Copying Famicom Game Disks

Original Japanese document from Famicom Kaizou Manual Vol. 3. (July 1988) by Sansai Books. Transcribed to Japanese text document by Rob Budrick, then translated to English by Phoenix "Hushicho" Roberts. English editing and footnotes by Rob Budrick. **v. 2.0**

How-To Guide*

by **Tama Saburou**

How to Use Dubbing Cables and Remove Disk Protection

In volume 2 of this text, dubbing cable creation was introduced and was largely popular, but we believe many readers found it fairly challenging.

However, in the above circumstances, the diagrams, pictures, documents, and the like contained insufficient sections and it was indicated to us that the beginners out there understood very little.

Accordingly, this how-to guide* will explain the construction and usage of the dubbing cable if followed exactly.

Furthermore, the previous issue's circuit proved unstable in some cases and this has been improved.

Also, we'll look at the method for removing the protection introduced on newer models produced after last autumn.

Dubbing Cable Creation How-To Guide

First of all, to use the dubbing cable, here's what is necessary.

System Composition

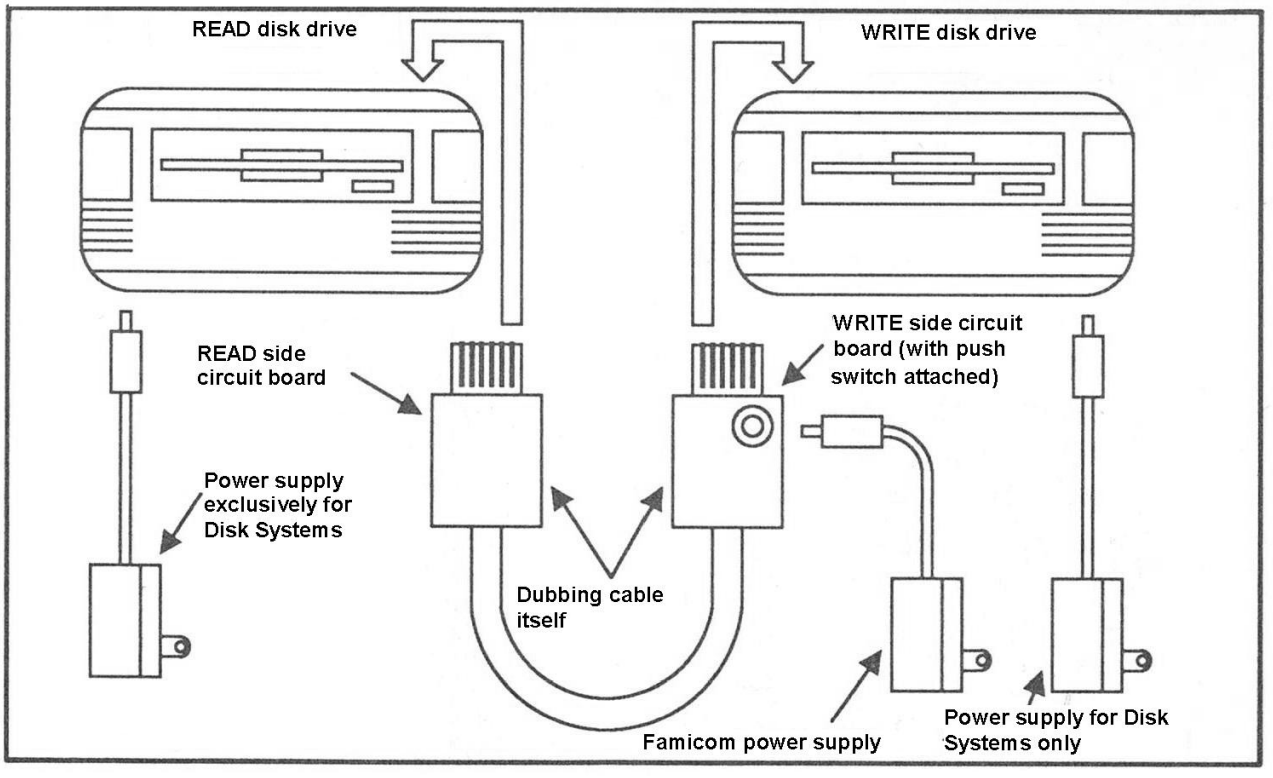
1) Famicom Disk System
(RAM adapter not used with the cable)
・・・・・・・・・・・2 sets

2) Famicom Disk System AC adapter. Or, size C batteries ・・2 sets

* Literally, this reads "Practice Section," or "Practice Compilation." "How-to Guide" seemed like the best equivalent that didn't sound funny. -RB

"Dubbing Cable" use and Disk Protection Removal Methods

<Fig. 1> Dubbing Cable System Composition



3) Assembled "dubbing cable" . . . . . 1 set
4) Famicom AC power adapter (for use with dubbing cable) . . . . . 1 set

The equipment above is required for the dubbing of a disk card.

Prepare to insert an original game disk card and a blank disk card. (Fig. 1)

Dubbing Cable Production

Please look at Vol. 2 in detail.

Here, figures (Fig. 2~4) are added to that which was omitted from Vol. 2. Please see figure 5 for each of the parts used.

When doing the wiring work, pay close attention to the detailed wiring diagram.

Avoid sweet potato soldering*. The solder attached to the soldering iron will oxidize immediately and change color.

After wiping the old solder from the iron with some wet tissue paper and then using fresh new solder, you should be able to conserve solder and use a minimum amount**.

With plenty of soldering practice you will polish your soldering skills.

Please be careful and certain when wiring the connectors that insert into the disk drives in accordance with the above diagram. This requires special attention since there are many signals that may not operate properly due to mistakes here.

As for the method to make the connectors themselves introduced in Vol. 2, it may be too difficult and frustrating for many people to do, but you can mail order for completed connectors, introduced later.

Dubbing Cable Usage

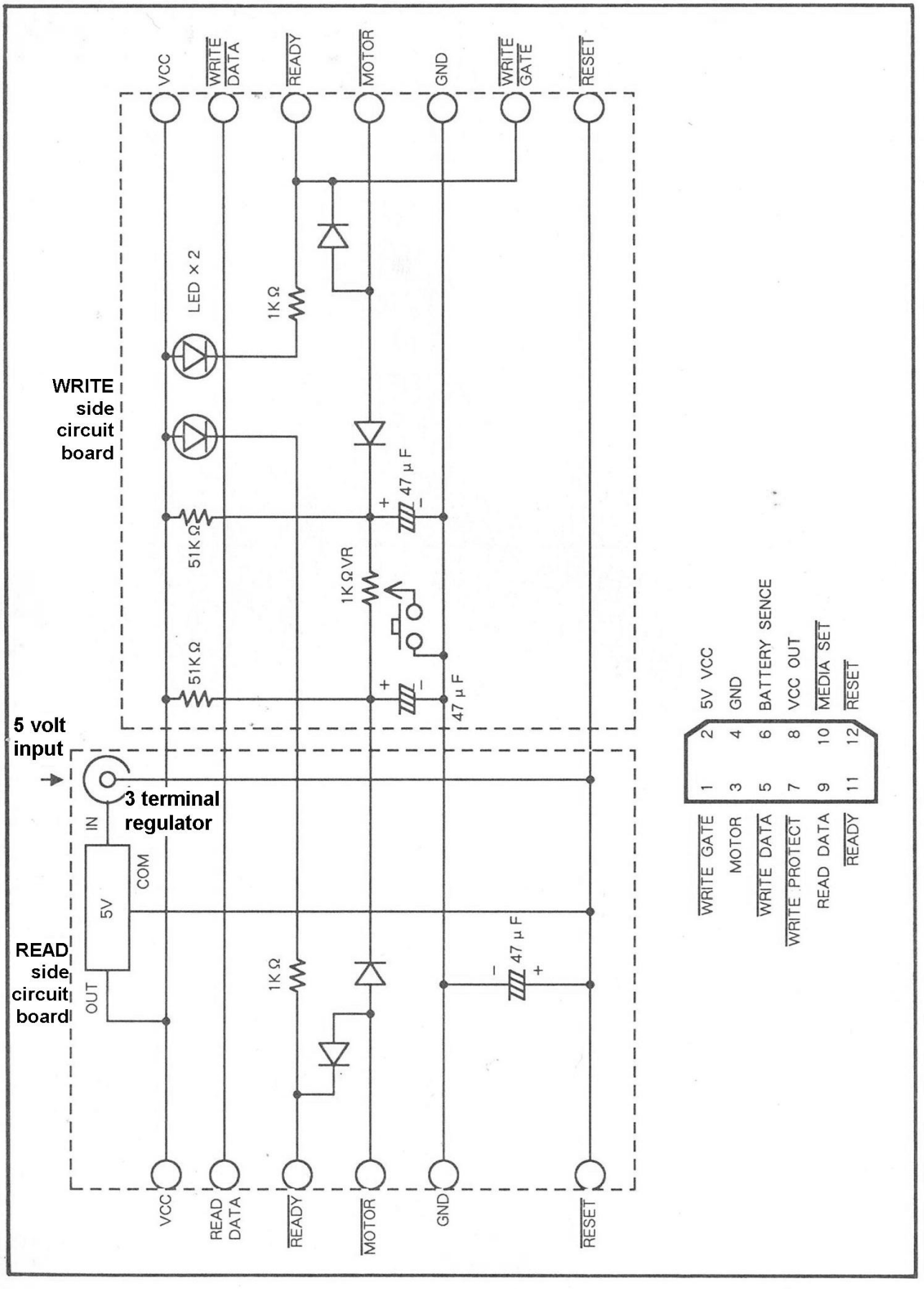
When the wiring and assembling of the dubbing cables are done, verify there are no wiring errors, then connect the power sources as shown in Fig. 1.

Then, prepare a blank disk card and an original disk card.

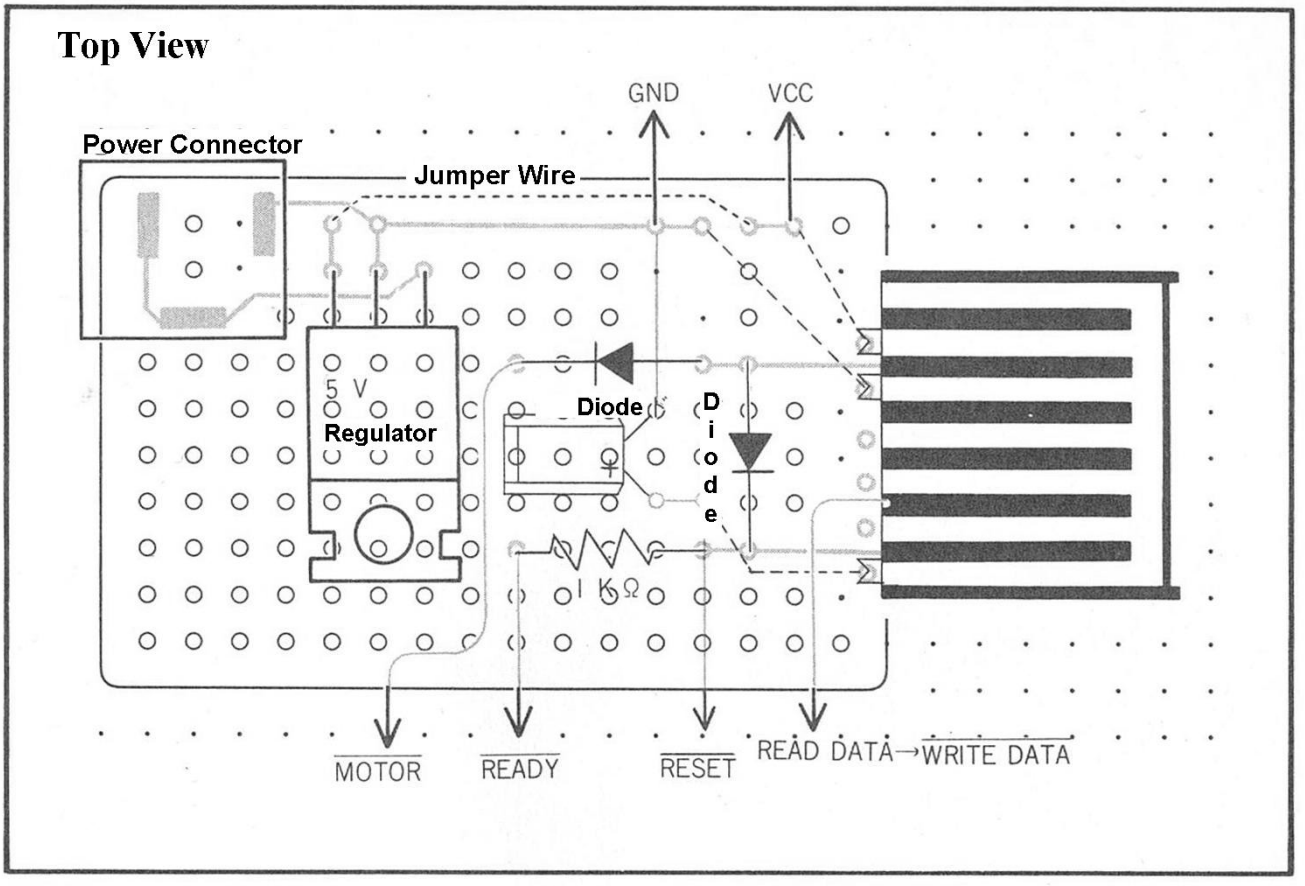
*It appears "imo handa," or, "sweet potato soldering" (I guess. I don't think "imo" has any other definitions) is a term that is generally used to mean bad soldering, or faulty soldering technique. I would welcome any correction on this, but I believe it might not just refer to overheating the solder with the iron, causing the solder to change color but possibly also just generally bad connections in the soldering. Over-oxidizing the solder (generally done via excessive over-heating) causes weak solder joints, which is why it is recommended to avoid this.

**Cleaning your soldering iron of excess old solder will improve conductivity and flow in the solder you apply thereafter. This removes excess residue, flux, dirt, etc. -RB

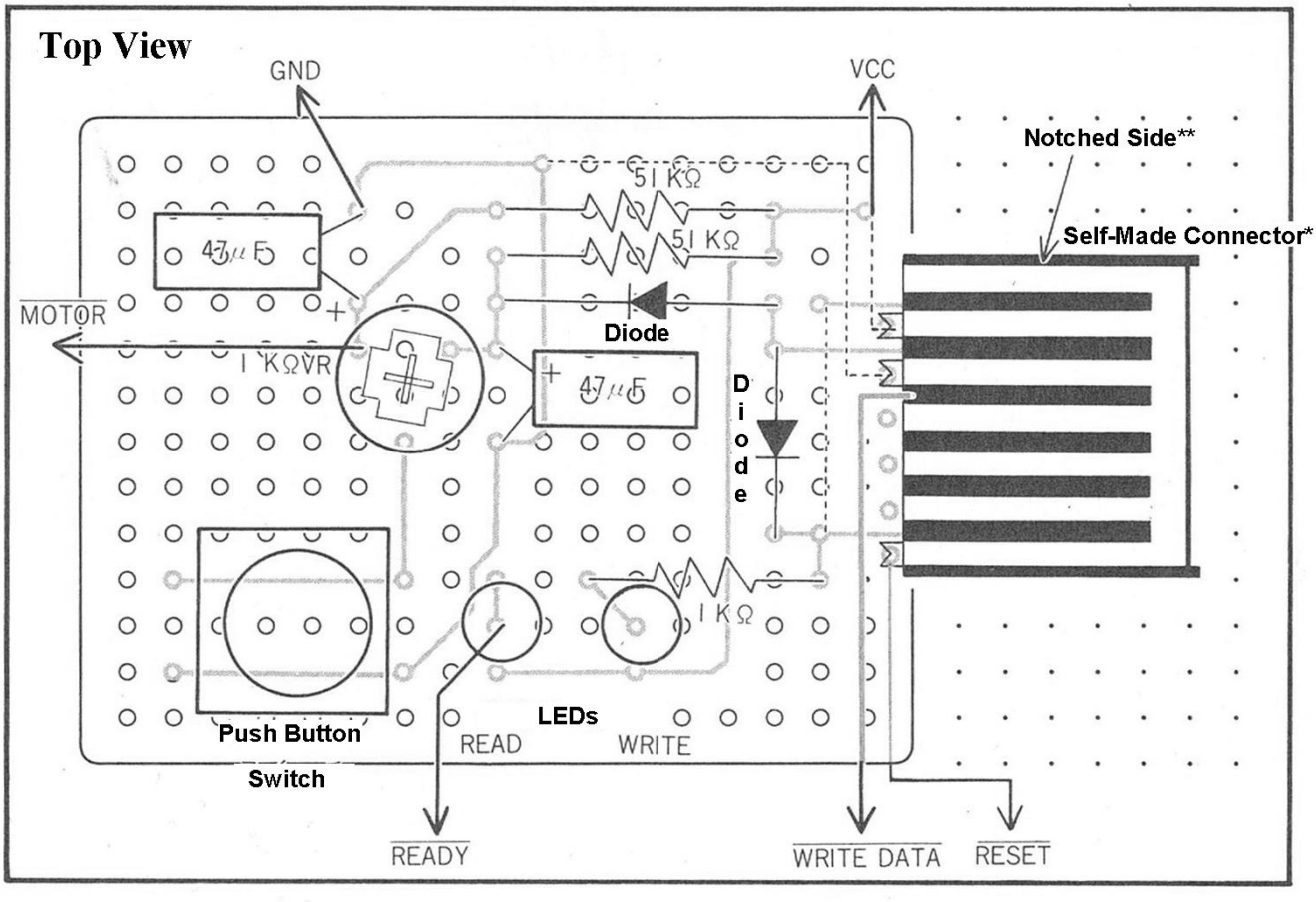
<Fig. 2> Dubbing Cable Wiring Diagram



<Fig. 3> Connector Wiring Diagram (READ Side)

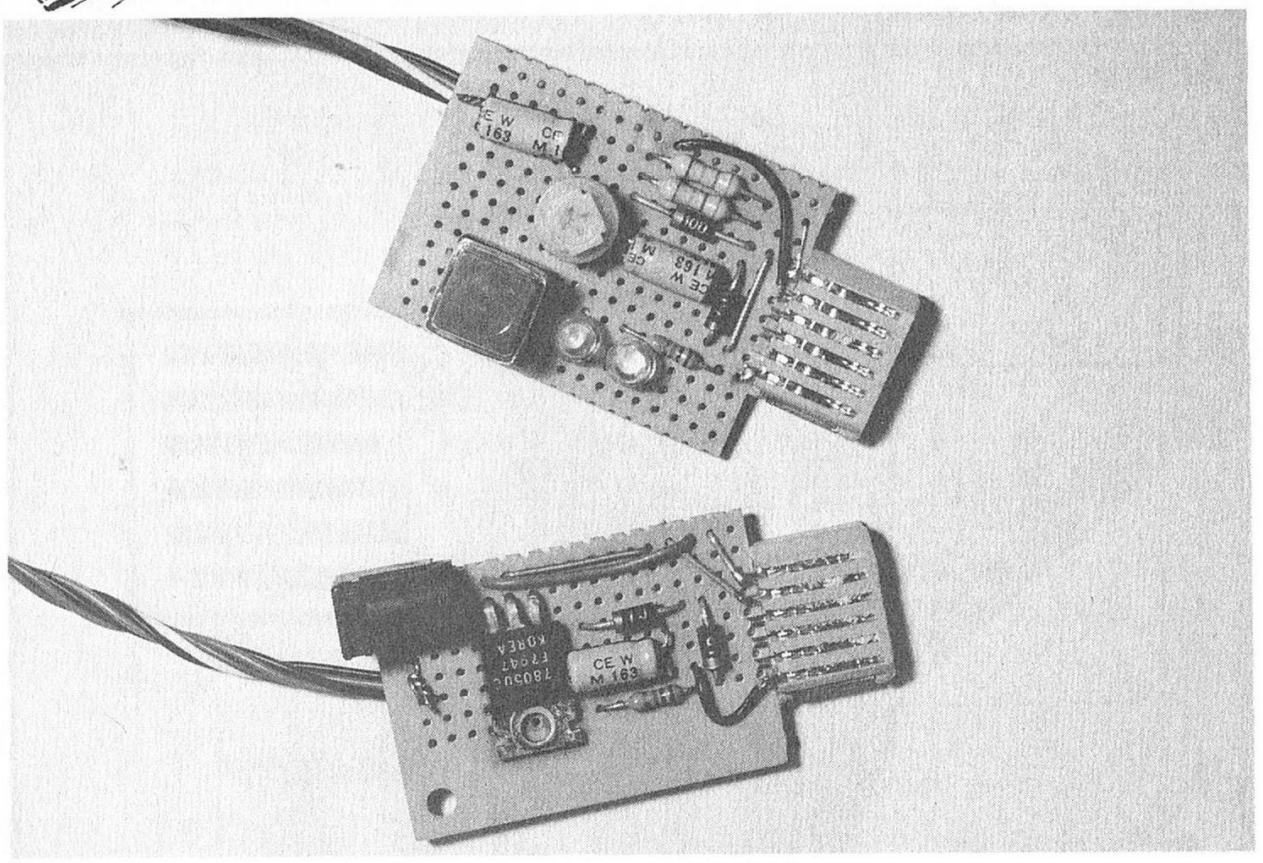


<Fig. 4> Connector Wiring Diagram (WRITE Side)



*Instructions to make these are in Volume 2, the previous issue.

** Note that there is a slanted notch on two corners of a real FDS RAM Adapter connector. You may notice this on the self-made connectors more in Photos 1 and 10. These connectors were made by hacking up the ends of a larger "off-the-shelf" type of connector, and consequently only have one notch, but they still will fit in the FDS RAM cart port. -RB



<Photo 1> WRITE Side and READ Side

Follow these steps to perform the dubbing.

<<Step 1>>

Set the READ side disk drive with the original (game) disk that you want to back up, and set the WRITE side disk drive with the disk (a blank disk is OK) you want to write to.

<<Step 2>>

Depress the push switch on the WRITE side for about 3 seconds.

<<Step 3>>

Adjust the variable resistor on the WRITE side board so that the two LEDs on the board shine simultaneously.

If they shine simultaneously, backup will happen automatically.

<<Step 4>>

Flip the disk cards of READ and WRITE sides over after this and repeat steps 2 and 3 to copy the other side of the disk cards.

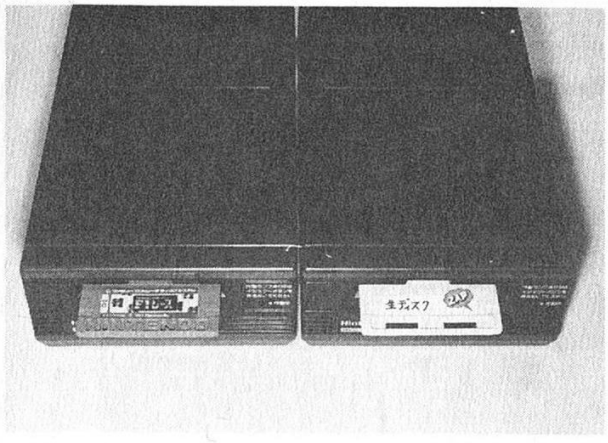
By following the above steps, the dubbing of the game disk is done.

Dubbing Cable Strengths and Weaknesses

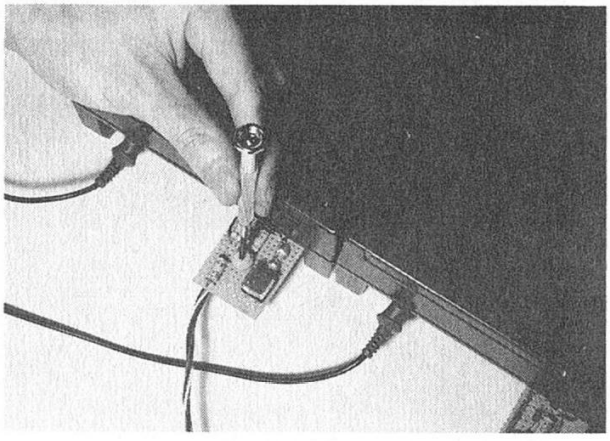
The principle of this system is the same as the dubbing of a cassette tape. Therefore, if dubbing is repeated by this method through successive generations of disk cards, data degradation occurs and eventually, further copying becomes impossible. In fact, a "great-grandchild" copy is the absolute limit, but try to copy directly from a parent disk when at all possible.

Although this is a weakness of the dubbing cable, as a strength, backup tools like "Disk Hacker," and so on, can copy with just one disk drive, and since the data of an original disk is not separately read by the CPU itself of the Family Computer, it will

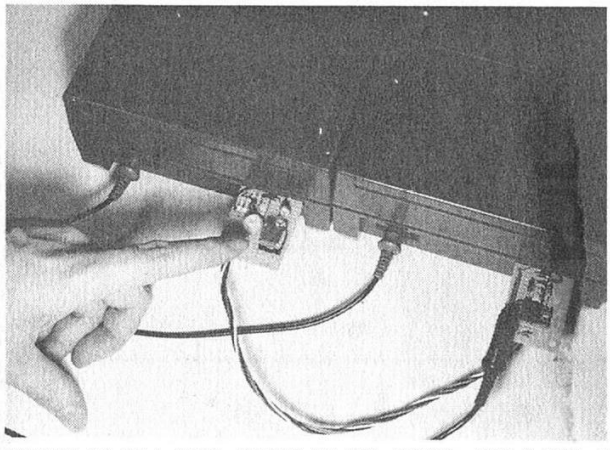
"Dubbing Cable" use and Disk Protection Removal Methods



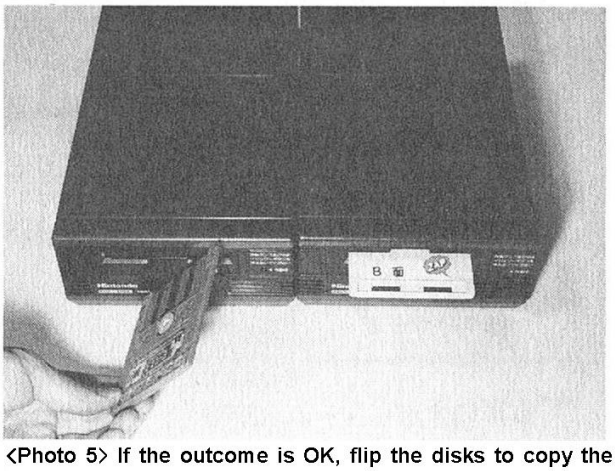
<Photo 2> The disks are set to the READ and WRITE sides, respectively.



<Photo 4> The variable resistor is adjusted so the WRITE side board's LEDs shine simultaneously



<Photo 3> The push switch on the WRITE side board is pushed for about 3 seconds.



<Photo 5> If the outcome is OK, flip the disks to copy the other sides.

still be able to do the backup even when powerful software protection* is in place.

Also, even when a disk card backed up by the cable has degraded, if re-backed up with "Disk Hacker," the copy becomes the same as its parent, combining the tools' strengths, so it's likely a good idea to use them both.

Furthermore, even when hardware (circuited) protection is integrated into the drive, all that's needed is some simple modification to remove it, which we'll now discuss.

Use of the Newer Protected Models is Also OK Now!!
How to Make the Disk Protection Takeover Board for the Newer Model

When the dubbing cable above is used, it's assumed the disk drive isn't protected, so we'll now examine how to address this.

A Look at How to Remove the Protection

This is carried out as follows.

Open the disk system's case, and remove the circuit board below the battery box to examine the number on it. (Fig. 6)

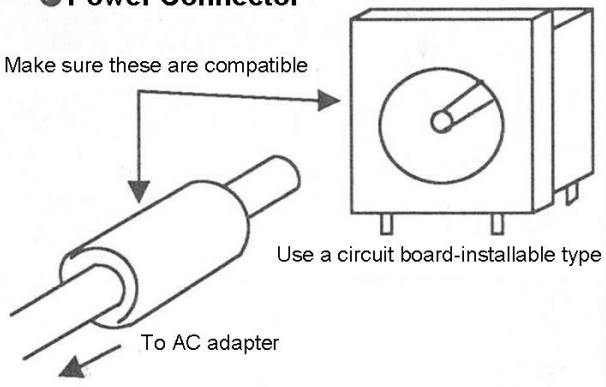
If this number is "01"~"03" then there is no protection. Reassemble the case and use it as before.

If it is "04" or "05," perform the wiring

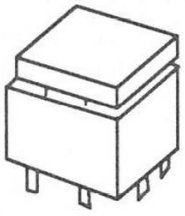
*I believe this refers to software protection (as opposed to the hardware protection introduced on this page, in which the second half of this document deals with removing), some disks have that makes copies unreadable due to CRC errors when using certain versions of copy tools like "Disk Hacker" mentioned above. Often, these copy tools had more than one version released over time that dealt with issues like this in their revisions. I'm not sure about the CPU claim in that paragraph, but I believe they are saying that using these copy tools make it so the Famicom CPU doesn't' read the data directly while copying (CPU bypassed?), allowing the CRC errors and such to be avoided. Please correct me if you believe I have interpreted any of this incorrectly. -RB

<Fig. 5> Parts Used For the Dubbing Cable

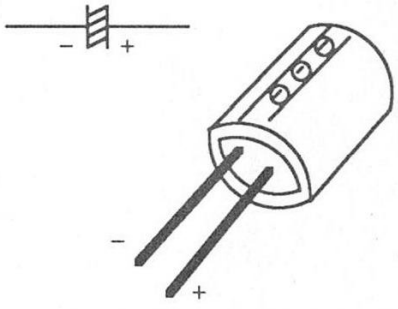
Power Connector



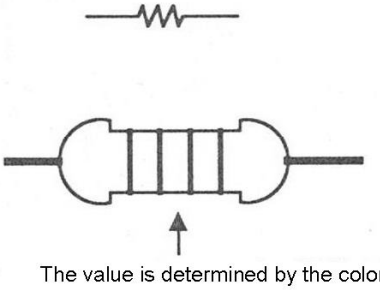
Push Button Switch



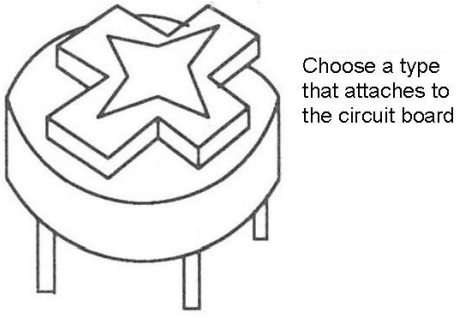
Condensers*



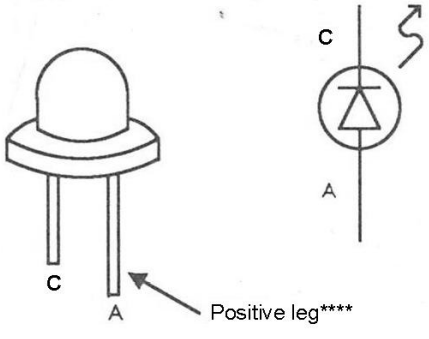
Resistors



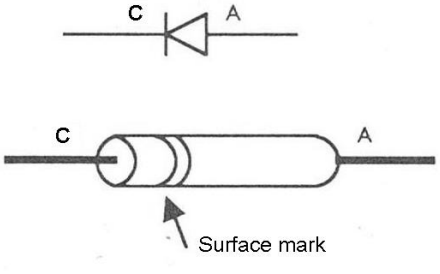
Semi-Fixed Volume Control (VR)***



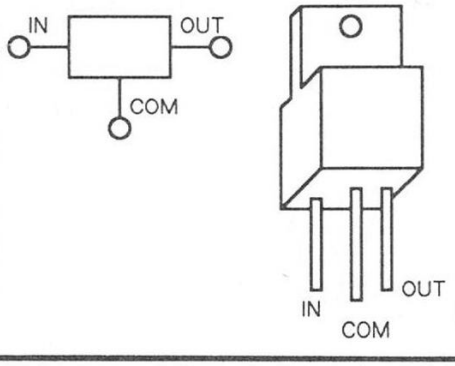
Light Emitting Diode (LED)



Diodes



3 Terminal Regulator



* Also known as capacitors.

** It is highly unlikely a store will need the color code on a resistor to find it, but it sometimes helps to know what they are and what they mean. Just give them the values denoted in the diagrams.

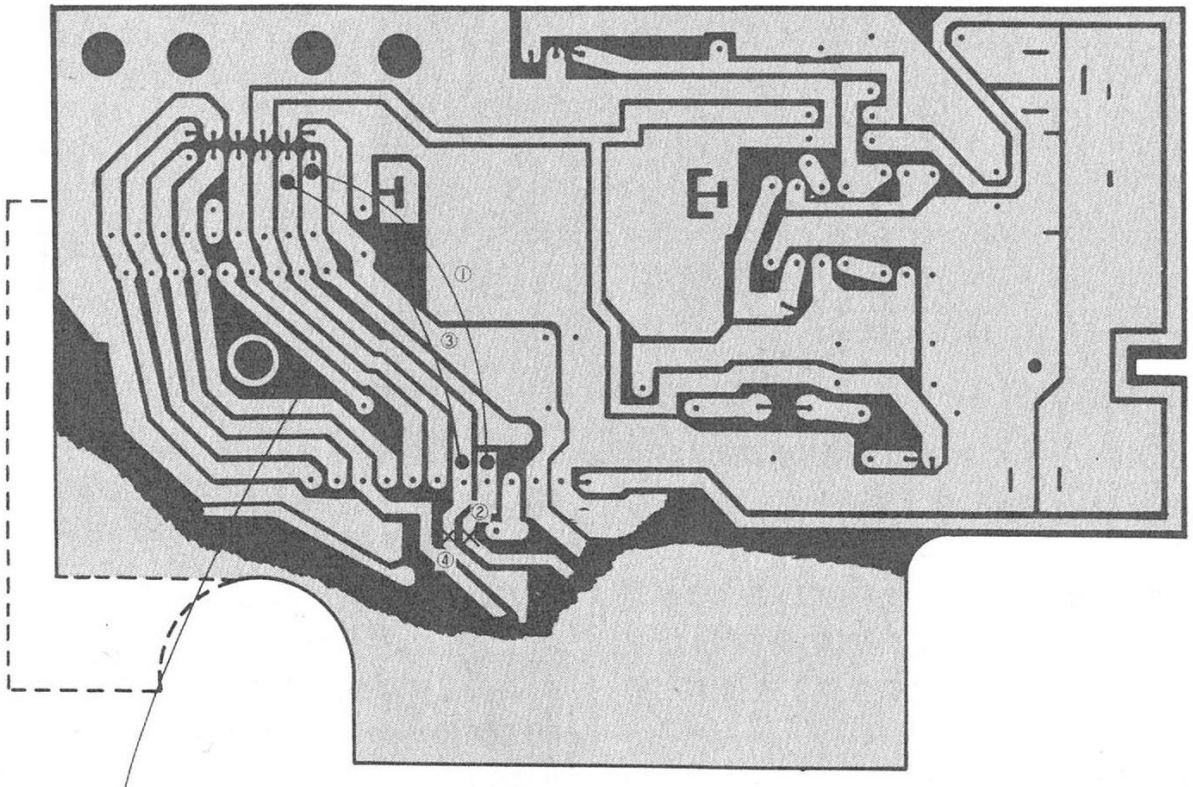
*** The anode, or positive leg is longer than the cathode, or negative leg.

**** Semi-fixed volume potentiometers are also known as variable resistors.

***** Literally, this is "entered mark," I believe. As far as I can tell, the term ("mark in") refers to a mark on something, like a logo or signature. Suitable English replacements might have been "printed mark," or "written-on mark," or "mark entered on (the item in question)," to be a bit less literal, but I felt these all strayed too far from the original literal meaning and sounded a bit too Engrish-like. "Surface mark" was the best I could think of as a compromise. I didn't think the term could possibly refer to the side the signal enters on (as in "entrance mark"), as the signal enters through the other (anode) side, though it may possibly be argued that the marked side is the side the signal really enters the rest of the circuit on. By the way, the line on a diode denotes the cathode, or negative side of a diode. Again, please inform me of any corrections you may offer. –RB

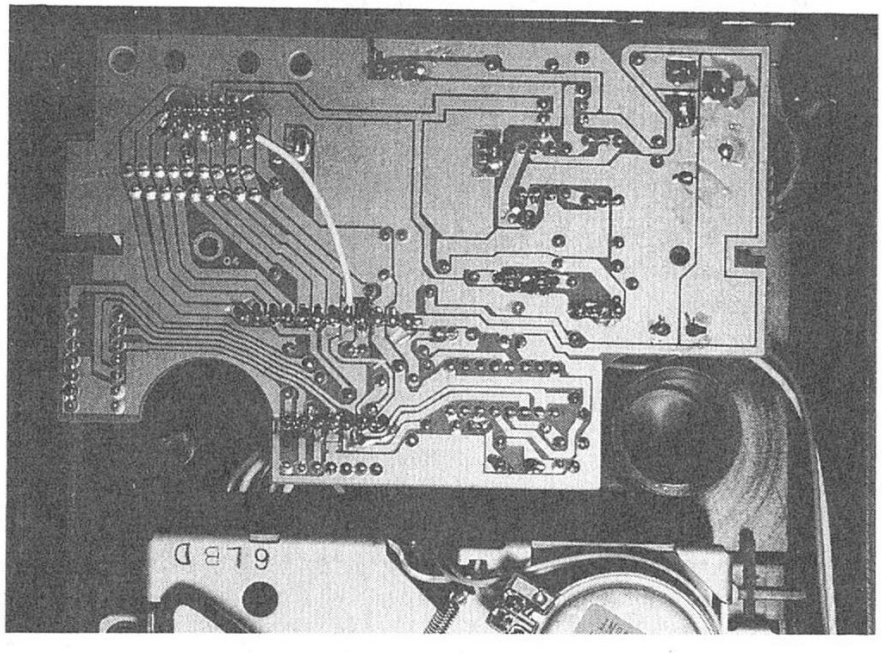
"Dubbing Cable" use and Disk Protection Removal Methods

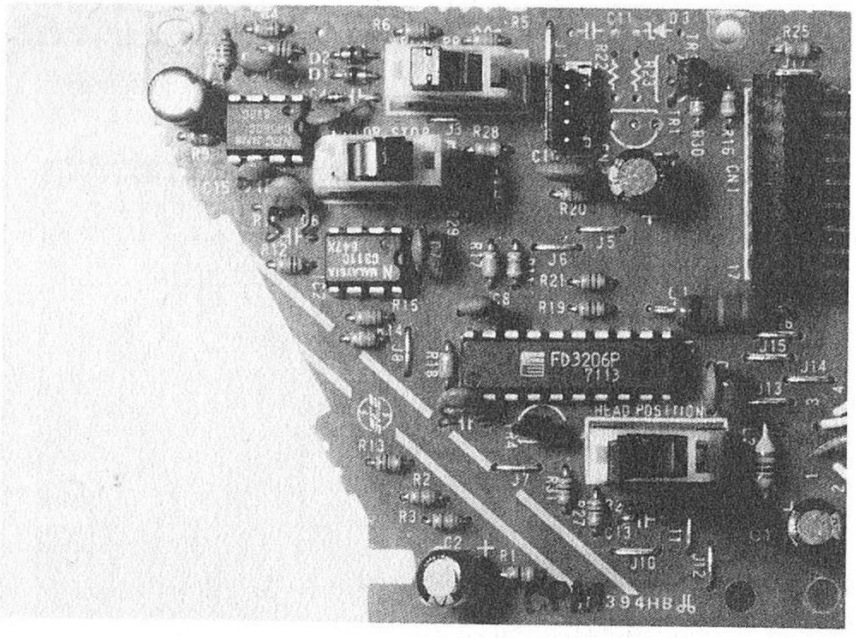
<Fig. 6> Section on Cutting Off the Protection



If the number written here is 04, connect ① and cut ②.

If it is 05, connect ① and ③ and cut ② and ④





<Photo 6> Look into the disk system from the top and if the IC number is FD3206 it is a newer protected model!!

and cut the pattern shown in Fig. 6, which will remove the protection.

In addition, if the READ side is also protected, it is not necessary to remove that protection when the dubbing cable is used with it.

Remove the protection only from the WRITE side.

How to Remove the Protection on the Newer Models

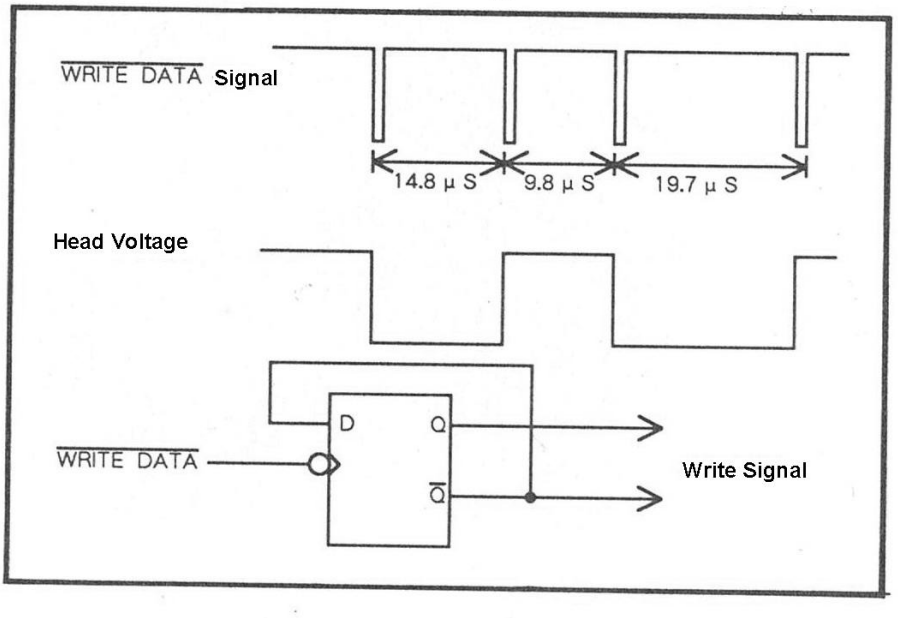
Although the above is the same as what was introduced in Vol. 2, the newer protected model came out around fall of last year.

Look into the disk unit from the top (Photo 6).

The IC is visible from here, and if the IC number is FD3206, it is the newer protected model (if it's FD7201 then it's OK).

Since demand was good with retailers, the older models have been selling out, and it's thought that the newer protected models are common now. However cheap they may be, it's safest to pass them by (if you intend to use them for the READ sides only without modification, then that's OK).

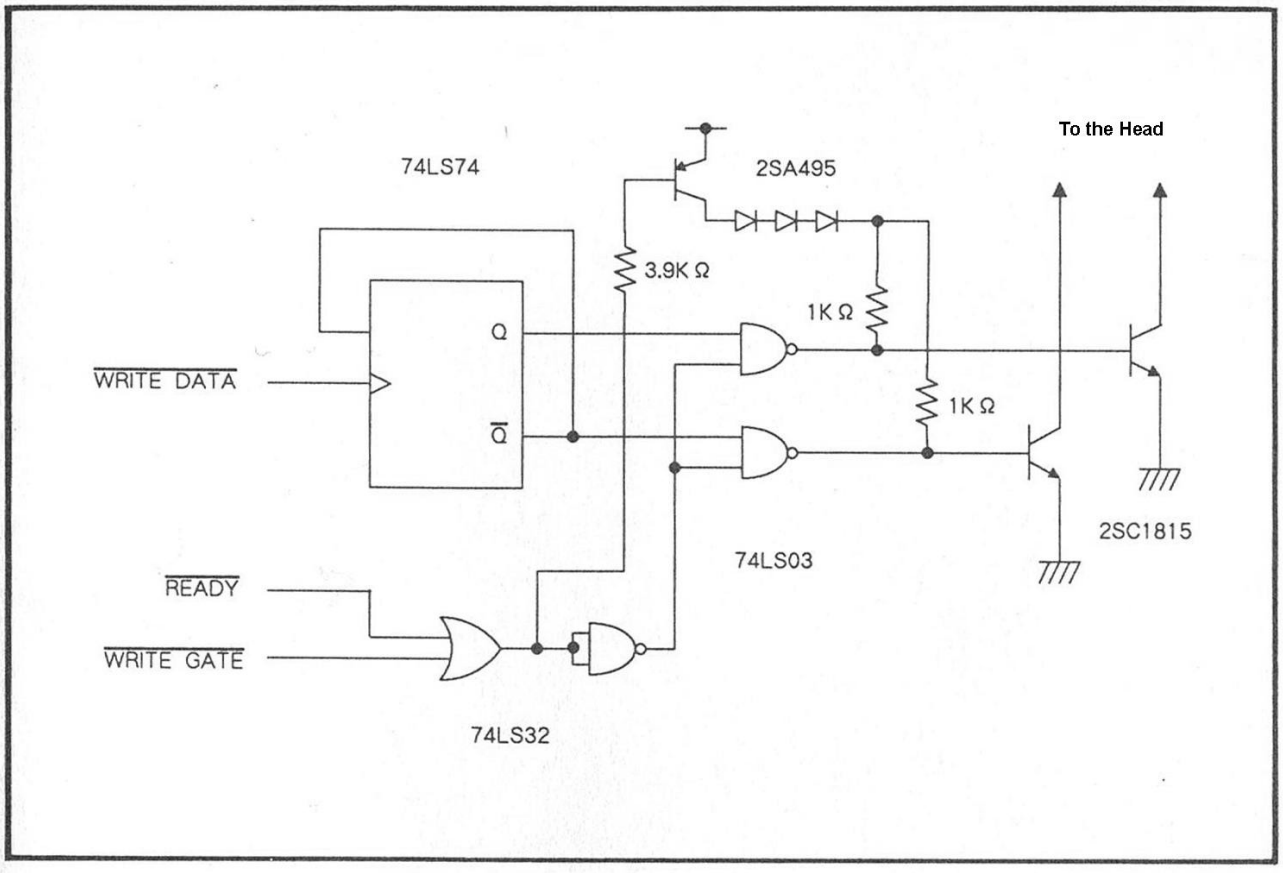
Unfortunately, both of the FD3206 units I



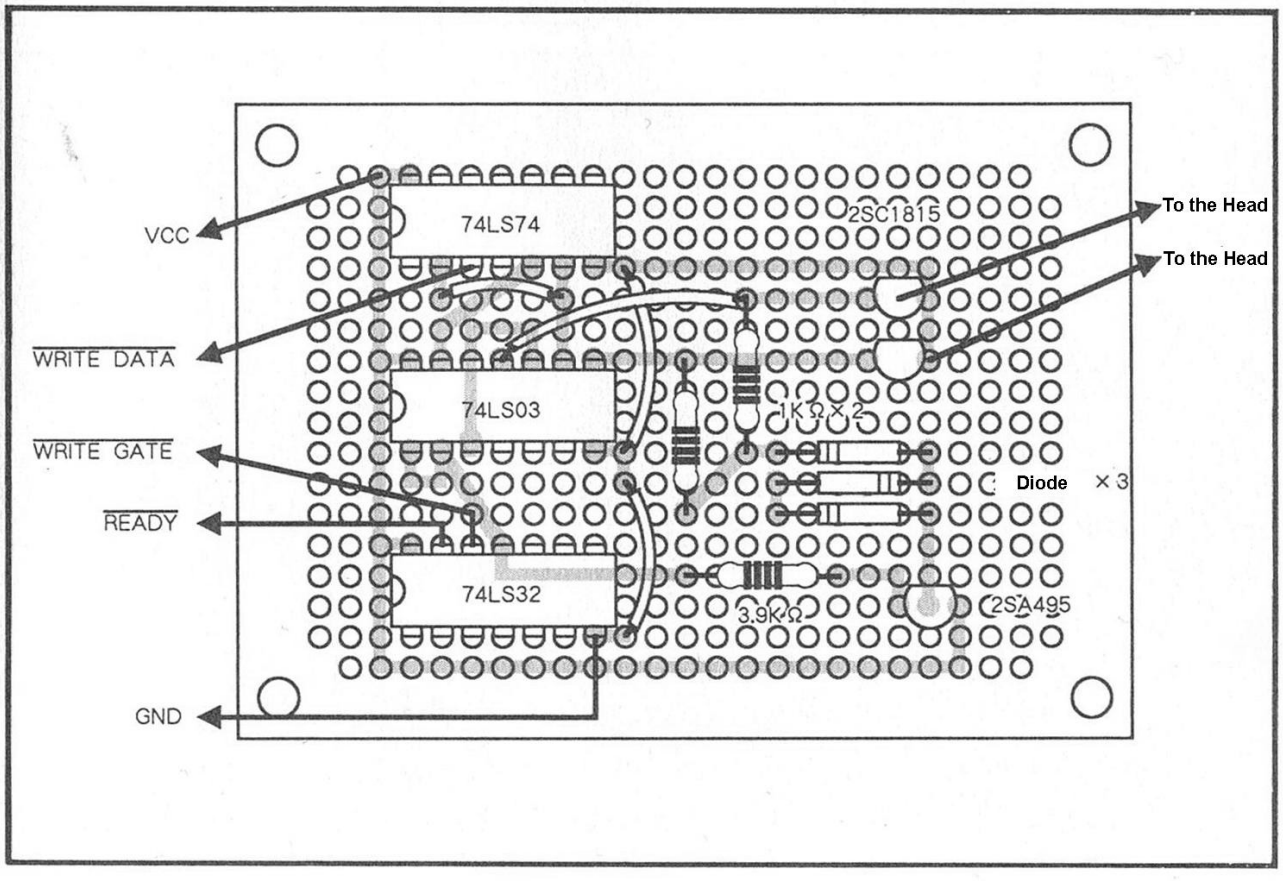
<Fig. 7> Structure of the Takeover Board

"Dubbing Cable" use and Disk Protection Removal Methods

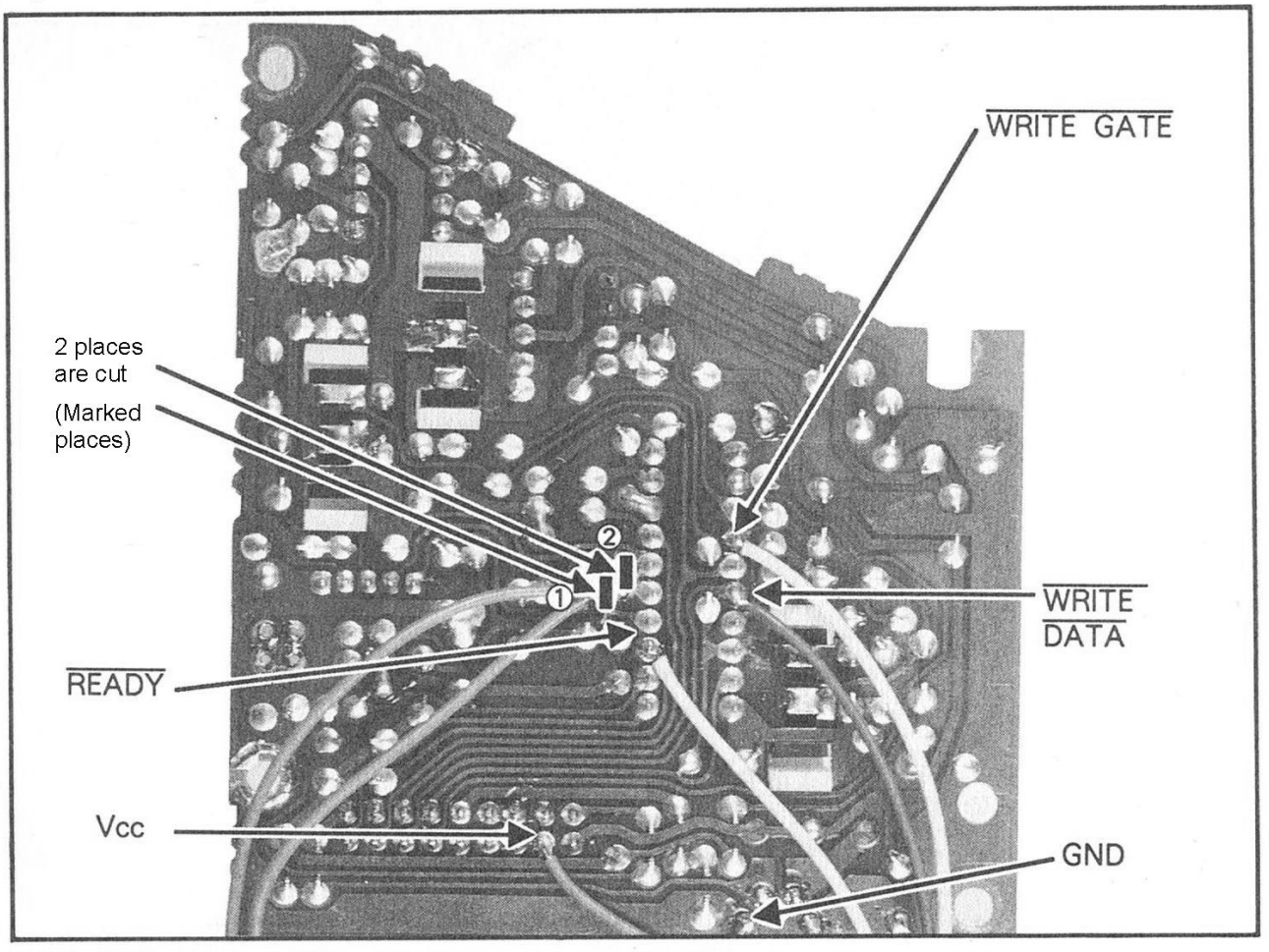
<Fig. 8> The Takeover Board Circuit Attached to the Protection Circuit

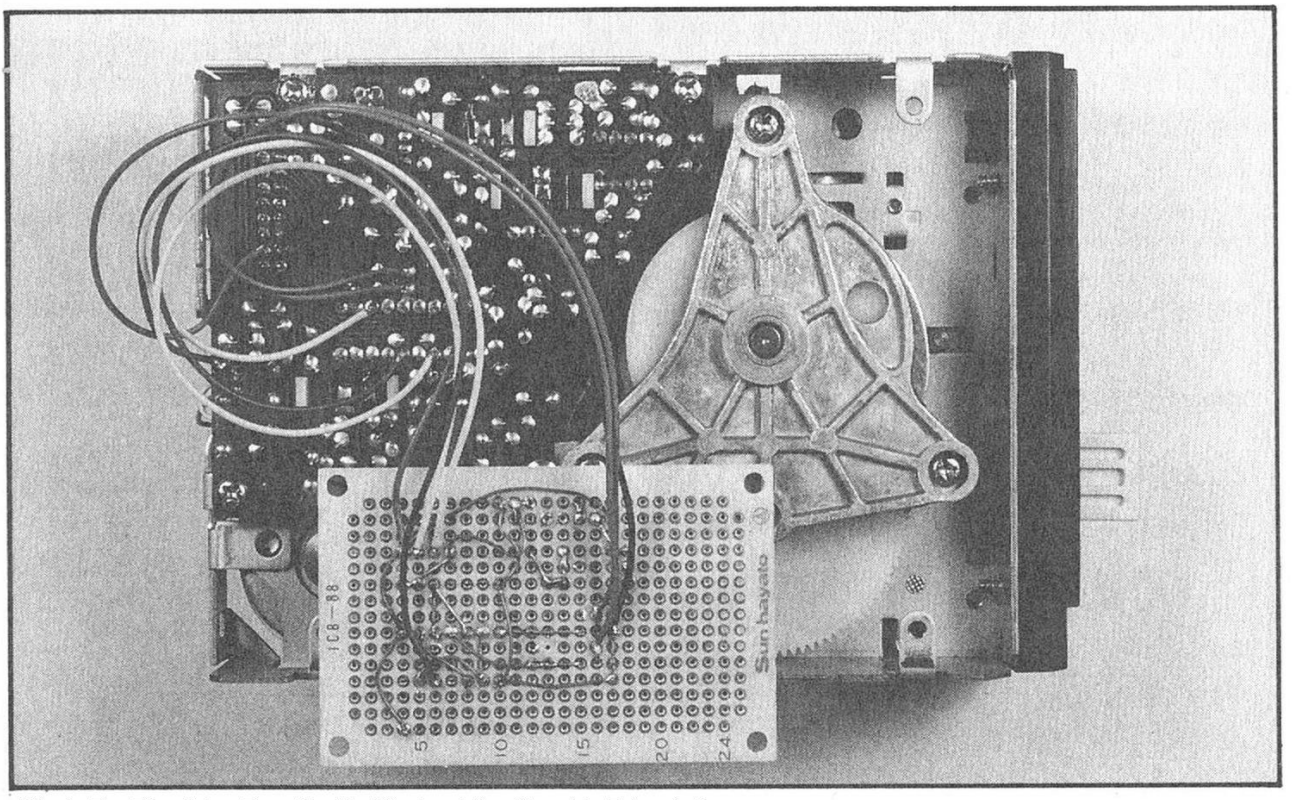


<Fig. 9> The Wiring Diagram of the Takeover Board Itself

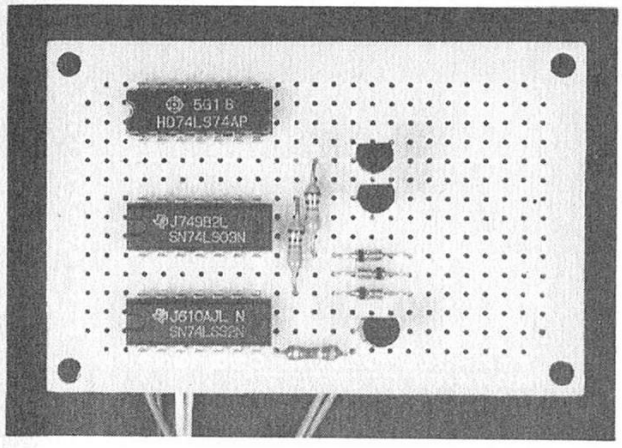


<Fig. 10> Section Showing the Cutting Pattern for the FD3206 Drive Board

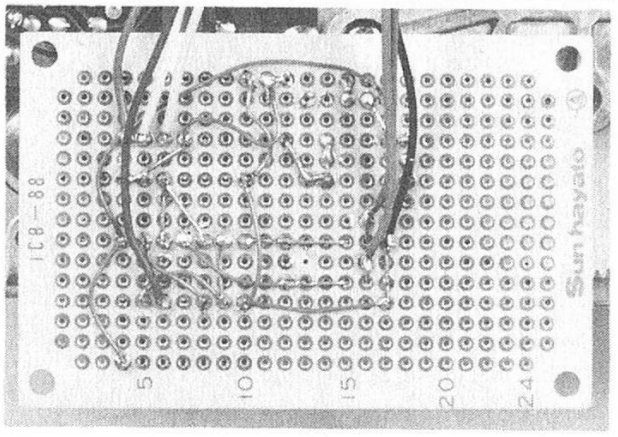




<Photo 7> The Drive Board is Modified and the Signal is Extracted.



<Photo 8> The Completed Takeover Board.



<Photo 9> Takeover Board (Reverse Side)

obtained had to be converted for WRITE side use.

About the Takeover Board

Since the contents of the IC are inconvertible, what the IC does is reconstructed by a logic circuit, as the IC can only be taken over externally.

The voltage of the head of the disk drive divides the $\overline{\text{WRITE DATA}}$ signal (Figure 7).*

In other words, it is necessary to let $\overline{\text{WRITE DATA}}$ input to the D flip-flop, and output right to the drive head.* Simple, isn't it? A hacker doesn't have to be a mega-genius!**

Fig. 8 adds a protection circuit so if there is a shock at $\overline{\text{WRITE GATE}}$, $\overline{\text{READY}}$, or if the power supply is turned on or off, it will not corrupt the disk card data. (Photo 7)

Takeover Board Installation

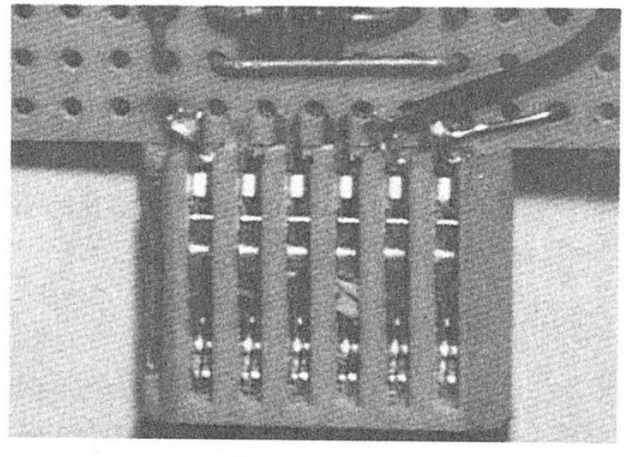
Remove the disk unit and open the metal cover on the reverse. At this time, please don't loosen the screw visible from the circular hole by any means.

Cut the pattern near pin no. 14 and pin no.15 of the FD3206 (the signals that go to the head).

Do the wiring as shown in Fig. 10. Also, with the modification, rest assured you can enjoy your games as before.

Moreover, this modification is effective with Disk Hacker, Kosodate Gokko, Tonkachi Editor, Quick Hunter, etc.

Those who want pre-made connectors (photo 9)*** shown in the article or blank disks need to write the following by registered mail.
◎The price is 900 yen (postage included) for 1 two-piece set of pre-made connectors.
◎10 blank disks (ZAP brand) are 4800 yen (for up to 40 include 900 yen postage, for 50 and up postage is included, and for 100 and up @ 450 yen each, postage is included).
◎Address
〒165 Nogata, Nakano-ku, Tokyo, 6-17-5 Iwade Kouporasu 202 "Angel Software"
TEL 03-223-1757



<Photo 10> Finished Self-Made Connector

* I don't assume to completely know how these circuits work, but I believe this is the correct translation for these sections, however ambiguous it may be to a beginner. Also, a D-type (or data type) flip-flop circuit is a standard form of logic circuit (flip-flops are meant to alternate the state of a signal between two states). The D also refers to one of the two inputs to a D-type flip-flop circuit.
** Whatever.
*** I think they meant Fig. 10, But maybe they sent you the whole board. Who knows?