Radio Shack®
A Division of Tandy Corporation

NATIONAL TECHNICAL SUPPORT 0220 817-390-3810
400 ATRIUM—ONE TANDY CENTER, FORT WORTH, TEXAS 76102

Date: March 28, 1985

To: All Computer Service Personnel

From: Ken Brookner

Subject: Tandy 6000 Memory Board Precaution

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**********
**IMPORTANT**
**********

When installing or servicing the 26-6014 and 6015 add on boards, please inspect the two caps located on the solder side of the board to insure that they are not shorted to each other or to the bottom of RP2. This problem may occur through shipping or when installing the additional 512K of memory (pressing down on the board)

Current production will have silicon sealant applied below the caps to prevent this from occurring and later production will relocate the caps to the component side of the board.

26-6014

# INSTALLATION GUIDELINES
(PRELIMINARY)

The following information is pertinent to installation and check out of Tandy 6000 upgrade kit:

Installation in Model II (26-4001/2)

1. Remove top cover.
2. Remove card cage retainer bar.
3. Install upgrade board set into adjacent unused slots.
4. Replace retainer bar. Be sure cards are aligned properly and do not short to metal panel.
5. Replace top cover.
6. Run Xenix diagnostics test.

Installation in Model 16 "A" (26-6001/2)

Follow directions for Model II, except after step 2 remove existing 68000 boards.

Installation in Model 12 (26-4004/5)

1. Remove top cover.
2. Remove card cage assembly.
3. On solder side of motherboard, cut traces going to pins 3, 4, and 5 of resistor pack R6 near the resistor pack.
   On the back of J1 connector, add a 220pF capacitor from each of the pins 44, 45, and 46 to ground (3 included).
4. Reassemble.
5. Run Xenix diagnostics test.

Installation in Model 16B (26-6004/5/6)

Follow directions for Model 12, except remove existing 68000 boards.

GH 2/27/85

TI

From the Desk of...

[redacted] 2/6/84

The following Texas Instruments parts should be removed from circuits and returned to TI:

AS240
AS241
AS242
AS243
AS244

AS230
AS231

AS756
AS757
AS758
AS759
AS760
AS762
AS763

4ELC

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NATIONAL TECHNICAL SUPPORT 0220 817-390-3810
400 ATRIUM—ONE TANDY CENTER, FORT WORTH, TEXAS 76102

Date: July 17, 1985

To: All Radio Shack Computer service centers

From: Gary Kueck, Technical Support

Subject: New Release of the 8" System Diagnostic

File: Diagnostics

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Enclosed in this mailing is a new copy of the 8" Systems diagnostic diskette (AXX-2037). Several programs have been changed.

DIAG68 and DIAG16 have been improved to help check the Tandy 6000s and upgrades more thoroughly.

A quick formatter has been added to HDREL. The program configure option has been modified to allow the drive type to be directly entered (12 Meg, 35 Meg... ). An option to disable retries has been added. The option to disable retries works ONLY on WD1010-05 and WD1010-08 ICs.

A new program has been added to test cartridge drives called SCSIDIAG. The manual for this program will be sent later.

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NATIONAL TECHNICAL SUPPORT 0220 817-390-3810
400 ATRIUM—ONE TANDY CENTER, FORT WORTH, TEXAS 76102

DATE: April 7, 1985

TO: Computer Service Personnel

CC: Ken Mabe, Ken Brookner

FROM: Randy Smith RB

SUBJECT: Tandy 6000

FILE: 26-6021

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Manufacturing has indicated that the gray cables used on the Model 6000 in both upgrade kits and manufactured units may have some degree of chemical contamination. These cables should be considered suspect in systems with intermittent problems.

Additionally the edge connectors (J0) on the 8 MHZ CPU and memory boards may also have been contaminated. Cleaning these connectors with isopropyl alcohol has significantly reduced the random and nonspecific problems associated with 6000 upgrades and installations.

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NATIONAL TECHNICAL SUPPORT 0220 817-390-3810
400 ATRIUM—ONE TANDY CENTER, FORT WORTH, TEXAS 76102

Date: April 3, 1985

To: All Computer Service Personnel

From: Ken Brookner KB

Subject: Tandy 6000 Upgrade Checklist

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With this memo you will find the Tandy 6000 and Upgrade Checklist for your use in ensuring that both the Tandy 6000 and upgraded Model 12/16Bs will function properly. It can not be overemphasized how important this checklist is to the proper operation of these machines.

You should use this checklist whenever a Tandy 6000 comes through your facility as well as when upgrading/servicing the previous machines. If you have any questions, please contact Technical Support for assistance.

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NATIONAL TECHNICAL SUPPORT 0220 817-390-3810
400 ATRIUM—ONE TANDY CENTER, FORT WORTH, TEXAS 76102

DATE: April 24, 1985

TO: All Computer Service Personnel

FROM: Valerie See, Technical Support VB

SUBJECT: CAS*/BERR* Modification on 512k/1 meg memory board (AX-9007)

FILE: Tandy 6000

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The CAS*/BERR* modification, consisting of two cuts and two jumpers, is being implemented by manufacturing in a manner slightly different than that presented in Technical Bulletin 6000:8 and the 6000 upgrade checklist. The full modification is as follows:

(1) Cut at U26, pin 11 on the solder side of the memory board.
(2) Cut at U1, pin 1 on the solder side of the board.
(3) Jumper U1, pin 1 to U1, pin 2 on the component side.
(4) Jumper U17, pin 4 to U26, pin 8 on the component side.

Step (4) is the point of contention. There is a trace on the component side of the board running under U26 which connects pin 8 to pin 11. The factory is taking advantage of this fact and is implementing step (4) as follows:

(4a) Jumper U17, pin 4 to U26, pin 11 on the component side.

You may see boards with either step (4) or (4a) implemented. Both are correct. **In summary, the modification is now implemented as follows:**

(1) Cut at U26, pin 11 on the solder side.
(2) Cut at U1, pin 1 on the solder side.
(3) Jumper U1, pin 1 to U1, pin 2 on the component side.
(4) Jumper U17, pin 4 to U26, pin 8 **or** U26, pin 11 on the component side.

Hopefully this will alleviate the confusion.

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NATIONAL TECHNICAL SUPPORT 0220 817-390-3810
400 ATRIUM—ONE TANDY CENTER, FORT WORTH, TEXAS 76102

DATE: March 1, 1985

TO: All Computer Service Personnel

FROM: Valerie See, Technical Support KB

SUBJECT: Jumpers and Dip Switch Settings on Tandy 6000 512k/1 meg board and Tandy 6000 8 MHz CPU board

FILE: Tandy 6000

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The jumpers and dip switch settings which should be present on the Tandy 6000 512k/1 meg memory board are as follows:

Dip switch S1 should have position 2 on, all other positions off. This holds for boards with both 512k and 1 meg of memory.

For 512k/1 meg boards, jumpers are as follows:

(1) Jumper E2-E3.
(2) Jumper E5-E6.
(3) Jumper E7-E8.
(4) For 200 ns RAM in conjunction with the 8 meg CPU board, jumper E13-E14. For all uses of 150 ns RAM, jumper E12-E14 (E12-E14 is the most common configuration).

For the 8 MHz CPU board, jumpers are as follows:

(1) Jumper E1-E2.
(2) Jumper E6-E7.

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NATIONAL TECHNICAL SUPPORT 0220 817-390-3810
400 ATRIUM—ONE TANDY CENTER, FORT WORTH, TEXAS 76102

Date: March 28, 1985

To: All Computer Service Personnel

From: Ken Brookner KB

Subject: Tandy 6000 Memory Board Precaution

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**IMPORTANT**
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When installing or servicing the 26-6014 and 6015 add on boards, please inspect the two caps located on the solder side of the board to insure that they are not shorted to each other or to the bottom of RP2. This problem may occur through shipping or when installing the additional 512K of memory (pressing down on the board)

Current production will have silicon sealant applied below the caps to prevent this from occurring and later production will relocate the caps to the component side of the board.

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NATIONAL TECHNICAL SUPPORT 0220 817-390-3810
400 ATRIUM—ONE TANDY CENTER, FORT WORTH, TEXAS 76102

Date: April 3, 1985

To: All Computer Service Personnel

From: Ken Brookner KB

Subject: Tandy 6000 Upgrade Checklist

---

With this memo you will find the Tandy 6000 and Upgrade Checklist for your use in ensuring that both the Tandy 6000 and upgraded Model 12/16Bs will function properly. It can not be overemphasized how important this checklist is to the proper operation of these machines.

You should use this checklist whenever a Tandy 6000 comes through your facility as well as when upgrading/servicing the previous machines. If you have any questions, please contact Technical Support for assistance.

# TANDY 6000 AND TANDY 6000 UPGRADE CHECKLIST

## Modifications required on 8Mhz 68000 PCB (AX-9006)
## Revision A

[__] Burst Mode PAL

Check PAL at U36. Pin 5 bent up from PCB and jumpered to U25 pin 9.

[__] BERR* Modification

Cut at U21 pin 9 on solder side of PCB.
Jumper from U9 pin 4 to U33 pin 13.

[__] Revised PAL at U48

Insure that PAL at U48 is a 16R4.

[__] Data Buffers Direction Modification

[__] Jumper from U10 pin 9 to U2 pin 4 on solder side.
[__] Jumper from U2 pin 3 to U18 pin 11 on solder side.
[__] Jumper from U18 pin 12 to U19 pin 8 on component side.
[__] Jumper from U18 pin 13 to U19 pin 7 on component side.

[__] WAIT* Modification

[__] Add 330pf capacitor from GND end of C43 to feedthrough near +5V end of C37. This feedthrough is hooked to TP28.
[__] Add GND strap (22-24 gauge) from GND end of C29 to GND end of C28 on solder side of board.

[__] GND Modification for J2

Jumper J2 pins 5, 13, and 34 to GND.

[__] Refresh Jumper Option

The jumper option for refresh MUST be jumpered from E1 to E2.

[__] Miscellaneous

[__] U3 **MUST** be either a 74AS373 or a 74F373.
[__] U31 **MUST** be a 74F240.
[__] U41, U44, and U51 **MUST NOT** be a Texas Instruments "AS" part with a date code of "84xx" or earlier.

## TANDY 6000 512K/1MEG MEMORY PCB MODIFICATIONS (AX-9007) REVISION A

[__] Power-Up Reset Modification

[__] Cut at U11 pin 4 on solder side of board.
[__] Add 100K 1/4 watt 5% resistor from U11 pin 4 to U11 pin 14 (+5V).
[__] Add 1uf 16V+ capacitor from U11 pin 4 to U11 pin 7 (GND).

[__] CAS* Modification (delay line modification)

[__] Cut at feedthrough next to right end of C8 (+5V end) on the component side.
[__] Jumper from same above feedthrough to U17 pin 13.
[__] Jumper from U17 pin 10 to U16 pin 10.
[__] Jumper from U17 pin 12 to U17 pin 11.

[__] BUS Filter Modification (AS*, UDS*, LDS*)

[__] Add 330pf capacitor from U9 pin 7 to U9 pin 10 (GND).
[__] Add 330pf capacitor from U9 pin 18 to U9 pin 19 (GND).
[__] Add 330pf capacitor from U9 pin 16 to U9 pin 19 (GND).

[__] CAS*/BERR* Modification

[__] Cut at U26 pin 11 on solder side of board.
[__] Cut at U1 pin 1 on solder side of board.
[__] Jumper from U1 pin 1 to U1 pin 2.
[__] Jumper from U17 pin 4 to U26 pin 8.

[__] Memory Size Jumper Option

For **512K** jumper E1 to E2.
For **1 meg** jumper E2 to E3.

[__] Switch Setting

S1 must have position 2 ON, all other positions OFF.

[__] Miscellaneous

[__] U2, U3, U4, U5, U6, U7, U8, U9, and U28 **MUST NOT** be Texas Instruments "AS" parts with a date code of "84xx" or earlier.

FLOAT U9.6
JUMP " * TO U9.11
" U9.11 " U11.2

* THE LEG ON THE CHIP

# TANDY 6ØØØ AND TANDY 6ØØØ UPGRADE CHECKLIST

## MODIFICATIONS TO TANDY 6ØØØ MOTHER BOARD
**THIS MODIFICATION WILL APPLY TO MODELS 12 AND 16B ALSO**

[__] Cut pins 3, 4, and 5 on R6.

[__] Install three (3) 22Øpf capacitors on the bottom-most connector of the mother board. These should be jumped from pins 44, 45, and 46 to GND.

**NOTE:** If 33Øpf capacitors are already in use, these are acceptable. If replacement is necessary, 22Øpf must be used.

## MODIFICATIONS TO TANDY 6ØØØ MAIN Z-8Ø BOARD (AX-9364)
## REVISION A AND ALL PREVIOUS REV LEVELS
**THIS MODIFICATION WILL APPLY TO MODELS 12 AND 16B ALSO**

[__] Check that the following devices are NOT Texas Instruments "AS" parts with a date code of "84xx" or earlier:

U26-U29, U31, U32, U35, U37, U4Ø, U42, and U43.

## MODIFICATIONS TO TANDY 6ØØØ VIDEO BOARD (AX-924Ø)
**THIS MODIFICATION WILL APPLY TO MODELS II, 12, 16A, AND 16B**

[__] Check that the device located at U1 (74LSØ4) is either a Motorola or Fairchild package.

## MODIFICATIONS TO TANDY 6ØØØ INTERNAL HARD DRIVE CONTROLLER BOARD (PART NUMBER AX-9432)
**THIS MODIFICATION WILL APPLY TO MODEL 16B+ ALSO**

[__] U21, U4Ø, and U41 MUST NOT be Texas Instruments "AS" devices with a date code of "84xx" or earlier. If these devices are present on the board, they MUST be replaced with equivalent "S", "LS", "ALS", or "F" parts.

# TANDY 6ØØØ AND TANDY 6ØØØ UPGRADE CHECKLIST

## IMPORTANT NOTE FOR ALL MODEL II AND 16A TO TANDY 6ØØØ UPGRADES

[__] Power Supply Voltage Check

+5V supply measured at 68ØØØ Memory board is greater than +5.ØØV and less than +5.15V.

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

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

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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.: 6000:02

PRODUCT: 26-6021/2 Tandy 6000

SUBASSEMBLY: 8 MHz 68000 CPU PCB, Rev. A.

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PURPOSE: To correct timing error.

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DISCUSSION:

A timing error has been found involving signals BERR* and DTACK* on the 8 MHz 68000 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)

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

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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.

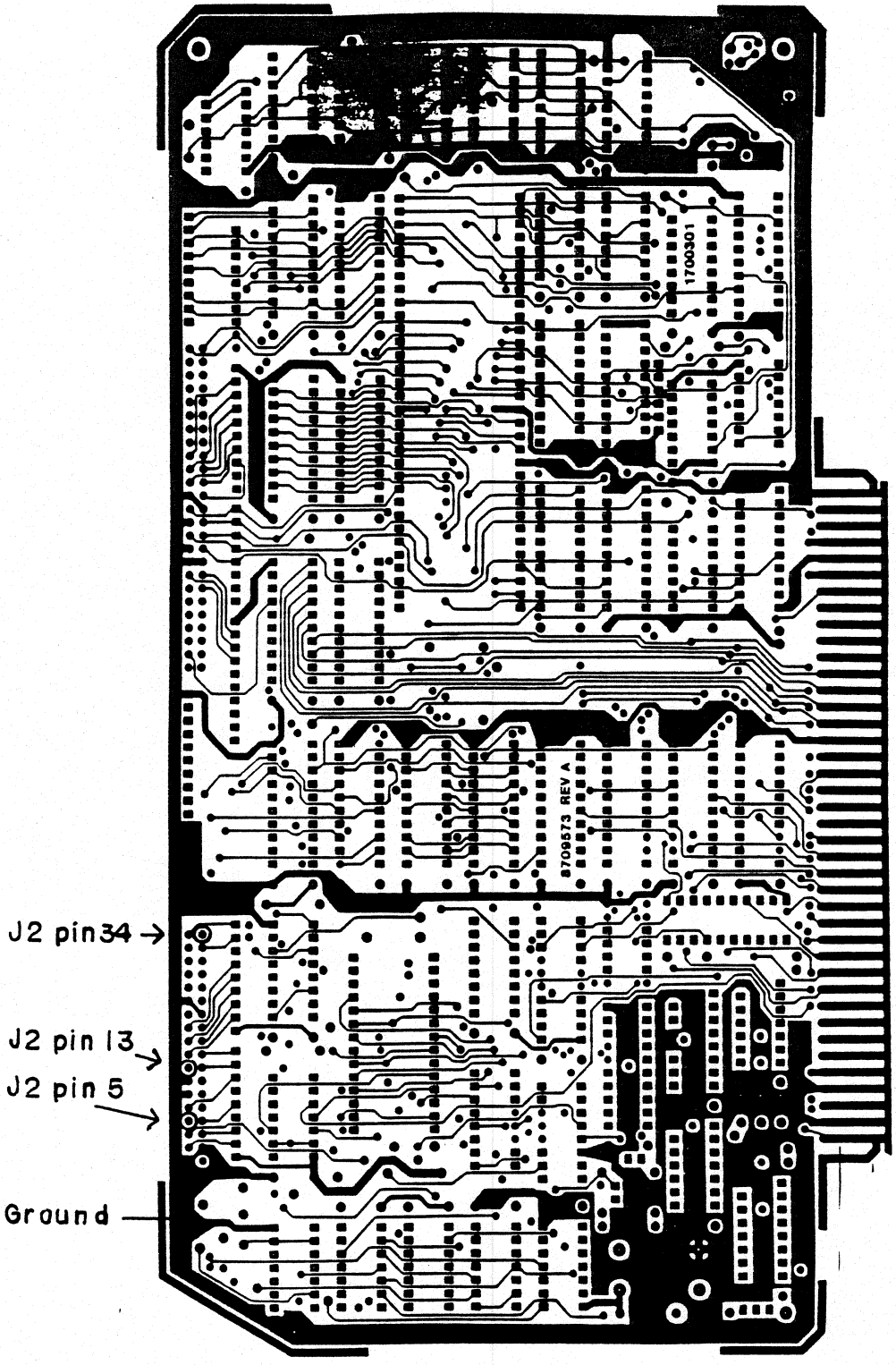
PROCEDURE:

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

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

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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.

TRS-80®

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

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

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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

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PURPOSE: To outline modifications to increase operational reliability.

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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.

TRS-80®

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

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PURPOSE: To outline modifications to increase operational reliability.

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**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

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RCV'd 4-22-86



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

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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.

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**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

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PURPOSE: To outline modifications to increase operational reliability.

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**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

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

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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.

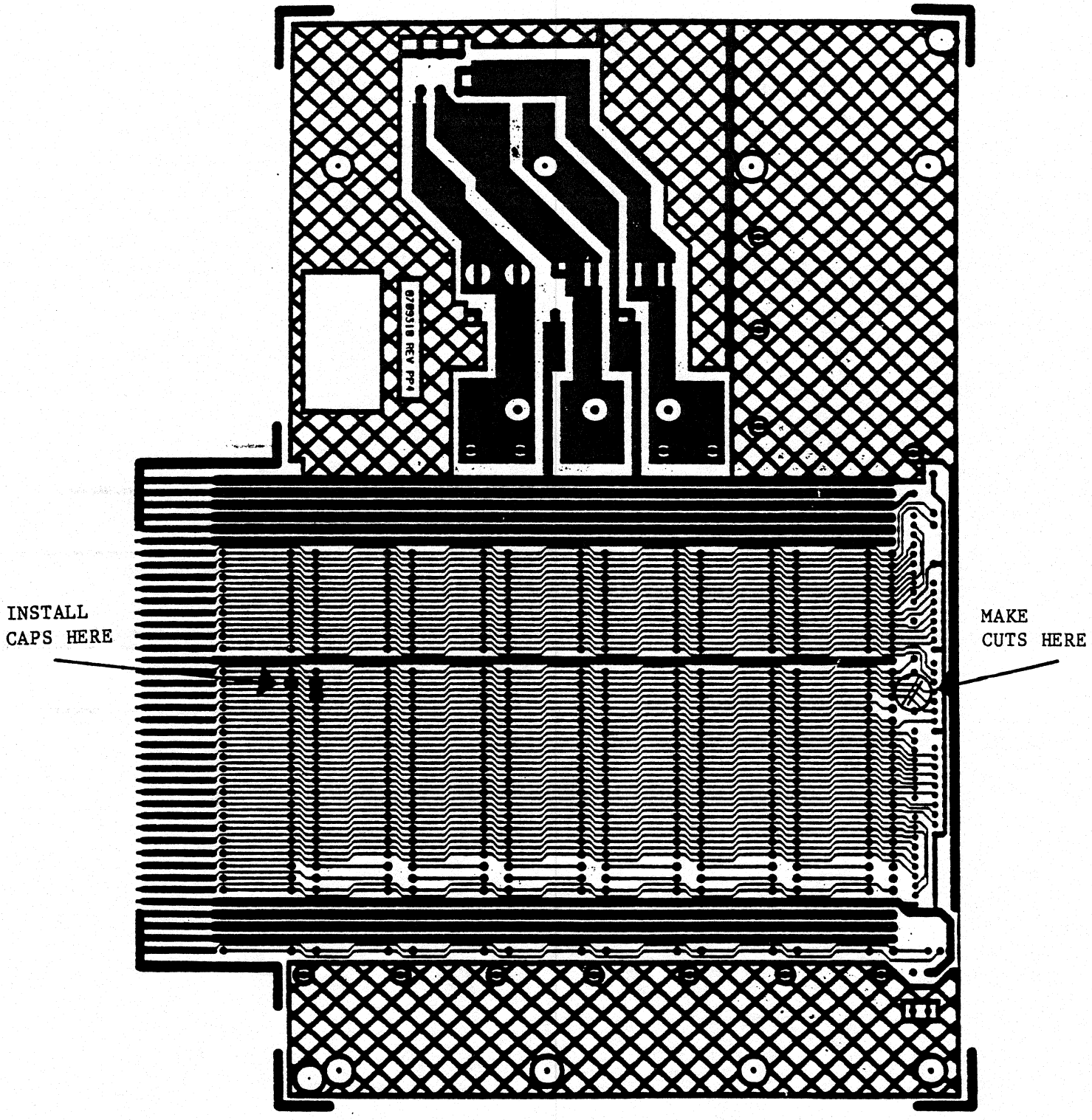
On mother boards of revision levels prior to Rev. B, pins 3, 4, and 5 on resistor pack R6 need to be cut.

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

TRS-80®

DATE: May 29, 1985

REVISION DATE: May 29, 1985

BULLETIN NO.: 6ØØØ:12

PRODUCT: 26-6Ø21/22, Model 6ØØØ

SUBASSEMBLY: AXX-Ø344, Tandon Belt Drive Logic Board, Rev. Y

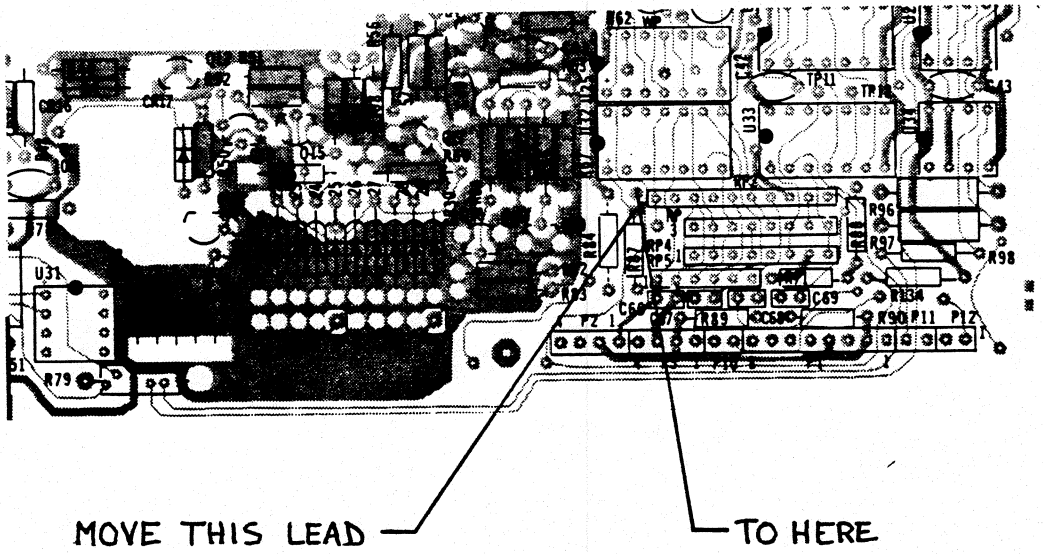
---

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 15Ø 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.



Rec'd -4-22-86

Radio Shack
A Division of Tandy Corporation

NATIONAL TECHNICAL SUPPORT 0220 817-390-3810
400 ATRIUM—ONE TANDY CENTER, FORT WORTH, TEXAS 76102

Date: March 18, 1986

To: Recipients of Technical Bulletins

From: Ken Mabe, Technical Coordinator KM

Subject: Technical Bulletin 6000:13

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For clarity, the contents of Technical Bulletin 6000:13, dated August 27, 1985 has been incorporated into Technical Bulletin 6000:8, dated March 10, 1986.

Therefore, remove Technical Bulletin 6000:13, with the revision date of August 27, 1985 and replace it with this memo. A new 6000:13 will be issued at a later date.

old 6000:13 Removed

7-29-86

TECHNICAL BULLETIN



**TANDY COMPUTER PRODUCTS**

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.

9-15-86 Ver 3.2 Will not work without This mod says Frank Durda.

Recd. 1-21-86



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 |

RCVS - 8-11-86

TECHNICAL BULLETIN



TANDY COMPUTER PRODUCTS

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.

TECHNICAL BULLETIN



**TANDY COMPUTER PRODUCTS**

THIS MOD CAUSES CARRIER DETECT TO NOT WORK IF NO DEVICE IS CONNECTED. MAY CAUSE SLOWNESS UNDER XENIX.

DATE: July 28, 1987

REVISION DATE: July 28, 1987

BULLETIN NO: 6000:16

PRODUCT: 26-6021/2 Tandy 6000

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:**

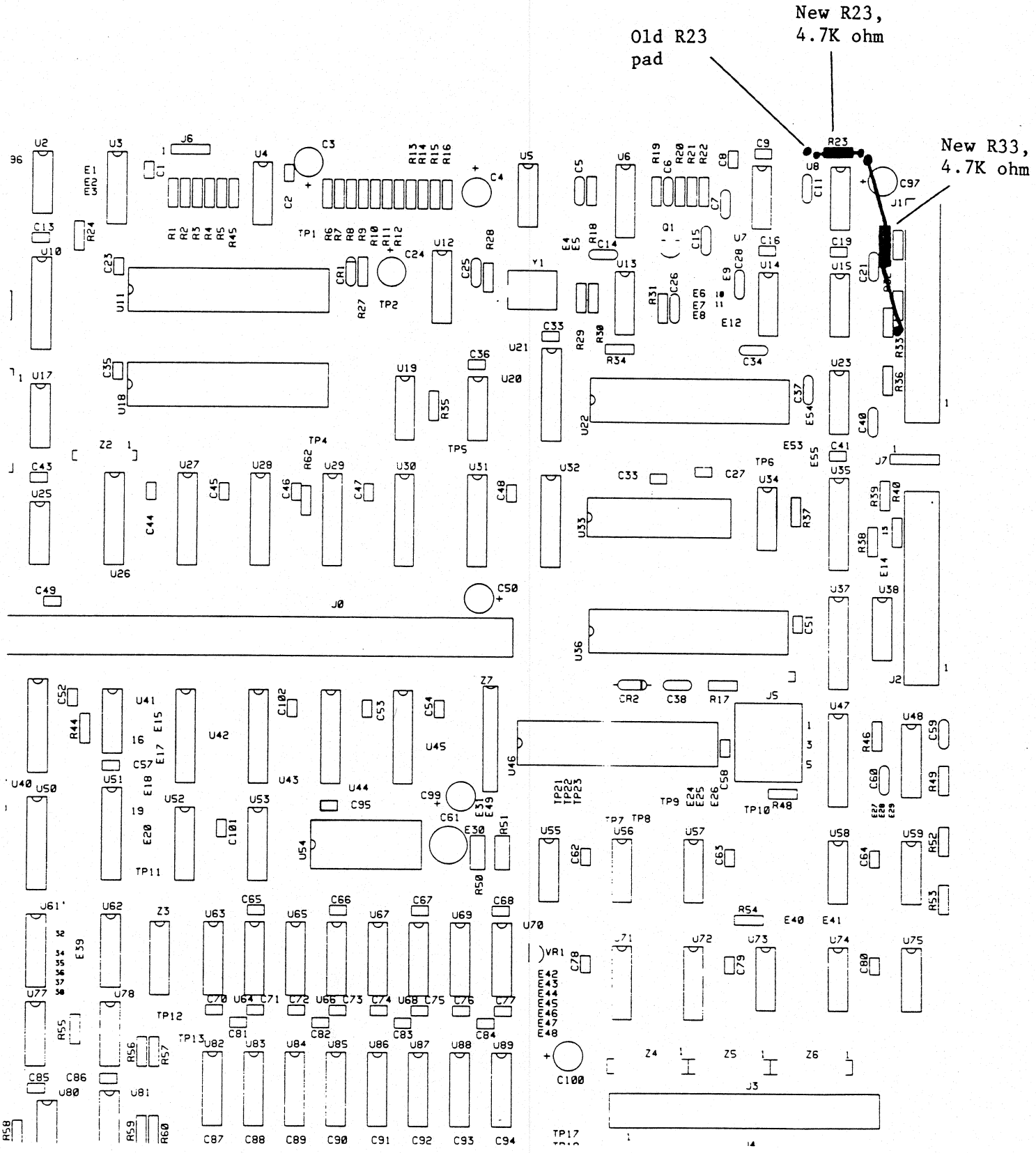
**Part (1), mandatory for Rev. Blank boards:**

Change R21, R23, R25, R32, R36 from 10K 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

DATE: November 3Ø, 1987

REVISION DATE: November 3Ø, 1987

BULLETIN NO: 6ØØØ:17

PRODUCT: 26-6Ø21/22 Tandy 6ØØØ/HD

SUBASSEMBLY: AX-9364 Main Logic Board

SUBASSEMBLY REVISION: Rev. A

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PURPOSE: To describe a manufacturing modification for use of the TMS 2716 ROM, and reversal of the modification to allow use of other ROMs.

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**DISCUSSION:**

The Texas Instruments TMS2716 ROM is different from those normally used in the Model 12/16B/6ØØØ family. It requires a -5V and +12V supply in addition to the +5V and ground normally supplied to the ROM socket on this board. An extremely limited number of boards (approximately 3ØØ) were manufactured with these ROMs, and had a modification applied to allow the correct supply voltages to be applied to the ROM. The factory modification added a voltage regulator to the ROM socket which can short out to the chassis of the computer. By using the onboard regulator (VR1), the additional regulator can be deleted, allowing the TMS2716 ROM to be used without running risks of shorting supply voltages to ground.

If any other type of ROM other than the Texas Instruments TMS2716 is to be used in this board, the modification supplying the additional voltages **must be** removed. Failure to do so will result in damage to the new ROM.

**PROCEDURE:**

Two procedures will be outlined: the first will explain how to change the factory modification to prevent shorting out supply voltages, the second will describe how to reverse the modification.

Revised Texas Instruments TMS2716 Support Modification:

**No unmodified boards should be newly modified in this fashion! This should be performed only on boards which already have the factory version of this mod.**

(1) On the solder side of the board, ensure that the trace connected to U54 pin 21 has been cut.

(2) On the solder side of the board, ensure that the trace leading to the feedthrough nearest U54 pin 5 has been cut. This trace was formerly connected to U54 pin 2Ø.

(3) On the component side of the board, ensure that the trace leading to U54 pin 19 has been cut.

(4) On the solder side of the board, jumper U54 pin 19 to J5 pin 5 (+12V).

(5) On the solder side of the board, run a jumper from the feedthrough isolated in step (3) (near U54 pin 5) to the feedthrough next to U44 pins 16 and 17. For check purposes, the feedthrough next to U44 pins 16 and 17 is connected to U42 pin 3.

(6) Remove the 79LØ5 regulator connected to U54 and its associated jumpers. This regulator will have pin 1 jumpered to U54 pin 12, pin 2 jumpered to J5 pin 1, and pin 3 jumpered to U54 pin 21.

(7) Jumper VR1 pin 3 (-5V) to U54 pin 21.

(8) Reassemble the unit and test using appropriate software and diagnostics.

To allow use of regular +5V only ROMs:

(1) On the solder side of the board, find the trace cut at U54 pin 21. Bridge the cut by running a jumper from U54 pin 21 to staking pin E19 on the solder side of the board.

(2) On the solder side of the board, remove the jumper from the feedthrough next to U54 pin 5 to the feedthrough next to U44 pins 16 and 17.

(3) On the solder side of the board, remove the jumper from U54 pin 19 to J5 pin 5.

(4) On the component side of the board, find the trace cut on the trace leading to U54 pin 19. Bridge the cut by running a jumper from U54 pin 19 to U42 pin 3 on the solder side of the board.

(5) On the solder side of the board, find the trace cut on the trace leading to the feedthrough that is next to U54 pin 5. Bridge the cut by running a jumper from that feedthrough to U54 pin 2Ø on the solder side of the board.

(6) Remove the jumper from VR1 pin 3 to U54 pin 21.

(7) Remove the Texas Instruments TMS2716 ROM from the U54 socket and install a +5V only boot ROM in its place. Reassemble the unit and test with appropriate software and diagnostics.

DATE: January 17, 1989

REVISION DATE: January 17, 1989

BULLETIN NO: 6000:18

PRODUCT: AX-0254 6000 MMU Upgrade Kit

SUBASSEMBLY: Entire Item

SUBASSEMBLY REVISION: N/A

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PURPOSE: To explain the installation procedure for the 6000 MMU upgrade kit.

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**DISCUSSION:**

The original 8 MHz 68000 CPU board used in Tandy 6000's and 6000 upgrade kits has on-board memory management capabilities which will allow it to support up to one megabyte of 68000 memory. In order to extend this range, a 68000 MMU (Memory Management Unit) satellite board was developed, and paired with a suitably modified 8 MHz 68000 CPU board, allows extension of the available 68000 memory from a one board to a two board maximum. Using 1 meg 68000 RAM boards, this implies that up to 2 megabytes of 68000 RAM may be available for Xenix use. The installation procedure for this upgrade kit is described here; also, for reference purposes, a description of the modifications necessary for the addition of the MMU board to the 8 MHz 68000 CPU board is given.

**PROCEDURE:**

**Note:** This upgrade is to be installed in systems with 8 MHz 68000 hardware **only**!

(1) Verify proper operation and modifications on the computer (Tandy 6000 or upgraded Model 2/12/16/16B) in its original configuration. Ensure that all appropriate modifications and alignments have been performed, that the voltages in the unit are with correct specifications as to level and noise, that all cards installed are in the correct order and that all diagnostics pass. Verify that Xenix version 3.2.0 runs on the computer.

(2) Remove the original 8 MHz 68000 CPU board and 68000 cables from the computer.

(3) Install the modified CPU/MMU board in the card cage position formerly occupied by the original 68ØØØ CPU board. Attach the 68ØØØ cables to the CPU/MMU board and the first 1 meg memory board. If a second 1 meg memory board is to be installed in the system, install it below the first memory board. Switch settings and jumpers for the 1 meg memory boards are:

First board: S1, position 2 on, all others off.
E2-E3, E5-E6, E7-E8 (for 1 meg of memory on board)

Second board: S1, positions 2 and 7 on, all others off.
E2-E3, E5-E6, E7-E8 (for 1 meg of memory on board)

(4) Verify that the card cage voltages are at least +5.Ø5V on the last board in the cage (i.e. the 68ØØØ CPU board), and are not greater than +5.2ØV on the floppy drives. If the voltages are in need of adjustment, refer to TB 12/16B:23 for adjustment procedures.

(5) Verify that the upgraded system passes all diagnostics, including MMUTEST, and that Xenix 3.2.Ø correctly recognises the 68ØØØ RAM installed in the system.

**For reference purposes only**, the modifications to the 8 MHz 68ØØØ CPU board to enable use of the MMU board are listed here. These are here to allow resoldering of any jumper wires which may pull loose; **no boards are to be modified in the field for MMU use.**

(1) Remove the 68ØØØ CPU from its socket (U19).

(2) Check the 68ØØØ CPU board to see if U2Ø, U22, U23, and U26 - U3Ø are socketed. If they are, remove the chips from the sockets, then carefully remove the chips' sockets from the CPU board, and solder the chips directly to the CPU board, verifying correct matching of pin 1 on the IC to pin 1 on the board location.

(3) Cut pin 6 of U8 and bend the pin up on the component side of the 68ØØØ CPU board.

(4) On the solder side of the 68ØØØ CPU board, install jumpers at the following locations:

U19 pin 24 to U1Ø pin 1
U19 pin 19 to U24 pin 9
U19 pin 2Ø to U38 pin 1
U19 pin 21 to U41 pin 11.

(5) Cut off test points TP5, TP8, TP9 and TP1Ø.

(6) Install the MMU board in socket U19 of the 68ØØØ CPU board, verifying correct pin 1 orientation. Pin 1 of U19 on the CPU board is towards U2Ø on the CPU board; pin 1 on the MMU board is towards U7 on the MMU board.

(7) Install the 68ØØØ CPU into socket U4 on the MMU board, verifying correct pin 1 orientation.

DATE: March 8, 1984

REVISION DATE: July 9, 1985

BULLETIN NO.: HD:21

PRODUCT: HD controllers with WD1010's

SUBASSEMBLY: WD1010 and WD1100

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PURPOSE: Acceptable WD1010 and WD1100 combinations.

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DISCUSSION:

Beginning in March 1984, all hard disk controllers containing the WD1010 series will begin using two new chips. These two chips, the WD1010-05 and the WD1100-21, are direct replacements for the WD1010-00 and the WD1100-11. Although most combinations are compatible, one combination is not acceptable on certain boards.

In addition, if the controller is to be used with the Quantum 35 meg bubble assembly, only the permitted combinations involving the WD1100-21 chip should be used. The reason for this is that the Quantum read window is 24 ns wide, versus the 50 ns of the Tandon and Micropolis bubble assemblies, and there is a minor timing difference between the WD1100-11 and the WD1100-21 causing data to be latched on a different edge. To prevent read errors, the WD1100-21 should be used on controller boards used with the 35 meg drive.

The following is a list of acceptable combinations that may be used on the same controller board. This list applies to both internal and external controller boards.

WD1010-00 with the WD1100-11 -----> use with Tandon and Micropolis drives.
WD1010-00 with the WD1100-21 -----> use with all drives.
WD1010-05 with the WD1100-21 -----> use with all drives.

The remaining combination (WD1010-05 with the WD1100-11) is compatible with the external Western Digital controller board provided that the board is a WD1000-TB1 board. This type of external Western Digital

board should be the only type in the field; the designation is stamped on the board and should be checked for certainty. This combination should only be used with Tandon and Micropolis drives.

The WD1010-05 and WD1100-11 combination **is not** acceptable on Model 2000 and Model 16B+ internal controllers, or on any Western Digital external controller which is not a WD1000-TB1 board. This is summarized in the table below:

| Board | Part # | OK with 1010-05 & 1100-11 |
|---|---|---|
| 16B+ int. board | AX 9432 | no |
| 2000 int. board | AX 9451 | no |
| **ext. W. D. bd.(WD1000-TB1)** | **AX 9454** | **yes** |
| any other W. D. ext. controller | AX 9454 | no |

After replacement of these parts, an alignment will be necessary.

Replacement parts may be ordered under the following part numbers:

WD1100-11: part # MP-0042, cat. # 26-4155W
WD1100-21: part # MX-2131, cat. # 26-6022
WD1010-05: part # MP-0043, cat. # 26-4155W