TECHNICAL BULLETIN INDEX
Sorted by Bulletin Number
06/25/86

No.	Catalog	Description	Rev. Date
6000:001	26-6021	Correct timing to memory board during write cycle.	02/13/85
6000:002	26-6021	correct timing error.	01/21/85
6000:003	26-6021	Insure ground between 68000 CPU and RAM boards.	01/16/85
6000:004	26-6021	Incompatibility of Video PCB oscillator inverters.	02/25/85
6000:005	26-6021	Faulty Texas Instruments "AS" type parts.	03/11/85
6000:006	26-6021	Increase operational reliability of 8 MHz CPU PCB.	03/18/85
6000:007	26-6022	Increase operational reliability of HD controller.	03/18/85
6000:008	26-6021	Increase operational reliability of 68K RAM PCB.	03/10/86
6000:009	26-6021	Increase operational reliablility of video board.	03/18/85
6000:010	26-6021	Correct errors in artwork and prevent bus errors.	04/23/85
6000:011	26-6021	BOOT ERROR MF caused by slow multiplexers.	03/11/85
6000:012	26-6021	Tandon belt drive Rev. Y not seeing index pulse.	05/29/85
6000:013		Deleted - Combined into 6000:8	
6000:014	26-6022	Reduce occurances of ACTIVE DRIVE NOT READY errors	01-06-86

DATE: January 16, 1985

REVISION DATE: February 13, 1985

BULLETIN NO.: 6000:1

PRODUCT: 26-6021/2 (Tandy 6000)
26-6014 (8 MHz CPU upgrade kit)

SUBASSEMBLY: 8 MHz 68000 CPU board

PURPOSE: To correct data setup time to memory board during a write cycle.

DISCUSSION:

An error in the artwork on early revision 8 MHz 68000 CPU boards (Revision A) will cause the data setup time to the 68000 memory board to be incorrect during a write cycle.

PROCEDURE:

This modification is for Revision A boards only.

Using wire wrap wire, install the following four jumpers:

(1) Jumper U10, pin 9 to U2, pin 4.
(2) Jumper U2, pin 3 to U18, pin 11.
(3) On the solder side of the board, jumper U18, pin 12 to U19, pin 8.
(4) On the solder side of the board, jumper U18, pin 13 to U19, pin 7.

DATE: January 21, 1985

REVISION DATE: January 21, 1985

BULLETIN NO.: 6ØØØ:Ø2

PRODUCT: 26-6Ø21/2 Tandy 6ØØØ

SUBASSEMBLY: 8 MHz 68ØØØ CPU PCB, Rev. A.

PURPOSE: To correct timing error.

DISCUSSION:

A timing error has been found involving signals BERR* and DTACK* on the 8 MHz 68ØØØ CPU board.

PROCEDURE:

1. On solder side of PCB cut the trace at U21 pin 9.

2. Add a jumper wire from U9 pin 4 to U33 pin 13.

NOTE: Modification applies to revision A boards only.

DATE: January 16, 1985

REVISION DATE: January 16, 1985

BULLETIN NO.: 6000:3

PRODUCT: 26-6021/2 (Tandy 6000)
26-6014 (8 MHz CPU upgrade kit)

SUBASSEMBLY: 8 MHz 68000 CPU board (AX-9006)

PURPOSE: To insure good ground connections between 68000 CPU and memory boards.

DISCUSSION:

Due to an error in the artwork on early revision (Revision A) boards, a modification to insure good ground connections between the 68000 CPU board and associated memory boards is required.

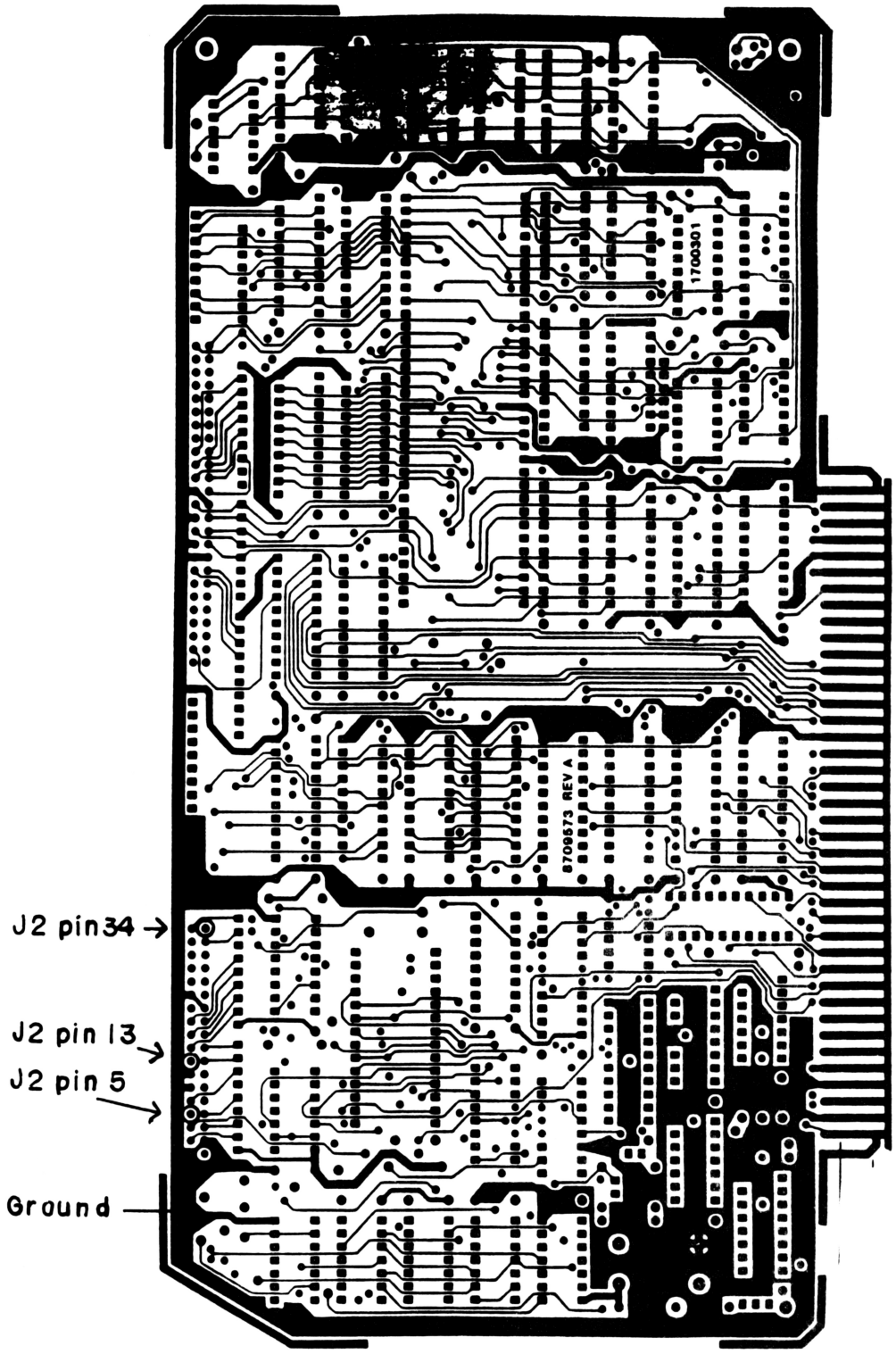
PROCEDURE:

This modification is for Revision A boards only.

Using wire wrap wire, install the following jumpers on the solder side of the 68000 CPU board:

(1) Jumper J2, pin 5 to ground.
(2) Jumper J2, pin 13 to ground.
(3) Jumper J2, pin 34 to ground.

Ground may be found at the feed-throughs on the ground plane near J2 on the solder side on the board.



SOLDER SIDE (LAYER 4)

DATE: February 25, 1985

REVISION DATE: February 25, 1985

BULLETIN NO.: 6000:4

PRODUCT: 26-6021/2 Tandy 6000

SUBASSEMBLY: Video Board AX-9240

PURPOSE: To discuss incompatibility of inverters in the oscillator of Tandy 6000 Video Board.

DISCUSSION: An incompatibility problem exists on the Tandy 6000 Video board. You will need to check IC U1 on the Video Board to insure that only Motorola or Fairchild inverters are used. This chip is a 74LS04 and is used in the clock circuitry. The correct parts can be ordered under 26-6021/2 as either AMX-3552 or AMX-4945.

PROCEDURE: Check the inverter chip in the U1 position and replace it with the correct Motorola or Fairchild IC's as needed.

DATE: March 11, 1985

REVISION DATE: March 11, 1985

BULLETIN NO.: 6000:5

PRODUCT: 26-6021/2 (Tandy 6000)

SUBASSEMBLY: AX-9364 Main Logic Board

PURPOSE: To check for the presence of faulty Texas Instruments "AS" type parts.

DISCUSSION:

The presence of faulty Texas Instruments "AS" type parts needs to be checked and corrected if necessary on boards of **all** revision levels. The faulty parts are of the following types: 74AS240, 74AS241, 74AS242, and 74AS244, manufactured in 1984 or earlier (date codes "84xx" or "4xxxx" with "84" and "4" being year of manufacture).

** **Compliance With This Bulletin Is Mandatory** **

PROCEDURE:

Disassemble the Tandy 6000 so that the main logic board may be removed. Check to see that U26-U29, U31, U32, U35, U37, U40, U42, and U43 are **not** Texas Instruments "AS" type parts with a "84xx" or earlier, or "4xxxx" or earlier date code. If they are, replace them with the following:

U26, U29, U31: part # MX-5853, cat. # 26-6004

U27, U28, U32,
U40, U42, U43: part # MX-5933, cat. # 26-6006

U35, U37: part # AMX-3864, cat. # 26-6001

Note: The preceding modification is to be performed on all boards.

DATE: March 18, 1985

REVISION DATE: March 18, 1985

BULLETIN NO.: 6000:6

PRODUCT: 26-6021/2 (Tandy 6000)

SUBASSEMBLY: AX-9006 8 MHz CPU board

PURPOSE: To outline modifications to increase operational reliability.

DISCUSSION:

To increase operational reliability, the following modifications are necessary on the 8 MHz 68000 CPU board.

** **Compliance With This Bulletin Is Mandatory** **

PROCEDURE:

Modifications for the 8 MHz 68000 CPU board are as follows:

(1) U3 must be either a 74AS373 or a 74F373. If it is not, replace it with the following:

U3: part # MX-6579, cat. # 26-6004

(2) U31 must be a 74F240. If it is not, replace it with the following:

U31: part # MX-2119, cat. # 26-6021

(3) U41, U44, and U51 **must not be** Texas Instruments "AS" parts with a date code of "84xx" or earlier, or "4xxxx" or earlier. (The "84" and "4" denote year of manufacture.) The parts in question are 74AS240, 74AS241, 74AS242, and 74AS244. If they are chips with the bad date codes, replace them with the following:

U41: part # AMX-4583, cat. # 26-6001
U44, U51: part # MX-5735, cat. # 26-6021

(4) On the component side, add a 330 pf ceramic cap from the end of C43 closest to C37, to the feedthrough connected to TP-28. The capacitor may be ordered as:

330 pf ceramic cap, part # CF-1514, cat. # 26-9999

(5) On the foil side, add a ground strap (22 ga. stranded wire) between the grounded ends of C28 and C29.

(6) The jumper installed at E2-E3 should be moved to E1-E2.

(7) On U36, pin 5 should be bent upward and jumpered to U25, pin 9.

(8) On the solder side of the board, cut the trace at U21, pin 9 and run a jumper from U9, pin 4 to U33, pin 13.

(9) Make sure that U48 is a 16R4 type PAL.

(10) Run the following jumpers:
- (a) On the solder side, jumper from U10, pin 9 to U2, pin 4.
- (b) On the solder side, jumper from U2, pin3 to U18, pin 11.
- (c) On the component side, jumper from U18, pin 12 to U19, pin 8.
- (d) On the component side, jumper from U18, pin 13 to U19, pin 7.

Verify correct operation using 68000 family diagnostics.

DATE: March 18, 1985

REVISION DATE: March 18, 1985

BULLETIN NO.: 6000:7

PRODUCT: 26-6022 (Tandy 6000)

SUBASSEMBLY: AX-9432 Internal HD controller board

PURPOSE: To outline modifications to increase operational reliability.

DISCUSSION:

All Texas Instruments (TI) AS parts of the following types with a date code of "84xx" or earlier have been confirmed by TI as being defective. The parts in question are: 74AS240, 74AS241, 74AS242, and 74AS244. If these parts are present on the board they must be replaced by equivalent "S", "LS", "ALS", or "F" parts.

** **Compliance With This Bulletin Is Mandatory** **

PROCEDURE:

If U21, U40, or U41 are TI "AS" parts with a date code of "84xx" or earlier, replace them with the following:

U21: part # AMX-3864, cat. # 26-6001
U40, U41: part # AMX-4225, cat. # 26-6001

DATE: March 18, 1985

REVISION DATE: March 10, 1986

BULLETIN NO.: 6000:8

PRODUCT: 26-6021/2 Tandy 6000

SUBASSEMBLY: AX-9007 512k/1 meg memory board

SUBASSEMBLY REVISION: Rev. Blank, Rev. A

PURPOSE: To outline modifications to increase operational reliability, and to reduce occurrence of bus arbitration errors. These errors may appear as Supervisor Trap 2 problems when printing documents from within the XENIX environment.

DISCUSSION:

To increase operational reliability, and to reduce the occurrence of bus arbitration errors in the 68000 hardware, it is necessary to replace the incoming timing and control signal buffer on the 512k/1 meg memory board. Additionally, the following modifications must be present on the 512k/1 meg memory board.

** **Compliance With This Bulletin Is Mandatory** **

PROCEDURE:

Texas Instruments "AS" parts of the following types manufactured prior to 1984 are faulty. The parts in question are: 74AS240, 74AS241, 74AS242, and 74AS244. If U2, U3, U4, U5, U6, U7, U8, U9, or U28 are Texas Instruments "AS" parts with a date code of "84xx" or earlier, or with a date code of "4xxxx" or earlier ("84" and "4" being the year), replace them with the following:

U2-U8: part # MX-2119, cat. # 26-6021 (74F240)
U9: part # MX-5853, cat. # 26-6021 (74ALS244)
U28: part # MX-6120, cat. # 26-5103 (74F244)

Note: U9 must be a 74ALS244. An **AS** or **F** type chip is not acceptable. If U9 is a 74AS244 or a 74F244, it should be replaced with the part listed in the above parts list.

Perform the following modifications:

(1) On the solder side, cut the trace at U11, pin 4.

(2) Add a 100k 1/4 watt 5% resistor from U11, pin 4 to U11, pin 14. This resistor may be ordered as:

100k, 1/4 watt, 5% resistor: part # N 0371EEC, cat # 26-9999

(3) Add a 1 microfarad, 16V+ capacitor from U11, pin 4 to U11, pin 7. This capacitor may be ordered as:

1 microfarad, 16V+ capacitor: part # CC 105KDTP, cat # 26-9999

(4) On the component side, cut the trace at the feedthrough next to the +5V (right) end of C8. Run a jumper from that feedthrough to U17, pin 13.

(5) Run a jumper from U17, pin 12 to U17, pin 11.

(6) Run a jumper from U17, pin 10 to U16, pin 10.

(7) Add a 330 pf cap in the following locations:
(a) U9, pin 7 to U9, pin 10.
(b) U9, pin 18 to U9, pin 19.
(c) U9, pin 16 to U9, pin 19.

This capacitor may be ordered as:

330 pf ceramic cap: part # CF-1514, cat. # 26-9999

(8) Lift U9, pin 6. Jumper the lifted pin to U9, pin 11.

(9) Jumper U9, pin 11 to U11, pin 2.

(10) On the solder side of the board, cut the trace at U26, pin 11.

(11) On the solder side of the board, cut the trace at U1, pin 1.

(12) Run a jumper from U1, pin 1 to U1, pin 2.

(13) Run a jumper from U17, pin 4 to U26, pin 8.

On 512k boards, E1-E2 should be jumpered.
On 1 meg boards, E2-E3 should be jumpered.

Check for correct operation using the 68000 family diagnostics.

DATE: March 18, 1985

REVISION DATE: March 18, 1985

BULLETIN NO.: 6000:9

PRODUCT: 26-6021/2 (Tandy 6000)

SUBASSEMBLY: AX-9420 Video Board

PURPOSE: To outline modifications to increase operational reliability.

DISCUSSION:

All Texas Instruments (TI) "AS" parts of the following types with date codes of "84xx" or earlier have been confirmed by TI as being defective. The parts in question are: 74AS240, 74AS241, 74AS242, and 74AS244. If these parts are present on the board they must be replaced by equivalent "S", "LS", "ALS", or "F" parts.

** **Compliance With This Bulletin Is Mandatory** **

PROCEDURE:

If U7, U38, U39, or U40 are TI "AS" parts with date codes of "84xx" or earlier, replace them with the following:

U7: part # AMX-3864, cat. # 26-6001
U38, U39, U40: part # AMX-4225, cat. # 26-6001

In addition, U1 **must be** a Motorola or Fairchild part. If it is not, replace it with the following:

U1: part # AMX-3552, cat. # 26-6001

DATE: March 11, 1985

REVISION DATE: April 23, 1985

BULLETIN NO.: 6000:10

PRODUCT: 26-6021/2 (Tandy 6000)

SUBASSEMBLY: AX-9369 Mother Board

PURPOSE: To correct errors in artwork and prevent bus errors.

DISCUSSION:

To prevent bus errors, three traces need to be cut away from a resistor pack and three capacitors need to be installed on the card cage mother board.

** **Compliance With This Bulletin Is Mandatory** **

PROCEDURE:

Due to a change in the silk-screening for the resistor packs on the card cage mother board, the actual pin to be cut on the resistor packs will be different for certain board revision levels.

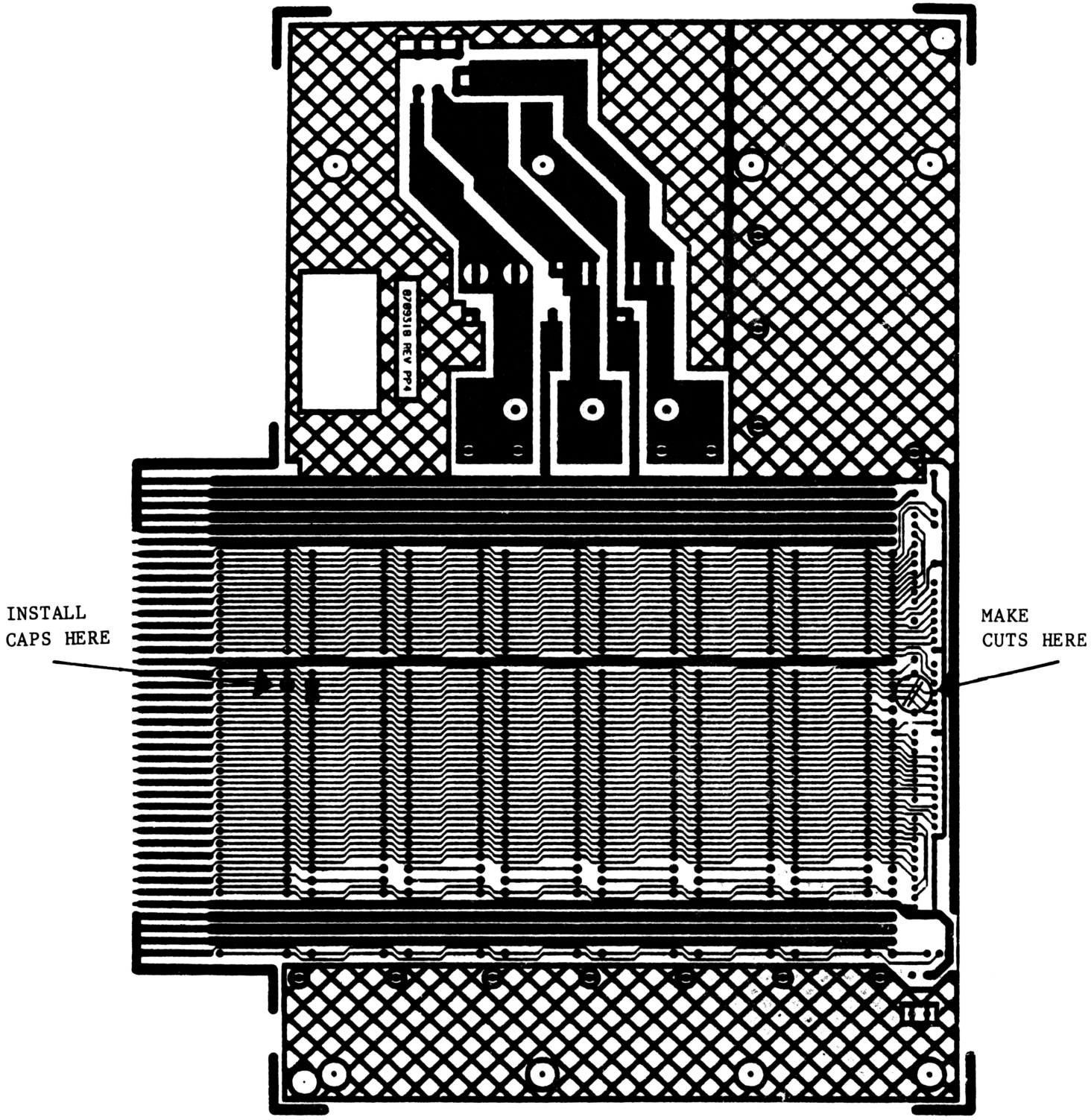
On mother boards of revision levels prior to Rev. B, pins 3, 4, and 5 on resistor pack R6 need to be cut.

On mother boards of revision level Rev. B or later, pins 4, 5, and 6 on resistor pack R6 need to be cut.

On boards of all revision levels, three (3) 220 pf caps should be jumpered from pins 44, 45, and 46 to ground on the bottom-most connector. These pins correspond to the traces cut on the resistor pack R6. See Figure 1 for clarification. The capacitors needed for this modification may be ordered as:

220 pf ceramic cap: part # CF-1490, cat. # 26-9999

If 330 pf caps are found installed on the mother board, they may be considered satisfactory; however, should they need replacement, 220 pf caps should be used.



Circuit Trace, Mother Board 8897701, Solder Side

Figure 1

DATE: March 11, 1985

REVISION DATE: March 11, 1985

BULLETIN NO.: 6000:11

PRODUCT: 26-6021/2 Tandy 6000

SUBASSEMBLY: Main Logic Board AX-9364

PURPOSE: To correct BOOT ERROR MF caused by slow multiplexers on the main logic board.

DISCUSSION: An addressing problem exists with Tandy 6000s due to slow multiplexers on the main logic board. U52, U53, and U79, three 74LS157 IC's, are misaddressing memory causing BOOT ERROR MF.

PROCEDURE: Remove the three 74LS157 IC's and replace them with 74S157 IC's or 74F157 IC's. The part numbers for these IC's are below.

74S157 MX-6112 26-5103
74F157 MX-2135 26-6014/5 or 26-6021/2

DATE: May 29, 1985

REVISION DATE: May 29, 1985

BULLETIN NO.: 6000:12

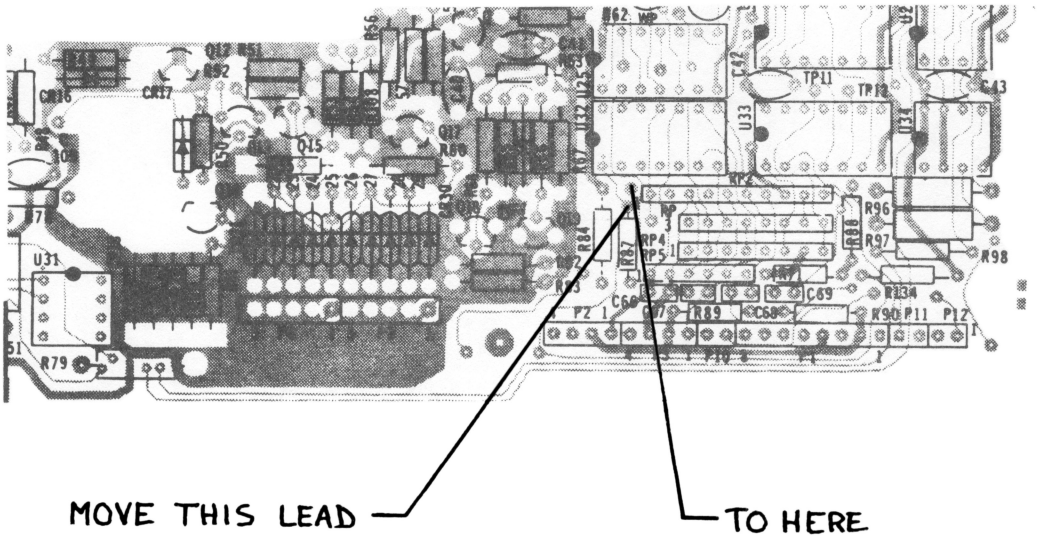
PRODUCT: 26-6021/22, Model 6000

SUBASSEMBLY: AXX-0344, Tandon Belt Drive Logic Board, Rev. Y

PURPOSE: To correct an error in installation of R87

DISCUSSION: Some Tandon Belt Drive Logic Boards (Rev. Y) have come from the vendor with R87, a 150 ohm pullup resistor, installed incorrectly. These boards may be identified by the existance of a small white sticker (bearing a bar code, three numbers, and the letter "Y") attached to the board right next to the "REV" marking. The defective boards will not see the index pulses at all and will not recognize an inserted diskette, i.e. will remain at the "Insert Diskette" prompt even after a diskette is inserted and the drive door is closed.

PROCEDURE: Locate R87 on the Drive Logic Board. Note that one lead is connected to a feedthrough which has a trace running to U32, pin 1. Unsolder this lead of R87 and resolder it to the feedthrough right above it. The correct feedthrough is a +5V trace.



DATE: June 3Ø, 1986

REVISION DATE: June 3Ø, 1986

BULLETIN NO: 6ØØØ:13

PRODUCT: 26-6Ø18 Disk Cartridge Interface (16/6ØØØ)

SUBASSEMBLY: AX-9Ø34 Interface PCB

SUBASSEMBLY REVISION: PCA ØØ717ØØØ Rev. Ø

PURPOSE: To reduce occurrence of random lockups and "Bugchk: SCSIFI" errors in the Xenix environment.

DISCUSSION:

The DMA XFERRQ signal is not being properly qualified on the interface board for the disk cartridge system. If an error occurs while the DMA is receiving data from the cartridge drive, the error is treated as though it was data and is stored in the RAM buffer. After the data transfer is completed and the DMA goes offline, the CPU will attempt to read the error, which is no longer there. This may cause lockup of the computer, or "Bugchk: SCSIFI." By correctly qualifying the XFERRQ signal, Xenix will be able to retry and recover from soft errors, which in the current configuration it is unable to do.

** **Compliance With This Bulletin Is Mandatory** **

PROCEDURE:

1. On the solder side of the interface board, cut the trace at U21, pin 2.

2. Jumper U11, pin 1 to U21, pin 2.

Test the disk cartridge interface and drives under diagnostics and Xenix after completing the modification.

TANDY COMPUTER PRODUCTS

DATE: January 6, 1986

REVISION DATE: January 6, 1986

BULLETIN NO: 6000:14

PRODUCT: 26-6022 Tandy 6000

SUBASSEMBLY: AX-9432 Internal hard drive controller board.

PURPOSE: Reduce occurances of ACTIVE DRIVE NOT READY errors from Xenix 3.x

---

DISCUSSION: In order to make Xenix run faster, some modifications were done to the Hard Disk I/O routines. One of these improvements was to reduce the amount of time software waited for a reset from the controller board. The software now expects the controller to reset in 15 microseconds or less. The design of the internal hard drive controller makes it reset in an average of 12 microseconds. Due to differences in component tolerance, the reset can be lengthened to more than 15 microseconds. Changing R27 on the built in controller board to 10K ohm will ensure a shorter reset pulse.

****Compliance with this bulletin is mandatory****

PROCEDURE: Replace R27 with a 10K ohm, 1/4 watt resistor. Run hard drive diagnostics to ensure proper operation.

26-9999R	Resistor 1/4 watt	10K ohm	N-0281EEB

DATE: July 24, 1986

REVISION DATE: July 24, 1986

BULLETIN NO: 6ØØØ:15

PRODUCT: 26-6Ø21/2 Tandy 6ØØØ

SUBASSEMBLY: AX-9364 Main Logic Board

SUBASSEMBLY REVISION: Rev. Blank, Rev. A

PURPOSE: To correct power-on reset problems in heavily loaded machines.

DISCUSSION:

In some Tandy 6ØØØ's with heavily loaded card cages (i.e. systems which have several additional boards such as one or two multiterminal boards, graphics card, ARCNET board, etc.) the power-on reset pulse may be too short to properly initialize the machine. This may cause erratic behavior such as failure to boot, strange or misplaced characters on the CRT, and other malfunctions which may or may not be overcome by using the front panel reset switch. This problem may be resolved by replacing a capacitor in the power-on reset circuit on the main logic board with one of a higher value.

PROCEDURE:

(1) Remove C3 (1µF electrolytic capacitor) on the main logic board.
(2) Install a 1Øµ F electrolytic capacitor in the C3 position.

Reassemble and test the machine by installing all boards and powering up. The machine should initialize correctly.

The 1Øµ F electrolytic capacitor is available as:

Part # CC-1Ø6MDCA, Cat. # 26-4ØØ5

DATE: July 28, 1987

REVISION DATE: July 28, 1987

BULLETIN NO: 6ØØØ:16

PRODUCT: 26-6Ø21/2 Tandy 6ØØØ

SUBASSEMBLY: AX-9364 Main Logic Board

SUBASSEMBLY REVISION: Rev. Blank, Rev. A

PURPOSE: Modification to make carrier detect signal normally true and guarantee fail-safe signal level for SIO control signals. This modification may also correct problems with systems which will not initialize port B terminals in Xenix operation.

DISCUSSION:

To make the serial ports more reliable the pullups for SIO control signals need to be changed. The pullup for carrier detect needs to be changed not only in value, but from -12V to +12V so that it is normally true. This modification is required on all Rev. Blank boards.

On some boards which display problems initializing port B in Xenix operation (i.e. boards which refuse to communicate with terminals on port B), an additional modification may be necessary, which pulls carrier detect normally true on port B as well as on port A. This modification may be necessary on both Rev. Blank and Rev. A main logic boards.

** **Compliance with part (1) of the procedure is mandatory** **
** **for Rev. Blank boards** **

PROCEDURE:

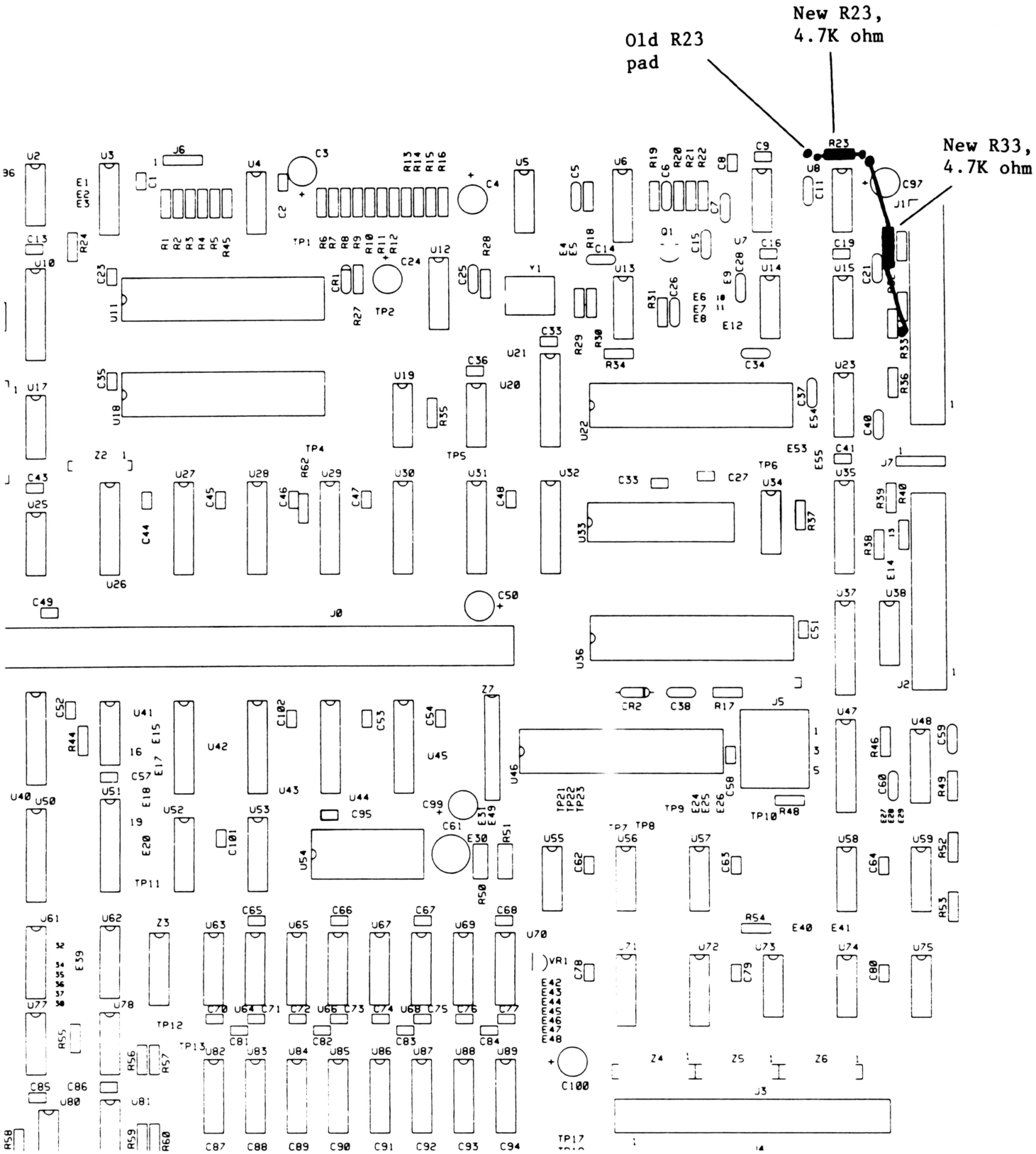
Part (1), mandatory for Rev. Blank boards:

Change R21, R23, R25, R32, R36 from 1ØK ohm to 4.7K ohm resistors. Remove resistor R33. On the component side of the board, install a 4.7K ohm resistor with one lead attached to the old R33 solder connection closest to R36 and the other lead attached to the +12V line at the feedthrough adjacent to R23 between U8 and C97 (refer to figure 1). The leads should be insulated to prevent them from shorting.

Part (2), apply as needed to all boards:

Remove resistor R23. On the component side of the board, install a 4.7K ohm resistor with one lead attached to the old R23 solder connection closest to C97, and the other lead attached to the +12V line at the feedthrough adjacent to the remaining R23 solder connection. The +12V line in question also connects directly to U7, pin 14 (refer to figure 1).

All resistors required for this modification should be 4.7K ohm +/- 5% 1/4W. They can be ordered through National Parts using part number N-Ø247EEC with catalog number 26-9999R.


Old R23
pad
New R23,
4.7K ohm
New R33,
4.7K ohm