TECHNICAL BULLETIN INDEX
Sorted by Bulletin Number
04/03/86

No.	Catalog	Description	Rev. Date
CC:001	26-3002	Quick Printer II only prints one letter than stops	01/17/83
CC:002	26-3002	Describe proper AC line cord termination.	01/17/83
CC:003	26-3002	C18 backwards causes -5 volt failure.	01/17/83
CC:004	26-3022	RF interference when using Disk Operating System.	06/24/83
CC:005	26-3002	Replacement ICs for U12 fail.	06/24/83
CC:006	26-3002	Keyboard failure aftger 32K upgrade.	01/17/83
CC:007	26-3002	Sound command does not work after CLOAD or CSAVE.	01/17/83
CC:008	26-3022	Changes in servo motor control board.	01/17/83
CC:009	26-3022	Drive will not hold steady speed.	01/17/83
CC:010	26-3067	Wildcatting cartridge will not initialize properly	01/17/83
CC:011	26-3010	Different versions of U701 and how to install.	06/16/83
CC:012	26-3002	Updates and corrections to service manuals.	06/16/83
CC:013	26-3002	Modifications to assure false color.	06/16/83
CC:014	26-3002	Keyboard failure after 32K upgrade (AX-9328 PCB).	06/16/83
CC:015	26-3002	32K/64K upgrade procedure.	06/24/83
CC:016	26-3002	Consistant "64K MEMORY U21 (or U26) BAD" errors.	06/24/83
CC:017	26-3002	List of parts changed between old and new boards.	06/24/83
CC:018	26-3002	Checksums for ROMs.	06/24/83
CC:019	26-3002	To determine if unit needs 64K upgrade.	09/14/83
CC:020	26-3002	After a warm up period the Color Computer locks up	10/13/83
CC:021	26-3022	Intermittent errors caused by missing trace.	09/14/83
CC:022	26-3016	Installation procedures for keyboard upgrade kit.	09/07/83
CC:023	26-3002	Sound command fails to function properly.	09/21/83
CC:024	26-3027	Color Computer 2 64K upgrade procedure.	11/15/83
CC:025	26-3002	Describe a component deletion.	02/01/84
CC:026	26-3002	Installation procedures for direct video board.	06/21/84
CC:026	26-3002	Garbage on screen during disk access.	05/23/85
CC:027	26-3026	Installation procedures for direct video board.	01/18/85
CC:028	26-3134	Explain differences in new Color Computers.	11/30/84

DATE: November 3, 1980

REVISION DATE: January 17, 1983

BULLETIN NO.: CC:1

PRODUCT: 26-3001/2 Color Computer

SUBASSEMBLY: N/A

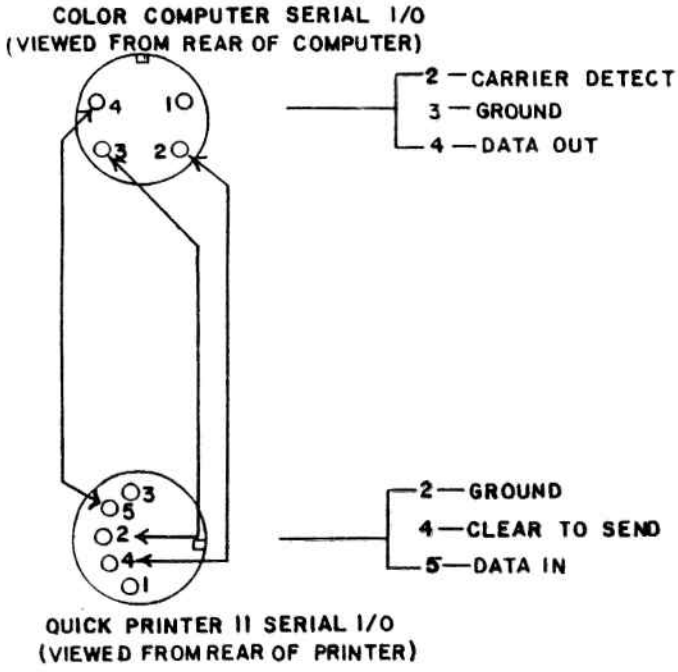
PURPOSE: When connecting a Quick Printer II to the Color Computer, printer only prints one letter and then stops.

DISCUSSION:

The Color Computer Preliminary Documentation concerning RS232 interfacing shows the incorrect pinouts of the RS232 port.

PROCEDURE:

Use the following diagram to interconnect the Color Computer and Quick Printer II.



DATE: March 26, 1981

REVISION DATE: January 17, 1983

BULLETIN NO.: CC:2

PRODUCT: 26-3001/2/3/4, 26-3002A/3A/4A Color Computers
26-5000 Videotex Terminal

SUBASSEMBLY: AX-8709 "Old" model power supply
ATA-1007 "Revised" model power supply
AX-8790 Videotex PCB

PURPOSE: Describe proper AC line cord termination.

DISCUSSION:

Following repairs to ALL units, be certain to properly re-connect the AC line cord to the power supply according to the following charts and diagram.

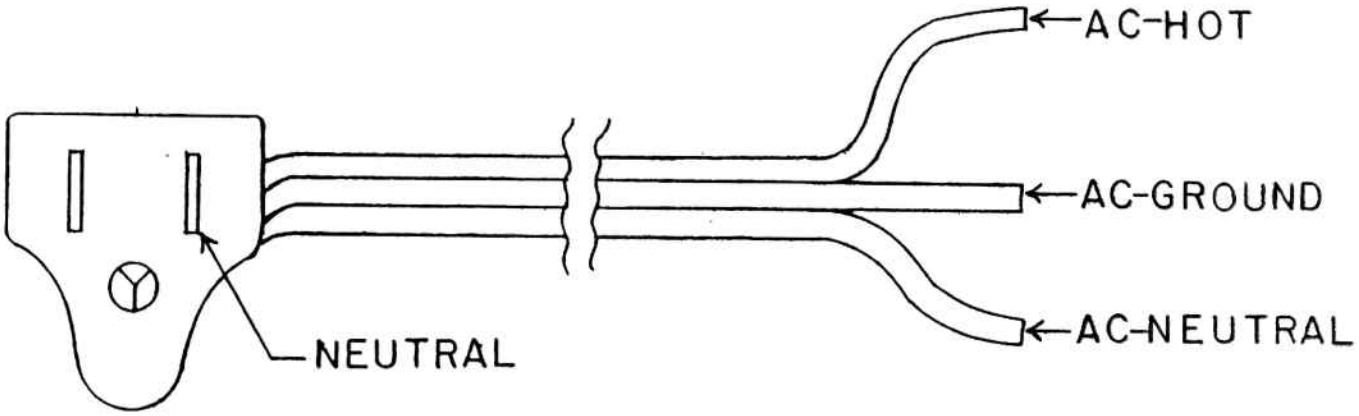
FOR UNITS WITH **ROUND** COLOR CODED AC LINE CORDS:

AC LINE CORD COLOR	<-connects to-> 'Old' style PCB	PCB TERMINAL DESIGNATION 'Revised' PCB	Videotex
GREEN (AC ground)	E5	E8	E5
WHITE (AC neutral)	E6	E6	E6
BLACK (AC hot)	E7	E7	E7

FOR UNITS WITH **FLAT** AC LINE CORDS:

AC LINE CORD WIRE	<-connects to-> 'Old' style PCB	PCB TERMINAL DESIGNATION 'Revised' PCB	Videotex
AC GROUND (see Figure 1)	E5	E8	E5
AC NEUTRAL (see Figure 1)	E6	E6	E6
AC HOT (see Figure 1)	E7	E7	E7

Verify that the AC line cord terminals are properly identified by doing a continuity check using an ohmeter.



NOTE: PLUG IS SHOWN FROMA FRONTAL VIEW.

FIGURE 1

DATE: October 15, 1981

REVISION DATE: January 17, 1983

BULLETIN NO.: CC:3

PRODUCT: 26-3001/2/3/4

SUBASSEMBLY: AXX-0338, AX-9003 Revision 'D' and 'E' PCBs

PURPOSE: Failure of -5 volt DC power supply

DISCUSSION:

Some PCBs have been found with C18, 1µf 50 volt tantalum (National Parts number ACC105QJTP), installed backwards. Failure does not occur until C18 overheats and burns up.

PROCEDURE:

Inspect ALL units in for repair or upgrade for proper polarity of C18. Replace the capacitor if it is found to be installed wrong, as the capacitor may already have been damaged internally, causing it to fail if it is reused.

DATE: October 28, 1981

REVISION DATE: June 24, 1983

BULLETIN NO.: CC:4

PRODUCT: 26-3Ø22 #Ø Disk drive, 26-3ØØ1/2/3/4 Color Computer

SUBASSEMBLY: AX-9ØØ2 Revision 'B' and 'C' PCB
AXX-Ø338 Revision 'D' PCB

PURPOSE: RF interference present when Disk Operating System Cartridge installed.

DISCUSSION:

Two RFI clips should be installed on the Cartridge Connector. This is **MANDATORY** if the unit is upgraded to 32K, but may have been missed on early units. If the unit only has 16K of memory the RFI clips may not have been installed at the factory. Obtain a set of RFI clips (National Parts number ART-3947), and install them as per Technical Bulletin CC : 4

Failure to do so may lead to video interference problems if a disk system is installed at a later date.

PROCEDURE:

(1) Remove the case top. Remove the 9 mounting screws securing the PCB. Remove the PCB from the case, and turn it upside down. Remove the two hex nuts securing the Cartridge Guide to the PCB, and remove the Cartridge Guide. Remove the long screws and washers from the Cartridge Connector, and save them to be used later.

(2) Insert a small flat blade screwdriver between the PCB and the cartridge connector, then twist the screwdriver GENTLY to slightly separate the PCB and the connector. Use a thin bladed knife (an X-ACTO knife, or something similar) and scrape away the green solder mask from the ground foil immediately under the ends of the connector. Scrape away an area slightly larger than the small washer removed in Step 1.

(3) Put one RFI clip on each end of the Cartridge Connector, and install the small washer between the RFI clip and the PCB (see Figure 1). The open side of the RFI clip should face towards the cartridge. Insert the long screw through the RFI clip, the cartridge connector, the small washer, the PCB and the PCB shield. Insert the Cartridge Guide between the PCB and the PCB shield. Install a large washer and nut on the long screw.

(4) Install the PCB into the case bottom. Attach the case top.

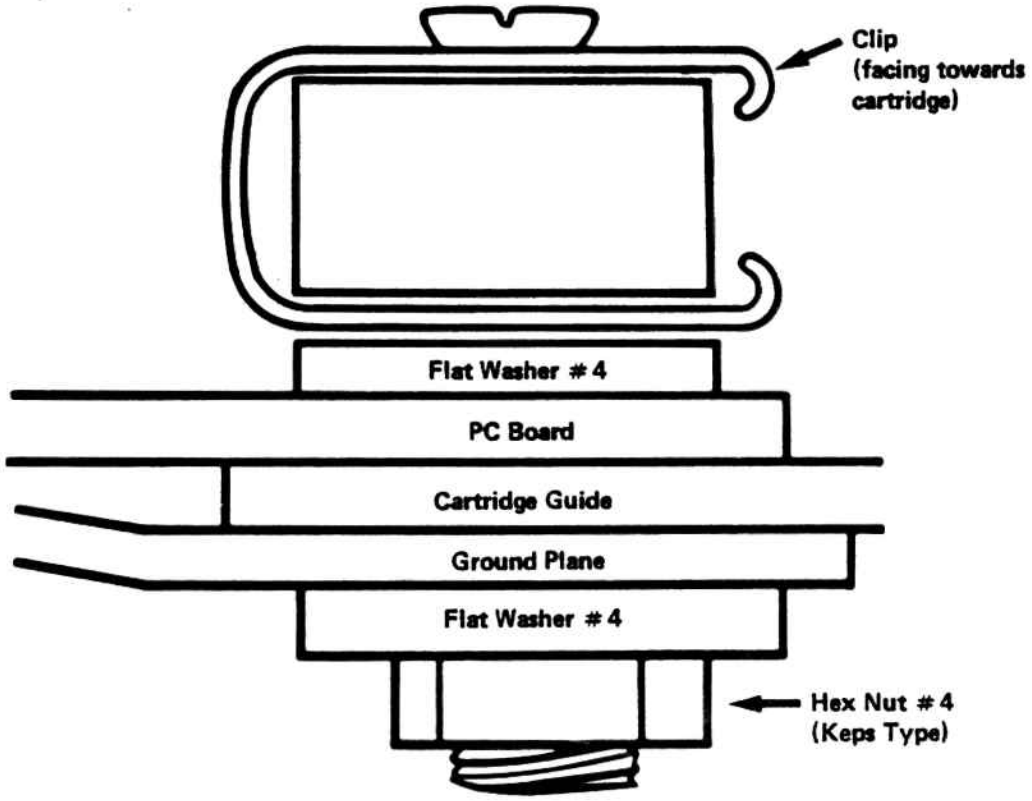

Clip
(facing towards
cartridge)
Flat Washer # 4
PC Board
Cartridge Guide
Ground Plane
Flat Washer # 4
Hex Nut # 4
(Keps Type)

FIGURE 1

DATE: January 2Ø, 1983

REVISION DATE: June 24, 1983

BULLETIN NO.: CC:5

PRODUCT: 26-3ØØ1/2/3 Color Computers

SUBASSEMBLY: AXX-Ø338 Revision 'D' PCB

PURPOSE: Replacement ICs for U12 fail. Some ICs work, some don't.

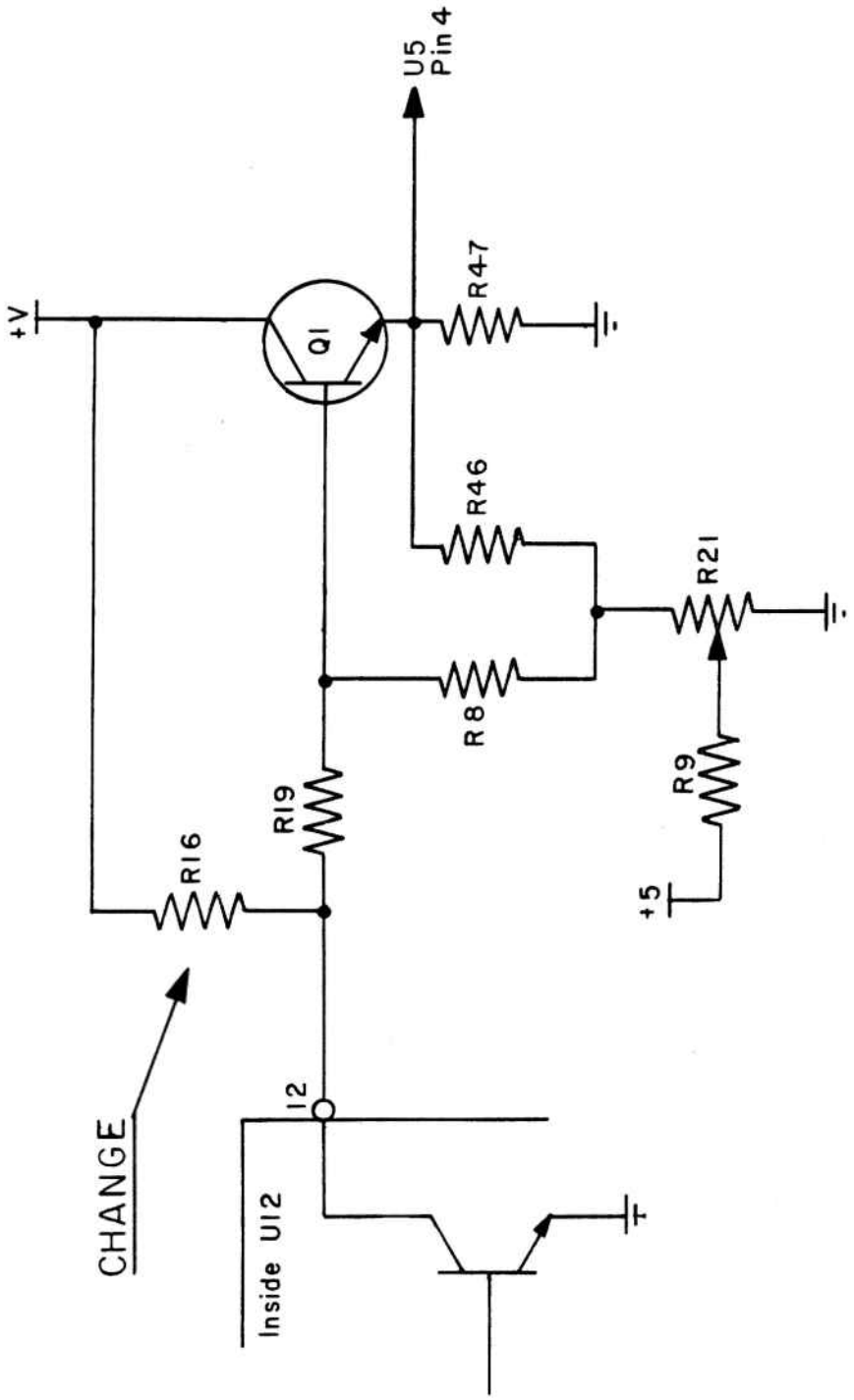
DISCUSSION:

It has been determined that the MC1372 Video Mixer is not actually failing. The problem lies in different drive current capabilities of the output stage of U12, the video mixer. Only hand selected ICs for U12 will work.

PROCEDURE:

Check the value of R16. If it is 3.9K ohms change it from 3.9K ohms to 3.3K ohms (National Parts # AN-Ø23ØEEC). This will increase the drive current available from U12, and allow all presently available MC1372 ICs to work.

This resistor has already been changed in later production units.


U5
Pin 4
+V
Q1
R47
R46
R21
R8
R9
R19
R16
+5
CHANGE
12
Inside U12

DATE: January 11, 1982

REVISION DATE: January 17, 1983

BULLETIN NO.: CC:6

PRODUCT: 26-3002/3/4 Color Computer

SUBASSEMBLY: AXX-0338 Revision 'D' PCB, AX-9003 Revision 'E' PCB

PURPOSE: To prevent or cure keyboard failure. Problem usually shows up as an intermittent inability to use keys G and O after 32K upgrade.

DISCUSSION:

The keyboard matrix is handled by one of the PIA chips, U8. One line of the PIA, pin 17 now called TTSL, is shared between the keyboard and RAMSZ select line. Two of the lines from the PIA are also shared by the joystick circuitry. The schematic will show that the G and O keys utilize these three lines.

The lines coming from pins 2 and 3 of the PIA are labeled RSW (Right SWitch) and LSW (Left SWitch) on the schematic. The RFI suppression in the joystick circuitry (C57 and C58) adds capacitive loading to these two lines. This, along with the added usage of pin 17, causes intermittent failure of the keyboard. Lowering the value of the capacitors on these lines improves the response.

PROCEDURE:

Change the value of C57 and C58. Change them from .01 µf to .005 µf (National Parts number CC-502KFCP). Check the capacitor value before removing it as these capacitors may already have been changed.

NOTE: This change is **MANDATORY** if the unit is being upgraded to 32K and the capacitors are still the old value.

DATE: April 8, 1982

REVISION DATE: January 17, 1983

BULLETIN NO.: CC:7

PRODUCT: 26-3001/2/3/4 Color Computer

SUBASSEMBLY: AXX-0338 Revision 'D' PCB, AX-9003 Revision 'E' PCB

PURPOSE: SOUND command does not work after doing a CLOAD or CSAVE.

DISCUSSION:

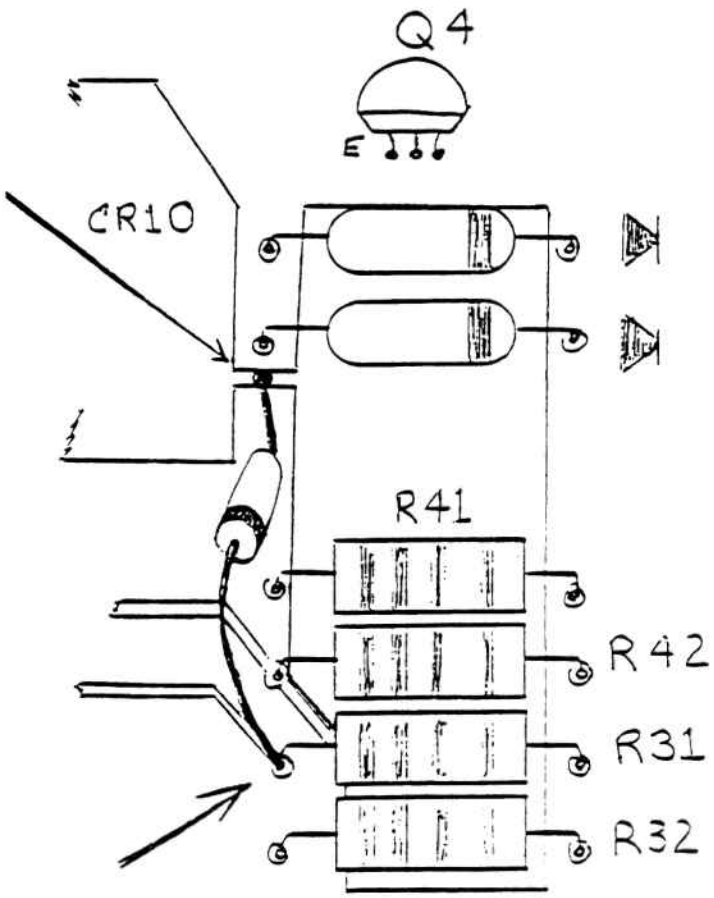
During a CLOAD, the CSN signal may be more than 5 volts peak-to-peak. This will depend on the recorder used, the volume setting on the recorder, and the tape being loaded.

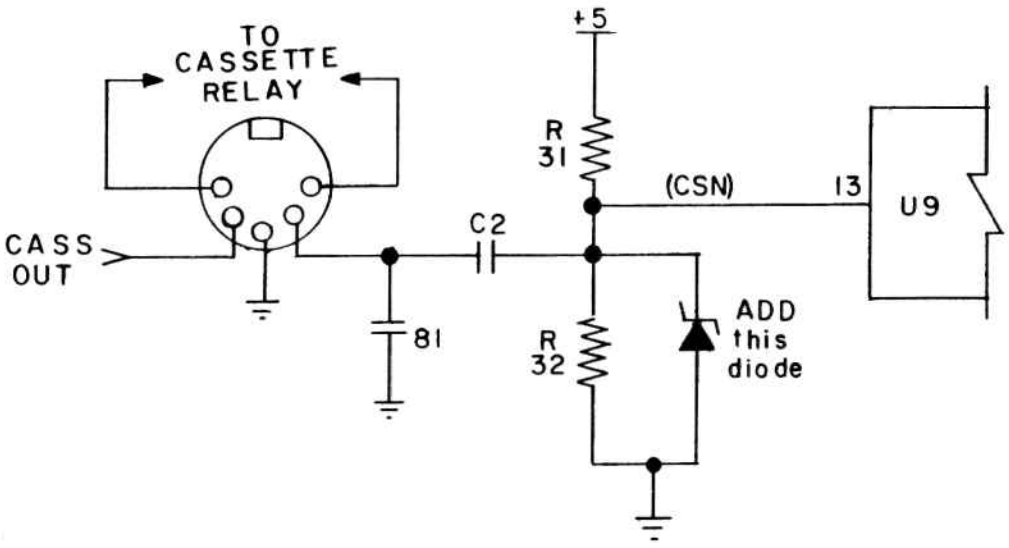
If the CSN signal is greater that 5 volts peak-to-peak, U9 may be damaged. To prevent damage to U9, add a Zener diode to the CSN line to clamp it to 5 volts peak-to-peak.

PROCEDURE:

(1) Replace U9 (National Parts number AMX-4585).

(2) Install a 5.1 volt Zener diode (National Parts number ADX-1211) at the junction of R31 and R32. Install the diode with the CATHODE (banded) end at the junction of R31 and R32, and the ANODE end to ground.


Q4
E
CR10
R41
R42
R31
R32


TO
CASSETTE
RELAY
CASS
OUT
C2
81
+5
R
31
(CSN)
13
U9
R
32
ADD
this
diode

DATE: April 12, 1982

REVISION DATE: January 17, 1983

BULLETIN NO.: CC:8

PRODUCT: 26-3Ø22/3 Color Computer Disk Drives

SUBASSEMBLY: AM-4666 Motor assembly

PURPOSE: To describe and implement changes to motor control PCB.

DISCUSSION:

A problem with motor start-up time has been discovered at the TEC factory. TEC has produce a fix for this problem, and it has been implemented in two steps, or phases. Phase 1 involves adding a piggy-back module to boards which have already been manufactured. Phase 2 involves a re-designed Motor Control PCB which incorporates the new circuitry. There are three different Motor Control PCBs in use due to this modification.

Figure 1 is the schematic for the **ORIGINAL** (unmodified) PCB. CN-3 is the large multi-wire connector on the main PCB. Note that the RED wire from the Motor Control PCB goes to pin B7 of CN-3, and that the BLACK wire goes to pin A7 of CN-3. Note that there is no WHITE wire connected to this board.

Figure 2 is the wiring diagram for the Motor Control/Satellite PCBs as used in Phase 1. Note that the RED wire is connected to pin B7 of CN-3, the WHITE wire is connected to pin A7 of CN-3, and the BLACK wire is connected to pin B14 of CN-3.

Figure 3 is the new Motor Control PCB as used in Phase 2. Note that the RED wire is connected to pin B7 of CN-3, the WHITE wire is connected to pin A7 of CN-3, and the BLACK wire is connected to pin B14 of CN-3.

PROCEDURE:

If you must replace the Motor Control PCB, several wiring changes become possible:

(1) ORIGINAL board being replaced with PHASE 1 board -- Remove BLACK wire from pin A7 of CN-3 and insert it into pin B14 of CN-3. Plug WHITE wire from PHASE 1 board into pin A7 of CN-3.

(2) ORIGINAL board being replaced with PHASE 2 board -- Remove BLACK wire from pin A7 of CN-3 and insert it into pin B14 of CN-3. Plug WHITE wire from PHASE 1 board into pin A7 of CN-3.

(3) PHASE 1 board being replaced with ORIGINAL board -- No wiring changes are necessary, but DO NOT remove the satellite PCB unless it is **PROVEN** defective. The unit must remain as a PHASE 1 configuration.

(4) PHASE 2 board being replaced with ORIGINAL board -- DON'T!! Replace the PHASE 2 board **ONLY** with the PHASE 1 assembly, or another PHASE 2 PCB.

(5) PHASE 1 (or 2) board being replaced with a PHASE 2 (or 1) board -- No wiring changes are necessary.

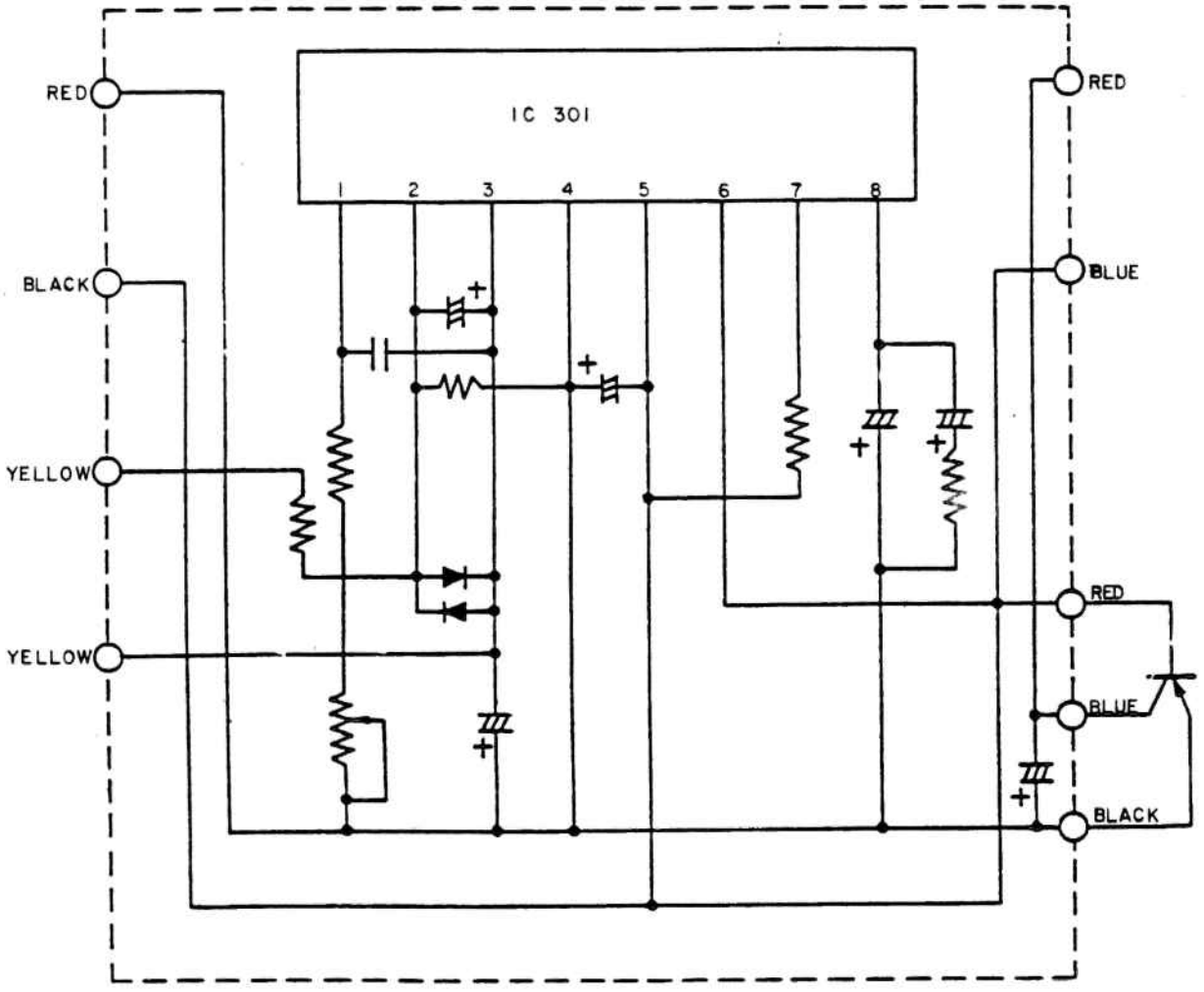


FIGURE 1

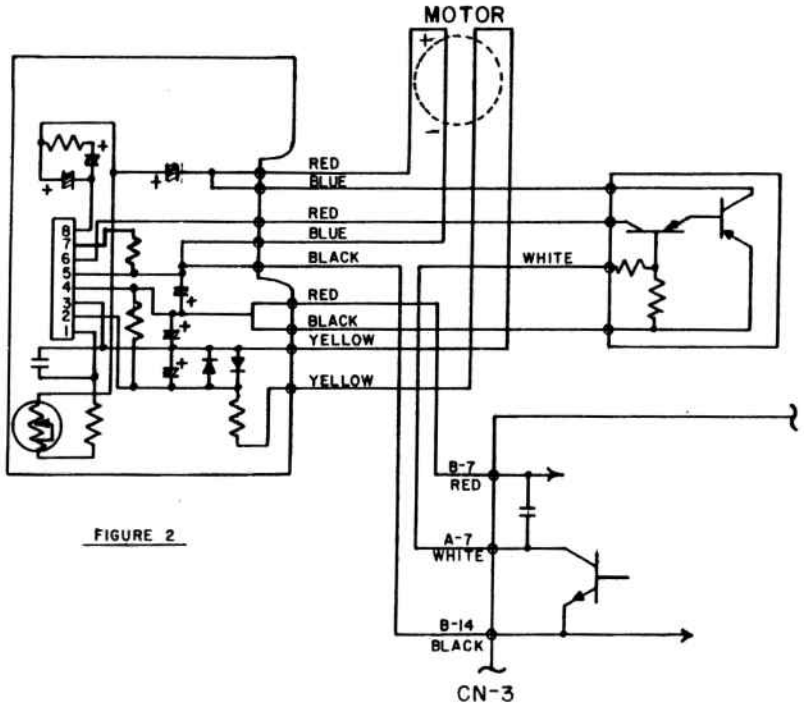


FIGURE 2

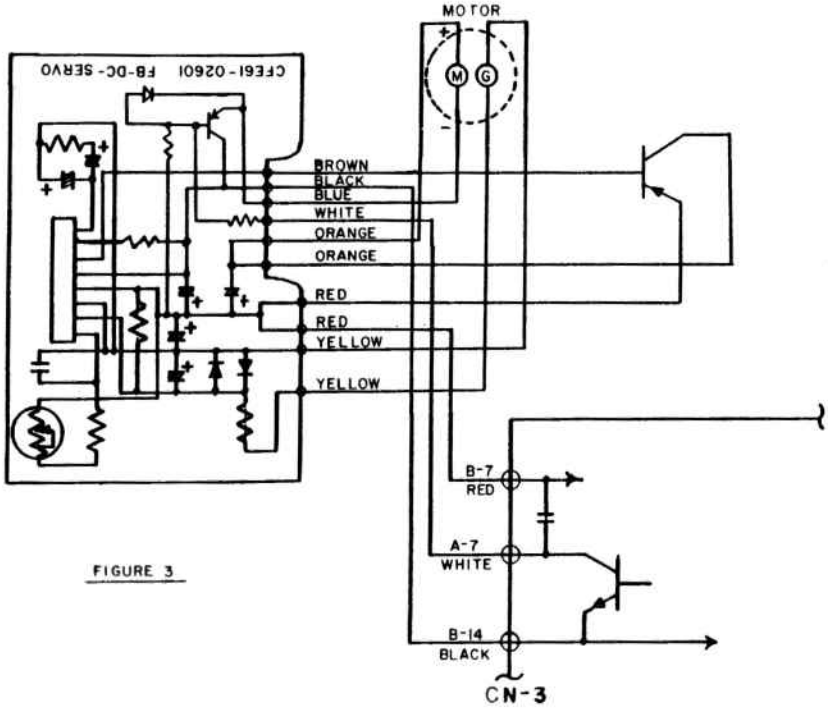


FIGURE 3

DATE: June 1Ø, 1982

REVISION DATE: January 17, 1983

BULLETIN NO.: CC:9

PRODUCT: 26-3Ø22/3 Color Computer Disk Drives

SUBASSEMBLY: ARA-2895 Spindle Pulley

PURPOSE: Drive will not hold steady speed.

DISCUSSION:

Some Color Computer drives have been received from TEC with a defective spindle pulley. This pulley is has defects which allow bearing oil to seep out and be slung onto the drive belt, causing slippage.

The defective pulleys can be identified as die cast aluminum, and are almost black in color. These spindle pulleys **MUST** be replaced.

PROCEDURE:

(1) Replace the die cast (black) pulley with a new, machined aluminum pulley (National Parts number ARA-2895) that is a light gold in color.

(2) Clean the drive motor pulley with isopropyl alcohol.

(3) Replace the drive belt (National Parts number AB-65Ø7).

(4) Adjust tension on the belt as required.

(5) Adjust motor speed as required.

(6) Allow drive to run for 1/2 hour, and recheck or reset speed as necessary. If it is necessary to reset speed, let drive run for another 1/2 hour and recheck again.

DATE: August 2, 1982

REVISION DATE: January 17, 1983

BULLETIN NO.: CC:1Ø

PRODUCT: 26-3Ø67 "WILDCATTING" cartridge

SUBASSEMBLY: None

PURPOSE: "WILDCATTING" cartridge will not initialize properly

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DISCUSSION:

The "WILDCATTING" cartridge requires that at least one memory bit be of a different logic level than the rest, however, all Mostek 16K RAMS power up with the same bit pattern. This confuses the "WILDCATTING" initialization sequence.

PROCEDURE:

Replace ONE of the Mostek 16K RAMs with one Motorola RAM. This will destroy the pattern and allow "WILDCATTING" to initialize properly.

DATE: November 1, 1982

REVISION DATE: June 16,1983

BULLETIN NO.: CC:11

PRODUCT: 26-3Ø1Ø

SUBASSEMBLY: Main PCB and bias/drive PCB

PURPOSE: Identification of various versions of U7Ø1 provided by RCA and the proper parts to properly modify the circuit when replacing U7Ø1.

PROCEDURE/DISCUSSION

RCA has used 9 different variations of the Luminance/Chroma processor chip (U7Ø1) in the assembly of the CTC-1Ø7 Color Television Receiver chassis. During repair, parts availability may require installing a different version of the IC than was originally installed in the chassis. It may be necessary to change, install, or remove several other parts to make the supplied IC work in the circuit.

The Luminance/Chroma processor IC (National Parts number AMX-4638) will have one of the following part numbers on its body:

```
1465638 - x
   5638 - x      Where 'x' is the revision number (1 - 1Ø)
    638 - x
```

In the following chart the IC will be referred to only by the '-x', ie: '-9' is part number 1465638 - 9.

In one instance it may be necessary to add diode CR7Ø7 (National Parts number ADX-1511). The full RCA part number for this diode is:

```
1471872-6        diode is physically marked "Ø31"
```

Since the diode is too tiny to hold the full part number, the number "Ø31" is marked on its body.

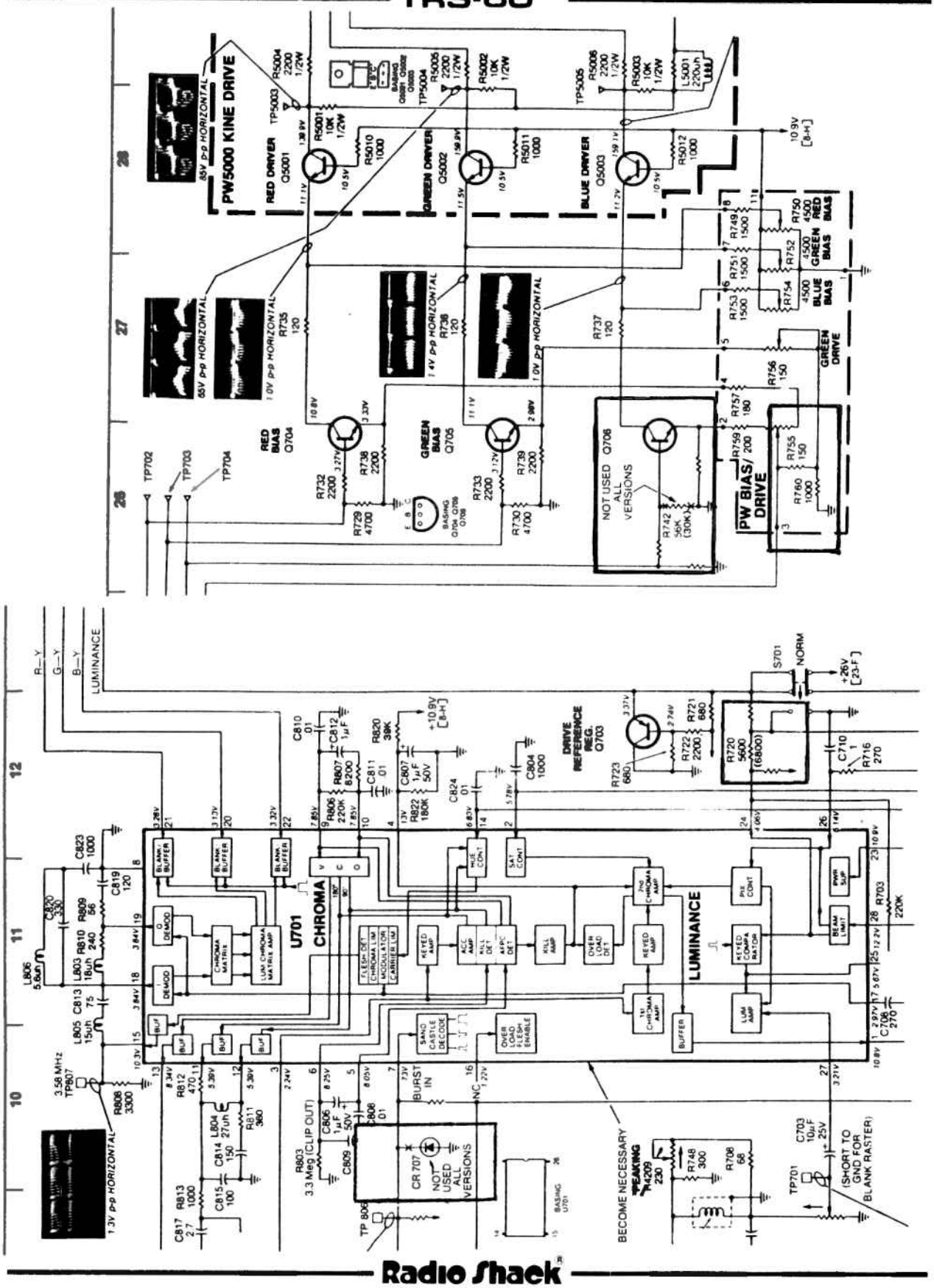
When removing U7Ø1, be careful not to destroy R7Ø3 (22ØK 1/4 watt 5%) which is tack soldered on the foil side of the PCB between pins 24 and 25 of U7Ø1. If the insulating tubing around R7Ø3 is damaged it must be replaced with a short length of heat shrinkable tubing.

The following chart shows the necessary parts to be added, deleted, or changed when installing any given revision of U7Ø1. The correct parts that should be in the circuit are included with the IC. Parts listed as "OMIT" should not be installed in the circuit, and should be removed if they are already installed.

All resistor values are in ohms, 1/4 watt 5%.

U7Ø1 Rev.	CR7Ø7	R72Ø	R742	R755	R76Ø
	(on main PCB)			(on bias/drive PCB)	
-1	OMIT	5.6K	OMIT	15Ø	OMIT
-2	OMIT	5.6K	OMIT	15Ø	1K
-3	********THIS REVISION OF U7Ø1 IS NOT USED*********				
-4	OMIT	5.6K	OMIT	15Ø	OMIT
-5	OMIT	5.6K	OMIT	OMIT	OMIT
-6	Ø31 (SEE TEXT)	5.6K	56K	15Ø	OMIT
-7	OMIT	5.6K	OMIT	15Ø	OMIT
-8	OMIT	6.8K	3ØK	15Ø	OMIT
-9	OMIT	6.8K	3ØK	OMIT	OMIT
-1Ø	OMIT	5.6K	OMIT	15Ø	OMIT

For your information, the following page highlights the schematic areas effected by this modification.


PW5000 KINE DRIVE
RED DRIVER Q5001
GREEN DRIVER Q5002
BLUE DRIVER Q5003
RED BIAS Q704
GREEN BIAS Q705
NOT USED Q706 ALL VERSIONS
PW BIAS/ DRIVE
GREEN DRIVE
RED BIAS
GREEN BIAS
BLUE BIAS
U701 CHROMA
LUMINANCE
DRIVE REFERENCE REG. Q703
NORM
3.58 MHz TP807
BURST IN
CR 707 NOT USED ALL VERSIONS
BECOME NECESSARY
(SHORT TO GND FOR BLANK RASTER)
R-Y
G-Y
B-Y
LUMINANCE

DATE: November 2, 1982

REVISION DATE: June 16, 1983

BULLETIN NO.: CC:12

PRODUCT: 26-3002/3/4 Old style Color Computer
26-3193 Technical Reference Manual

SUBASSEMBLY: Service Manual

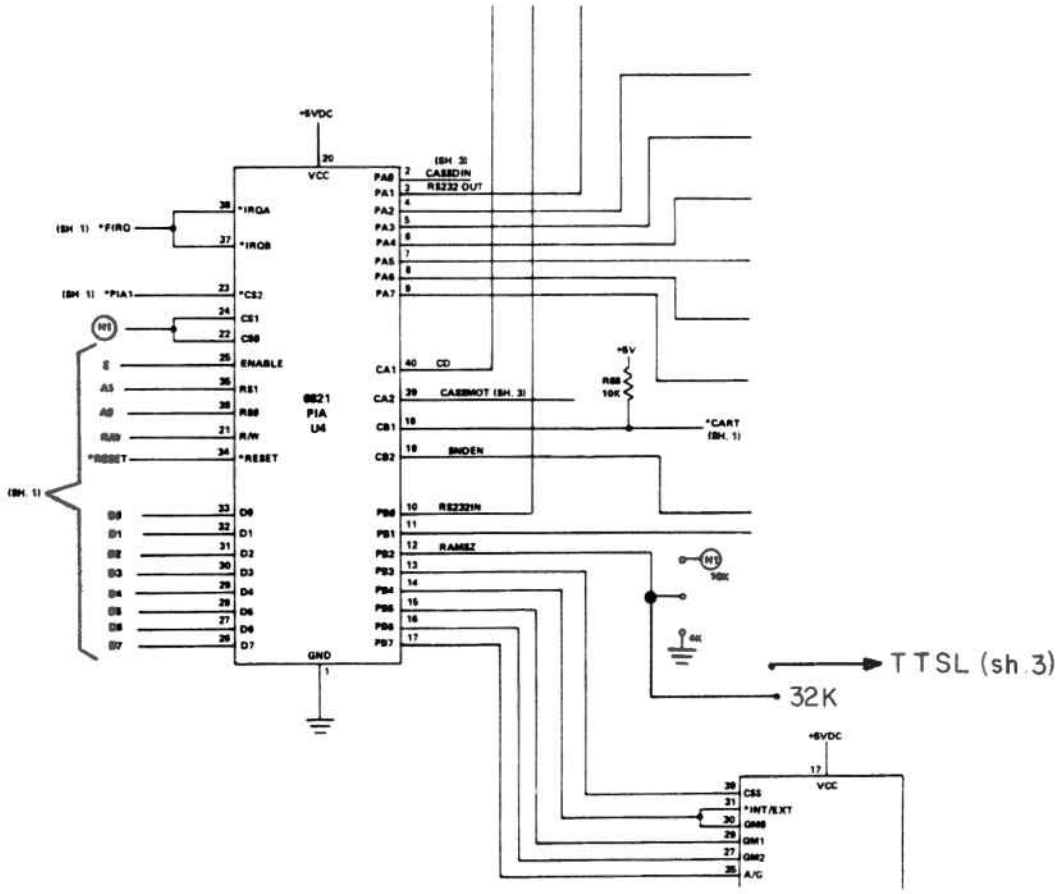
PURPOSE: 1) Updates 3002, 3003, 3004 manual to accommodate Rev. E board
2) Corrects missing traces in 26-3193 manual

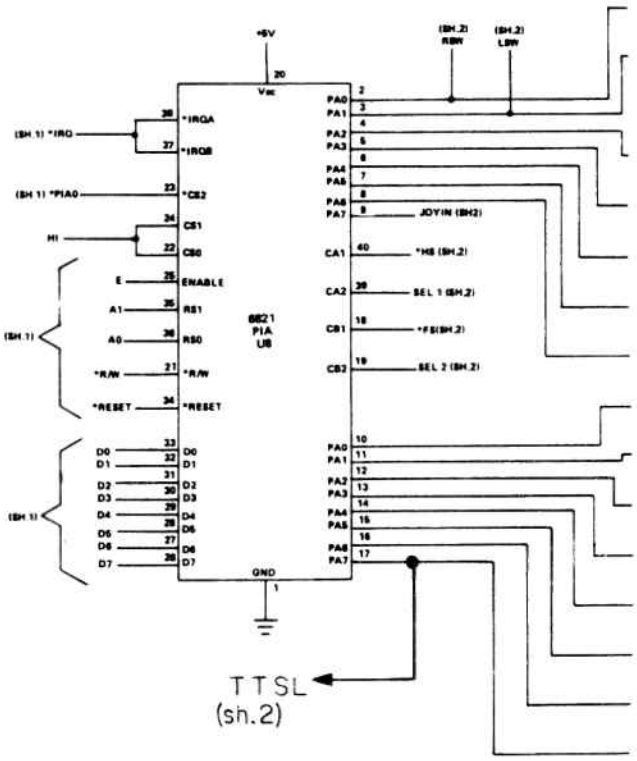
DISCUSSION:

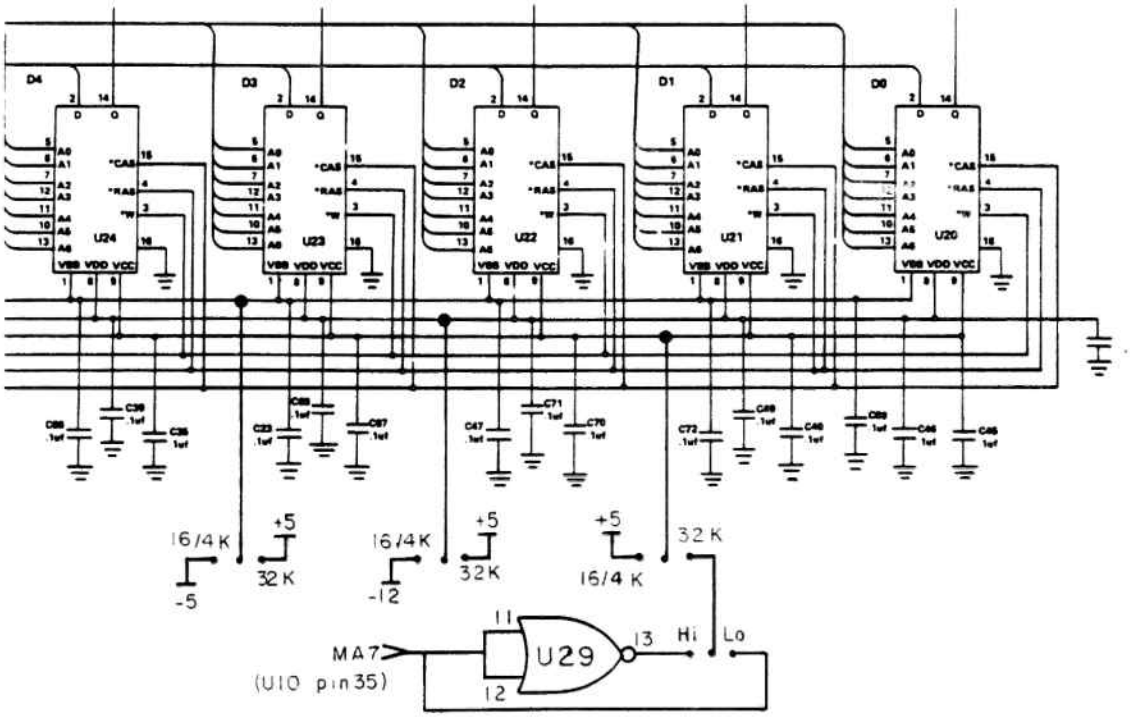
(1) The current Service Manual for the Color Computer does not reflect the changes incorporated in the Revision 'E' circuit board. Please make the enclosed changes (Figures 1, 2, and 3) to your schematics.

On the Revision 'D' circuit board these changes are made with cut traces and wire jumpers during the 32K upgrade procedure. The resulting circuitry is the same as the revision 'E' board.

(2) The Color Computer Technical Reference Manual contains the schematic for the Revision 'E' circuit board. Sheet 2 refers to the signal "TTSL (SH. 3)" which doesn't appear on Sheet 3. The enclosed Figure 1 shows the corrected schematic.


+5VDC
VCC
GND
8821
PIA
U4
*IRQA
*IRQB
*CS2
CS1
CS0
ENABLE
RS1
RS0
R/W
*RESET
D0
D1
D2
D3
D4
D5
D6
D7
PA0
PA1
PA2
PA3
PA4
PA5
PA6
PA7
CA1
CA2
CB1
CB2
PB0
PB1
PB2
PB3
PB4
PB5
PB6
PB7
CASSDIN
RS232 OUT
CD
CASSMOT (SH. 3)
*CART (SH. 1)
SNDEN
RS232IN
RAMSZ
+5V
R68 10K
(H1) 10K
4K
TTSL (sh 3)
32K
(SH. 1) *FIRQ
(SH. 1) *PIA1
(SH. 1)
(SH. 3)
CSS
*INT/EXT
GM0
GM1
GM2
A/G


+5V
6821
PIA
U8
*IRQA
*IRQB
*CS2
CS1
CS0
ENABLE
RS1
RS0
*R/W
*RESET
D0
D1
D2
D3
D4
D5
D6
D7
GND
PA0
PA1
PA2
PA3
PA4
PA5
PA6
PA7
CA1
CA2
CB1
CB2
JOYIN (SH.2)
*HS (SH.2)
SEL 1 (SH.2)
*FF(SH.2)
SEL 2 (SH.2)
TTSL
(sh.2)


D4
D3
D2
D1
D0
U24
U23
U22
U21
U20
16/4K
+5
32K
-5
-12
32K
MA7
(U10 pin35)
U29
Hi
Lo

DATE: November 4, 1982

REVISION DATE: June 16, 1983

BULLETIN NO.: CC:13

PRODUCT: 26-3002A/3A/4A Revised Color Computer

SUBASSEMBLY: AX-9328 Revised PCB

PURPOSE: Modifications of revised PCB to assure 'false color'

DISCUSSION:

There are two possible modifications that may be found on the revised Color Computer PCB. Both of these have been approved, and should not be removed unless PROVEN defective. Note that either of the two modifications may be found, but not both on the same unit.

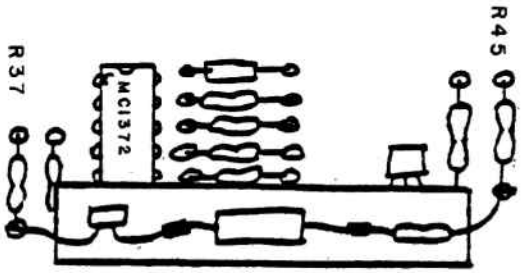
The modifications are made to assure the 'false color' response. In the high resolution graphics mode only two possible colors are available to the programmer. However, it is possible to trick the computer and television into producing more colors by putting certain repetitive bit patterns into video memory (by way of POKEs or machine level routines). These colors are known as 'false colors'. The two modifications assure that the computer and video will respond to these programming 'tricks'.

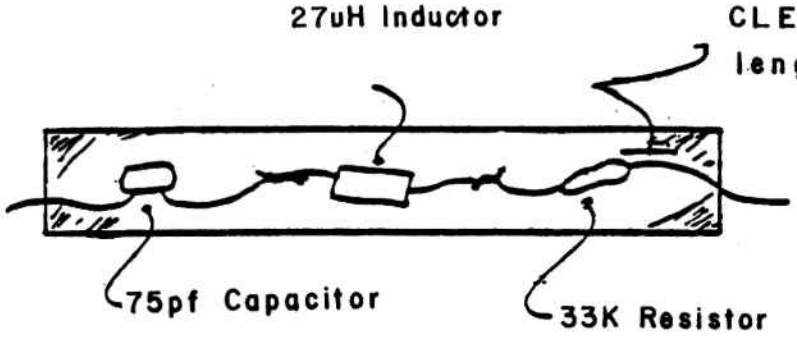
Modification 1 is the addition of a 56K 1/4 watt 5% resistor (National Parts number N-0345EEC) between pins 2 and 12 of U6 (MC1372).

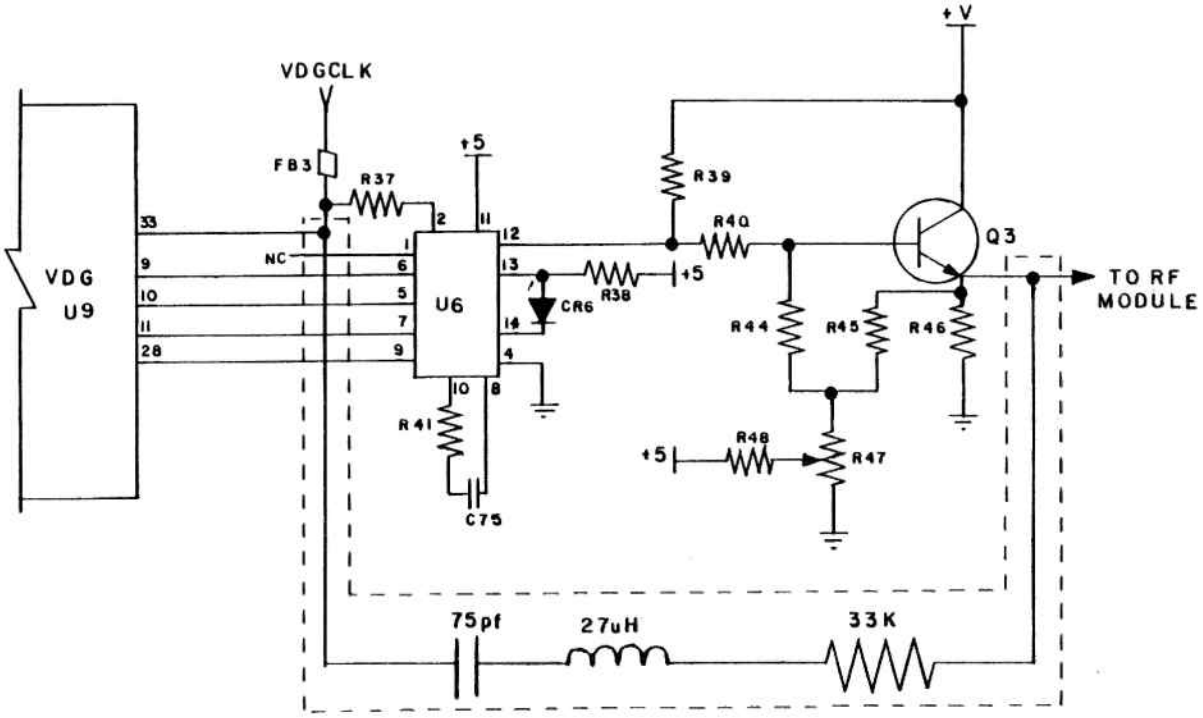
Modification 2 is the addition of a 33K 1/4 watt 5% resistor (National Parts number N-0324EGE), a 75pf capacitor (National Parts number CC75ØJJWP), and a 27µH inductor (National Parts Number ACA-8165) all connected in series between the emitter of Q3 and U9 pin 33 (MC6847). The enclosed drawing details this modification.

In general, the changeover occurred at the following serial numbers. PC boards or complete units with serial numbers BEFORE those indicated have the resistor only modification. PC boards or units AFTER those indicated will have the resistor/capacitor/coil modification. Please note that due to production transitions there may be a small amount of "overlap" concerning serial number vs. modification type.

CATALOG #	BOARD SERIAL #	UNIT SERIAL#
26-3002A	032433	0014413
26-3003A	032100	0001395
26-3004A	032405	0010372


R37
MC1372
R45


27uH Inductor
CLEAR VINYL TUBING
length = 1.75"
75pf Capacitor
33K Resistor


+V
VDGCLK
FB3
R37
+5
R39
R40
Q3
TO RF MODULE
VDG U9
33
9
10
11
28
NC
U6
CR6
R38
+5
R44
R45
R46
R41
R48
R47
+5
C75
75pf
27uH
33K

DATE: November 2, 1982

REVISION DATE: June 16, 1983

BULLETIN NO.: CC:14

PRODUCT: 26-3ØØ2A/3A/4A Revised Color Computer

SUBASSEMBLY: AX-9328 Revised PCB

PURPOSE: To prevent or cure keyboard failure. Problem usually shows up as an intermittent inability to use keys F and N after 32K upgrade.

DISCUSSION:

The keyboard matrix is handled by one of the PIA chips, U18 on the redesigned PCB. One line of the PIA, pin 16 labeled 64SL, is shared between the keyboard and RAMSZ select line. Two of the lines from the PIA are also shared by the joystick circuitry. The schematic will show that the F and N keys utilize these three lines.

The lines coming from pins 2 and 3 of the PIA are labeled RSW (Right SWitch) and LSW (Left SWitch) on the schematic. The RFI suppression on the joystick circuits add capacitive loading to these two lines. This, along with the added usage of pin 16, causes intermittent failures of the keyboard. Lowering the value of the capacitors on these lines improves the response.

PRECEDURE:

On the revised board the capacitors are C4 and C7. Change them from .ØØ22µf to .ØØ1µf (National Parts number CC-1Ø2QJCP). Check the capacitor value before removing it as these capacitors may already have been changed on boards on later units.

DATE: December 16, 1982

REVISION DATE: June 24, 1983

BULLETIN NO.: CC:15

PRODUCT: 26-3001/2/4 'old style' Color Computer

SUBASSEMBLY: AXX-0338 Revision D PCB, AX-9003 Revision E PCB

PURPOSE: Upgrade procedure from 4K or 16K memory to 64K memory

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DISCUSSION: The following is the correct upgrade procedure for the "old style" Color Computer PCBs, Revisions 'B' through 'E', using memory upgrade kit 26-3017A (National Parts number AXX-7079).

The upgrade kit consists of the following parts. Please check to make sure you have all of the following parts before attempting the upgrade procedure.

PARTS LIST

Description	Quantity	Part number
64K RAM, 8040665	8	8040665
Ferrite bead	1	
Keyboard shield	1	
Jumper plug, R83	1	8519098
Jumper plug, high/low	1	8519021
Label, upgrade	1	

In addition, you will need the following materials:

Wire wrap (Kynar®) wire
20-gauge insulated solid hook-up wire (for Revision 'D' board only)
AXX-2023 Color Computer Diagnostic ROM Cartridge, version 2.0 or greater
X-ACTO® knife

PROCEDURE:

REVISION 'B' PCB

The old style Revision 'B' PCB will not support the 64K upgrade kit. Remove this board from the unit and replaced it with a Revision 'E' PCB, National Parts number AXX-9ØØ3.

REVISION 'C' PCB

The old style Revision 'C' PCB will not support the 64K upgrade kit. Remove this board from the unit and replace it with a Revision 'E' PCB, National Parts number AXX-9ØØ3.

REVISION 'D' PCB

The old style Revision 'D' PCB can be modified to accept the 64K upgrade kit. The following is the procedure to modify the old style Revision 'D' board.

Before attempting a 64K upgrade procedure, you should test the Color Computer with the currently available diagnostic ROM cartridge. Correct any faults that may show up BEFORE attempting the 64K upgrade procedure.

1) Place the Color Computer upside down on a padded surface or a towel and remove the seven screws holding the case halves together. One screw will be found under the warranty seal. It will be necessary to break the warranty seal to remove the screw. Note the two shorter screws go to either side of the keyboard.

2) Turn the computer right side up, remove the case top, and set it aside.

3) Carefully unplug and remove the keyboard from its mounting posts.

4) Cut the tie wraps holding the RFI shield cover in place, and remove the shield cover.

5) Make a careful, accurate note of the color and position of the wires connected to the transformer module. Remove the three screws holding the module in place (2 long screws through the transformer, one short screw holding the PCB in place). Disconnect and remove the transformer module.

6) Remove the ten screws holding the PCB in place, and lift the PCB from the mounting posts.

7) Using a long, flat blade screwdriver, remove the sixteen fasteners which hold the bottom shield and insulator in place. It is not necessary to remove the fasteners from the shield, simply pry them loose from the PCB. Remove and set aside the bottom shield and insulator.

8) Check the number stamped on U3. It must marked 8Ø4Ø364A or 8Ø4Ø364B, or marked REV. 1.1 or REV.1.2. If it is not, you MUST replace it with the 1.1 ROM National Parts number AXX-3Ø52 or the 1.2 ROM, National Parts number AXX-3Ø59.

9) Remove capacitors C61, C31, C64, C35, C67, C45, C7Ø, C48. Refer to Figure 1 for their locations.

1Ø) Find the jumper plug located to the right of U1Ø. MOVE this jumper to the 16K position.

11) Find the jumper between U4 and U8. REMOVE this jumper.

12) Make the following cuts on the CIRCUIT side of the PCB. Refer to Figure 2, and cut EXACTLY where indicated. Failure to cut in the designated spots may result in power supply voltages being inadvertently removed from part of the computer.

CUTS

Ground to pin 3 of U29
Ground to pin 2 of U29
+5 volts to pin 9 of the RAMs
+12 volts to pin 8 of the RAMs
-5 volts to pin 1 of the RAMs
Foil between U29 pin 3 and U29 pin 11

13) Remove U11 from its socket, and bend pin 5 upwards. Replace U11 in its socket.

14) Using small diameter (2Ø gauge) insulated wire, install the following jumpers on the COMPONENT side of the PCB. Refer to Figure 3 for proper location.

JUMPERS

+5 volts to pin 1 of the RAMs
+5 volts to pin 8 of the RAMs

15) Using wire wrap wire, install the following jumper on the COMPONENT side of the PCB. Refer to Figure 3 for proper location.

JUMPER

U29 pin 1 to U11 pin 5 (the bent up pin)

16) Using wire wrap wire, install the following jumpers on the FOIL side of the PCB. See Figure 4 for location.

JUMPERS

U4 pin 12 to U8 pin 16
U29 pin 8 to U29 pin 2
U29 pin 3 to U8 pin 21
U1Ø pin 35 to pin 9 of the RAMS

17) Remove the old RAMS (U2Ø through U27). Store them in antistatic foam or an antistatic tube to preserve them.

18) Using proper care to prevent damage, install the 64K RAM chips at U2Ø through U27. Make sure the notch in the RAM chips points towards U4 and U1Ø. Make sure that you do not bend any pins under the IC.

19) Carefully check your work. Are all cuts clean (no 'splinters')? Are all jumpers properly soldered to the correct pins? Are all ICs properly installed? Are there no accidental solder bridges?

2Ø) Find the PCB shield that you removed and set aside earlier. Remove the five connectors that are along what will be the front of the shield.

21) Locate the keyboard shield included with the upgrade kit. Note that it has two rows of five holes each along one edge. Holding the shiny side down, bend this edge upwards and over until the two sets of five holes match. Fold the shield along the scoring in this area.

22) Insert the folded edge of the shield BETWEEN the keyboard shield and the paper insulator. Make sure all five holes line up. Insert the five connectors removed earlier into the five holes, making the PCB shield, the keyboard shield, and the paper insulator one unit. Attach the PCB shield to the PCB.

23) Place the PCB back into the case bottom. Be sure the AC cord wires are pulled through the transformer opening in the PCB. Bend the keyboard shield in a "stair-step" fashion so that the small holes in the keyboard shield fit over the locating pins on the keyboard mounting posts. Do not force the keyboard shield down over the mounting posts.

24) Using the notes you made earlier, attach the transformer wiring, and set the transformer module in place.

25) Carefully attach the keyboard to the main PCB, and set the keyboard onto its mounting posts.

26) BEFORE PROCEEDING FURTHER, TEST YOUR WORK! Connect the Color Computer to a television receiver, apply AC power to both, and turn both on. The familiar green screen and Color Basic Sign On Message should appear. If it does not, stop immediately and recheck your installation. Make corrections or repairs as necessary until the Color Computer powers up normally.

27) When the Color Computer powers up with the proper sign on message, type: **?MEM** <enter>

The Computer should reply: **24871**
(with Extended Color Basic installed)

or it will reply: **31Ø15**
(with Color Basic 1.1 or 1.2 ONLY installed)

If the Color Computer locks up, gives the wrong response, or gives an error, recheck your work.

28) Before reassembling the Color Computer, check the unit using the currently available diagnostic ROM cartridge. Make any corrections or repairs as necessary.

29) With the Color Computer working properly, fasten the PCB in place using the ten screws removed earlier. Fasten the transformer in place using the three screws removed earlier.

3Ø) Set the top RFI shield in place and install new tie wraps to hold it in place.

31) If the keyboard cable has a shield attached to it, remove it. If the keyboard has a long cable connected (with the connector under the spacebar), hold the cable to the keyboard shield with strips of electricians' tape. If the keyboard has the short cable, push down the scored square in the middle of the shield to accommodate the cable.

32) Make sure the keyboard shield is properly seated on the mounting posts. Reinstall the keyboard.

33) Remove the old 4K or 16K emblem from the case top and replace it with the 64K emblem.

34) Set the case top in place, making sure the keyboard is properly aligned. Carefully turn the Color Computer upside down onto a padded surface or a towel, and insert the seven screws to hold the case halves together. Note that the two shorter screws go on either side of the keyboard.

35) Affix the RAM label to the bottom of the case. Replace the warranty seal.

REVISION 'E' PCB

The old style Revision 'E' PCB can be modified to accept the 64K upgrade kit. The following is the procedure to modify the old style Revision 'E' board.

Before attempting a 64K upgrade procedure, you should test the Color Computer with the currently available diagnostic ROM cartridge. Correct any faults that may show up BEFORE attempting the 64K upgrade procedure.

1) Place the Color Computer upside down on a padded surface or a towel and remove the seven screws holding the case halves together. One screw will be found under the warranty seal. It will be necessary to break the warranty seal to remove the screw. Note the two shorter screws go to either side of the keyboard.

2) Turn the computer right side up, remove the case top, and set it aside.

3) Carefully unplug and remove the keyboard from its mounting posts.

4) Cut the tie wraps holding the RFI shield cover in place, and remove the shield cover.

5) Make a careful, accurate note of the color and position of the wires connected to the transformer module. Remove the three screws holding the module in place (2 long screws through the transformer, one short screw holding the PCB in place). Disconnect and remove the transformer module.

6) Remove the ten screws holding the PCB in place, and lift the PCB from the mounting posts.

7) Using a long, flat blade screwdriver, remove the sixteen fasteners which hold the bottom shield and insulator in place. It is not necessary to remove the fasteners from the shield, simply pry them loose from the PCB. Remove and set aside the bottom shield and insulator.

8) Check the number stamped on U3. It must marked 8Ø4Ø364A OR 8Ø4Ø364B, or marked REV. 1.1 OR REV.1.2. If it is not, you MUST replace it with the 1.1 ROM National Parts number AXX-3Ø52 or the 1.2 ROM, National Parts number AXX-3Ø59.

9) Remove capacitors C61, C31, C64, C35, C67, C45, C7Ø, C48. Refer to Figure 1 for their locations.

1Ø) Locate the two tall staking pins at the R83 position to the right of U1Ø. Install the ferrite bead over the pin closest to R75, and install the SMALLER of the two jumper plugs onto BOTH staking pins.

11) Set the jumper plug located just below C44 to the 16K/32K position.

12) **REMOVE** the jumper between U4 and U8.

13) Locate the staking pins next to U29. Install the larger jumper plug in the LOW position.

14) Locate 3 jumpers in the area just above the keyboard connector. Move ALL 3 of these jumpers to the 32K position.

********** CAUTION **********

These three jumpers change the power supply lines from the 4K/16K configuration to the 32K/64K configuration. ALL 3 of these jumpers must be changed BEFORE the RAM chips are changed and power is applied. Failure to change these jumpers will result in damage to the 64K RAM chips.

****

15) Make the following cuts on the CIRCUIT side of the PCB. Refer to Figure 5, and cut EXACTLY where indicated.

CUTS

Ground to pin 3 of U29
Ground to pin 2 of U29

16) Remove U11 from its socket, and bend pin 5 upwards. Replace U11 in its socket.

17) Using wire wrap wire, install the following jumpers on the FOIL side of the PCB. See Figure 5 for location.

JUMPERS

U4 pin 12 to U8 pin 16
U29 pin 8 to U29 pin 2
U29 pin 3 to U8 pin 21

18) Using wire wrap wire, install the following jumper on the COMPONENT side of the PCB. See Figure 3 for location.

JUMPER

U29 pin 1 to U11 pin 5 (the bent up pin)

19) Remove the old RAMS (U2Ø through U27). Store them in antistatic foam or an antistatic tube to preserve them.

2Ø) Using proper care to prevent damage, install the 64K RAM chips at U2Ø through U27. Make sure the notch in the RAM chips points towards U4 and U1Ø. Make sure that you do not bend any pins under the IC.

21) Carefully check your work. Are all jumper plugs properly installed? Are all ICs properly installed?

22) Find the PCB shield that you removed and set aside earlier. Remove the five connectors that are along what will be the front of the shield.

23) Locate the keyboard shield included with the upgrade kit. Note that it has two rows of five holes each along one edge. Holding the shiny side down, bend this edge upwards and over until the two sets of five holes match. Fold the shield along the scoring in this area.

24) Insert the folded edge of the shield BETWEEN the keyboard shield and the paper insulator. Make sure all five holes line up. Insert the five connectors removed earlier into the five holes, making the PCB shield, the keyboard shield, and the paper insulator one unit.

25) Place the PCB back into the case bottom. Be sure the AC cord wires are pulled through the transformer opening in the PCB. Bend the keyboard shield in a "stair-step" fashion so that the small holes in the keyboard shield fit over the locating pins on the keyboard mounting posts. Do not force the keyboard shield down over the mounting posts.

26) Using the notes you made earlier, attach the transformer wiring, and set the transformer module in place.

27) Carefully attach the keyboard to the main PCB, and set the keyboard onto its mounting posts.

28) BEFORE PROCEEDING FURTHER, TEST YOUR WORK! Connect the Color Computer to a television receiver, apply AC power to both, and turn both on. The familiar green screen and Color Basic Sign On Message should appear. If it does not, stop immediately and recheck your installation. Make corrections or repairs as necessary until the Color Computer powers up normally.

29) When the Color Computer powers up with the proper sign on message, type: **?MEM** <enter>

The Computer should reply: **24871**
(with Extended Color Basic installed)

or it will reply: **31Ø15**
(with Color Basic 1.1 or 1.2 ONLY installed)

If the Color Computer locks up, gives the wrong response, or gives an error, recheck your work.

30) Before reassembling the Color Computer, check the unit using the currently available diagnostic ROM cartridge. Make any corrections or repairs as necessary.

31) With the Color Computer working properly, fasten the PCB in place using the ten screws removed earlier. Fasten the transformer in place using the three screws removed earlier.

32) Set the top RFI shield in place and install new tie wraps to hold it in place.

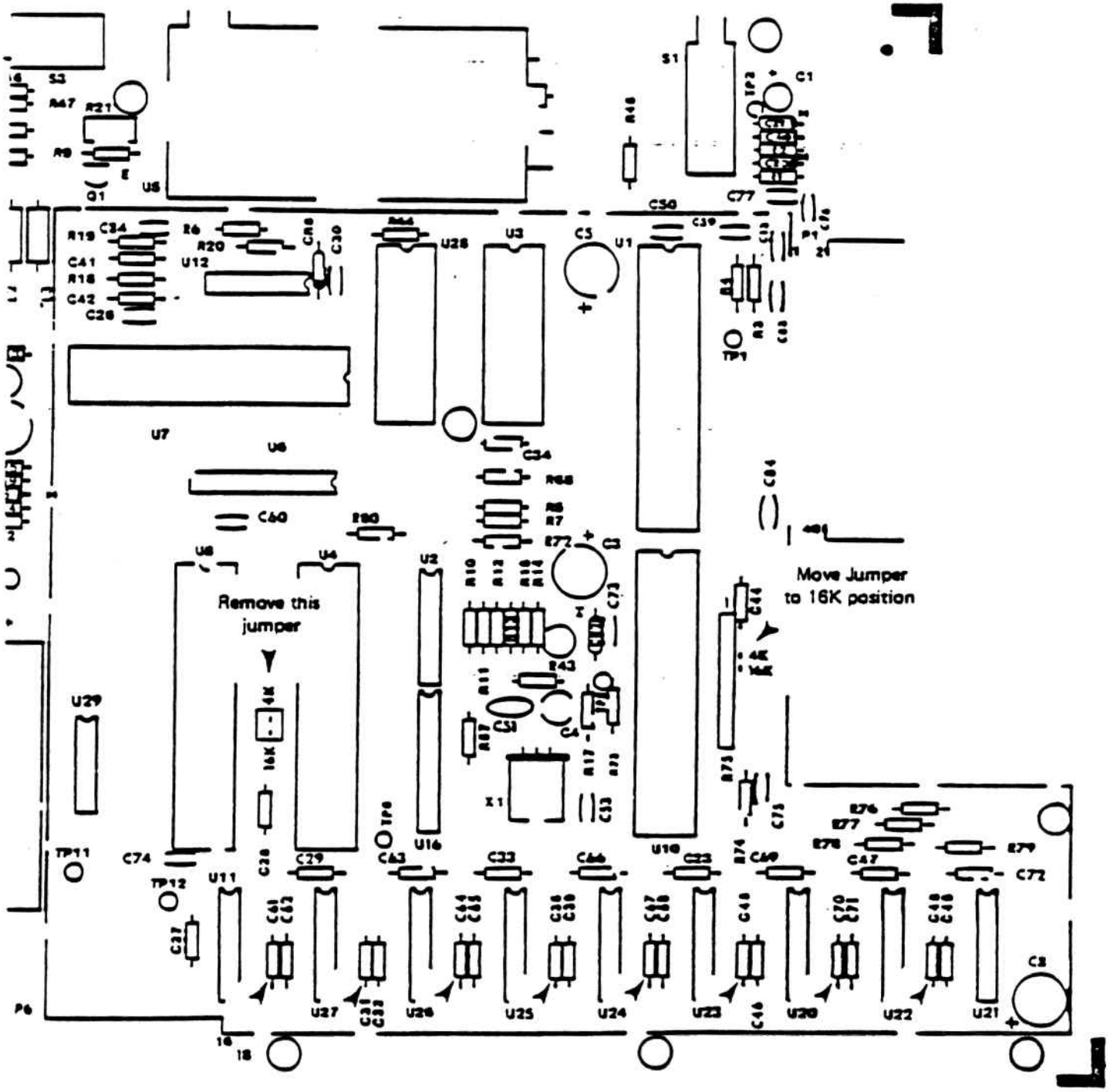
33) If the keyboard cable has a shield attached to it, remove it. If the keyboard has a long cable connected (with the connector under the spacebar), hold the cable to the keyboard shield with strips of electricians' tape. If the keyboard has the short cable, push down the scored square in the middle of the shield to accommodate the cable.

34) Make sure the keyboard shield is properly seated on the mounting posts. Reinstall the keyboard.

35) Remove the old 4K or 16K emblem from the case top and replace it with the 64K emblem.

36) Set the case top in place, making sure the keyboard is properly aligned. Carefully turn the Color Computer upside down onto a padded surface or a towel, and insert the seven screws to hold the case halves together. Note that the two shorter screws go on either side of the keyboard.

37) Affix the RAM label to the bottom of the case. Replace the warranty seal.



DELETE CAPACITORS : C81, C31, C84, C35, C57, C45, C70, and C48.

FIGURE 1
LOCATION OF CAPACITORS TO BE CUT
('D' AND 'E' BOARDS IDENTICAL)

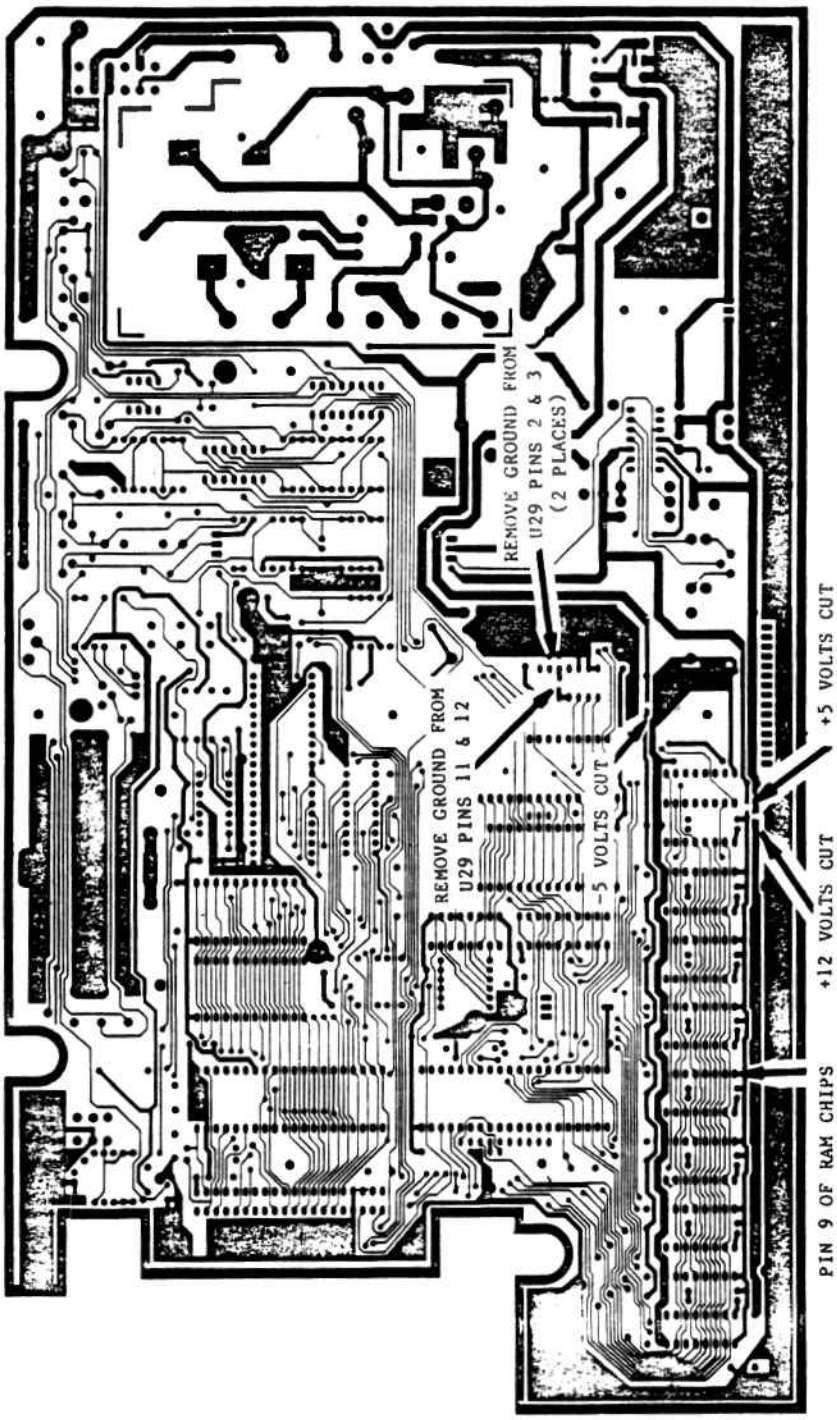


FIGURE 2
REVISION 'D' FOIL SIDE CUTS

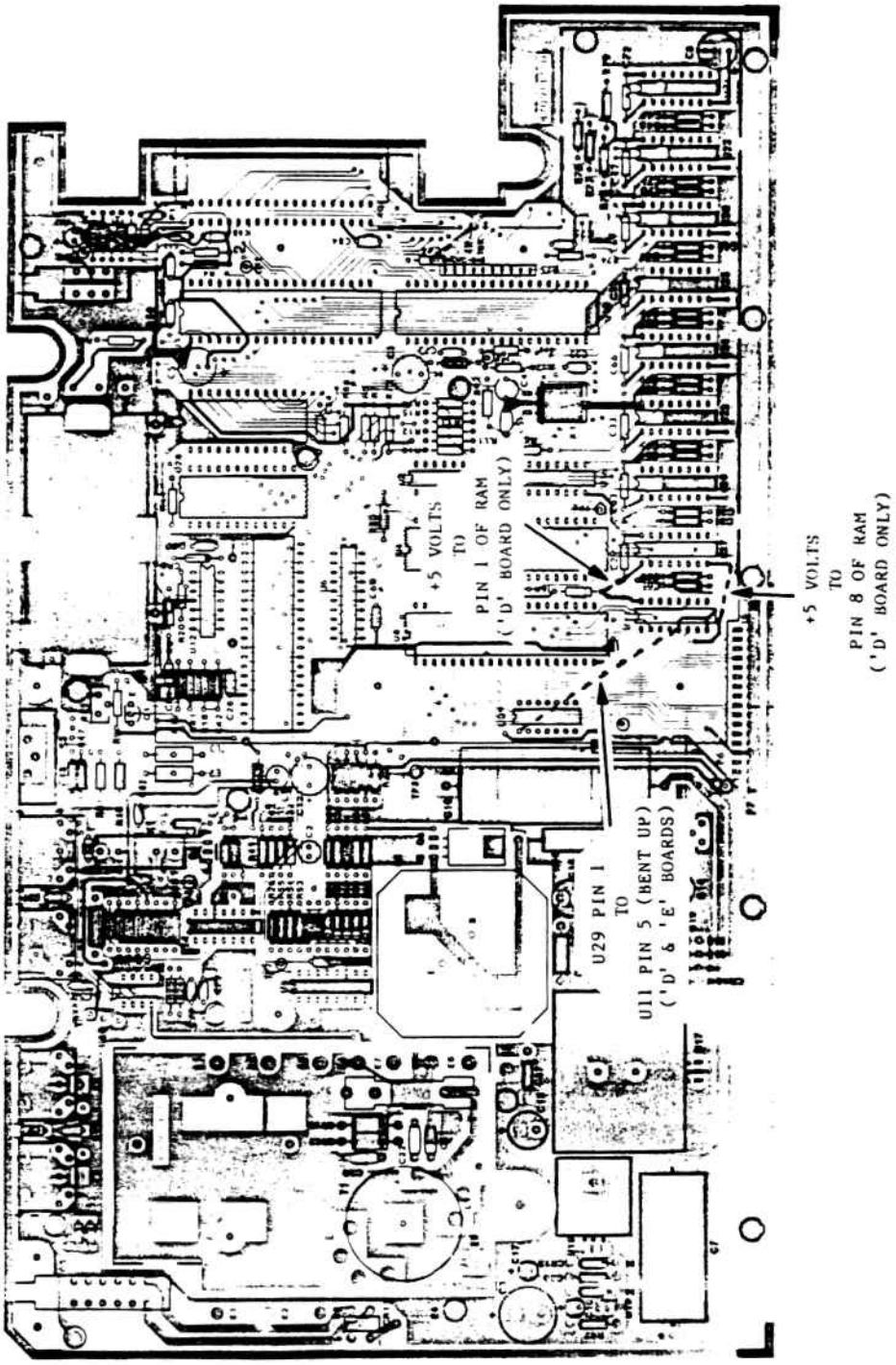


FIGURE 3
REVISION 'D' AND 'E' COMPONENT SIDE JUMPERS (SEE TEXT)

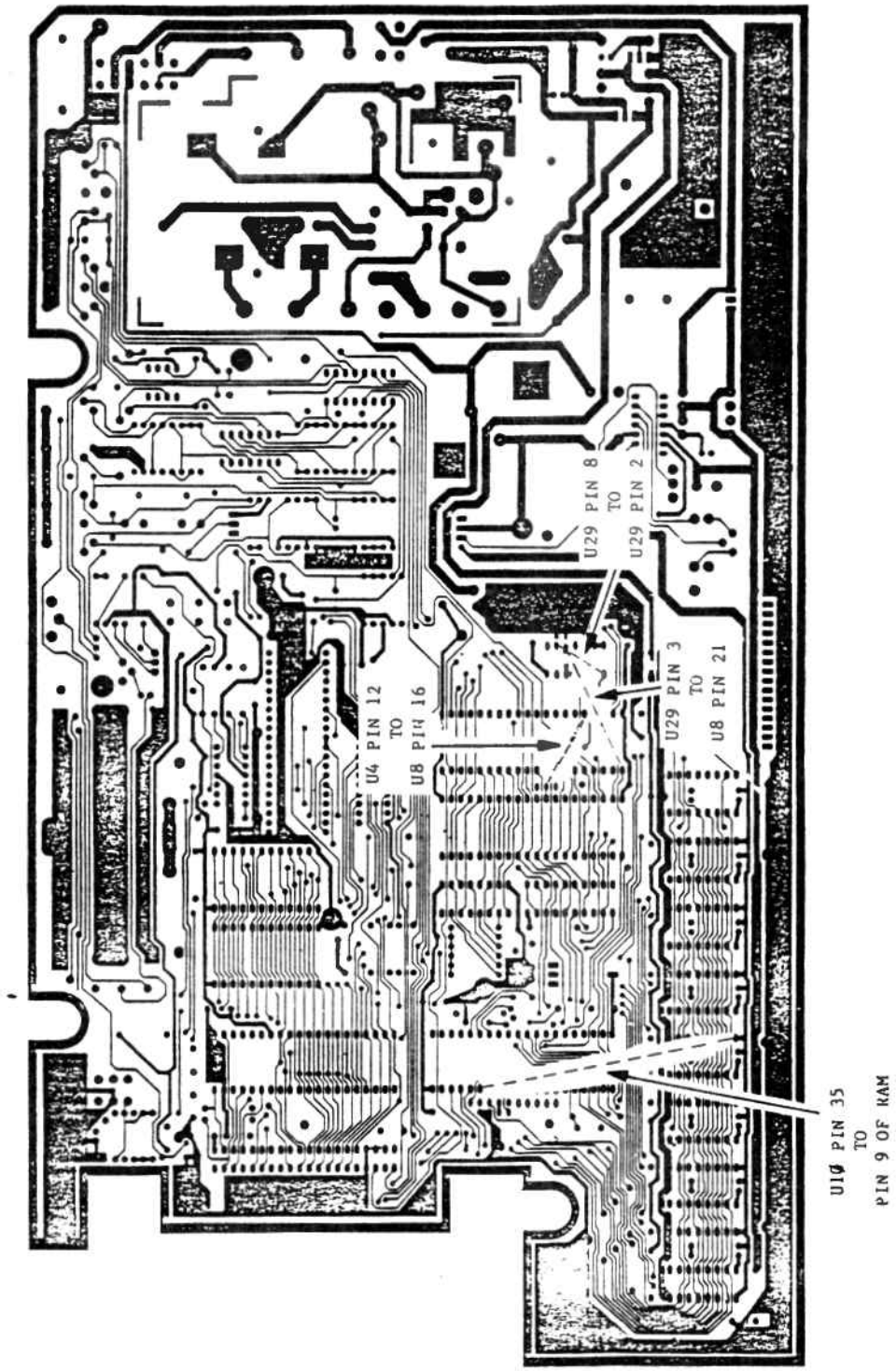


FIGURE 4
REVISION 'D' FOIL SIDE JUMPERS

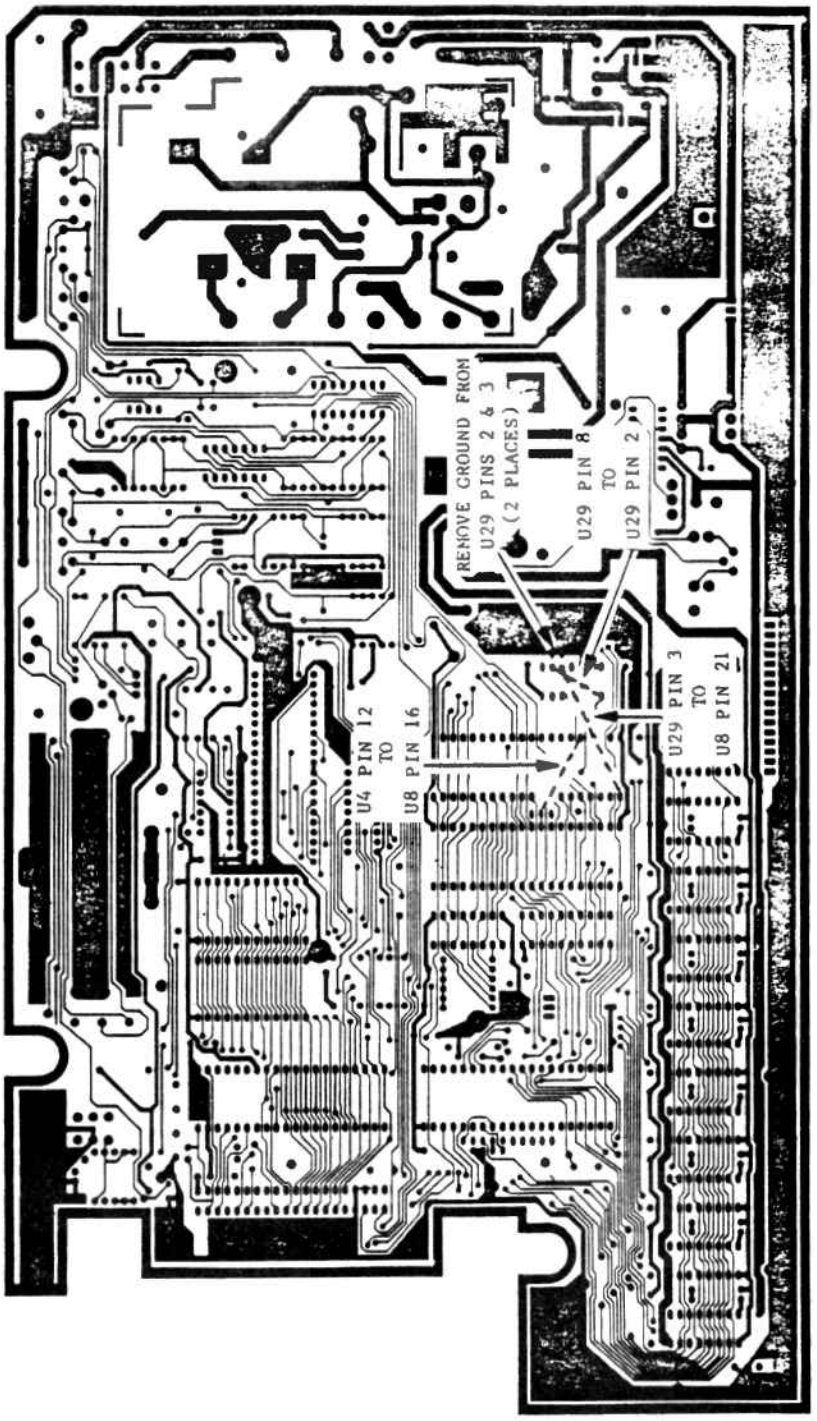


FIGURE 5
REVISION 'E' FOIL SIDE CUTS AND JUMPERS

DATE: December 23, 1982

REVISION DATE: June 24, 1983

BULLETIN NO.: CC:16

PRODUCT: 26-3001/2/4 'old style' Color Computer

SUBASSEMBLY: AXX-0338 Rev 'D' PCB, AXX-9003 Rev 'E' PCB
AXX-2023 Diagnostic ROM cartridge

PURPOSE: After 32K upgrade, memory test says "64K MEMORY U21 [or U26] BAD". Repeated replacement of RAM chips, SAM chip, or CPU does not cure the problem.

DISCUSSION:

The ORIGINAL 32K upgrade instructions for the Revision 'D' PCB (dated October 15, 1981) contained a PCB diagram which showed U4 pin 12 connected to U8 pin 16. If the jumper is connected to U8 pin 16 as shown in the ORIGINAL drawing, the Diagnostic Cartridge thinks that it is to test 64k of memory. When it tries to check the second 32K bank, the Revision D board will also try to read the ROM as well, producing a dual addressing problem which shows up as U21 BAD if the unit has Extended Color Basic. If the unit is only Color Basic 1.1, the problem may show up as U26 BAD.

Units upgraded using the ORIGINAL upgrade instructions are NOT 64K compatible without further modifications. Technical Bulletin CC : 15 contains the proper upgrade procedure to use when upgrading a Color Computer to 64K of memory.

PROCEDURE:

Open the computer and remove the top RFI shield. Check the manufacturers' part number that appears on the RAM chips and do the procedure that applies as follows:

IF RAM CHIPS ARE LABELED MCM66330 OR MCM 66331

Remove the PCB from the unit, and remove the botton shield from the PCB. Make sure that the jumper is connected from U4 pin 12 to U8 pin 17, and not to U8 pin 16 as indicated by the original drawing. Correct any errors that exist.

IF RAMS CHIPS ARE LABELED 8Ø4Ø665

Check the complete upgrade procedure against Technical Bulletin CC : 15. Make sure all cuts are EXACTLY as shown, and that all cuts have been made. Check to see that ALL jumpers are properly installed, and that there are no loose or broken wires, or no bad solder joints. Make sure that no sharp points have punctured the cardboard insulator on the shield. Replace U29 and/or U11 if necessary.

DATE: January 20, 1983

REVISION DATE: June 24, 1983

BULLETIN NO.: CC:17

PRODUCT: 26-3002/3/4, 26-3002A/3A/4A old and new Color Computer

SUBASSEMBLY: AXX-0338, AXX-9003, AX-9328 old and new style PCBs

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PURPOSE: List of parts changed between old and new style PCBs

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DISCUSSION:

Below is a list of parts changed and their part numbers for old and new style PCBs. Note that the OLD parts numbers are still valid for the OLD style Rev. D and E PCBs. They have NOT been removed from stock.

DESCRIPTION	OLD PART NUMBER	NEW PART NUMBER
Keyboard	AXX-0206	AXX-0209
Keyboard PIA	AMX-4578 (MC6821)	AMX-5682 (MC6822)
Power supply (see note 1)	AX-8709	ATA-1007
Video Mixer MC1372P (see note 2)	AMX-4574	AMX-5770
Cassette relay	AR-8130	AR-8154
Main PCB	AXX-0338 (Rev D) AXX-9003 (Rev E)	AX-9328

1) Includes transformer and PCB. The two PCBs are different, but the transformer itself (ATA-0856) is the same in both units
2) There is no visible difference in these chips. Be sure you use the correct one.

DESCRIPTION	OLD PART NUMBER	NEW PART NUMBER
Upper case half	Not Available Use AZ-6555	AZ-6847
Lower case half	AZ-5845	AZ-6846
Complete case (see note 3)	AZ-6555	AZ-6555
Service manual	MS-26Ø3ØØ1	MS-26Ø3ØØ2A

3) The new style case is molded to fit either the "old" style PCB (Rev. 'D' and 'E') or the "revised" style PCB

DATE: May 16, 1983

REVISION DATE: September 8, 1986

BULLETIN NO: CC:18

PRODUCT: 26-3ØØ2A/3A/4A
26-3134/A/B
26-3136/A/B
26-3127/A/B Color Computer 2

SUBASSEMBLY: Color BASIC, Extended BASIC, Disk BASIC ROMs

SUBASSEMBLY REVISION: N/A

PURPOSE: To release checksums for new ROMs.

DISCUSSION/PROCEDURE:

Checksums for the current ROM versions seen in the 26-3ØØ2A/3A/4A are as follows:

ROM type	Part Number	Checksum
Color BASIC version 1.2	AXX-3Ø59	5917
Extended BASIC version 1.1	AXX-3Ø54	3338
Disk BASIC version 1.1	MX-5643	EDC9

Checksums for the ROM versions seen in the 26-3134, the 26-3136, and the 26-3127 are as follows:

ROM type	Part Number	Checksum
Color BASIC version 1.2	MX-62Ø3	1DF1
Extended BASIC version 1.1	MX-62ØØ	3338

Checksums for the ROM versions seen in the 26-3134A/B, the 26-3136A/B, and the 26-3127A/B are as follows:

ROM type	Part Number	Checksum
Color BASIC version 1.3	MX-6435	1DF1
Extended Color Basic version 1.1	MX-6436	BASIC: 1DF1 Extended: 3338

It should be noted in the 26-3134A/B, the 26-3136A/B, and the 26-3127A/B that the Extended Color BASIC ROM is a 128K ROM which replaces the original Color BASIC ROM. This is why the BASIC and Extended Checksums are listed for it.

The Color BASIC and Extended BASIC ROM checksums may be tested with the Diagnostic ROM cartridge, version 2.Ø (part # AXX-2Ø23, cat. # 26-9999X). The Disk BASIC ROM should be tested using the program "FDCTST" (part # AXX-2Ø3Ø, cat. # 26-9999X).

For informational purposes, here are the checksums which may be found for the older ROM versions:

ROM type	Part Number	Checksum
Color BASIC version 1.Ø	N/A	95Ø5
Color BASIC version 1.1	N/A	E54B
Extended Color BASIC version 1.Ø	N/A	22Ø6
Disk BASIC version 1.Ø	N/A	278A

DATE: August 4, 1983

REVISION DATE: September 14, 1983

BULLETIN NO.: CC:19

PRODUCT: 26-3001/2/3/4 "Old style" Color Computer
26-3002A/4A Revised Color Computer

SUBASSEMBLY: 26-3017A 32K RAM upgrade kit
AXX-0338 Rev. 'D' PCB
AX-9003 Rev. 'E' PCB
AX-9328 Domestic (new style) PCB

PURPOSE: 1) To determine if unit needs to be upgraded to 64K
2) Procedure to be used for 64K upgrade.

DISCUSSION:

In the past, the "old style" Color Computer could be upgraded to 32K using the 26-3017 upgrade kit. These early kits were marked "UPPER" or "LOWER" to indicate which upgrade procedure was to be used. While these kits are true 32K upgrade kits, they in fact contained 64K memory chips with one or more faults in one half of the IC. These ICs were grouped according to which half of the IC was fully functional, UPPER or LOWER. The 26-3017 upgrade did not have the ability to be expanded to a functional 64K memory due to the internal memory faults.

In approximately November 1982, Radio Shack introduced the 26-3017A upgrade kit. These kits are unmarked as to upper or lower, and in fact contain 64K memory chips with no faults. These kits were originally to be used ONLY in the revised Color Computers (26-300xA), and the 26-3017 were to be used only in the old style Color Computer. As supplies of the 26-3017 kit were depleted, the 26-3017A was substituted, and is now the only kit available.

In February, 1983 Technical Bulletin CC : 20 was re-released, restating the upgrade procedure for Revision 'D' and 'E' PC boards found in the old style Color Computer. The differences largely concern the application of U29. An extra gate present in U29 is wired into the circuit, making the circuitry identical to the "new style" Revised PCB. As well, U4 pin 12 is connected to U8 pin 16 to allow detection of the 64K memory modification. Since both halves of the ICs are are functional, there is no need to to specify an UPPER or LOWER bank. All units are wired as though they are LOWER bank chips. This procedure allows the Revision 'D' and 'E' PC boards to access 64K of memory, and in fact makes the circuitry match the Revised Color Computer.

In September, 1983 the Technical Bulletin system was renumbered. Technical Bulletin CC:2Ø became Technical Bulletin CC:15. **TECHNICAL BULLETIN CC:15 REVISED JUNE 24, 1983 IS THE ONLY ACCEPTABLE UPGRADE PROCEDURE FOR THE REVISION 'D' AND 'E' BOARDS.**

The Revised Color Computer has always been able to access 64K of memory. No modifications are required, but the 26-3Ø17A upgrade kit is required. The upgrade instructions are found in the Revised Color Computer Service Manual, National Parts number MS26Ø3ØØ2A SUPPLEMENT.

It is important to note that NO Color Computer can access 64K of memory from BASIC. All 64K Color Computers, either factory direct or upgraded after purchase, will appear as 32K machines. 64K of memory is accessible ONLY to alternate operating systems such as OS9, or through custom written machine level programs.

PROCEDURE:

If a customer requests a 64K upgrade, first determine if a 64K upgrade is truly necessary. This can be done with a simple BASIC program:

```
1ØØ CLS
11Ø IF MEM<16ØØØ THEN PRINT "LESS THAN 32K" : END
12Ø FOR X= 16ØØØ TO 16Ø13
13Ø READ Y : POKE X,Y : NEXTX
14Ø DEFUSRØ = 16ØØØ
15Ø A = USRØ(Ø)
16Ø IF A THEN PRINT "32K" ELSE PRINT "64K"
17Ø END
18Ø DATA 198, 191, 247, 255, 2, 246, 255, 34, 196, 4, 79, 126, 18Ø,
    244
```

To use the program, type in the program after a cold start, that is, immediately after the computer has been turned ON. Check the program for errors, and then type **RUN <ENTER>**. The memory size will appear in the upper left hand corner of the screen. This program can be saved to tape or disk for future use.

Based on the above test, four possibilities can arise, each having a different solution.

1) THE MEMORY SIZE IS LESS THAN 16K.
   Upgrade the unit to 64K using the proper procedure for the board involved -- Revision D, Revision E, or New Style.

2) THE MEMORY SIZE IS 64K.
   No further modifications are necessary. Verify proper 64K operation using the Diagnostic Cartridge version 2.Ø (National Parts number AXX-2Ø23). Make any repairs necessary if the unit fails the diagnostics.

3) THE MEMORY SIZE IS 32K. THE MEMORY CHIPS ARE NOT MARKED WITH THE NUMBER 8Ø4Ø665.
These units were upgraded using the old "UPPER" or "LOWER" upgrade kits. It will be necessary to replace the memory ICs using the 26-3Ø17A upgrade kit. The modifications must be done using Technical Bulletin CC : 15. After completing the upgrade, check the unit using the Diagnostic Cartridge version 2.Ø (National Parts number AXX-2Ø23). Make any repairs necessary if the unit fails the diagnostics.

4) THE MEMORY SIZE IS 32K. THE MEMORY CHIPS ARE MARKED 8Ø4Ø665.
These units were upgraded using the wrong upgrade procedure. Check the following cuts and jumpers. Check the complete modification against the instructions given in Technical Bulletin CC : 15. The memory ICs should not be replaced unless proven defective. After completing the upgrade, check the unit using the Diagnostic Cartridge version 2.Ø (National Parts number AXX-2Ø23). Make any repairs necessary if the unit fails the diagnostics.

The following is a list of correct cuts and jumpers for "D" and "E" boards. This list is for reference only. For complete upgrade procedures, diagrams, and parts list, please refer to Technical Bulletin CC : 15 with a revision date of June 24, 1983.

Cut ground to U29 pin 2
Cut ground to U29 pin 3
Lift U11 pin 5 out of the socket
Cut +5 volts to pin 9 of RAMS ("D" board only)
Cut +12 volts to pin 8 or RAMS ("D" board only)
Cut -5 volts to pin 1 of RAMS ("D" board only)
Cut foil between U29 pin 3 and U29 pin 11 ("D" board only)
Jumper +5 volts to pin 1 of RAMS ("D" board only)
Jumper +5 volts to pin 8 of RAMS ("D" board only)
Jumper U1Ø pin 35 to pin 9 of the RAMS ("D" board only)
Jumper U11 pin 5 to U29 pin 1
Jumper U4 pin 12 to U8 pin 16
Jumper U29 pin 8 to U29 pin 2
Jumper U29 pin 3 to U8 pin 21

DATE: September 8, 1983

REVISION DATE: October 13, 1983

BULLETIN NO.: CC:2Ø

PRODUCT: 26-3ØØ2A/3A/4A "Revised" Color Computer
26-3ØØ3B 64K Color Computer

SUBASSEMBLY: AX-9328 Domestic PCB
AX-7Ø89 Final Fix Kit

PURPOSE: After a warm up period the Color Computer locks up.

DISCUSSION:

This problem shows up ONLY on the "Revised" Color Computer, those with the 'A' after the catalog number. The symptoms develop as follows:

1) Random characters begin to appear on the screen. These characters appear only in the second and ninth columns on the screen. Characters which appear in the logo may seem to misspell words. Any program in memory may begin to exhibit misoperation.

2) After a period of time the random characters will begin to completely fill columns 2 and 9. The random characters eventually turn to graphics characters. This pattern will continue until character columns 2 and 9 completely fill with orange graphics blocks (orange block = decimal 255).

3) During the above period of time the cursor has moved to the upper left hand corner of the screen (PRINT@ location Ø) after leaving an image of itself at its last location. The cursor continues to flash.

4) Any attempt to make keyboard entries or RESET the unit will result in total system lockup requiring the computer to be shut off for a few seconds.

The above sequence of events may take from 3Ø minutes to 2 hours or more to complete.

Any unit in for repair of this problem, or any unit suspected of having this problem, should be modified as described.

PROCEDURE:

You will need the following equipment:

1) Final fix satellite PCB kit AX-7Ø89 under catalog number 26-3ØØ3B.
2) Soldering equipment.

Some machines may contain an earlier modification (described under ADDITIONAL NOTES), characterized by a jumper from U18 pin 18 to a feed-through near U9 pins 35 and 36. If this modification is present it must be partially removed.

If the early modification is NOT present, proceed directly to STEP 1.

A) Desolder and remove the jumper from U18 pin 18 to the feed-through. Remove U18 from its socket and bend pin 18 down. Place U18 back into the socket, re-inserting pin 18 into the socket. It may be necessary to replace U18 if pin 18 has been cut.

B) Repair the trace cut to the left of TP7. Carefully scrape the green coating from both sides of the trace cut. Be careful not to damage any other traces. Solder a short length of hook-up wire or bare wire wrap wire across the cut. Be careful not to make any accidental solder bridges to any other traces.

STEP 1) CUT THE FOLLOWING ON THE COMPONENT SIDE OF THE PCB:

A) Cut the trace going to pin 5 or R64. R64 is the resistor pack near pin 1 of U18.

STEP 2) PREPARE U2Ø FOR MODIFICATION:

A) Remove U2Ø from its socket, bend pin 9 of U2Ø upwards, and reinsert U2Ø into its socket with pin 9 bent up.

STEP 3) INSTALL THE SATELLITE PCB:

Before installing the satellite PCB, strip 1/16 inch of insulation from the free end of the GREEN, YELLOW, RED, and BLACK wires. Tin the bare wire for easy soldering later. Strip 1/4 inch of insulation from the BLUE wire, and tin the bare wire.

A) Remove the logic PCB from the case. Remove the top RFI shield from the main PCB. Remove the bottom RFI shield from the main PCB and set it aside until later. Lay the top RFI shield upside down on top of U17 and U18, oriented as shown in figure 1.

B) Remove the paper backing from one piece of foam tape supplied. Apply the foam tape to the upper right hand corner of the RFI shield. Place the satellite PCB onto the foam tape, with the component side up. Orient the satellite PCB so that R2 is closest to the top edge of the shield. See Figure 1.

C) Solder the GREEN wire to the feed-through hole on the main PCB which is located 1/8 inch below pins 36 and 37 of U9. See Figure 1.

D) Solder the BLACK wire to the feed-through located between U21 and U22. The feed-through is located just above the letters "U22". See Figure 1.

E) Wrap and solder the BLUE wire to U2Ø pin 9, the pin bent out of the socket. See Figure 1.

F) Solder the RED wire to the feed-through located 1/4 inch below U2Ø pin 4Ø. The feed-through is located just above the letters "FB9". The trace leaving the feed-through goes directly to U2Ø pin 4Ø. See Figure 1.

G) Solder the YELLOW wire to the feed-through just above TP9. TP9 is located to the right of U2Ø. See Figure 1.

H) Remove the paper backing from the remaining piece of foam tape supplied. Apply the foam tape to the satellite PCB, attaching it to the top of the ICs.

STEP 4 REASSEMBLE THE UNIT

Before installing the RFI shields make sure that none of the wires accidentally short to any other components or traces.

Install the bottom RFI shield. Install the top RFI shield. Make sure that the wires are routed such that they are slack and free from tension.

After modification the unit **MUST** be given an operational check. Connect the computer to a television receiver and turn on both the computer and the television. The copyright message and the OK prompt should appear. Turn the computer OFF, insert the diagnostic cartridge, and turn the computer back ON. Run **ALL** diagnostics to thoroughly check the computer.

If the computer fails to function after modification, check the modification for broken wires, bad solder joints, and accidental shorts. Remove the bottom RFI shield and retest the unit. Visually check the bottom RFI shield for punctures or shorts.

ADDITIONAL NOTES

The following is a description of the EARLY modification procedure. This modification may be found in some units, but not all.

The following is for your information only and is intended for use as a reference to help you repair any units which come into your shop for repair. The following is no longer considered to be the proper "fix" for the problem stated on Page 1 of this Technical Bulletin.

If the problem is present it must be repaired using the "Final Fix" satellite PC board and the procedure detailed earlier in this Technical Bulletin to bring the unit up to current factory specifications.

A) Cut the trace going to pin 5 of R64. R64 is the resistor pack near pin 1 of U18.

B) Locate TP7 near the hole in the center of the PCB. Cut the trace that is nearest TP7 on the LEFT SIDE of TP7.

C) Remove U18 from its socket, bend pin 18 of U18 upwards, and reinsert U18 into its socket with pin 18 bent up.

D) Install a jumper from U18 pin 18 (the bent up pin) to the feedthrough between pins 35 and 36 of U9. This feedthrough goes to the trace cut in step B above. The foil side of the board goes to U9 pin 37.

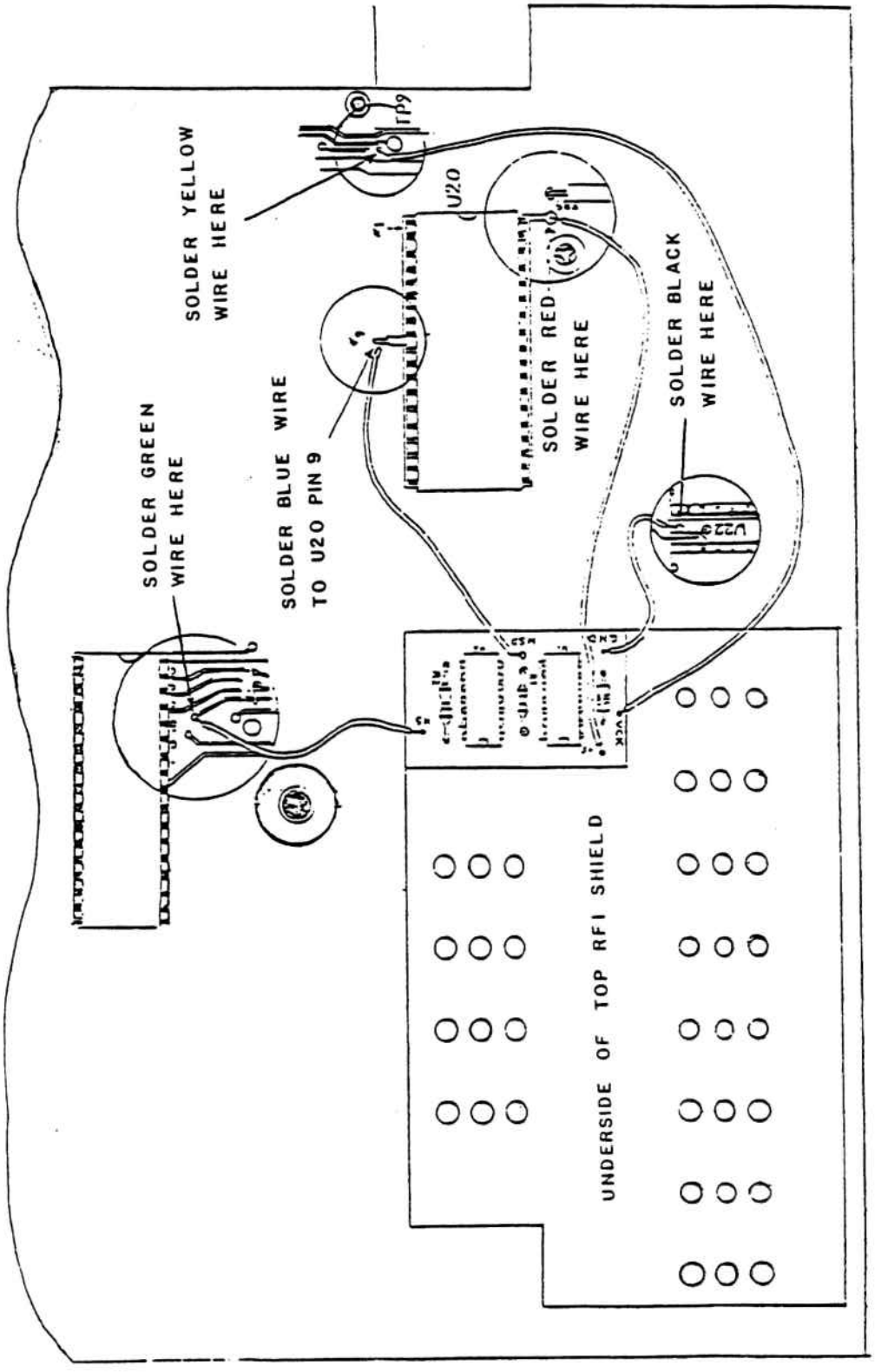

SOLDER YELLOW WIRE HERE
SOLDER GREEN WIRE HERE
SOLDER BLUE WIRE TO U20 PIN 9
SOLDER RED WIRE HERE
SOLDER BLACK WIRE HERE
U20
UNDERSIDE OF TOP RFI SHIELD

FIGURE 1

DATE: August 15, 1983

REVISION DATE: September 14, 1983

BULLETIN NO.: CC:21

PRODUCT: 26-3Ø22/23 TEC Disk Drive for Color Computer

SUBASSEMBLY: AX-88Ø2 Drive Logic PCB

PURPOSE: Missing traces on Drive Logic PCB. Symptoms may be intermittent, and include drive not ready, drive write protected, no head stepper action, or I/O errors due to no read data.

DISCUSSION:

Some TEC drive Logic PCBs have been found with traces missing. These traces lead to the pullup resistor pack RA3 located near U18. Resistor pack RA3 supplies pullup resistors for several sections of U16 (74LS33 open collector NOR gate). With the traces missing two sections of U16 have no pullup resistors on their outputs.

Open collector gates will not work properly without pullup resistors on their outputs. A good TTL level signal can not be guaranteed without the pullups. In the case of the TEC Logic PCB, one section of U16 is used as an enable signal for the Index Sector, Write Protect, and Track ØØ signals. Without the pullup resistor on this section of U16 these three signals may appear intermittent or they may not function at all.

The other affected section of U16 is part of the step and read circuitry. Without the pullup on this section the drive may step intermittently or not at all. As well, the read circuitry may be affected in a similiar manner, causing intermittent I/O errors.

The affected boards may be identified by the the markings silk screened on the component side of the PCB between TP1 and the mounting screw. The boards are marked as follows:

FB-2Ø1DV-AA
CFE61-Ø13Ø8

Boards marked CEF61-Ø13Ø4 or less have the traces present. Boards marked CEF61-Ø13Ø6 or greater have the traces missing. Boards marked CEF61-Ø13Ø5 are unknown. All boards should be checked to be sure these traces are present, and jumpers added if the traces are missing.

PROCEDURE:

You will need the following tools:

Wire wrap wire
Wire cutters
Soldering equipment

Add the following jumper wires to the FOIL side of the PC board. Refer to Figure 1.

1) Add a jumper from RA3 pin 5 (the pin closest to the edge card fingers) to the feed through next to U18 pin 8.

2) Add a jumper from RA3 pin 3 (the middle pin) to the feedthrough between U18 pins 8 and 9.

After modification the board should be checked and realigned if necessary.

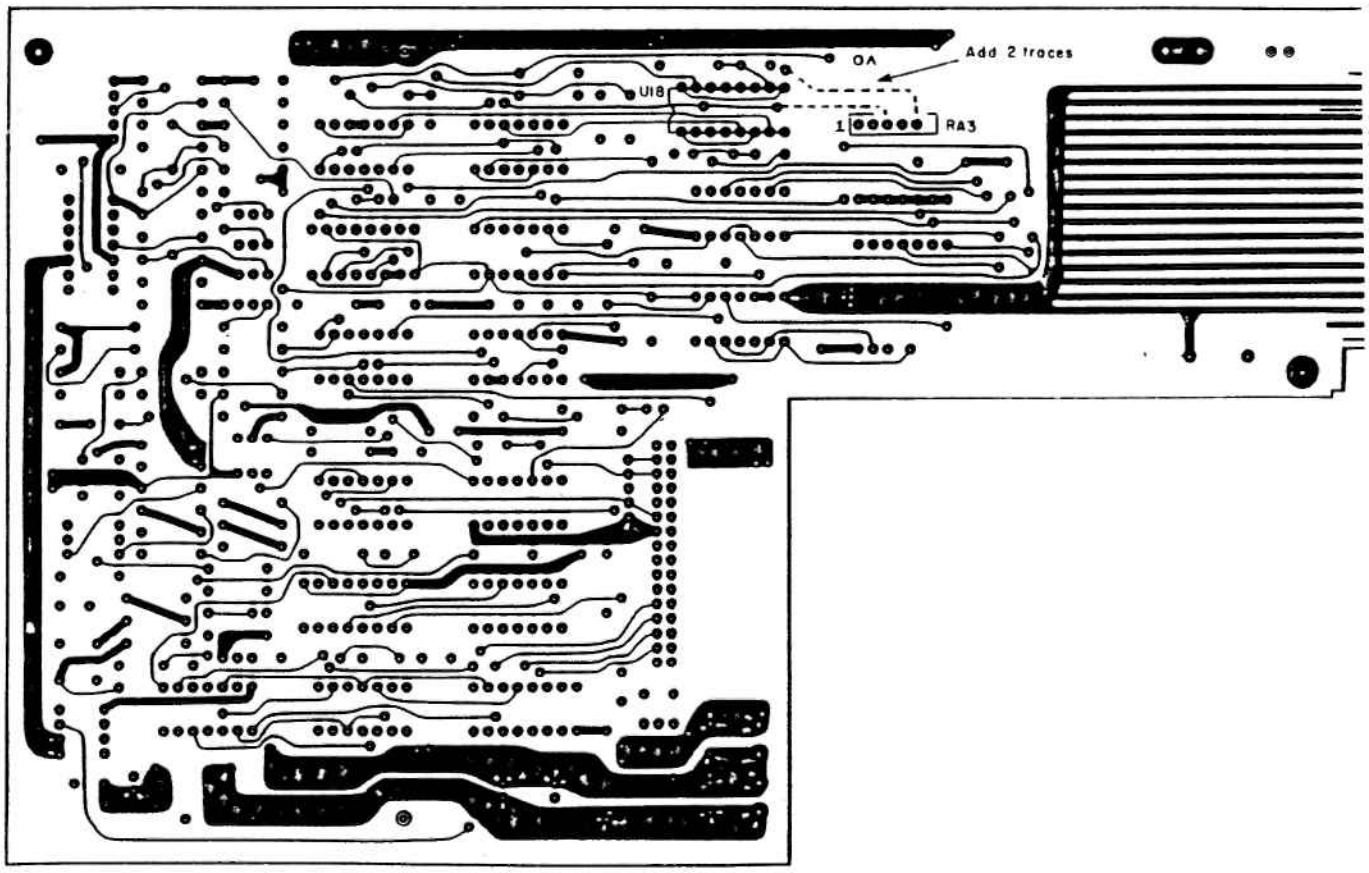
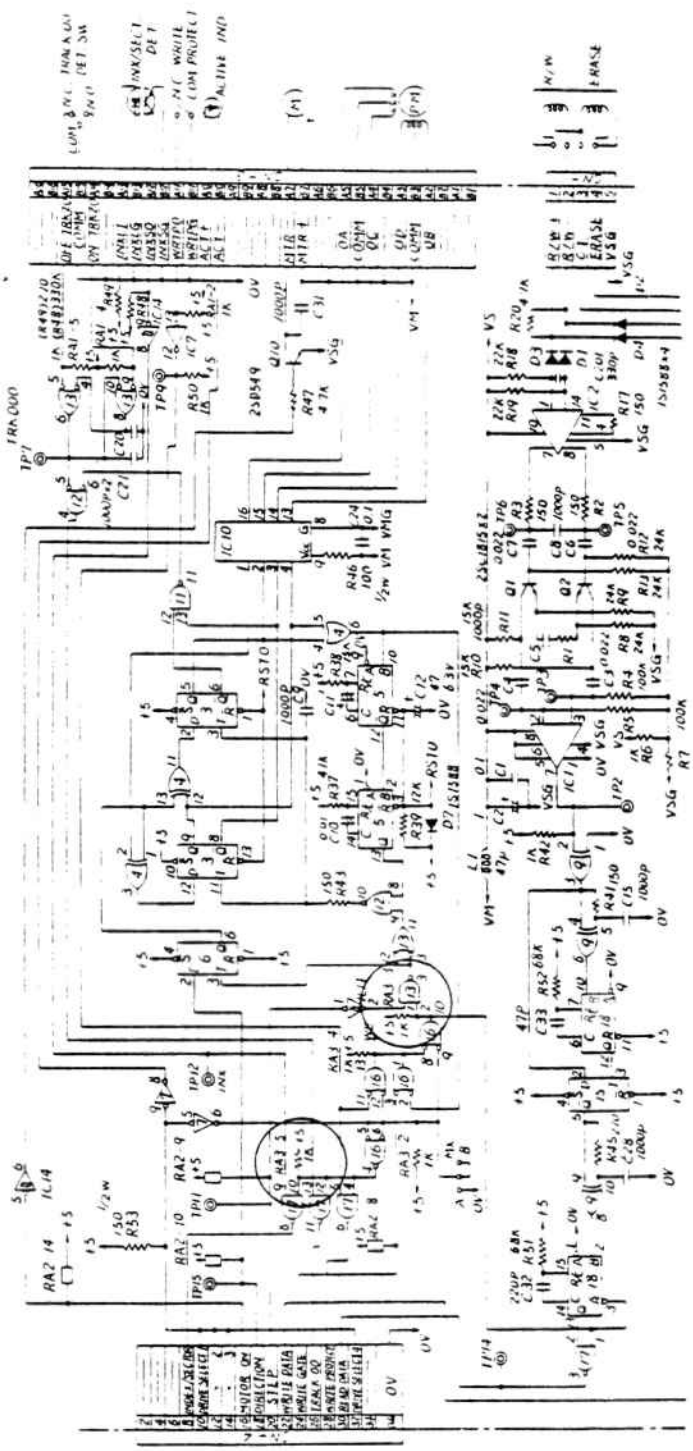


FIGURE 1



DATE: September 7, 1983

REVISION DATE: September 7, 1983

BULLETIN NO.: CC:22

PRODUCT: 26-3Ø16 Color Computer keyboard upgrade kit

SUBASSEMBLY: AXX-7Ø88 Keyboard

PURPOSE: Installation procedures for Color Computer Keyboard Upgrade Kit

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DISCUSSION:

The following procedures are to be used to install the 26-3Ø16 New Keyboard Upgrade kit in any Color Computer with a revision 'B', 'C', 'D', 'E', or Domestic ("revised") printed circuit board.

Revision 'B', 'C', 'D', and 'E' boards will require the use of a special adapter kit. The Domestic (revised) PCB does NOT require this adapter.

PROCEDURE:

REVISION 'B', 'C', 'D' (AXX-Ø338) OR REVISION 'E' (AX-9ØØ3) PCB:

You will need the following parts:

New style keyboard -- National Parts # AXX-7Ø88 catalog # 26-3Ø16
Adapter kit -- National Parts # AXX-7Ø84 catalog number 26-3ØØ2

1) Lay the Computer upside down on a towel or other soft cloth to prevent scratching the surface. Remove the seven screws that hold the case halves together. One screw will be found under the warranty seal. Note that two of the screws are shorter than the other five.

2) Holding the case halves together, carefully turn the unit right side up. Remove the case top and the top RFI shield and set them aside.

3) Check the value of C57 and C58. C57 is located between the joystick jacks. C58 is located directly above U15. The value of these capacitors should be .ØØ1 µf. If they are not, replace them with the .ØØ1 µf capacitors supplied with the adapter kit.

4) Locate one of the 4.7K ohm 1/4 watt resistors supplied with the adapter kit. Cut the leads of one resistor to a length of 1/2 inch. Carefully, solder one lead of the resistor to pin 2Ø of the MC6822 PIA chip supplied with the adapter kit. Carefully, solder the remaining lead of the resistor to pin 19 of the MC6822 PIA chip. Bend the resistor so that it lies on top of the PIA chip. Be carful that the leads do not touch each other, or any other pins or components.

5) Remove U8 (MC6821 PIA) from its socket. Install the MC6822 PIA into the socket at U8.

6) Locate the remaining 4.7K resistor supplied with the upgrade kit. Cut one lead to a length of 1/4 inch. Carefully, solder the short lead of the resistor to U8 (MC6822 PIA) pin 39. Solder the remaining lead of the resistor to the right-most leg of C6Ø (+5 volts). Be carful that the leads do not touch each other, or any other pins or components.

7) Locate the 1ØK 1/4 watt resistor supplied with the adapter kit. Cut both leads to a length of 1/2 inch. Carefully, solder one lead of the resistor to U4 (MC6821 PIA) pin 12. Carefully, solder the remaining lead to U4 pin 2Ø. Be carful that the leads do not touch each other, or any other pins or components.

8) Locate the adapter PCB supplied with the adapter kit. Plug the brown connector onto the keyboard connector attached to the front of the main logic PCB. Route the short (6 inch) length of wire through the opening cut into the RFI shield support. Solder the free end of the wire to TP12.

9) Locate the new style keyboard, AXX-7Ø88. Insert the free end of the ribbon connector into the flat, black connector on the adapter PCB. Set the keyboard into place on its support posts.

1Ø) Make sure that the bottom RFI shield is in place, and all transformer leads are plugged in if you removed the main logic PCB from the case. Reinstall the top RFI shield.

11) Before closing the case, check the operation of the keyboard by turning on the computer and pressing every key. Check to see that every key functions by watching the television screen. Be sure and check that the keys function in the SHIFT mode as well.

12) Reassemble the case, using the seven screws removed in Step 1. Note the two short screws must be in the openings towards the front of the case. Using the longer screws in these two openings will damage the case top.

13) Apply the warranty seal sticker over the seventh screw opening.

NEW STYLE "DOMESTIC" (AX-9328) PCB:

You will need the following parts:

New style keyboard -- National Parts # AXX-7Ø88 catalog # 26-3Ø16
The AXX-7Ø84 Adapter Kit is **NOT** required for this PCB

1) Lay the Computer upside down on a towel or other soft cloth to prevent scratching the surface. Remove the seven screws that hold the case halves together. One screw will be found under the warranty seal. Note that two of the screws are shorter than the other five.

2) Holding the case halves together, carefully turn the unit right side up. Remove the case top.

3) Locate the new style keyboard, AXX-7Ø88. Insert the free end of the ribbon connector into the flat, black connector on the main PCB. Set the keyboard into place on its support posts.

4) Before closing the case, check the operation of the keyboard by turning on the computer and pressing every key. Check to see that every key functions by watching the television screen. Be sure and check that the keys function in the SHIFT mode as well.

5) Reassemble the case, using the seven screws removed in Step 1. Note the two short screws must be in the openings towards the front of the case. Using the longer screws in these two openings will damage the case top.

6) Apply the warranty seal sticker over the seventh screw opening.

DATE: September 21, 1983

REVISION DATE: September 21, 1983

BULLETIN NO.: CC:23

PRODUCT: 26-3001/2/3/4 "old Style" Color Computer
26-3002A/3A/4A "Revised" Color Computer
26-3003B 64K Color Computer
26-3026/27 Color Computer 2

SUBASSEMBLY: All Main Logic PC boards

PURPOSE: SOUND command fails to function properly. Usually SOUND won't shut off after command is finished. All other functions seem to work properly.

DISCUSSION:

NOTE: This is NOT the same problem as discussed in Technical Bulletin CC:7. With this problem, the SOUND command works, but does not function properly. Technical Bulletin CC:7 concerns the SOUND command that fails to function in any manner.

The SOUND command determines its duration by counting Real Time Clock interrupts appearing at the IRQ* input to the CPU (frequency is determined by software timing loops). These interrupts are indirectly produced by the FS* pulses from the VDG chip. The FS* pulses are connected to the keyboard PIA chip which is programmed to produce an interrupt (IRQ*) whenever the FS* line changes state. Therefore, while the PIA chip actually produces the interrupt signal to the CPU, it is the VDG chip which is responsible for the timing of the interrupts. If the interrupts are not produced, not received, or ignored the SOUND command will not function properly.

The TIMER function also depends on the Real Time Clock interrupts, as does OS9. It is possible for a failure to develope such that the computer will run normally unless the SOUND or TIMER commands are used, or the customer attempts to use OS9.

PROCEDURE:

The TIMER command is updated using the Real Time Clock interrupts, and can be used as a direct indication of interrupt (IRQ*) function. Run the following program to determine that failure of the interrupt system is the fault.

```
10 PRINT@0,TIMER : GOTO 10
```

The TIMER value should appear in the upper left hand corner of the screen, and should be quickly incrementing. If only one number is displayed and does not increment the Real Time Clock interrupts are faulty.

Using an oscilloscope, check pin 37 of the VDG chip (FS*) for the presence of a negative going pulse with a 16.67 millisecond (60 Hz) repetition rate. Check pin 18 of the keyboard PIA to see this same signal. If this signal is not present suspect the VDG chip or the keyboard PIA.

Check pins 37 and 38 of the keyboard PIA for negative going pulse with a 16.67 millisecond (60 Hz) repetition rate. This pulse will be narrower than the previously measured pulse. Check pin 3 of the CPU for this same pulse. If the pulse is not present suspect the keyboard PIA or the CPU.

If both pulses are present, suspect the CPU. RAM or ROM failure could also cause this problem, but is much less likely than failure of the above three ICs.

The three chips to be checked have different U-number designations on each board. The following chart is for your reference.

BOARD STYLE	CHIP DESCRIPTION	IC NUMBER
B, C, D, or E	VDG chip	U7
	Keyboard PIA	U8
	CPU	U1
"REVISED" Color Computer	VDG chip	U9
	Keyboard PIA	U18
	CPU	U1
Color Computer 2	VDG chip	U8
	Keyboard PIA	U7
	CPU	U23

DATE: November 15, 1983

REVISION DATE: November 15, 1983

BULLETIN NO.: CC:24

PRODUCT: 26-3027,3027 Color Computer 2

SUBASSEMBLY: Main logic board.

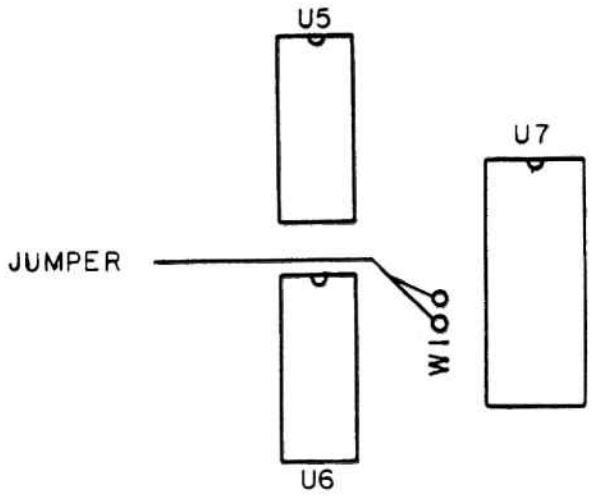
PURPOSE: Describe the 64K RAM upgrade procedure.

DISCUSSION:

The Color Computer 2 can be upgraded to 64K of RAM using the following procedure.

PROCEDURE:

A 'W1' is marked on the main PCB between U7 and U6, as shown in the diagram below. Jumper the two plated-through holes immediately adjacent to the W1 symbol. Change the RAM chips U14 through U21 to 26-3017 64K chips. There are no capacitors to remove. Following this procedure the Color Computer 2 will be capable of running OS-9 or any other software that requires 64K of RAM.



DATE: February 1, 1984

REVISION DATE: February 1, 1984

BULLETIN NO.: CC:25

PRODUCT: 26-3002A/3A/4A Color Computer
26-3003B 64K Color Computer

SUBASSEMBLY: Main logic board

PURPOSE: Describe a component deletion.

DISCUSSION:

All revision 'A' Color Computers (26-3002A, 26-3003A, 26-3004A and the 26-3003B) boards contain a capacitor on the SLENB* line. This capacitor bypasses pin 40 of the cartridge connector to ground. The presence of this capacitor will cause timing problems on any device that attempts to use the SLENB* line. At the present time no Radio Shack software or hardware implemented uses this pin. However to ensure compatibility with future products it is necessary to remove C77.

PROCEDURE:

Locate C77 just in front of the reset switch. Remove C77 from the board. Verify normal operation by running the diagnostic ROM cartridge.

DATE: May 23, 1985

REVISION DATE: May 23, 1985

BULLETIN NO.: CC:26

PRODUCT: Color Computer, All Revisions

SUBASSEMBLY: Main Logic Board

PURPOSE: To eliminate garbage on screen during disk access.

DISCUSSION: During drive access, especially during formatting or backups, garbage may appear on the screen, mainly on the right hand side. This is due to the fact that when a halt is generated during disk access the address lines are tri-stated, and erroneous video addresses may be generated due to floating address lines. If this problem appears it may be remedied by adding pullups to address lines AØ and A1.

PROCEDURE:

1.) On the solder side of the board, add a 1ØK 1/4W 5% resistor from pin 19 of the cartridge connector(AØ) to pin 9 of the connector(+5V).

2.) On the solder side of the cartridge connector, add a 1ØK 1/4W 5% resistor from pin 2Ø(A1) to pin 9(+5V).

3.) Insulate the resistors with heat shrink and insure that they do not short to any other components. Test the machine to verify proper operation.

The parts needed to perform this modification may be ordered as:

1ØK ohm 1/4W 5% resistor Catalog# 26-9999R Part# N-Ø281EEC

DATE: July 2Ø, 1984

REVISION DATE: January 18, 1985

BULLETIN NO.: CC:27

PRODUCT: 26-3Ø27 26-3127 26-3128 Color Computer II

SUBASSEMBLY: AXX-7Ø92 Direct Video II

PURPOSE: Installation and alignment instructions for Direct Video II.

DISCUSSION:

In many cases it is desirable to bypass the R.F. modulator in the Color Computer II and the RF receiver section in the television by using a DIRECT VIDEO CONNECTION between the Color Computer II and the monitor.

The Direct Video II modifies the Color Computer II to supply a direct video (also called composite video) output. After the modification is installed, the Color Computer II no longer produces a RF (channel 3/4) output, making it unusable on normal television receivers.

Composite video is NOT the same as "Cable Ready" or "Cable Input", as these are RF inputs.

PROCEDURE:

INSTALLATION

1. Remove P.C. board from the color computer.
2. Remove the ground shield.
3. Remove the RF modulator (U5) from the P.C. board.
4. Install the Direct Video II into the holes where the modulator was removed.
5. Solder all connections (7 pins and the brackets).
6. Connect the wire from E1 to the cathode side (polarity band) of CR4 on the color computer board.

7. Connect the wire from E2 to the anode side of CR4 on the Color Computer board.

8. Replace R1Ø on the main logic board with 6.81k ohm 1% resistor supplied with the kit.

9. Replace U4 with the new Signetics SE555 IC chip supplied with the kit.

1Ø. Reassemble the computer except for the case top.

ALIGNMENT

1. Turn power OFF.

2. See building a terminator plug, page 3.

3. Terminate the video output with 75 ohms or plug into the monitor.

4. Connect the oscilloscope probe to the right side of R13 on the Direct Video II (the side closest to the output jack). Use X1Ø probe. Set the oscilloscope controls:
   VERTICAL - 2Ø millivolts per division, AC coupled.
   HORIZONTAL - 1Ø microseconds per division.

5. Turn R5 and R7 on the Direct Video II fully counterclockwise (signal present).

6. Turn on the computer.

7. Adjust the Gain Control (R7) on the direct video circuit board for 525 mv (4 divisions high, peak to peak).

8. Adjust the symmetry control (R5) on the direct video circuit board for 3ØØ mv (2 divisions high, peak to peak (from reference black level to sync tip (as in illustration).

9. Check the color of the unit with a diagnostics cartridge (AXX-2Ø23) using the color bar test. Any fine tuning can be accomplished by using (R7) gain control.

1Ø. Check the sound by using the diagnostics cartridge (AXX-2Ø23). There are no adjustments for the audio section except to check for satisfactory signal at the output. When terminated with 6ØØ ohms, the output should be about 1.1 volts peak to peak.

BUILDING A TERMINATION PLUG

You will need the following materials:

One (1) 1/8 inch miniature phone plug (male)
Radio Shack catalog number 271-1312
Two (2) 15Ø ohm 1/4 watt 5% resistors
Radio Shack catalog number 274-286
Wire Cutters
Soldering Equipment

1. Locate the two 15Ø ohm resistors. Lay them side by side and twist their leads together at each end, making a parallel connection. This will result in an effective resistance of 75 ohms.

2. Locate the male mini plug. Unscrew and remove its barrel housing.

3. Cut one end of the resistor leads to 1/4 inch in length. Solder this end to the center (smaller) connector of the mini phone plug.

4. Bend the long resistor leads around and solder them to the ground (larger) connector of the mini phone plug. Clip off any excess lead length.

5. If the above is done neatly the barrel housing can be screwed onto the plug, protecting the resistor. However, this is not required. The barrel connector may be left off without damage to the plug or the connector.

6. The above assembly can now be plugged into the Direct Video II output jack to properly terminate the video line during the alignment procedure.

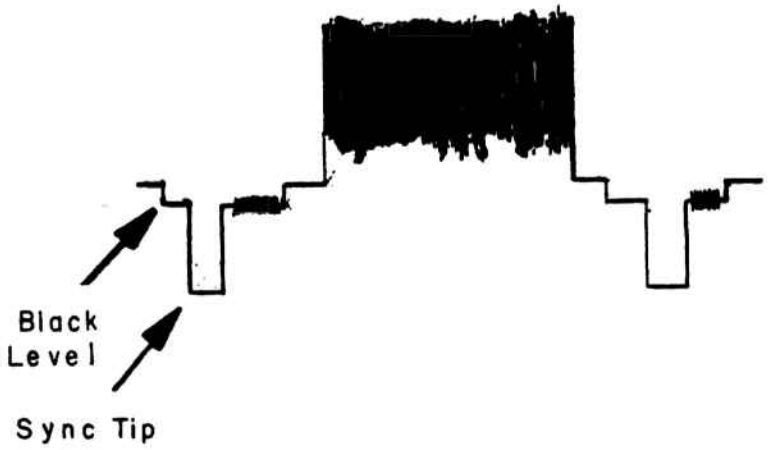


FIGURE 1

DATE: November 3Ø, 1984

REVISION DATE: November 3Ø, 1984

BULLETIN NO.: CC:28

PRODUCT: 26-3134/36/27 Color Computers

SUBASSEMBLY: N/A

PURPOSE: To explain differences in new version Color Computers.

DISCUSSION/PROCEDURE:

There are four basic differences between these Color Computers and the older Color Computer II's. These differences lie in the areas of ROM, RAM, SAM, and VDG. In the area of ROM some of the new units will contain a new ROM which will be either a 64K 24 pin Standard Color Basic or a 128K 28 pin Extended Color Basic ROM. In the area of RAM some of the new machines will have the same kind of RAM as before, while some of the 16K machines will have two 16K by 4 RAM IC's instead of the normal eight 16K by 1 IC's. In order to upgrade these machines you will be required to remove these two RAM's and install a 64K RAM satellite board. The units which contain the new style RAM will also contain a new SAM IC, Part# 74LS785. This SAM chip can only be used in these machines as it will not function properly in the older machines. The newest version of the Color Computer will also include a new style VDG which incorporates some of its support logic and therefore will only work in this one style of machine. The chart below will be used to compare catalog numbers and configurations of these computers.

CATALOG#	CONFIGURATION	NEW ROM?	NEW RAM?	NEW SAM?	NEW VDG?
26-3134	16K Standard	No	No	No	No
26-3136	16K Extended	No	No	No	No
26-3127	64K Extended	No	No	No	No
26-3134A	16K Standard	Yes	Yes	Yes	No
26-3136A	16K Extended	Yes	Yes	Yes	No
26-3127A	64K Extended	Yes	Yes	Yes	No
26-3134B	16K Standard	Yes	Yes	Yes	Yes
26-3136B	16K Extended	Yes	Yes	Yes	Yes
26-3127B	64K Extended	Yes	Yes	Yes	Yes

There are also differences in the upgrade procedures for these machines which I will outline in another chart.

CATALOG#	UPGRADE PROCEDURE
26-3134/36	Install 64K RAM's and solder jumper J1 ROM upgrade same as previous machines
26-3134A/36A	Remove 16K by 4 RAM's, install RAM board and jumper J6 Remove 24 pin ROM, install 28 pin ROM and jumpers J1-J5
26-3134B/36B	Same as 26-3134A/36A

Other useful information:

1.) The machines with the new ROM's must have Extended Basic in order to run 64K of RAM.
2.) There is a new direct video adapter being manufactured for use in these new machines. In the meantime there is a machine available which comes with direct video installed. It is available by special order only under Catalog# 26-3128.
3.) Some part numbers which may be helpful are listed below.

DESCRIPTION	PART #	CATALOG #
New SAM	MX-6433	26-3136A
New VDG	MX-6551	26-3136B
Extended Basic	MX-6436	26-3136A
16K by 4 RAM	MX-6434	26-3136A
64K Board	AX-9534	26-3136A

DATE: August 14, 1986

REVISION DATE: September 16, 1987

BULLETIN NO: CC:29

PRODUCT: 26-3Ø24/3124 Multi-Pak Interface

SUBASSEMBLY: AX-938Ø PCB, Multi Pak
AX-9535 PCB, Multi Pak

SUBASSEMBLY REVISION: All Revisions

PURPOSE: To eliminate dual addressing and insure proper operation with Color Computer 3.

DISCUSSION: Currently the main data buffer in the Multi Pak is enabled with I/O accesses to addresses in the range of &HFF4Ø through &HFF9F. It is only necessary to enable this buffer for the range of addresses from &HFF4Ø through &HFF7F. The Color Computer 3 uses registers located in the range of addresses from &HFF8Ø through &HFF9F which could cause a conflict with the Multi Pak unless this range is disabled in the Multi Pak's address decoding. This will be done by installing a new PAL on the 26-3Ø24 Multi Pak, or by installing a satellite board on the 26-3124 Multi Pak.

**** This Bulletin Is Mandatory For Use With The Color Computer 3 ****

PROCEDURE:

If you are modifying a 26-3Ø24 Multi Pak, perform part A below.
If you are modifying a 26-3124 Multi Pak, perform part B below.

PART A: 26-3Ø24

1.) Remove the PAL at IC location U8 and replace it with a new IFL ordered under the part number listed below.

IFL, 82S153 Part# AXX-7123 Catalog# 26-3Ø24

2.) Test the Multi Pak by installing a cartridge in each slot, plugging it into a Color Computer, and insuring each cartridge slot can be accessed by setting the front panel switch to that slot's number.

PART B: 26-3124

1.) Order a satellite board kit with the part number given below. The kit will contain a satellite board with 7 wires attached, a plastic spacer, and a 3/4" #4 screw.

Satellite Board Part# AXX-7119 Catalog# 26-3124

2.) With power removed, remove the four screws holding the top case to the unit. Be sure to note the length of the screws as to their location. Remove the top case.

3.) Remove the three screws holding the logic board to the bottom case, leaving the transformer connected. Remove all the metal clips holding the shield to the bottom of the PCB, noting their positions. Remove the shield. This is to avoid melting through the shield insulation while soldering.

4.) Cut the trace coming from pin 52 of IC6 that connects pin 52 of IC6 to pin 19 of IC1.

5.) Position the satellite board over IC6, components up, with the wires facing towards the card edge connector which plugs into the Color Computer.

6.) Connect the 3 yellow wires to IC4 pins 3, 9, and 11. Any order is fine.

7.) Connect the white wire to IC6 pin 52, taking care not to short the leads of IC6.

8.) Connect the blue wire to IC1 pin 19.

9.) Connect the black wire to IC5 pin 8.

1Ø.) Connect the red wire to IC5 pin 16.

11.) Replace the shield and two of the logic board screws, the one near the power switch, and the one near the selector switch.

12.) Place the plastic spacer over the hole for the third logic board screw. Position the hole in the satellite board over the spacer with the components up. Insert the screw into the board and tighten. The board must be positioned parallel to the edge card connector so that it fits into the channel between the cabinet top and the cartridge frame. Replace the cabinet top.

13.) Test the unit by connecting it to a Color Computer, installing a cartridge in each slot, and checking to see that each slot is selectable and accessable.

DATE: September 19, 1986

REVISION DATE: September 19, 1986

BULLETIN NO: CC:3Ø

PRODUCT: 26-3134A Color Computer II

SUBASSEMBLY: AX-9534 64K RAM PCB

SUBASSEMBLY REVISION: All Revisions

PURPOSE: To eliminate piggy back IC in order to facilitate installation of RAM board.

DISCUSSION: The 26-3134A Color Computer II has an IC installed piggy back on IC U13 which is used to further qualify the G2B* input of IC12. This IC is connected to IC13 on pins 7 and 14 only from which it draws its power and ground connections. With this IC in place, the RAM upgrade board will not mount completely on CN3 and CN4. Therefore this IC must be moved when installing the 64K RAM upgrade board.

PROCEDURE:

1. Unsolder the two pins connecting the piggy back IC to IC13. Note that these two pins are pin 7 (GND) and pin 14 (+5V). Also note that pin 4 of this IC is jumpered to pin 5 of IC12 and pin 5 is jumpered to pin 3 of IC12. These two jumpers will need to be removed and longer jumpers installed before the chip can be moved.

2. Lengthen the jumpers on pins 4 and 5 of the IC as discussed in the last step. Install jumpers from pins 7 and 14 of the removed IC to pins 7 and 14 of IC13. Insure that all wire jumpers are of sufficient length to allow the IC to be mounted between the ROM (IC8) and connectors CN3 and CN4.

3. Using silicone rubber sealer (Radio Shack number 64-2314), mount the removed IC upside down on the clear portion of the board between the ROM (IC8) and connectors CN3 and CN4 (see figure 1). Use a small amount of the sealer to hold the jumper wires to the PC board so they out of the way of the RAM PCB. Allow at least 1 hour for the sealer to harden.

4. Install the RAM board as you normally would (remember that the 16K RAMs must be removed) and test the machine completely with the diagnostic cartridge to insure proper operation.

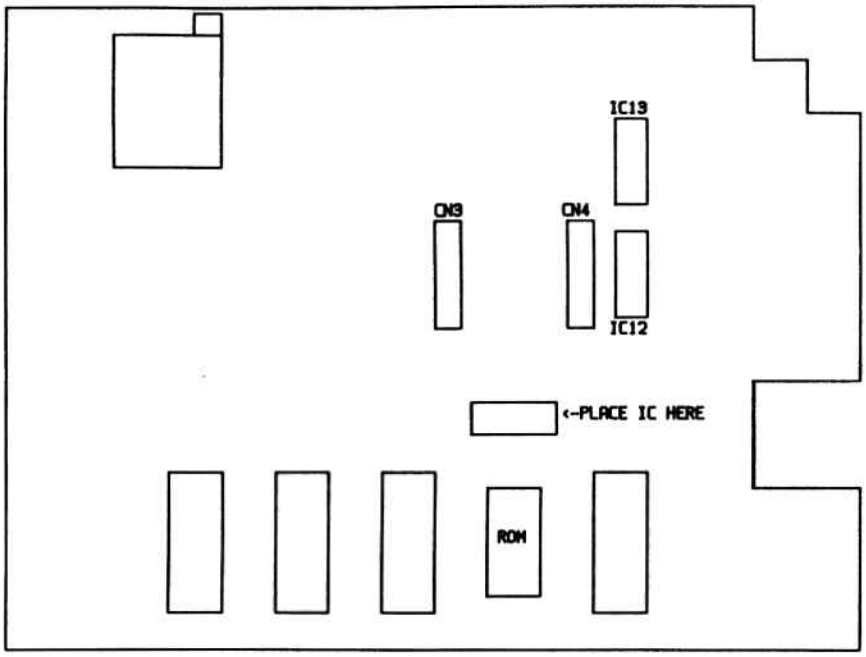


Figure 1

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DATE: March 28, 1987

REVISION DATE: March 28, 1987

BULLETIN NO: CC:31

PRODUCT: 26-3334 Color Computer 3

SUBASSEMBLY: AX-Ø132 Main Logic Board

SUBASSEMBLY REVISION: Rev. A

PURPOSE: Describe probable causes and solutions for unstable video at cold power up.

DISCUSSION: Some Color Computer 3s may power up with unstable or incorrect horizontal sync pulses being produced by the video circuits. The instability can cause the text, inside the green window, to move one or two horizontal character spaces to the left and wrap to the same line on the right. Other machines may display a total loss of horizontal sync at power up.

Two items have been found to be contributing factors in this unstable video. In many cases the chip carrier, and related pins on IC-6, may need cleaning to ensure good contact on all pins. Some pins may not be making good contact and become open or intermittent. In other cases a capacitor in the clock circuit may be at the wrong value, causing the clock to randomly power up into an abnormal state.

PROCEDURE:

To improve the performance of the video display chip:

1. Remove IC-6 from it's socket and clean all of the leads on the chip and socket with alcohol.
2. Re-insert IC-6 into it's socket paying special attention to pin orientation.
3. Reassemble the unit and test for proper operation.

To correct the unstable signal from the clock circuit:

1. Remove and replace C-64 (15ØpF) with a 22ØpF ceramic capacitor.
2. Reassemble the unit and test for proper operation.

As a note, the problem is more prevalent if the computer is cold. It should be allowed to cool normally before final testing.

Parts:

Ref. #	Value	Voltage	Tolerance	Composition
C-64	22ØpF	>=5Ø	5%	Ceramic Disk Dipped Mica

DATE: December 29, 1988

REVISION DATE: December 29, 1988

BULLETIN NO: CC:32

PRODUCT: Color Computer 3 (26-3334)

SUBASSEMBLY: All

SUBASSEMBLY REVISION: All

PURPOSE: To fix horizontal wiggle of text screens and possible color loss on composite video.

DISCUSSION:

The Color Computer 3 uses an LSI chip, called the ACVC, to handle address control, video and system clocks. A new revision of this chip corrects a horizontal timing problem that may cause the text screens to 'wiggle' and prevents against the loss of color burst to the composite output. This new ACVC requires a modification in the composite video circuit to earlier machines which have the original ACVC for proper operation. The new ACVC will be stamped with the number TCC1Ø14A.

PROCEDURE:

When replacing the ACVC LSI chip in a Color Computer 3 perform the following.

1.) Locate resistor R27 (1.5K 1/4 watt) on the main logic board of the Color Computer 3.

2.) Remove R27 and replace it with a 1.ØK 1/4 watt resistor.

3.) Install the new ACVC in location IC6.

After completing the modification, test the system with all applicable diagnostics.

The resistor for this modification may be ordered as:

Part Number	Catalog Number
ND-Ø196EEC	1Ø-9999R