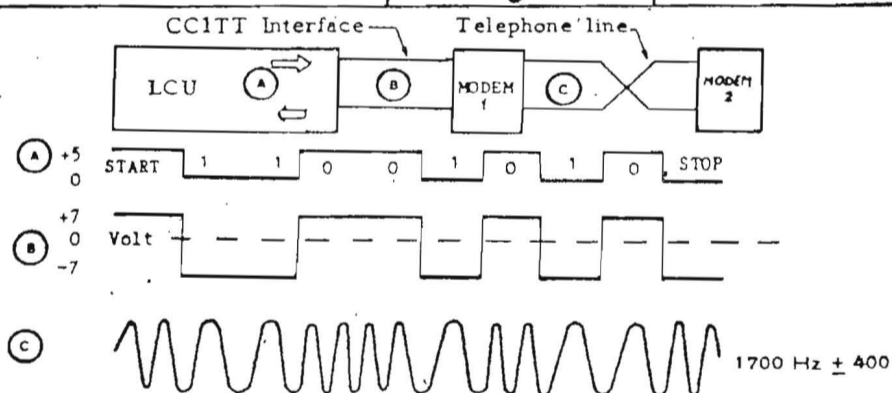


EQUIVALENCE CHART FOR CCITT V24 AND EIA RS 232 C CIRCUITS

MODEM CCITT EIA INTERFACE SIGNALS					
CCITT V24		EIA RS 232		Direction	Pin
Circuit No.	Signal name	Circuit No.	Signal name		
101	Protective ground	AA	Protective ground		1
102	Signal ground	AA	Signal ground		7
103	Transmitted data	BA	Transmitted data	to modem	2
104	Received data	BB	Received data	from mod.	3
105	Request to send	CA	Request to send	to modem	4
106	Ready for sending	CB	Clear to send	from mod.	5
107	Data set ready	CC	Data set ready	from mod.	6
108/1	Connect data set to line	CD	Data terminal ready	to modem	20
108/2	Data terminal ready				
109	Data channel received line signal detector	CF	Data carrier detector	from mod.	8
111	Data signalling rate selector	CH	Speed selector	to modem	23
125	Calling indicator	CE	Ring indicator	from mod.	22
114	Transmitter signal element timing	DB	Transmitter signal element timing	from mod.	15
115	Receiver signal element timing	DD	Receiver signal element timing	from mod.	17

CCITT V24 INTERFACE - EXAMPLE OF MODULATION ON DATA CIRCUITS

Binary condition (ISO code tag)	1	0
Electrical level	-3Volt ± -25Volt	+3Volt ± +25Volt
Signal name	MARK	SPACE
In telegraph terms	REST	WORK
Tape punching	PUNCHED HOLE	NO HOLE



The chart shows the line modulation by a SHIFT FREQUENCY modem (rest frequency: low) (see page 2.07)

Speed 600 Bd.      Work frequency = 1700 Hz.      Rest = 1300 Hz.  
 Speed 1200 Bd.      Work frequency = 2100 Hz.      Rest = 1300 Hz.