Assembly Instructions CT-E Screen Read Board

If you ever need to use your CT-1024 terminal system in a situation where you need to get edited information that has been typed onto the screen, transmitted out of the terminal and into another device, you will probably want to use the screen read board. The terminal's memory is constantly being addressed and read on the page of memory being displayed in order to generate the video data used by the television display. So the idea is to capture and store the data in a particular location is memory and tell the parallel input device thru a "data ready" line that the data is ready to be used. When the parallel input device accepts the data it in turn tells the screen read board thru the "data accepted" line, which causes the screen read board to seek and provide data in the next character location. The screen read when activated starts accessing information in the screen's cursor location and continues reading; advancing the cursor as it reads, until a manual switch stop command is given or if desired, an exclamation point is read from the screen. If the end of the page is reached it will continue after executing a home up on the same or opposite page depending upon the setting of the "page select" switch on the main terminal.

Since the cursor is automatically advanced by the read board, it is seldom seen at fast read rates which may be as high as the memory read speed or 16.6 milliseconds. This speed can only be achieved if the device connected to the read board can accept the data at a one character/microsecond or faster rate. This speed is very useful when performing memory search routines where you are looking for a specific character or symbol somewhere in memory. If the device connected to the read board is not capable of handling a 1 microsecond acquisition time but is capable of a 63 microsecond rate, the entire screen can be read in about 500 milliseconds. In both situations, however, up to 16.6 milliseconds delay may be encountered between the time the read command is given and the time the read board actually begins accessing data, in order to allow the memory address counters to cycle to the current cursor location. The entire circuit is built on a 3 1/6" x 4 1/2" fiberglass circuit board which is plugged onto connector strips J5 and J6 on the main board next to the cursor board.

PC Board Assembly

NOTE: Since all of the holes on the PC board have been plated thru, it is only necessary to solder the components from the bottom side of the board. The plating provides the electrical connection from the "BOTTOM" to the "TOP" foil of each hole. It is important that none of the connections be soldered until all of the components of each group have been installed on the board. This manes it much easier to interchange components if a mistake is made during assembly. Be sure to use a low wattage iron (not a gun) with a small tip. Do not use acid core solder or any type of paste flux. We will not guarantee or repair any kit on which either product has been used. Use only the solder supplied with the kit or a 60/40 alloy resin core equivalent. Remember all of the connections are soldered on the bottom side of the board only. The plated-thru holes provide the electrical connection to the top foil.

( )   Attach all of the resistors to the board. As with all other components unless noted, use the parts list and component layout drawing to locate each part and install from the "TOP" side of the board bending the leads along the "BOTTOM" side of the board and trimming so that 1/16" to 1/8" of wire remains. Solder.

( )   Install all of the capacitors on the board. Solder.

( )   Install the transistor and diode on the board, The diode must be turned so the banded end corresponds with that shown on the component layout drawing, and the transistor must be turned so its lead configuration matches with that of the board. Solder.

( )   Install all of the integrated circuits on the board being very careful to install each in its correct position. Do not bend the leads on the back side of the board. Doing so makes it very difficult to remove the integrated circuits should replacement ever be necessary. The semicircle notch on the end of the package is used for reference and should match with that shown on the component-layout drawing for each of the IC's. Make sure the integrated circuits are down firmly against the board and solder.

( )   Now attach the two fifteen pin female connectors to the board. These must be installed from the "TOP" side of the board and pressed down so the connectors seat firmly against the board. Solder.

( )   Now that most of the components have been installed on the board, double check to make sure that all have been installed correctly in their proper location.

( )   Now check very carefully to make sure that all components have been soldered. It is very easy to miss some connections when soldering which can really cause some hard to find problems later during the Check out phase. Also check for solder "bridges" and "cold" solder joints which are also a common problem.

( )   This completes the circuit board assembly phase of the instructions. This board should not be installed onto the main terminal board until the main board itself is working and has been completely checked out according to the checkout phase of the terminal assembly instructions.

NOTE: For the Screen Read board to work, a cursor board must be used with it since the screen read board requires the circuitry on the cursor board to incrementally advance the cursor.

Control Line Operation

Screen Read
ON/OFF
(Read Enable)

This input is normally held high by pull up resistor R6 and when grounded inhibits and stops screen read operation. After stopped, it is necessary to restart the reading process by triggering the "controlled start" input either manually or through the computer controlled cursor. Access to the input is provided at J10 pin 4 of the CT-1024 board.

Controlled Start
(Start Read)

Upon turning the screen read on through the "SCREEN READ ON/OFF" switch it will be necessary to momentarily ground the "controlled start" input to start the screen read function, This can either be done by a pushbutton switch, an unused key on the keyboard or software with the computer controlled cursor board. If the "controlled start" input is held low rather than being pulsed it will override the operation of both the manual and auto stops. Access to the input is provided at J9 pin 9 of the CT-1024 board.

Data Ready

This normally low output goes high when the data registers are loaded-with a character to be transmitted. When the "data accepted" line acknowledges its receipt, this "data ready" line returns to its normally low state and awaits the loading of the next character.

Data Accepted

This normally high input when brought low tells the screen read board when the character in the data registers has been assimilated and that the next character can be loaded. For maximum exchange speed you should provide a negative going pulse from 1100 ns to 500 ns in duration. However the system is a handshake type and the input need not be a pulse if show speed (63 micro seconds/ character or slower) operation is used.

Manual Stop

Once a screen read has been initiated, it will continue until it is stopped. One way is to temporarily ground the "Screen Read ON/OFF" input through a pushbutton switch or an unused switch on your keyboard.

If you wish, you can use the auto stop instead. This automatically stops the screen read at the receipt of an !. This is done by jumpering pad B to A on the screen read board through a jumper or switch. If the Auto Stop Feature is not used, pad C should be connected to pad A through a jumper or switch.

Final Assembly

( )   First of all remove power from your main terminal board.

( )   Orient your cursor board so the "TOP" side of the board faces toward the main terminal's memory board, and press the board down onto connectors J5 and J6. There were no extra pins on the connectors, so an indexing pin will not be provided. Be very careful not to plug the board on backward.

( )   This completes the assembly phase. You can either check the board out manually or you can go ahead and wire it into your system and check it there. In either case if you have problems, disconnect power, remove the board and check it very carefully for solder "bridges", "cold" solder joints and assembly errors.

In Case of Problems

If you have problems on some phase of operation of the cursor board, the best recommendation is to remove power and recheck your assembly over very carefully with the instructions. If you still cannot find the problem and feel secure in your understanding of digital circuits, you can troubleshoot the unit with an oscilloscope. This does, however, require a thorough understanding of how the unit works as is described in the "how it works" section. If you are still not able to locate the problem or prefer not to service the unit yourself, please consult us before sending the unit in for repairs.

How It Works

First of all we will assume that a Screen Read sequence is not already in progress. The "data accepted" input should be held high by whatever device is feeding it and the "data ready/advance cursor" output is normally low. The "screen read ON/OFF" and "controlled start" inputs are held high by pull up resistors R6 and R7. If the "screen read ON /OFF" input is not grounded the screen read sequence will be initiated by pulsing tire "controlled start" input tow. This sets IC5A which drives its Q output high. This along with a logic one on the "data accepted" line drives the output of IC6A low which in turn drives the outline of IC6B high, This removes the reset from the data registers and allows them to accept data the next time they are clocked.
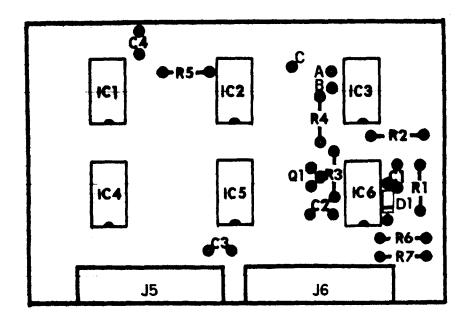
The "compare" and "load strobe" signals from the main board tell the read board when the memory has been indexed to the current cursor location and when the data is actually ready for reading. These logic 1 signals are then ANDed with the "ready to load" signal from IC1B pin 8 forcing IC6C pin 12 low and transistor Q1's collector high. This loads each of the data registers, IC1A, IC2, IC4, IC5B, with the memory data located in the cursor position. The "data ready" line goes high and the "ready to load" line, IC1 pin 8, goes low signaling that valid data is contained in the data registers and inhibiting IC6C from clocking in new data. The cursor is also advanced one forward position or carriage return/line feed if in column 32, since the "data ready" line drives a transistor on the cursor board which is wired O R ed to the cursor counter "forward" input on the main board. It is for this reason that the screen read board must always be used in conjunction with a cursor control board.
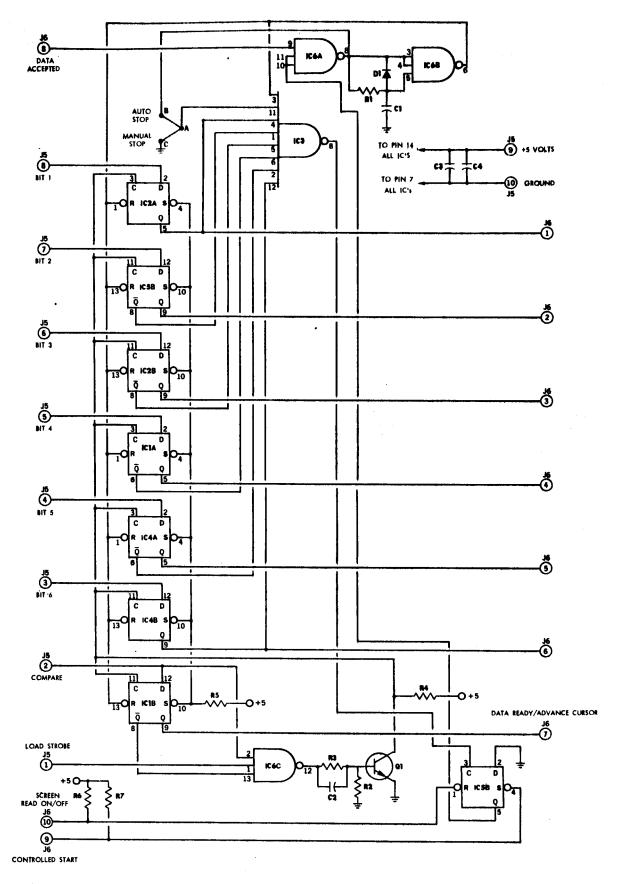
When the device connected to the read board accepts data it must put a low on the "data accepted" line, J6-8. This in turn resets the data registers and resets the "data ready" line. A variable delay provision has been built into the read board which allows for a premature "data accepted" acknowledgement since some devices connected to the read board may generate the acknowledge signal and yet require that the holding registers not be reset immediately. The delay time can be increased by making capacitor C1 larger, however, for maximum output speed the capacitor should be made as small as possible with a minimum capacitance of 100 pfd. New data is then loaded into the data registers and the "data ready" line goes high, completing one cycle of the operation which continues until a stop command is received from either the screen read Manual Stop switch, or if the auto stop jumper is installed, a ! clocks the Q output of IC5A low and stops the screen read function. The controlled start input, J6-9, must be pulsed low either with a manually operated switch, computer controlled cursor or a combination since the input may be wire OR ed, to either initially start the read sequence or restart it after a stop. Note however that the screen read ON /OFF switch must be in the ON (ungrounded) position for screen read operation.

Parts List - Screen Read Board

Resistors

R1, R3-R7   1K ohm 1/4 watt resistor
R2   4.7K ohm 1/4 watt resistor

Capacitors

C1   100 pfd polystyrene capacitor
C2   1000 pfd polystyrene capacitor
C3, C4   0.1 mfd capacitor

Semiconductors

D1   1N914 silicon diode
Q1   2N5129 transistor
IC1, IC2, IC4, IC5   7474 dual D flip-flop
IC3   7430 eight input NAND gate
IC6   7410 triple 3 - input NAND gate

PC Top Layout - Screen Read Board

Schematic - Screen Read Board