TANDY

TECHNICAL INFORMATION SERIES

TandyLink Information

0220 TECHNICAL SUPPORT SERVICES

Tandylink® Information

T A N D Y L I N K® I N F O R M A T I O N

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T A N D Y L I N K

Tandylink® is Tandy's own solution to networking a small number of MSDOS® computers to each other. The product is a combination of hardware and software that allows files to be shared from a common file server, similar to 3Comm® and other networks. The network can support up to 32 workstations, each using the option "Workgroup" in Professional Deskmate®. As of this writing, Professional Deskmate® is the only application that supports Tandylink®.

Which Board to Use

A single plug in card interfaces the PC to the network. Two styles of the board are available, depending on the computer type. Catalog number 26-56Ø1 has a card edge to plug into machines with a standard "XT" bus connector, like the 1ØØØSX. Catalog number 26-56Ø2 has a header plug on the side of the board for horizontal mounting in computers, such as the 1ØØØHX.

Memory Requirements

All workstations, including the server, must have at least 512K of RAM. The RAM requirement is not a function of Tandylink® itself, but is mandated by Professional Deskmate® which contains the Workgroup software.

The 1ØØØEX and 1ØØØHX need the Memory Plus board (Catalog number 25-1Ø62) to bring them to 512K. The Plus board has a header plug for the Tandylink® board to plug onto.

The original 1ØØØ will need the Memory Plus board (25-1Ø11) or equivalent to bring it to 512K. The 26-56Ø1 Tandylink® board needed for this machine will take a slot of its own.

Jumper Settings

Tandylink® is a port addressed device and uses both interrupts and DMA handshaking. The jumpers are as follows.

	Hex Address	E1-E2-E3	E4-E5-E6	E7-E8-E9	
Base (port) Address	31Ø	E1-E2	E4-E5	E7-E8	
	318	E1-E2	E4-E5	E8-E9	
	35Ø	E2-E3	E4-E5	E7-E8	
	358	E2-E3	E4-E5	E8-E9	
	39Ø	E1-E2	E5-E6	E7-E8	
	398	**E1-E2**	**E5-E6**	**E8-E9**	**(default address)**
	3DØ	E2-E3	E5-E6	E7-E8	
	3D8	E2-E3	E5-E6	E8-E9	

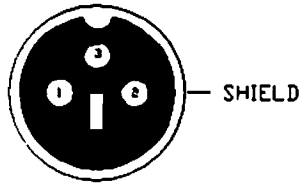
Interrupt Setting	E16-E17 = IRQ3	
	E17-E18 = IRQ2	
DMA Channel	E1Ø-E11 = DRQ1	E11-E12 = DRQ3
	E14-E15 = DACK1	E13-E14 = DACK3

When installing Tandylink® into any MSDOS® machine, you will have to take an inventory of all the boards in the machine, taking note of the IRQ, DRQ, and DACK settings of each. In many cases the Tandylink® board can be jumpered without conflicting with other boards. In some instances, another option board may need to use alternate settings, or even be removed to eliminate conflict.

REMEMBER: No two boards in a given machine may use the same interrupt or DMA settings. This is especially important in machines with hard drives.

Linking Workstations

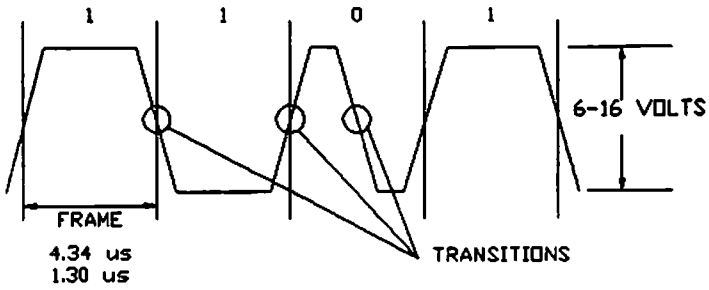
Once the Tandylink® board has been setup and installed in the machine, it must be physically linked to other workstations in the network. This is done via a three pin mini Din plug, with pins 1, 2 and the shield used. The cable is a two conductor twisted pair with an outer shield, and may be purchased as premade 6 and 5Ø ft. cables from Tandy. Maximum combined cable length from the first to last computer on the network cannot exceed 5ØØ ft. for 768K baud, or 1ØØØ ft. at 23Ø.4K baud.



CONNECTOR
FRONT VIEW

Theory of Operation Overview

The transmission method shown below is called FMØ (FM-Zero). A digital "Ø" is signified by an extra transition in the frame. Notice that the position of the transition in the frame is important. Whether the voltage is on the upswing or downswing during the transition is not important. The peak to peak level of the signal between transitions ranges from 6 to 16 volts. In addition, to reduce noise, the signal is sent differentially (balanced) into shielded twisted pair cable.



Two baud rates, 23Ø.4KB and 768KB, are selectable through software, the slower of which is used when the combined cable lengths exceed 5ØØ ft.

On Sheet 1 of the schematic, data from the host is taken in bytes (through U22) and processed by U17 (a dedicated processor) and sent out on pin 15 as FMØ serial data. The serial data TXDA is then converted to a differential signal pair by U6, which feeds a 1:1 ratio isolation transformer, T1 (only one of the transformers is used). The secondary winding of the transformer is connected directly to the Din jack.

FMØ data coming into the board is fed through transformer T1 and tapped at the junctions of R4 and R7. Chip U2, a differential to single ended converter, produces TTL level data, appearing at pin 3. This TTL signal is sent to a transition detector, comprised of U5 and U15. After transitions are detected, they are separated by U9, generating RTXCA* (receive data) and DCDA* (carrier detect) for the processor. The processor assembles the data into bytes and interrupts the host for retrieval.

The discrete gates at the bottom of sheet 1 determine port access to the board, DMA handshaking, wait state and interrupt generation for Tandylink®. Note the jumper blocks shown along the far left hand side of the page, labeled according to their functions.

Shown at the bottom of sheet 2 is the clock generation for the board. The base crystal oscillator runs at 18.432 MHz. This is directly divided to 3.6 MHz for the processor, U17. A programmable divider , U18, is used to provide clocking for the encoding and decoding circuitry, and can be set for an output of 1.8 or 6.1 MHz, depending on the selected baud rates of 23Ø.4KB or 768KB respectively.

Lastly, the Tandylink® board requires +5 and a -12 volts to operate. The -12 volts is used to feed an on-board -5 volt regulator, that in turn powers U6 (a single end - differential converter).

Software Installation

Professional Deskmate® (catalog number 25-41Ø3) is required to access the file server in the network. The complete workgroup software installation procedure is outlined in Chapter 16 of the Professional Deskmate® documentation. A condensed version of the procedure is outlined below.

There are a few items about the setup that are not obvious from the screen prompts; the default settings are marked by an "X". To move around on the screen, use the arrow keys then strike the spacebar to move the "X". Striking "ENTER" moves you to the next screen.

Workstation Setup

1.) Format a blank diskette (FORMAT a:/s), and copy the WRKGROUP directory from Disk 1 of Professional Deskmate® to the formatted diskette. Label it "workgroup startup".

2.) Insert the "workgroup startup" disk and type **wrkgroup** **<ENTER>**. A menu will appear. Press I to configure the system. At the next menu type **T** for a Tandylink® setup.

3.) The next screen to appear shows various DMA channel, interrupt line, base (port) address and network speed options that must be set to match the board's jumpers.

4.) The next screen asks for a client name. Enter a unique title, eight characters maximum. Press **<ENTER>** when finished.

5.) It now asks if this is to be a server or a local workstation. Press **<ENTER>** for a local station. It should display a message "initializing client" and scroll several messages, then drop to an "A>" prompt. A new file called DMLINK.TAN has been created to store your selected options, and WRKGROUP will use this file to install drivers and setup Tandylink® on bootup.

6.) Tandylink® contains driver routines that must be memory resident before network communication is established. Hold **<CTRL>** **<ALT>** and depress **<DELETE>** to reset the machine. After the date and time prompts, WRKGROUP will execute and load the drivers into memory. From now on, WRKGROUP will install the drivers on bootup initiated by an entry in AUTOEXEC.BAT.

Server Setup

Server setup is very similar to configuring a workstation, with a few added steps. Since this is the server, it asks what COM port, printer default and shared calendar drive to expect. The following installation will describe **hard drive** setup of Tandylink®.

1.) From disk #1 of Professional Deskmate®, copy the contents of its "WRKGROUP" directory to the root directory of the hard drive (C:).

2.) Make Drive C: active, and type **wrkgroup** to start the setup program. A configuration screen should appear.

3.) Follow the prompts for initialization and hardware configuration screens, noting especially the DMA and interrupt settings. At some point it will ask whether this is to be a server or a workstation. Answer "S" instead of **<ENTER>** to make this machine the server.

IMPORTANT: The first defined server should have a name of WRKGROUP

4.) As the setup progresses it asks for information about default printer, calendar drive location and file server names. The previously chosen hardware parameters are also displayed, and you may change them here if you need to, by using the arrow keys to move inside the screen, and then the spacebar to change the option.

5.) At this point WRKGROUP will begin initializing the system and creates the file DMLINK.TAN, directories WRKGROUP and DMLINK, and a modified AUTOEXEC.BAT file.

6.) After creating the necessary files, the program proceeds to install Tandylink® drivers as resident in RAM. From now on, the drivers will automatically be made resident on boot up. The drivers for the server(s) MUST be made resident before ANY workstations can access the network and the common directory WRKGROUP.

Note: The WRKGROUP program is fairly intelligent. If it can't find DMLINK.TAN on bootup, it will assume you need to initialize the system. Also, if it has already made the drivers resident on bootup, and you execute WRKGROUP, it will assume you want to change some operating parameter and drop you into the hardware parameters menu.

Using the Network

To enter the network, you must boot Professional Deskmate®. By pressing <F1> at the first screen, you can see the option WORKGROUP at the bottom of the popup window. Use the arrow keys to select this option and press <ENTER>. This gets you onto the network. You may list shared files in the WRKGROUP directory by pressing <F4> and selecting WRKGROUP. Below are some of the file manipulations you can do.

Copying a file from the shared directory to a workstation disk:

- Press <F2> and select "Copy from..."
- Type in the source and destination using full path names.
  (the software will fill in part of the pathname, depending on the directory you are currently in)

Copying to a shared directory:

- Press <F2> and select "Copy to..."
- Type in source and destination using full path names

Print a file on the server printer:

- Press <F2> and select "Print"
- Type the name of the file to be printed. Only local files can be selected for printing.

Some Notes on Workgroup Software

- As of this writing, you can't use wild card characters in filenames when copying to or from the server.
- In the pop up menus: you can use the first letter of the option instead of using arrow keys.
- When using any <F2> options: the software will fill in the source path and filename, based on the last cursor position in the directory listing. This is just a convenience. The path and filename may be retyped if you don't desire the default entry.
- Any file you wish to be shared on the network has to copied to the WRKGROUP directory on the server(s).

Diagnostic Software

A diagnostic is available for Tandylink® that tests each station's ability to transmit and receive packets of data. It also counts the number and type of difficulties incurred, if any. The following files must be present on the diagnostic disk:

TLI.EXE
DRVR853Ø.COM
EXERFST.EXE

Type **tli <ENTER>** to start the diagnostic. The first screen appearing asks for a port address selection. The number you choose has to match the jumper settings on the Tandylink® board. Option 5 (398h) is the standard address.

The second screen requires input for DMA channel and interrupt settings, again chosen to match the board jumpers. The bottom of the screen displays four tests; Bus, DMA, Int, All and Xmit & Receive.

Option Ø checks the data and address bus to Tandylink®, assuring that communication between host and board is intact.

Option 1 assures that a data request can be received from the Tandylink® board and that the host returns the appropriate acknowledge.

Option 2 sends an interrupt to the host and successfully completes when the host acknowledges.

Option 3 does tests Ø, 1, and 2 automatically.

Option 4 calls the program EXERFST.EXE to test network communication. For the diagnostic to be meaningful, the server and whatever workstations you are testing must be setup as follows:

- the machines must be rebooted, but must not be allowed to install the Tandylink® drivers. You can either rename AUTOEXEC.BAT to AUTOEXEC.BAK and then reset the machine, or reboot and strike <CNTL> <C> to abort AUTOEXEC.BAT as soon as starts to execute.

- start the diagnostic "TLI" and select the Xmit & Receive option. All machines involved must have option 4 selected.

Once option 4 is selected a menu will be displayed. The options and a brief description of what they do is below.

P - displays on the screen any packet transmitted to it. This is used to verify that data is being received from a transmitting station. Using the diagnostic transmission, you should see blocks of "AA", and "55" scroll down the screen. Random patterns should be regarded as errors.

D - keeps received transmissions from appearing on the display. If you don't desire to see the actual data packets on the screen, set this.

T - transmits alternating packets of AA and 55 hex on the network. Once "T" is selected, you can choose to transmit a single packet or send continuously.

C - stops transmission command "T" as soon as it's pressed.

E - removes the Tandylink® drivers from memory and exits to DOS.

R - reloads Tandylink® driver to memory. This may be necessary if the RAM gets trashed, or the diagnostic "acts up".

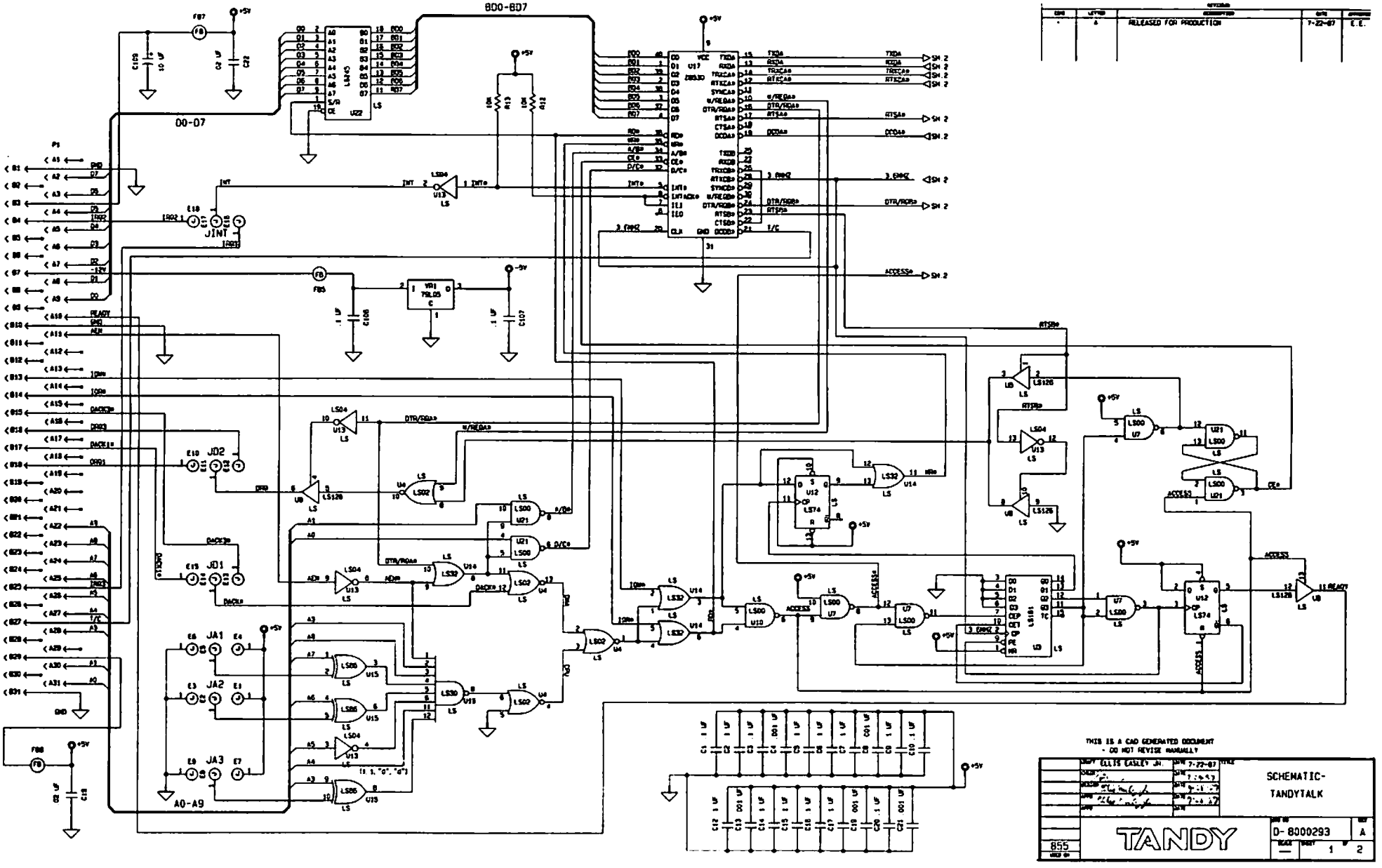
S - displays the driver and workstation status. I/O address, interrupt and DMA channels and the mode are displayed along with any errors or collisions that may have occured. This should be used after transmitting or receiving packets of data. When testing only two stations at a time, few collisions should occur.

M - toggles the station speed fast/slow. This permits checking the board at both the high and low network baud rates. Any two stations talking to each other must be set for the same speed.

To keep track of things, test each station individually with the host. The quickest way to test each station is to press "P" at both, then press "T" on one of the stations and see if the other station received the packet. This is evident by the receiving station scrolling "AA" and "55" data to the screen. If you chose continuous transmission, press "C" to stop it.

After pressing "C" the test may report that it missed X number of packets while trying to display them. This is not a fatal error. It is just telling you that it could not get some packets the first time. The sending machine will re-transmit the packet later.

Remember to press "S" to display the test results. After you are satisfied that the stations are working correctly, exit the diagnostic by pressing "E". Reinstate the auto execution file by renaming AUTOEXEC.BAK to AUTOEXEC.BAT.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JINT
JD2
JD1
JA1
JA2
JA3
A0-A9
RELEASED FOR PRODUCTION
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SCHEMATIC-
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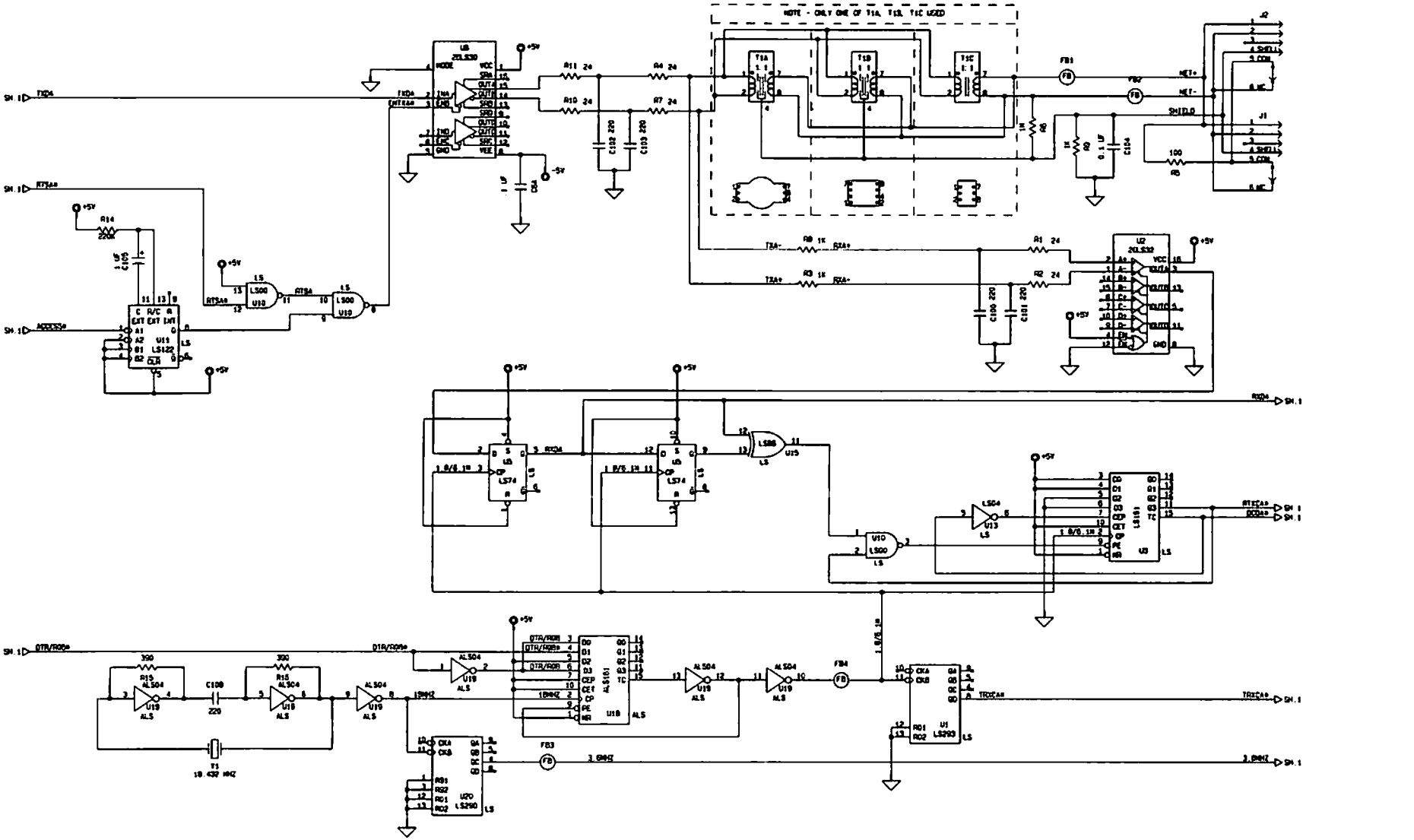

SUBTITLE	Doc no	REV
NETWORK, CLOCKS	D-8000293	A
	SCALE —	SHEET 2 OF 2

SERVICE POLICY

Radio Shack's nationwide network of service facilities provides quick, convenient, and reliable repair services for all of its computer products, in most instances. Warranty service will be performed in accordance with Radio Shack's Limited Warranty. Non-warranty service will be provided at reasonable parts and labor costs.

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