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Created with love by many humans.

Macintosh SE/30

Vertical & Horizontal Bars on Display Repair Guide

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Section 01

About This Guide

01 About This Guide

Introduction

If you've powered up a Macintosh SE/30 and see nothing but static dotted or straight lines on the screen, your unhappy Mac is suffering a condition affectionately referred to as "simasima" or "striped pattern" in Japanese. (Sometimes also referred to as "simasimac"). It is one of the most common failure modes of aging Macintosh SE/30's and can be due to a variety of causes.

The purpose of this guide is to provide some basic operating theory and a step-by-step method to achieve a 'Happy Mac' boot screen and get your system working again.



This guide covers a number of technical steps and procedures. While it is written for the average electronics enthusiast, some of the methods in this guide may require additional skills, technical knowledge, or repair experience. Please proceed with caution!

Steps in this guide can be followed out of order, but it is strongly recommended to first replace all electrolytic capacitors on the logic board and thoroughly clean it before attempting other diagnostic steps. Aging and failed capacitors can cause a number of issues that will interfere with these troubleshooting and repair steps.

Some steps are **labeled** with a level of difficulty, which ranges from moderately easy (e.g. cleaning the board) to very difficult (e.g. removing Bourns filters without causing damage). Each step notes which tools are required. These can vary from relatively inexpensive (e.g. digital multimeter) to very expensive (e.g. oscilloscope).

This guide is a work in progress! If you have corrections or feedback to offer, please do so in the [TinkerDifferent thread here](#). This is an enthusiast-maintained project and updates may take time. Thank you for your patience and understanding.

With a bit of care and patience, and luck, your Macintosh SE/30 may be happy again soon! 🖥️

Who is this guide for?



This guide is best suited for people who:

- Are electronics enthusiasts who are comfortable using a soldering iron and similar tools
- Have some experience repairing circuit boards with surface-mounted device (or SMD) components
- Want guidance on the order of operations to resolve these specific display issues with minimal frustration
- Have decent quality soldering and test equipment

If you are unfamiliar with these topics, or if the failure mode on your Mac is something other than ‘simasima’, then this guide may not be ideal for you. However, some of the general information and other tips provided by this guide might still be useful.

Although this guide can be helpful to people with minimal soldering and board repair experience, they may have more questions and struggle through some of the suggested steps. If you find yourself uncomfortable or uncertain at any step of this guide, it is strongly suggested you take a step back and consider your safety, skill level, and the risk of you damaging your system further.

Please consider skimming through the sections of this guide first to decide if you’re ready to dive in!

! IMPORTANT! !

This guide and its contents are provided “AS-IS” without any warranty!

By executing any actions or instructions outlined in this guide, you acknowledge that you assume sole responsibility for any consequences that may arise. The authors or contributors to this guide cannot be held responsible for any actions or potential damage you may cause to yourself, others, or items. Always practice good safety when handling or working with electronic devices and electricity.

This document is not endorsed or approved by Apple, Inc. or any other corporation(s) or individual(s).

What's not included?

This guide does not cover the following:

- System take-apart
- CRT discharge and safety ⚠ (Very important!)
- Electrostatic discharge (ESD) safety
- Analog video or power supply issues
- Distorted video on an otherwise working system
- Audio related issues (other than those related to the reset line)
- Other issues that may prevent booting beyond a Happy Mac (e.g. failed hard drives, bad memory, failed components)

The topics above are covered thoroughly online via forum posts, repair videos, and in other texts. Some helpful links related to these topics are listed below. In addition, refer to the **Resources** section of this guide for more useful links and materials.

- **System take-apart:** [Macintosh SE/30 - Apple Service Source Guide \(PDF\)](#) - Take apart steps start on page 27.
- **CRT discharge and safety:** [Discharging the CRT in a compact Macintosh](#), a YouTube video by Branchus Creations
- **ESD safety:** [A whitepaper about ESD safety](#) by Jeff Zopff from Universal Instruments. [A video on ESD](#) by DigiKey
- **Analog board:** [Macintosh SE & SE/30 Analog Board Recapping Walkthrough](#), a YouTube video by JDW
- **Power supply:** [Recapping Mac SE/30 Sony PSU](#), [New Power Supply \(Seasonic\) project](#), YouTube videos by JDW
- **CRT display:** [Fixing the focus control on a Mac SE/30](#), a YouTube video by Branchus Creations

This guide is in beta

This is in early beta. Although the primary “simasima” related areas of this guide are considered finished, some supplementary sections are a work in progress.

Icon Legend



Work In Progress: An area that’s a work in progress; information may be incomplete or unintentionally inaccurate.



Editor’s Note: A note from the authors to provide additional context, helpful tips, or info related to upcoming changes.



Take Caution! A note to be extra careful or take special note of a step, area, or subject.

Further help

If you follow this guide and are still stuck with a “simasima” Mac, don’t despair. Even very experienced technicians can get stumped. There are fortunately many people who are happy to share their advice, experience and wisdom when you need it.

1. Create a post at the [Tinker Different Compact Mac sub-forum](#)
2. Include the following in your post:
 - The current symptom, “simasima” pattern or otherwise
 - Any steps taken to reproduce the issue
 - All of the things you’ve done to try and resolve the problem so far
 - Attach photos of the symptom(s) when relevant, and of your board in as much detail as possible.

In addition, see the [**Resources**](#) section of this guide for more helpful links and troubleshooting tips.

Feedback

If you have feedback or contributions to offer, please provide them via this [TinkerDifferent thread](#).

Please remember to always be kind and supportive, we’re humans too! This guide is an enthusiast-maintained project and updates may take time. Thank you for your interest, patience and understanding! ❤️

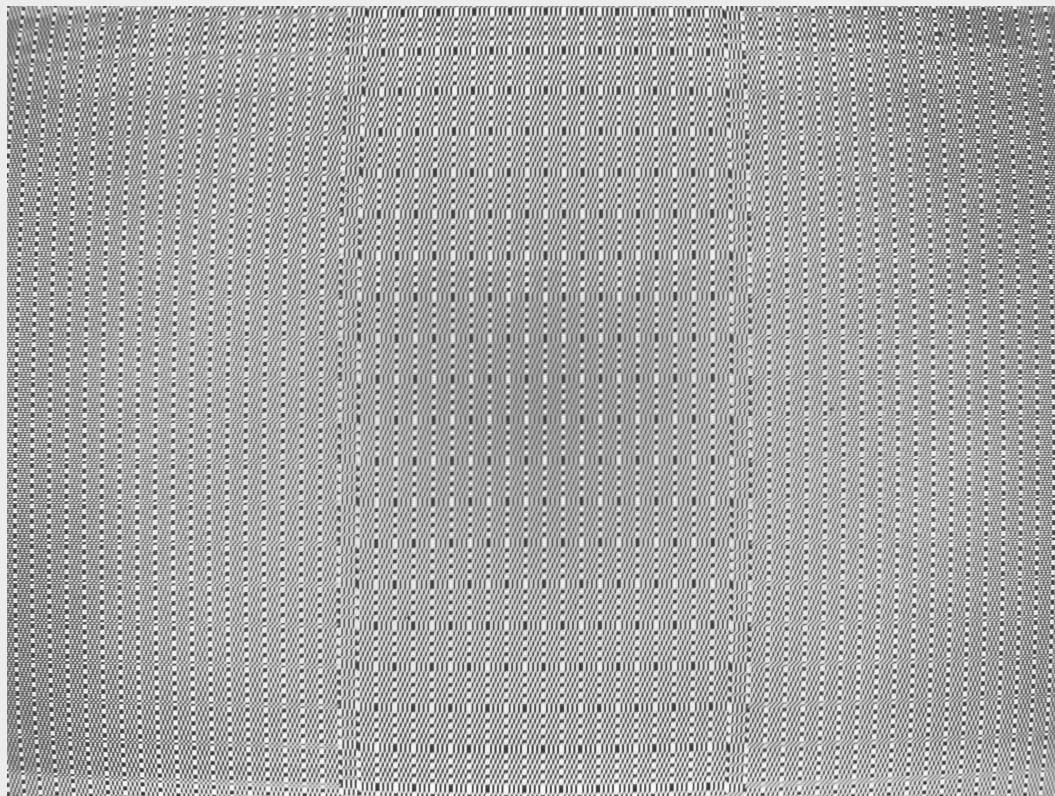
Section 02

Theory

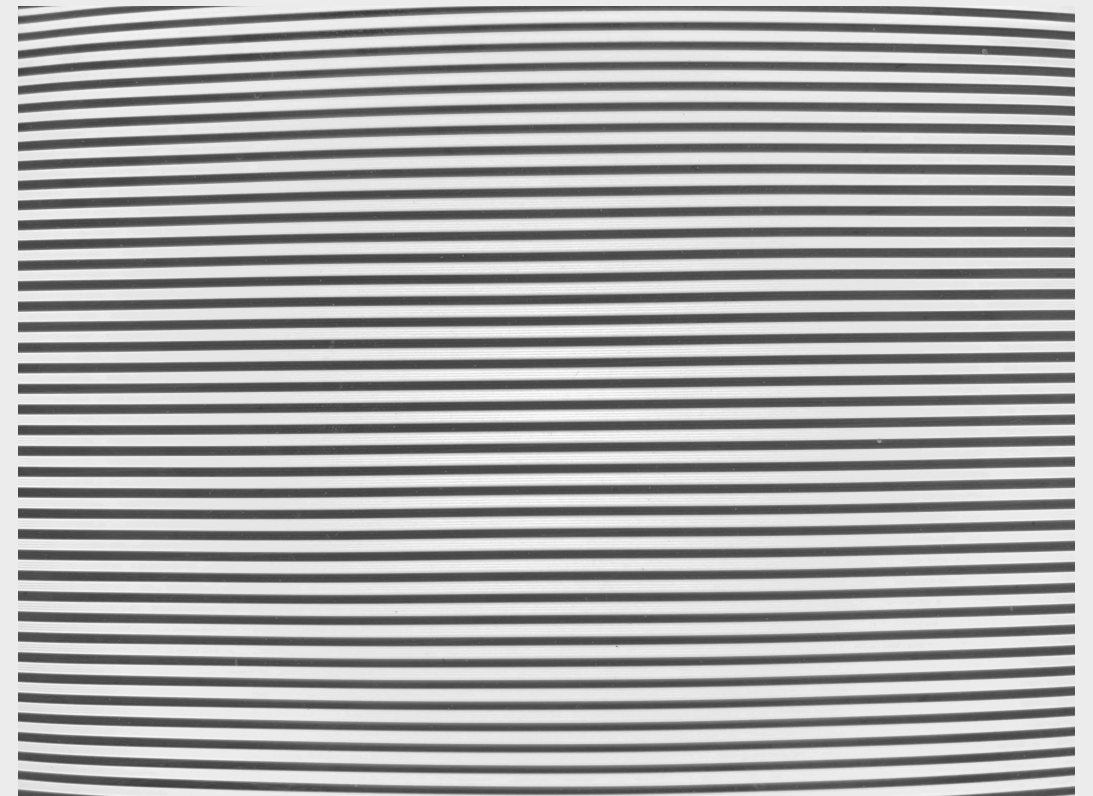
What does this pattern on the display mean?

The patterns, shown below, displayed on a Mac SE/30 represents the default state of VRAM. Depending on the VRAM vendor, the screen will display thin dotted vertical lines (NEC, left photo) or thicker solid horizontal bars (Texas Instruments, right photo).

This indicates the CPU has been unsuccessful initializing the VRAM to a known state due to the system failing early in the boot process or not able to read ROM at all. This is typically due to one or more address and/or data lines being open, short, under contention or misbehaving due to a failed component.



Default state of NEC VRAM



Default state of Texas Instruments VRAM



Macintosh SE/30 Boot Up Process*

Below is a summary of the Macintosh SE/30's boot up process. Understanding this workflow can be helpful in narrowing down the focus of your troubleshooting.



1. After initial power-on, and the voltages stabilize, the sound chip releases the reset line
2. The CPU begins executing code
3. The GLUE logic maps the ROM to the start of the address space (address \$0)
4. The CPU begins executing code from the ROM SIMM using one of the VIA chips
5. Boot-time diagnostics check if the system is operating normally. If any failures are detected or the user presses the NMI (non-maskable interrupt) button:
 - A. A "Sad Mac" tone is played (if the sound chip and circuitry is working and it is able to be selected by the GLUE logic).
 - B. The system ROM will attempt to start Apple Test Mode.

This mode will attempt to set up communication with the SCC (serial port controller) and Apple's TechStep hardware diagnostic tool. Note, this can be simulated with a serial connection.

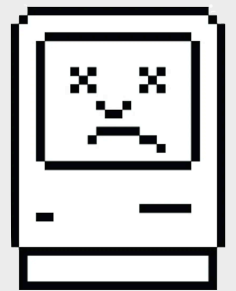
6. After all tests pass, the ROM will remap the RAM into address \$0 (by use of the VIA) and the system ROM will attempt to initialize video memory by with the video ROM.
7. The remainder of the boot process commences

**Courtesy of Adrian Black*



Sad Mac + “Simasima”

A sad Mac tone indicates the Mac is in Apple Test Mode. For this mode to function, the SCC (serial port controller) chip is required to be working, along with the buffers that make their way from SCC to the modem port. The GLUE logic must be selecting the SCC chip to setup the serial port. If no selection is happening, there may be a faulty trace or address line(s) into the GLUE, or a bad GLUE chip.



If a Mac SE/30 is playing the sad Mac tone but displaying the “simasima” pattern, then you may be able to use Apple Test Mode to help narrow down the problem. This can be done with TechStep hardware or via serial.



Apple TechStep Diagnostic Tool, YouTube video by JDW



Use Apple TechStep without TechSteap hardware: Mac's built in diagnostics, YouTube video by Adrian's Digital Basement

Troubleshooting 101 - First things to check

Before continuing too far with this guide, please take a moment to check the following. Getting a “simasima” pattern on your Mac SE/30 could *also* be due to one or more of the following.

COMMON CAUSES:

- Incompatible memory, an unsupported memory module/bank configuration, loose or unstable RAM connection
- Bad ROM SIMM, loose or unstable ROM SIMM connection
- Some reproduction ROM SIMMs may show temporary “simasima” patterns while performing a RAM check
- Reset line is never released; CPU cannot execute code
- Voltage out-of-spec

THINGS TO CHECK:

1. Check the voltage
This [video by Branchus Creations](#) shows you how to measure voltage via the external floppy drive port.
2. Check capacitors
If you have not recapped the logic board, you should do that first.
3. Check voltages on the analog board
Inspect the analog board for cracked solder joints and determine if the analog board needs to be recapped.
4. Check for bad traces and damage. Look for cracked or bad solder joints, especially on chips located near capacitors.
5. Check memory modules, are they compatible, are the slots damaged?
6. Check the ROM SIMM.
Can you try another one? If you hold the SIMM in the slot, does this fix it?
Some reproduction ROM SIMMs use thinner PCBs, these may have trouble making a good connection with the SIMM slot and can cause issues.
7. Does flexing the logic board, while the system is on or off, cause the problem to go away? Inspect sockets carefully.

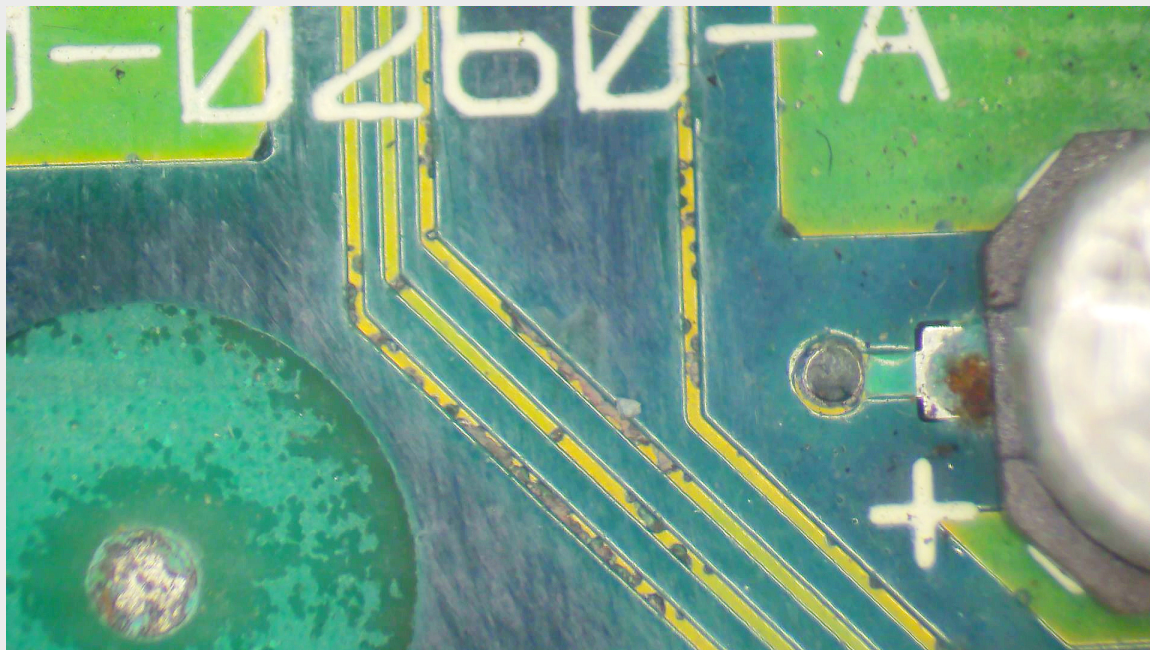
Possible Points of Failure

This issue can be due to one or more of the following:

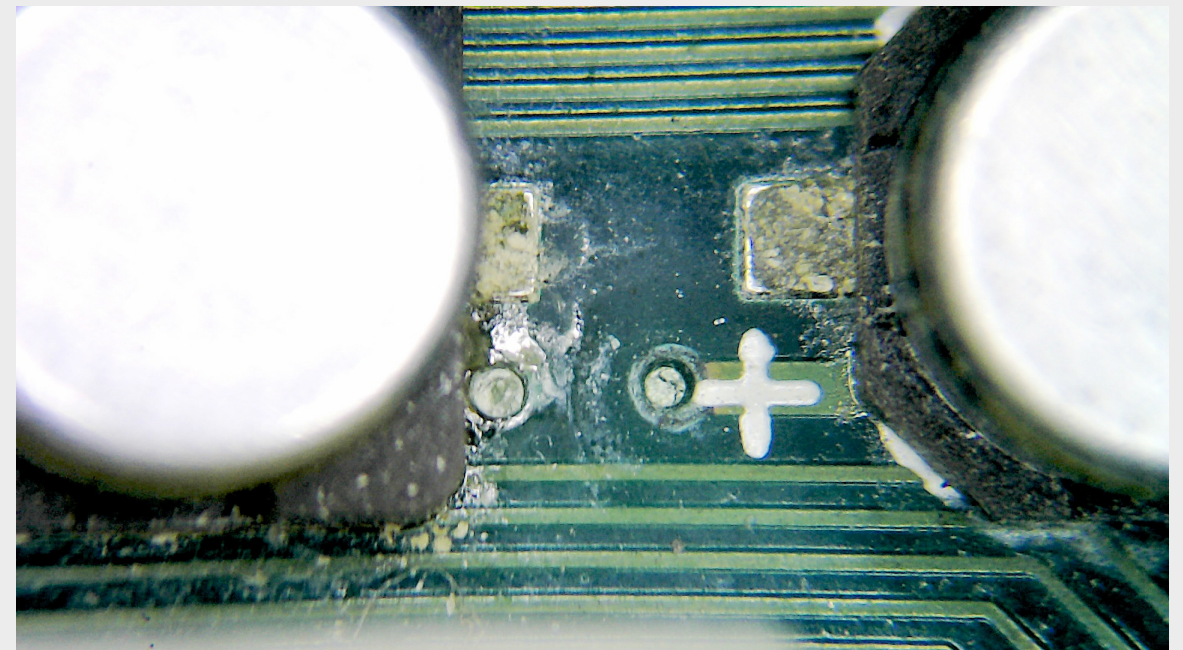
- Broken traces between ROM, video ROM, video multiplexers, CPU, RAM, and RAM multiplexers
- One or more failed components mentioned in the previous bullet
- Capacitor electrolyte or other contaminates shorting one or more of the components listed above

The root cause for these issues can vary, but is typically leaked components, environmental stresses, component fatigue or a confluence of factors.

When restoring your Mac SE/30, consider the root cause of the damage when deciding what components to use. For instance, you might want to consider using tantalum, aluminum, or polymer capacitors as a replacement for SMD electrolytic capacitors to avoid leaks in the distant future. Always be sure you clean capacitor pads thoroughly before installing new capacitors.



An example of broken traces. The dark areas on the traces are caused by corrosion. A break in traces can interrupt vital data and power signals. Some corrosion may only be on the surface, but it can also penetrate the trace, etc.



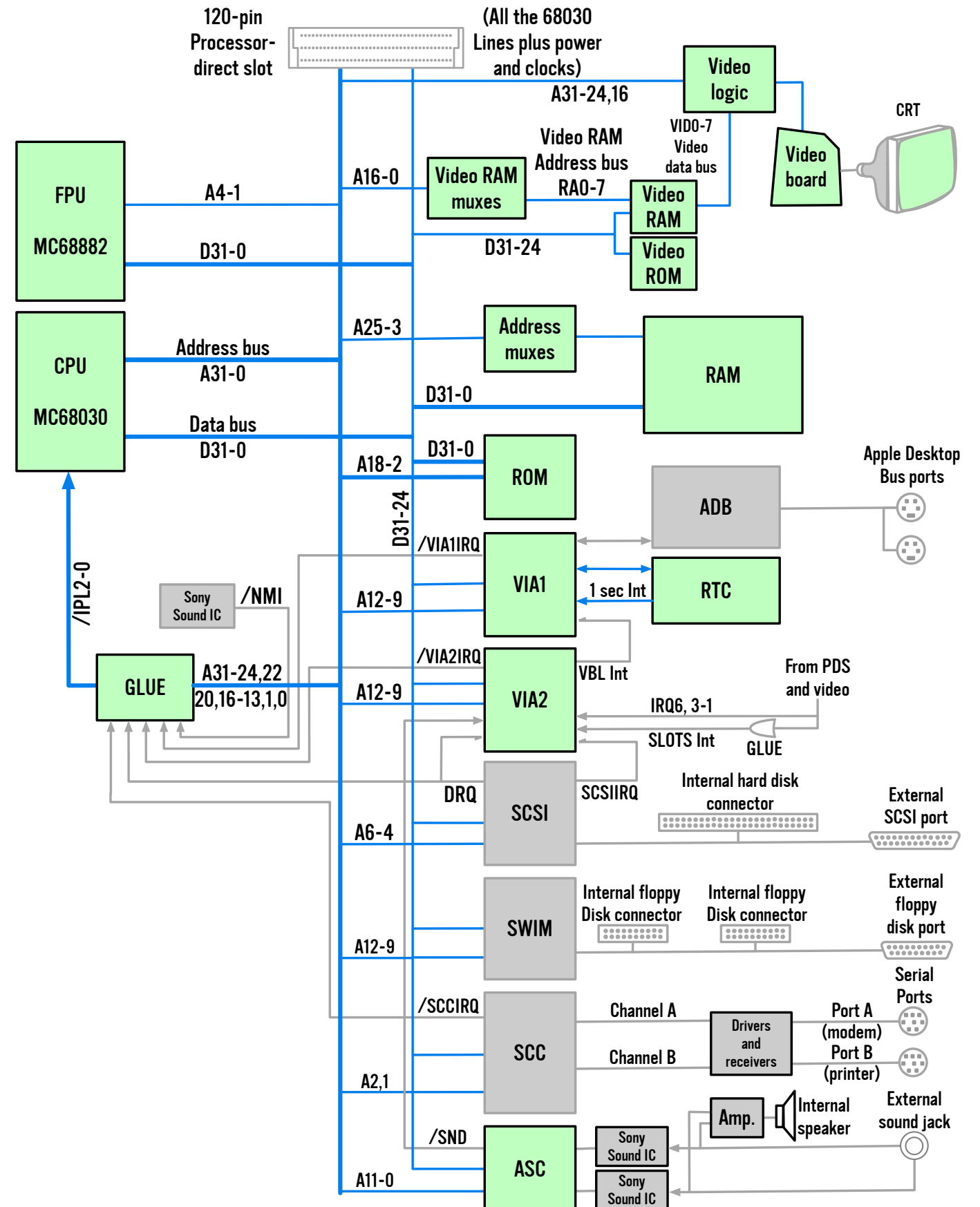
An example of leaking capacitors. The dirt and grime surrounding the capacitors indicates they have leaked. Electrolytic capacitors contain corrosive liquid that can damage components, traces, and cause shorts.



Block Diagram

This block diagram illustrates the hardware components of the Macintosh SE/30.

The components highlighted in green and the traces connecting them highlighted in blue must be functional in order to achieve a happy Mac at boot.



Note: The ASC Reset line must work, but otherwise sound is not necessary to get a Happy Mac.

To be added, info on how to check the Reset line.

Section 03

Troubleshooting & Repair

Overview

The steps below assume the following:

-  **You know how and when to safely discharge the CRT. If not, get professional assistance before proceeding!**
(This [video by Branchus Creations](#) shows the CRT discharge process and may be helpful)
- The power supply and analog video board are functional and +12V and +5V rails are within tolerance
- You know how to take apart and reassemble the system
- Your work environment is ESD safe
- You have access to the tools mentioned in the following two pages

Basic Tools & Supplies

These are the ‘must-haves’ for most repairs in this guide. It’s not necessary to use the highest end tools and supplies, however it is recommended to avoid the lowest quality options. For more expensive tools like solder and hot air stations, consider getting better quality used options. Estimated prices are in US dollars.

Tool	Purpose	Est. Price (USD)
Soldering station	Solder and desolder all components	\$125
Hot air station	Inexpensive way to remove SMD components	\$60
Fume extractor	Extract solder fumes	\$50
Digital multimeter	Test continuity, resistance, voltages and measure components	\$100
60/40 rosin core solder	Easier to work with compared to lead-free solder	\$10
Tacky no-clean flux	Improves solder flow when removing and replacing SMD parts	\$18
Solder wick	Scrub and clean solder and component pads	\$10
Solder mask	Prevent shorts on traces running underneath capacitors, etc.	\$8
99% IPA	Cleaning up flux and other dirt or residue	\$15
Desoldering pump (manual type)	Remove through-hole components quickly	\$10

Specialty Tools & Supplies

The following list of tools can make troubleshooting and repair easier, but use your judgement to decide what's best for your circumstance. Estimated prices are in US dollars.

Tool	Purpose	Est. Price
Sand & rubber eraser	Clean corroded contacts	\$3
ATX extension cable	Allows for testing logic board outside of the enclosure	\$8
Paint brush (size 000)	Paint UV mask in very tight spaces	\$8
Contact cleaner	Clean pins and sockets	\$15
UV flash light	Cure UV mask quickly indoors	\$25
Oscilloscope	Check bus activity, clock signals and more	\$200
10L ultrasonic cleaner	Effectively clean electrolyte and other contaminates	\$150
ESR meter	Test axial capacitors to determine if they actually need replacement	\$60
Hot tweezers	Quickly remove SMD parts without damaging nearby components	\$250
Desoldering tool (motorized pump)	Remove through-hole components quickly	\$200

Replacing Electrolytic Capacitors

The original electrolytic capacitors on most SE/30 logic boards will have leaked by the time you're reading this guide.

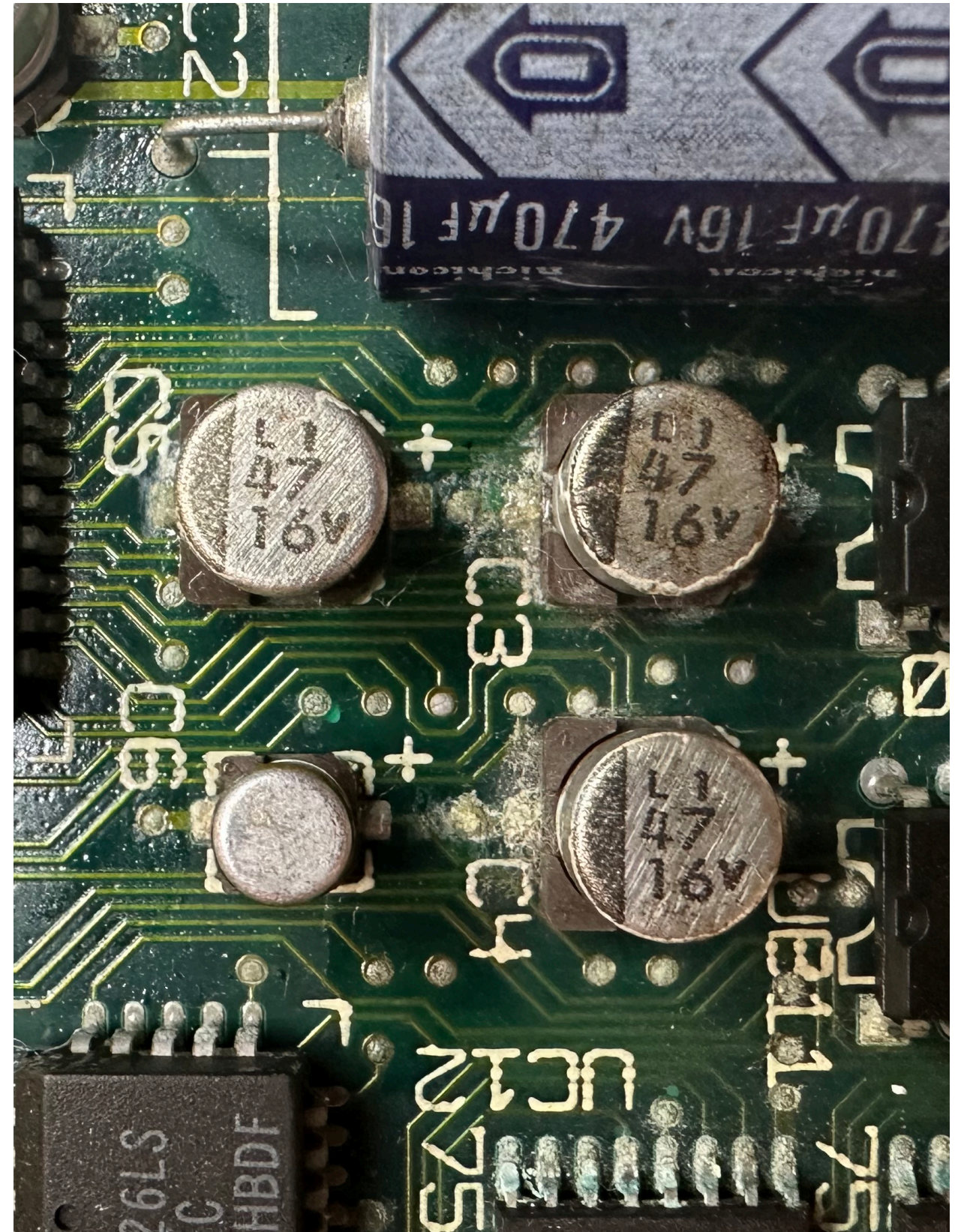
The damage can vary, but **it is essential to replace all the surface mount electrolytic capacitors and clean the board thoroughly** before spending time on other troubleshooting.

Further troubleshooting without first recapping the logic board can easily point you in the wrong direction.

The larger axial capacitors may still be within specification. They can be tested in-circuit with an ESR meter.

It is strongly recommended and most efficient to replace the capacitors and then clean the board before testing. But if you do not have the skills, tools or parts to replace these capacitors and want to make progress, skip to **Step 2**.

⚠ Note the corrosion on the leads of the electrolytic capacitors and nearby components. It may be necessary to remove nearby components to clean their pads and the area thoroughly.



03 Troubleshooting & Repair — Step 1

Recommended Tools

Soldering Station

Consider using a soldering station of decent quality (e.g. Hakko FX-888 \$100-150 USD). A very cheap iron will lead to poor results and a frustrating repair. Find a station with adjustable temperature that supports a decent variety of tips. A narrow (~1.6mm) chisel tip and bent conical tip can help get into tight spaces without burning nearby nylon parts. More expensive stations (e.g. Hakko FX-951 ~\$260 USD) feature conveniences like quick-swapping tips and better temperature stability. If price is no object, consider Metcal, Pace or JBC stations (\$500-1,500). High end stations are arguably overkill for hobby use, but have excellent tip options, temperature stability and build quality.



Hot Air Station

A more affordable tool for removing SMD capacitors is a basic hot air rework station (e.g. any brand's 858 model \$40-60 USD). Hot air stations work well for removing SMD parts, but require a bit more setup to avoid melting nearby nylon parts. They also add more stress to the board and other nearby components compared to hot tweezers. A higher end station (e.g. Quick 861D ~\$300 USD) will produce higher and more stable temperatures and move more air. The highest end stations (e.g. Metcal HCT-1000 ~\$2,500 USD) have even better thermal performance and include features like vacuum pumps for lifting ICs, external thermistors for better feedback and communications ports to coordinate temperature with external preheaters.



Hot Tweezers

Quality hot tweezers can be the best tool for the quickest and easiest removal of SMD components. But poor quality tweezers can be the exact opposite. If you already own a high quality soldering station that has support for hot tweezers and do a lot of SMD repair, considering giving them a try. Alternatively, two soldering irons can be used to effectively act as tweezers, but is not a very ergonomic option, especially if you perform a lot of SMD repairs.



03 Troubleshooting & Repair — Step 1

Recommended Tools (cont.)

Microscopes and Magnification

Seeing components and traces clearly is essential when trying to identify problem areas and perform repairs.

While an optical microscope is ideal, some relatively inexpensive magnifying headbands (with a light) or digital microscopes can provide a good budget option.

Please keep in mind, budget digital microscopes may have a fixed or restricted viewing area due to the placement of their stand or camera. This may make it difficult or impossible to view areas in the middle of a logic board. Carefully any product dimensions, capabilities, and user reviews before purchasing.

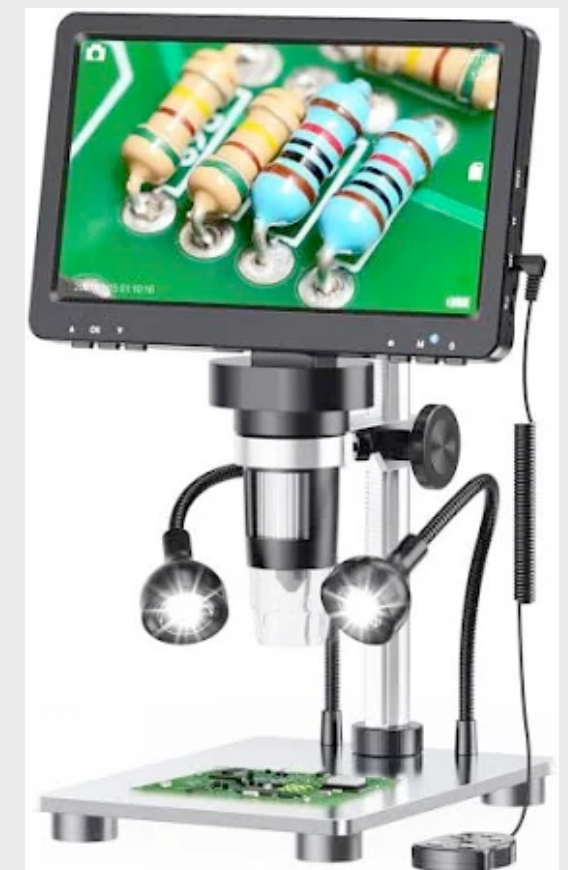
Don't forget that ample, flexible lighting is always helpful.

Typical prices:

Optical microscope: \$500-700 USD

Budget digital microscope: \$100 USD

Head-mounted magnifier: ~\$30 USD



Capacitor Information

The SE/30 main logic board has four types of electrolytic capacitors. It's a good idea to replace all of them, but it is less likely for the axial through-hole capacitors to fail. So those two may be considered optional to replace if they test okay with an ESR meter. Below is a table of the original capacitor specifications and recommended replacements for each. Note, there are varying opinions on what the best replacements are. This guide recommends specifications that have worked well across dozens of SE/30 boards with hundreds of hours of use.

It is okay to use parts with a higher voltage tolerance (e.g. 25V instead of 16V), but do not use parts with lower voltage tolerances or higher/lower capacitance.

Axial capacitors tend to be more expensive and less available than their radial counterparts. Radial capacitors can be used, but you will need to install them on their side to provide clearance when reinstalling the board back into the chassis.

Original Specification

Qty	Capacitance	Voltage	Type	Dia.	Height	Length
1	1uF	50V	Electrolytic Can	4mm	5.5mm	N/A
10	47uF	16V	Electrolytic Can	6.3mm	5.5mm	N/A
1	220uF	16V	Electrolytic Axial	8mm	N/A	16mm
1	470uF	16V	Electrolytic Axial	10mm	N/A	20mm

Recommended Replacements

Qty	Capacitance	Voltage	Type	Size Code	Dia.	Height	Length
1	1uF	50V	Tantalum or aluminum polymer	B	N/A	N/A	3.5mm
10	47uF	≥ 16V	Tantalum or aluminum polymer	C	N/A	N/A	6mm
1	220uF	≥ 16V	Electrolytic Axial	N/A	≤ 8mm	N/A	≤ 16mm
1	470uF	≥ 16V	Electrolytic Axial	N/A	≤ 10mm	N/A	≤ 20mm

03 Troubleshooting & Repair — Step 1

Capacitor Locations & Replacement

Refer to the YouTube videos linked below. These videos provide guidance for how to remove SMD capacitors with hot air and replace them with new tantalum capacitors. They also show examples of people repairing on SE/30 logic boards.

Important: Use solder mask to paint and cure exposed traces that run underneath or near removed capacitors to reduce the risk of creating unintended shorts.

Related YouTube videos:

- [Recapping Macintosh SE/30 logic board](#)
- [Re-recapping a simasimac SE/30](#)
- [Repairing damaged or lifted pads on a circuit board](#)
- [Repairing broken traces on a circuit board](#)
- [Recapping a new-old-stock SE/30 logic board](#)
- [Recapping and testing a Mac SE/30 motherboard](#)
- [Beginners Guide to Soldering Electronics](#)

⚠ New to soldering?

Please don't make a vintage computer your first soldering project! Start with a small DIY electronics soldering kit to test your skills and get plenty of practice. Vintage boards can be unforgiving and challenging to fix.

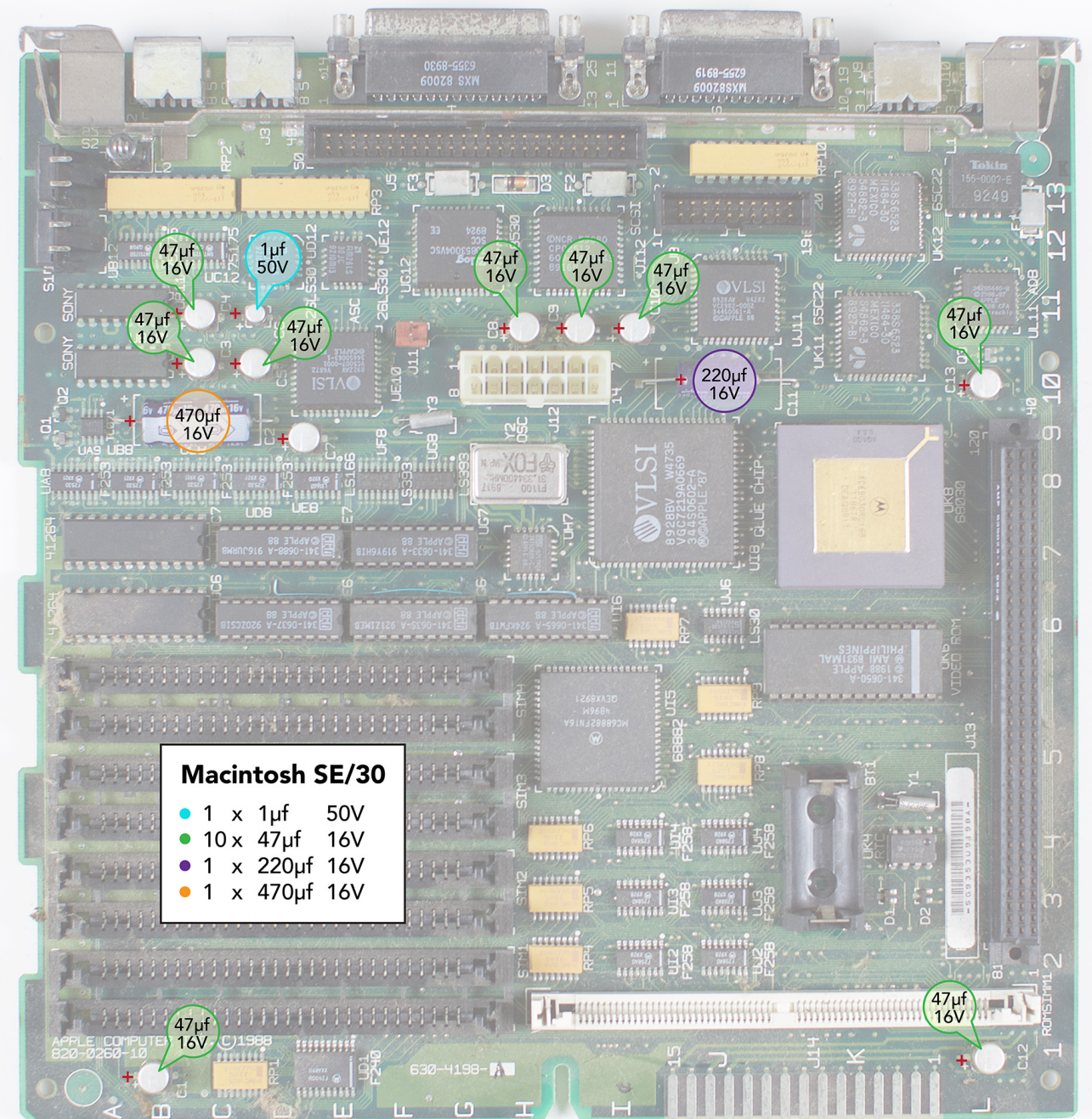


Photo of a visual recapping guide for the SE/30 logic board from www.recapamac.au.com. Courtesy of Bruce Rayne.

Cleaning the Logic Board

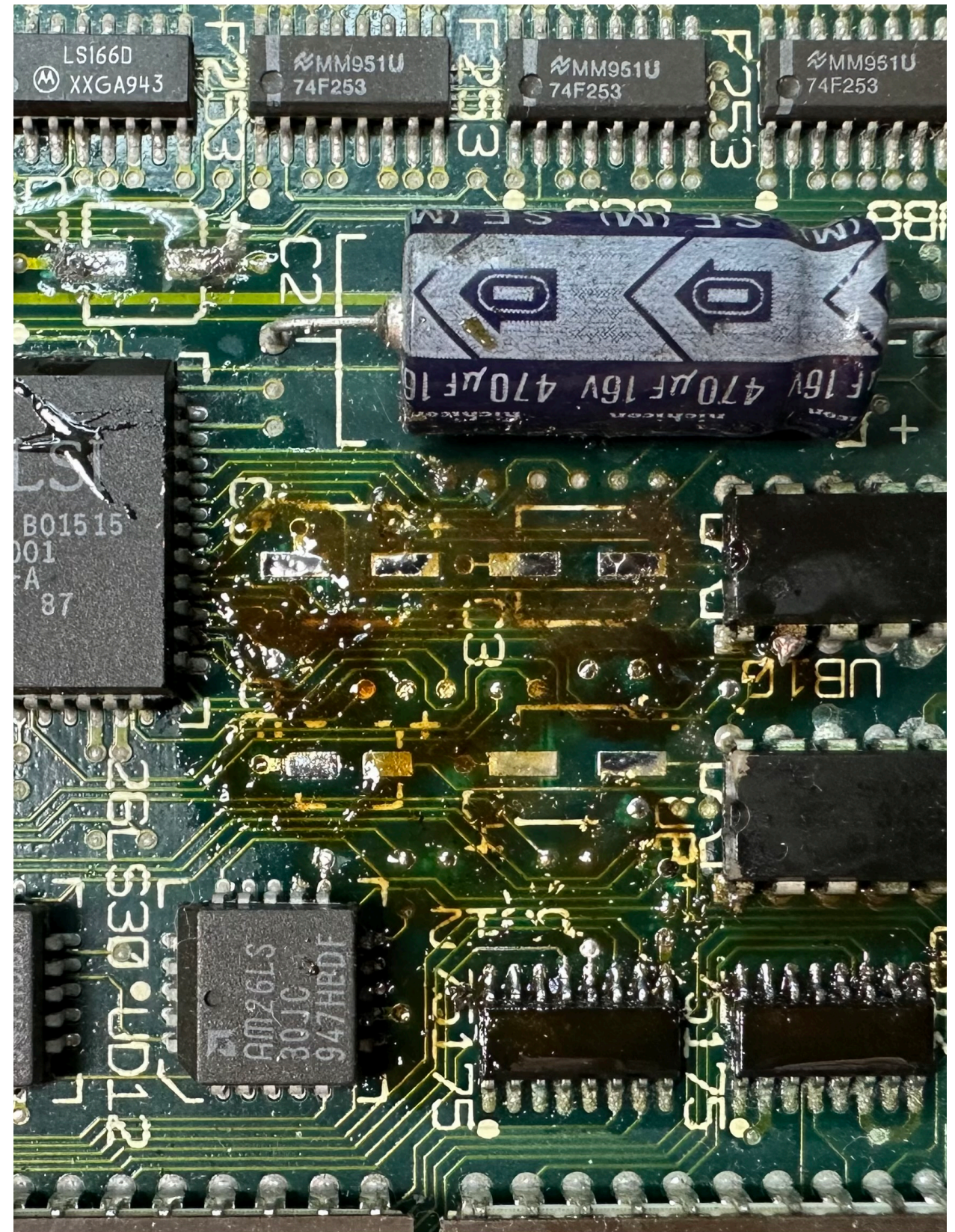
After the capacitors have been replaced, the board will be quite dirty with corrosion, flux, dust and grime.

There is a good chance that the board will not work in this state. Testing it before cleaning also adds risk of shorts due to remaining electrolytic goo and solder balls that may have accumulated during repair.

Ideally, the board should be washed in an ultrasonic cleaner with detergent formulated for electronics. Alternatively, the board can be manually cleaned with 99% IPA and a toothbrush, but even very thorough cleaning with this method may not be enough to be effective.

In that case, in **Step 6**, you may find components not working, such as the UE8 video mux. Sometimes removing and cleaning underneath the affected parts will resolve the problem or expose further issues.

Ultrasonic cleaning can save a lot of time and effort spent tracking down those problems.



An example of gunk, leftover flux and other residue that is often leftover from removing a surface-mount component.

03 Troubleshooting & Repair — Step 2

Recommended Tools

Ultrasonic Cleaner

A 10 liter ultrasonic cleaner (\$120-170 USD) is just large enough to clean the SE/30 main logic board and many other vintage computer circuit boards. The Crest Ultrasonics 1200PH045 fits much larger boards and uses higher quality components, but is substantially more expensive (~\$1,200 USD).



Cleaning Detergent

When possible, use a detergent engineered for circuit boards. It will have the right PH and surfactants to be most effective and not cause harm to the board. Options include Branson EC (~\$35 USD per liter) and Elmasonic 800 (~\$78 USD per liter).



Hair Dryer

A hair dryer helps get the majority of water off the board and blown out of its connectors quickly after cleaning. It reduces drying time and likelihood of corrosion. Use a dryer with a strong motor and narrow nozzle. The Conair Blue Bird (\$64 USD) is a good option.



Ultrasonic Cleaning Procedure

The following assumes you are already familiar with the setup and functionality of your ultrasonic cleaner. Always review the documentation and safety information for your ultrasonic cleaner. Never run your ultrasonic cleaner empty.

 **Warning:** Follow the proper safety precautions for any chemicals you are using. Wear protective gloves so your skin does not come into contact with any chemicals. Work in a well ventilated area. You will be dealing with very hot liquids!

1. Familiarize yourself with the manual and operating procedures of your specific ultrasonic cleaner.
2. Fill the machine with distilled or reverse osmosis (RO) filtered water and 5-7% of your cleaning solution of choice
3. Turn on the cleaner and set its temperature to 65° C (Tip: You may also use an external bath tub / kettle heater)
4. Clean around the replaced capacitors with cotton buds soaked in 99% isopropyl alcohol (IPA)
5. Take a photo of the board, focusing on any stickers or component labels that may be damaged or faded by soaking in liquid
6. Carefully remove the ROM SIMM and any installed RAM SIMMs
7. If your SE/30 has a socketed CPU, you may wish to remove it. The silkscreen can be easily removed during cleaning!
8. Once the solution is up to temperature, slowly place the board top-side down in the unit and clean for 5-10 minutes.
9. Afterwards, using protective gloves, flip the board over and around and clean again for 5-10 minutes.
10. When finished, using protective gloves, remove the board from the ultrasonic cleaner.
11. Use a hair dryer to blow the solution out of ports and other crevices until there are no obvious signs of remaining liquid.
12. Set the board somewhere to dry overnight.

  **Caution:** Sometimes small amounts of liquid can remain after drying. Especially under chips or low profile components, or in crevices such as the PDS slot. Always inspect the board thoroughly after drying to ensure no liquid remains before powering on your SE/30.

Manual Cleaning Procedure

If you do not have an ultrasonic cleaner you can often get good results with a careful manually cleaning of the board. However, this procedure may not remove all dirt and debris from under chips, small components, or tight spaces.

 **Warning:** Follow the proper safety precautions when working with any chemicals or tools.

1. Place the board in an ESD safe container or on top of paper towels above your ESD mat.
2. In sections, pour some 99% IPA on the board and scrub with a toothbrush towards the edge of the board.
3. *Scrub gently!* You can weaken connections or break components off the board if you are not careful.
4. Focus especially around the electrolytic capacitors, scrubbing between the legs of SMD IC legs. Scrub in the same direction as the legs to avoid damage. Take extra care around components with weak or damaged legs.
5. Repeat several times until the board looks clean.
6. Set the board somewhere to dry overnight.

  **Caution:** Sometimes small amounts of liquid can remain after drying. Especially under chips or low profile components, or in crevices such as the PDS slot. Always inspect the board thoroughly after drying to ensure no liquid remains before powering on your SE/30.

Clean Socketed Components

It is recommended that you remove, inspect, and clean the following socketed components. Intermittent connections or faulty sockets can cause “simasima” symptoms. If you are unfamiliar with how to remove a component please with extreme caution.

⚠ Warning: Be very careful when removing components. You can easily permanently damage socketed components and replacements are difficult to source. If you don't have experience removing a specific component, take a step back and proceed with caution. Review online videos or tutorials for assistance.

Perform the following steps for each component in this order:

1. ROM SIMM (J14)
2. RAM modules
3. Video ROM (UK8)
4. PALs (UC7, UE7, UG6, UE6, UI6)

Removal and Cleaning Instructions

1. Gently remove the component.
 - For SIMMs, use a nylon tool or fingernail to gently press on the plastic tabs while applying gentle pressure from the front side of the SIMM. Do this for each side until the SIMM is free of the tabs. Then gently lift it out of the socket.
 - For DIP ICs, use a small flat blade screwdriver to slightly lift one side out, then the other. Repeat until both sides are free, avoiding bending the pins.
2. Spray the socket and component's pins with contact cleaner. If the legs/pads of the component are not shiny, rub them lightly with the sanded side of an eraser until clean. Spray again and wipe clean with a cotton bud or pad.
3. Gently insert the component back into its socket. Take extra care to ensure the component is installed in the correct orientation. Installing the component incorrectly can damage the component or your system.

03 Troubleshooting & Repair — Step 3

Swap Test Socketed Components

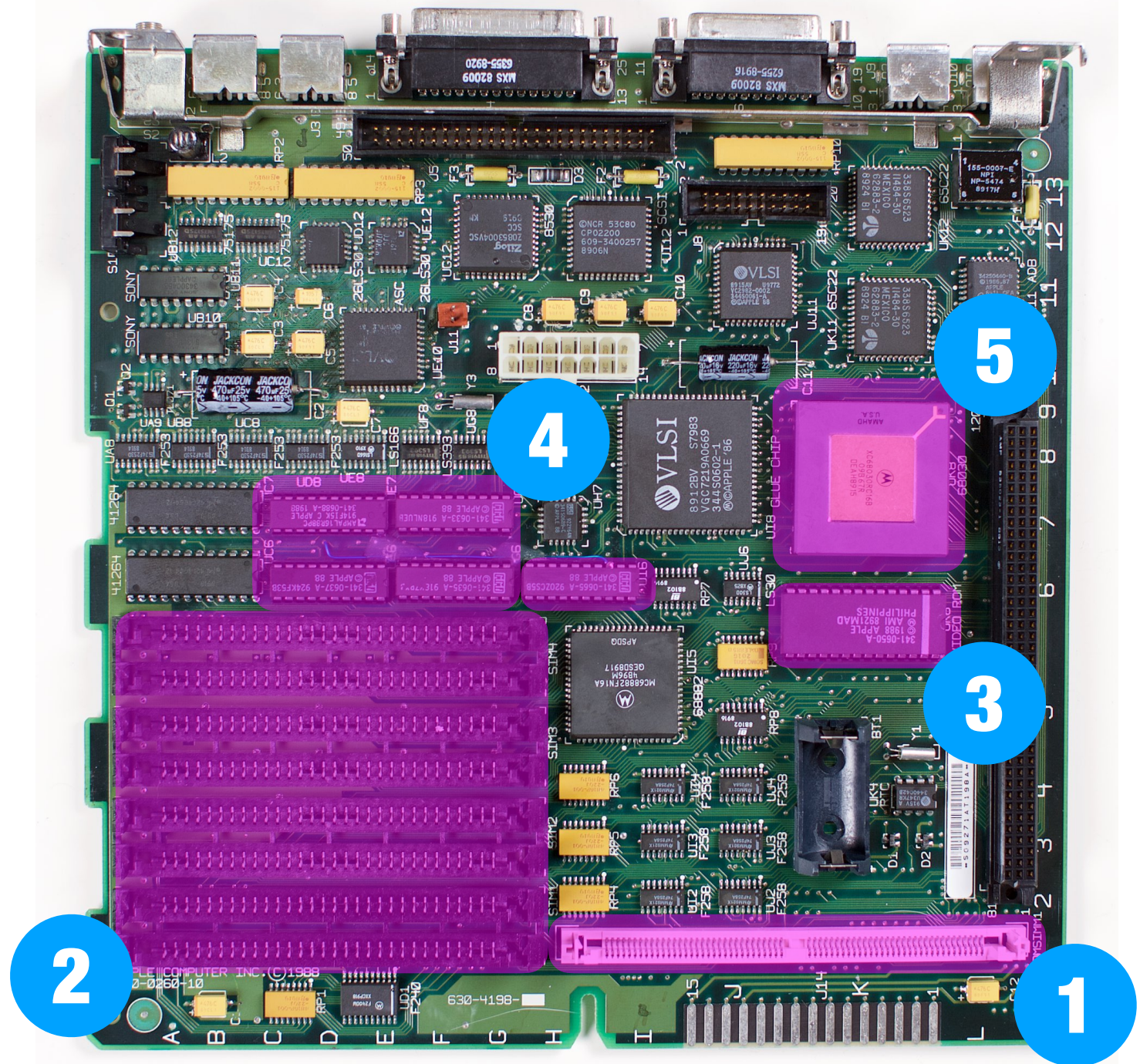
If you have a known-working SE/30 logic board, swap in the known-working socketed components one at a time in the following order.

1. ROM SIMM (J14)*
2. RAM modules
3. Video ROM (UK8)
4. PALs (UC7, UE7, UG6, UE6, UI6)
5. CPU (UK8 — only socketed on some systems)**

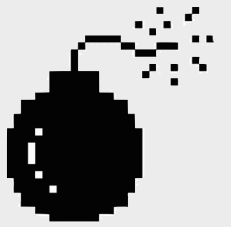
*Some ROM SIMM sockets use plastic clips to secure the inserted ROM SIMM. If these clips are damaged the ROM may not be making a good connection to the system. This can sometimes cause the “simasima” issue on its own. Use a rubber band or a 3D-printed clips to ensure the ROM is securely inserted and making a solid connection.

Some reproduction ROM SIMMs use thinner PCBs, these may have trouble making a good connection with the SIMM slot and can cause issues.

**The CPU is only socketed on earlier Mac SE/30 boards. If your CPU has a ceramic and gold top, it is likely socketed. If the CPU is black, it is likely not socketed.

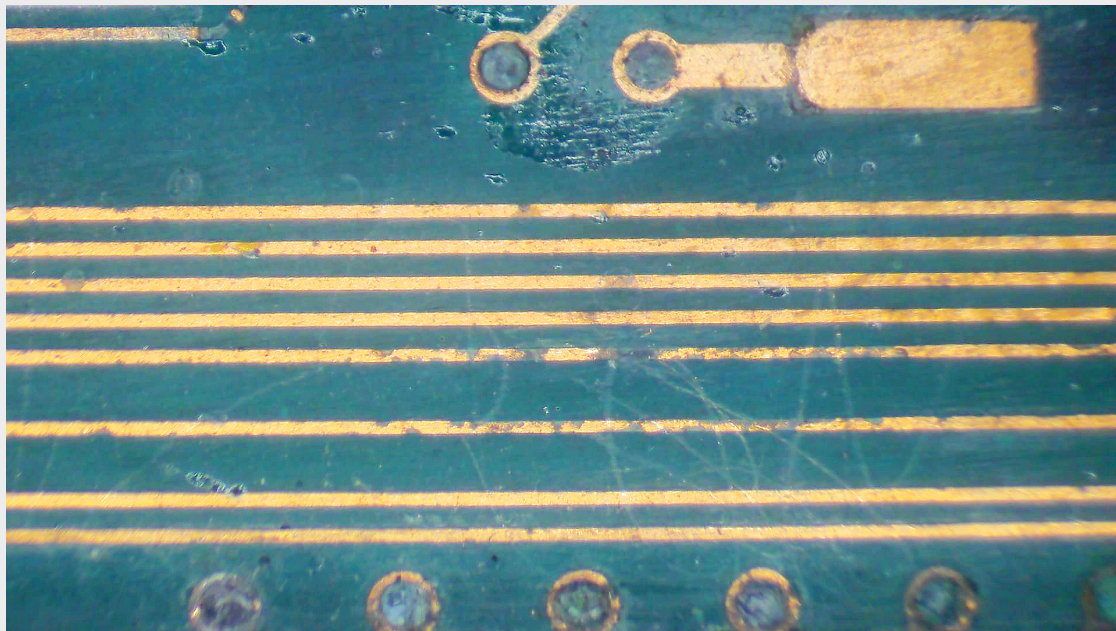


Check and Repair Data and Address Lines

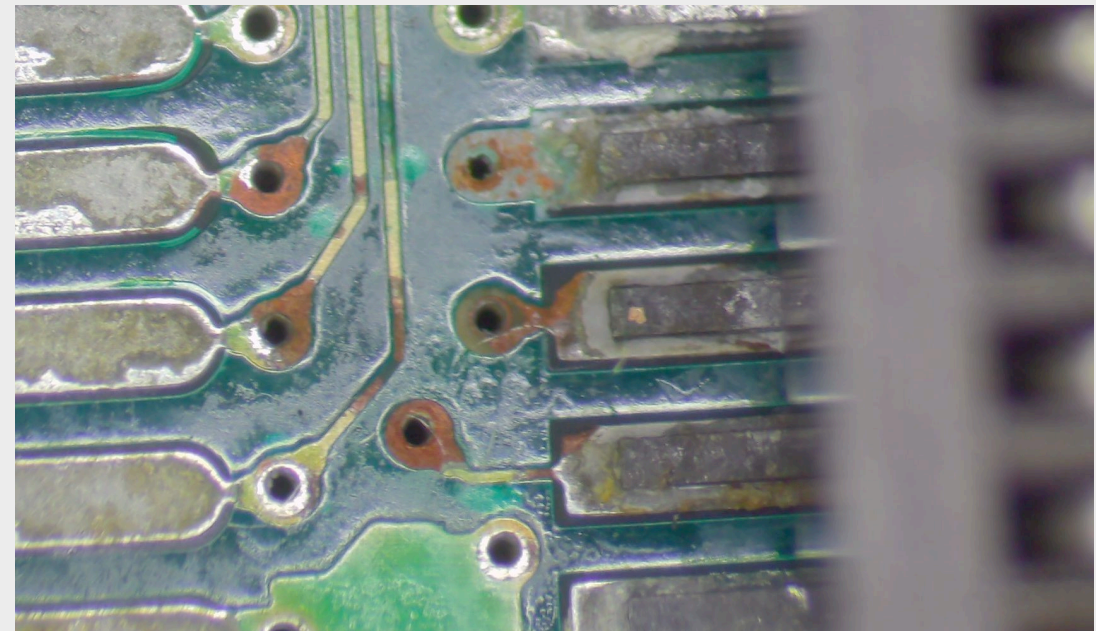


Perform the following steps for each component in this order:

1. ROM SIMM (J14)
2. RAM modules
3. Video ROM (UK8)
4. PALs (UC7, UE7, UG6, UE6, UI6)



An example of broken traces. These breaks are caused by corrosion and similar damage. Here the solder mask has been scraped away to reveal the copper or gold colored traces underneath. Notice the missing bits of metal in the traces. These dark spots represent damage that often creates a broken traces or intermittent connections.



An example of rotted vias. These vias (small pinholes that go through the PCB) contain thin traces in their walls that carry signals from one side of the board to the other. Leaking capacitors and corrosion can damage these vias, causing their traces to rot away and cause broken connections and further trace damage. These can be challenging to repair.

03 Troubleshooting & Repair — Step 4

Recommended Tools

Digital Multimeter

Any digital multimeter (~\$10-300 USD) that can measure voltage, resistance and continuity should work well. Using leads with fine points is helpful to measure some of the small and tightly spaced pins, saving time and frustration. The Kaiweets KM601 is a good entry-level budget model. (~\$45)



Enameled Wire

A variety of enameled copper wire from 28-40 AWG (~\$10 USD/spool) is used to neatly repair broken traces and does not require mechanical stripping.



Soldering Tools

See recommendations in **Step 1**.



Test Continuity

Testing the continuity of traces and components using your multimeter (set to continuity mode) can confirm what items are making a good connection and what aren't. Use the schematic linked below to search for missing or intermittent connections.

1. Download a copy of SE/30 [redrawn schematics](#) which include continuity cheat sheets.
2. If you are new to reading schematics [this video](#) can help you understand the basics.
3. Refer to pages 10 (Address Line Pin Matrix) and 11 (Data Line Pin Matrix) of the schematic.
4. Test continuity for each address and data line from ROM through UE10.*
5. Note any possible breaks and check them again once you get through everything.
 - Taking a break and trying again may reveal you were off by a pin or so on the first attempt.
 - Be mindful of your multimeter's sleep mode, it may switch off during your troubleshooting.
 - Ensure the area is clean for best results! Dirt, grime, and old crusty solder can often produce false positives.

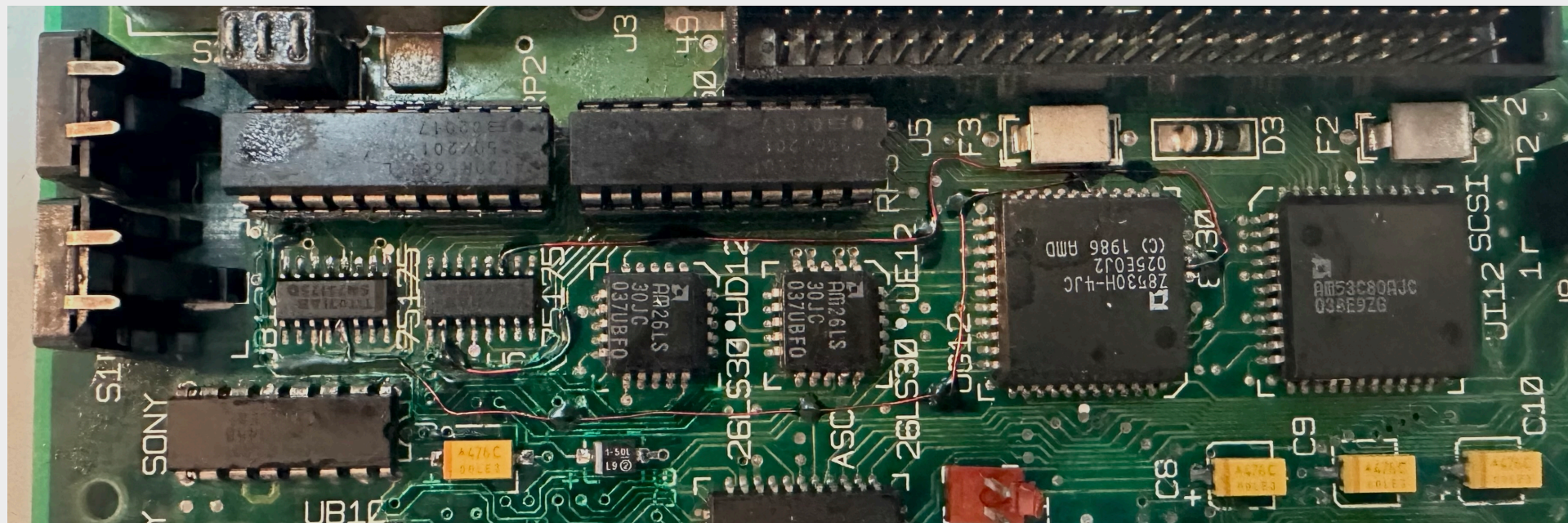
*Testing through the CPU, FPU and PDS slot is generally not necessary and quite cumbersome.



Repair Broken Traces

You can repair broken traces and missing connections with enameled wire. This [video tutorial](#) will show you the process of repairing traces. Magnification is strongly recommended, it can help ensure your connections are solid and tidy.

1. Tin one end of the enameled wire and the pin or via of the component it should attach to.
2. Apply flux to the pin or via of the component.
3. Solder the tinned end of the wire to the pin or via of the component.
4. Route the wire neatly on one side of the board. Avoid wrapping wire from one side to the other.
5. Clip the wire to size.
6. Tin the end of the wire and the pin or via it should attach to.
7. Apply flux to the pin or via it should attach to
8. Solder the tinned end of the wire to the pin or via of the component.
9. Tack down longer wires with blobs of solder mask to keep things tidy and prevent snagging.
10. Confirm the repaired trace with your multimeter set to continuity mode.





Test & Replace Components

Even after all the previous steps have been followed there still may be issues with broken traces missed, or some component that has failed. For instance, it is quite common for the UD8 video multiplexer or UE8 shift register to fail due to corrosion from nearby capacitors.

You will need a digital multimeter, oscilloscope and an ATX extension cable to effectively and efficiently test many of the components in this section.

The recommended test order is:

1. Clock signals
2. Reset circuit
3. CPU Address Walk
4. Video multiplexing circuit
5. RAM multiplexing circuit
6. Video ROM
7. CPU



An SE/30 logic board connected to its chassis via an ATX extension cable. This allows you to easily inspect components and test connections without needing to re-assemble the entire computer.

03 Troubleshooting & Repair — Step 6

Recommended Tools

Digital Multimeter

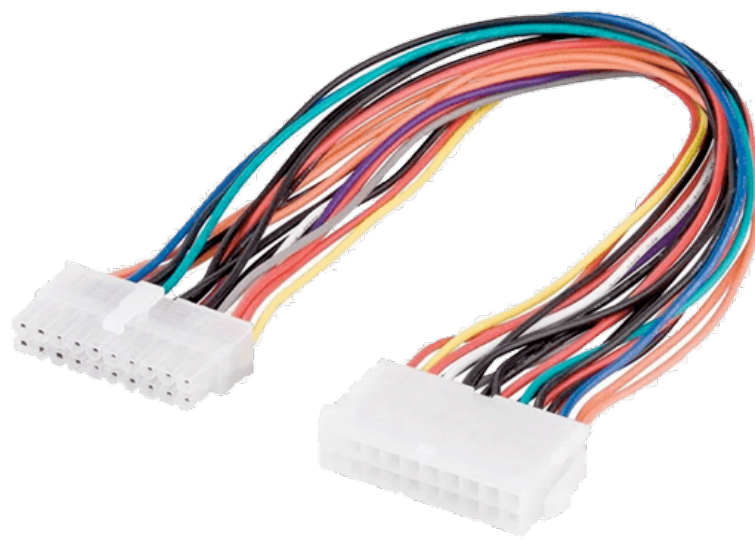
Any digital multimeter (~\$10-300 USD) that can measure voltage, resistance and continuity should work well. Using leads with fine points is helpful to measure some of the small and tightly spaced pins, saving time and frustration.



ATX Extension Cable

Allows for testing with the board outside of the enclosure. This is a must-have when testing board activity live. A standard 24-pin ATX extension cable will fit in J12 with an overhang and is pin compatible. It can be cut down to 14 positions if preferred.

Minimum suggested extension cable length is 12 inches. A longer cable, such as this 19.68 inch cable by Phanteks (model PH-CB24P), makes things easier to work on.



Modern Power & TTL Video Adapters (optional)

You can alternatively use modern hobbyist adapter boards designed specifically for the Mac SE or SE/30.

These boards use a standard ATX power supply to power your Mac SE system and bypass the analog board.

Some models also provide video output via TTL video signals that can be used with VGA or HDMI displays, bypassing the original Mac SE/30 CRT monitor.

One example board, the SE-COMBO MacPico Vid Edition by Ron McAdams, is available [here](#).



03 Troubleshooting & Repair — Step 6

Recommended Tools *(continued)*

Digital Storage Oscilloscope

An oscilloscope is used to check clock signals, bus activity and other IC signals.

Think of an oscilloscope as an advanced multimeter that can chart and display signals visually over a period of time.

Standalone oscilloscopes or USB-based models will work in this scenario. Ensure your model can measure all required frequency ranges and signals.

The ZOYI ZT-703S combination multimeter and oscilloscope offers a good balance of features and value. (~\$80, shown left)



Thermal Imaging Camera

A thermal imaging camera can help narrow down which components are running hot, which could implicate them as failure points.

Some models (like those made by FLIR) connect to your smart phone to operate. Standalone thermal camera units (like those made by Vevor) provide similar functionality without a smart phone.

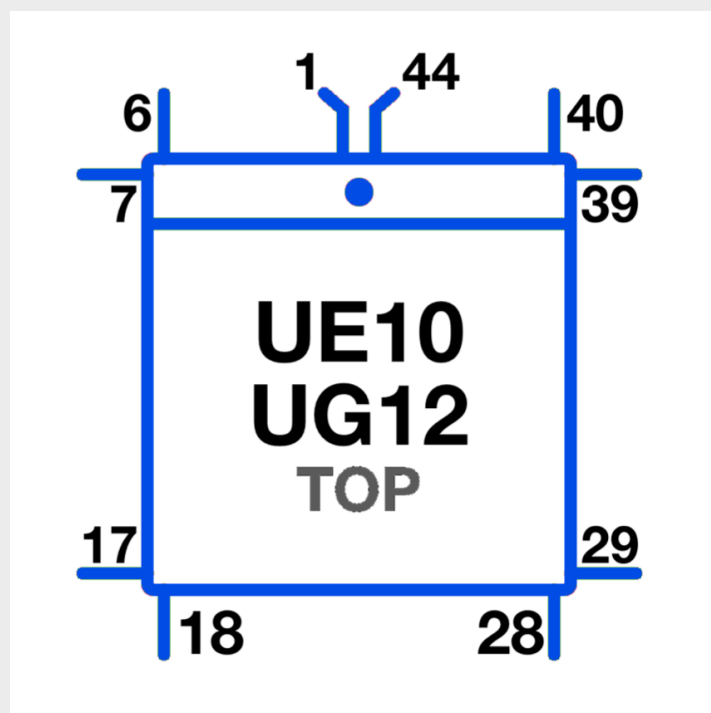




PLCC Pin Reference

There are a variety of package sizes which can make it difficult to quickly find the right pin to test.

Use the references in the redrawn schematic, specifically the last two pages of the PDF.



A diagram of a PLCC package found on the logic board. This 44-pin package is used for the UE10 and UG12 chips.

Pin 1 is located at the top; often marked with a dot or divot on the chip. Subsequent pins follow in a counterclockwise pattern.

Macintosh SE/30 MLB Address Line Pin Matrix

Address	ROM	UJ2 RAM Mux	UI2 RAM Mux	UI3 RAM Mux	UJ3 RAM Mux	UJ4 RAM Mux	UI4 RAM Mux	UI8 GLUE	UK12 VIA1	UK11 VIA2	UK6 Vid ROM	UA8 Video Mux	UB8 Video Mux	UC8 Video Mux	UD8 Video Mux	UJ11 SWIM	UG12 Serial	UE10 Sound	UK8 CPU	UI5 FPU	J13 PDS Slot
A(0)								77			10				4			41	A2		116
A(1)								74			9				12		39	42	C4	25	76
A(2)	4	3,6									8			4			37	43	D13	24	36
A(3)	5	2,5									7			12				44	D12	23	115
A(4)	6	10,13									6		4					1	C13	22	75
A(5)	7	11,14									5		12					2	C12		35
A(6)	8		3,6								4	4						3	D11		114
A(7)	9		2,5								3	12						4	B13		34
A(8)	31	10,13									25				3			7	B12		113
A(9)	32		11,14						42	42	24				13	37		8	C11		73
A(10)	33			3,6					41	41	21			3		40		9	A13		33
A(11)	34			2,5					40	40	23			13		41		10	C10		112
A(12)	35			10,13					39	39	2		3			42			B11		72
A(13)	36			11,14				46					13						A12		32
A(14)	37				3,6			45											B10		111
A(15)	38				2,5			44											A11		31
A(16)	39				10,13			41											B9		110
A(17)	40				11,14			28											A10		70
A(18)	41					3,6													C8		30
A(19)	42					2,5													A9		109
A(20)	43					10,13		61											B8		69
A(21)	44					11,14													A8		29
A(22)	45						3,6	58											B7		108
A(23)							2,5												A7		28
A(24)							10,13	56											A6		107
A(25)							11,14	40											B6		67
A(26)								55											A5		27
A(27)								39											B5		106
A(28)								37											A4		66
A(29)								36											B4		26
A(30)								34											A3		105
A(31)								31											B3		25

A page from the redrawn SE/30 schematic detailing the address line pin matrix. Available via [GitHub](#).

03 Troubleshooting & Repair — Step 6

Danger Zones

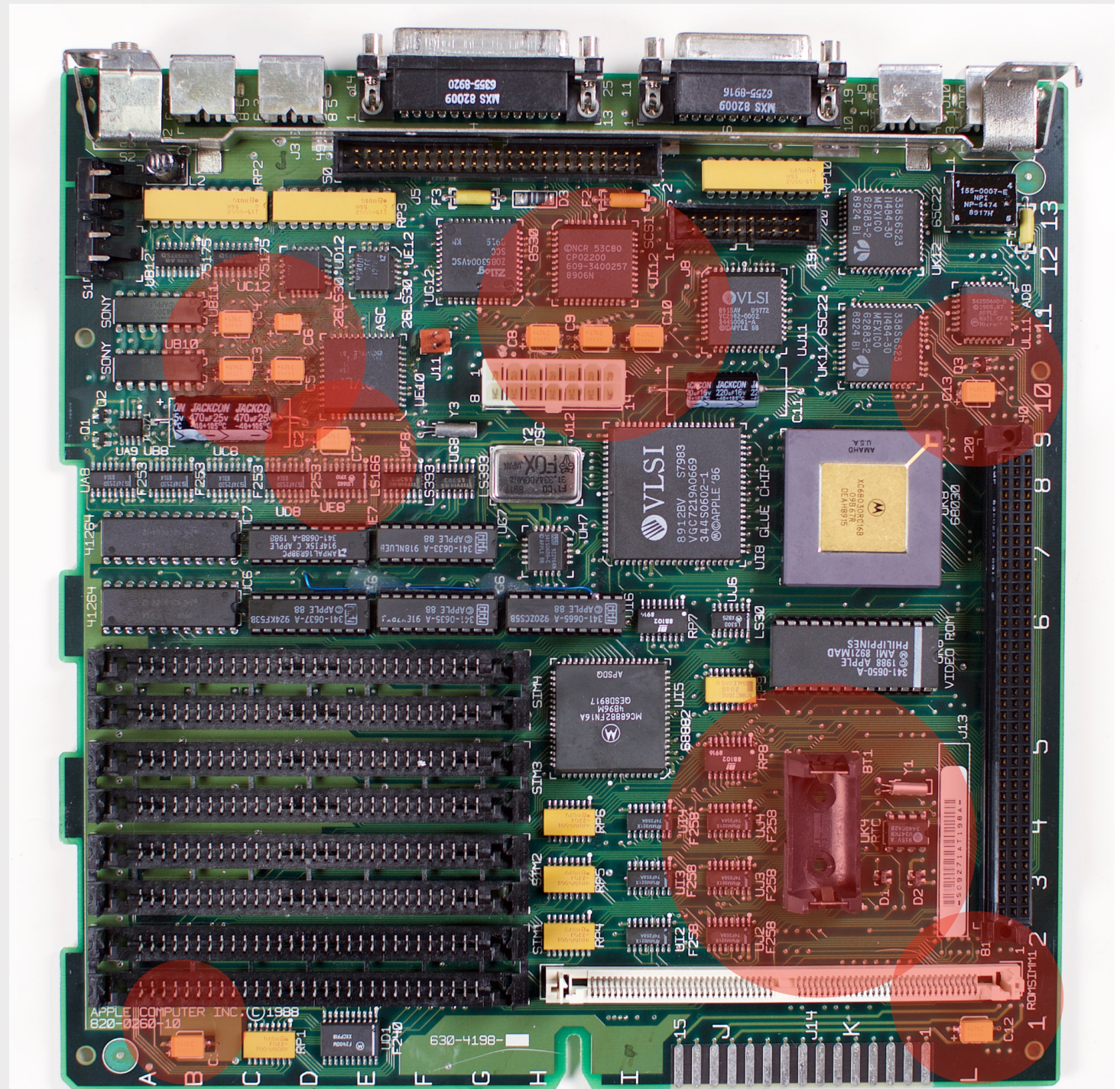
The following pages break down the troubleshooting flow mostly by component in an effort to be *thorough*. Often though, the most *efficient* way to find and resolve the problem is to look in the most obvious areas first. Those areas are near the SMD electrolytic capacitors and PRAM battery.

As can be seen in the photo, there is a greater chance that UE8 is short or faulty due to its proximity to C7 compared to something more isolated like UI6.

If you don't have an oscilloscope (or time) to test all components thoroughly, first try removing and cleaning underneath them. If the issue persists, swap with a known good component.

The most common components to fail are:

- UA8, UB8, UC8 & UD8 Video Multiplexers
- UE8 Shift Register
- UF8 & UG8 Binary Counters
- UI2, UI3, UI4, UJ2, UJ3, UJ4 RAM Multiplexers



03 Troubleshooting & Repair — Step 7

Clock Signals

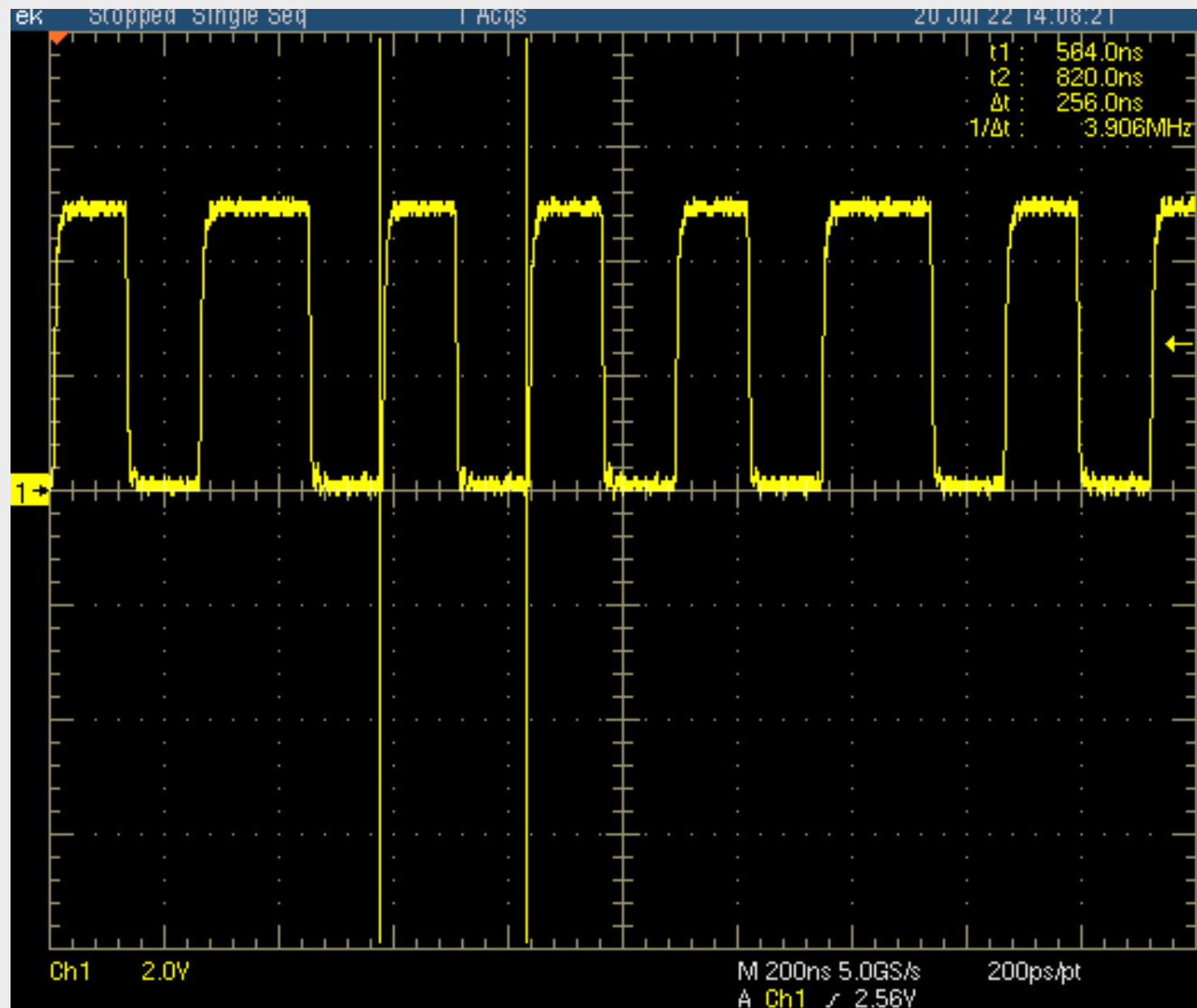
The circuit relies on a variety of clock signals. It is a good practice to verify they're functional before further checking the components they are driving. Use your multimeter's frequency mode to measure clock signals.

Component	C3M (~3.9 MHz)	C16M (15.6672 MHz)	C32M 31.3344 MHz)	C16G (~15.72 MHz)	E Clock (~786.2 kHz)
UK8 (CPU)		E1			
UI5 (FPU)		11			
UG7 (PAL)		1			
UG6 (PAL)		1			
UE7 (PAL)		1			
UE6 (PAL)		2			
UE8 (Shift Reg.)		7			
UJ11 (SWIM)		26			
UE10 (DSC)		14			
UI8 (GLUE)	21		17	18	72
UL11 (ADB)	26				
UG12 (Serial)	23, 32				
UH7 (PAL)			12		
UI6 (PAL)				2	
UK11 (VIA2)					27
UK12 (VIA1)					27

03 Troubleshooting & Repair — Step 7

Clock Signal Scope Shots: C3M

The C3M should look like the following. C3M should read ~3.9MHz. Note this clock signal jitters a bit.

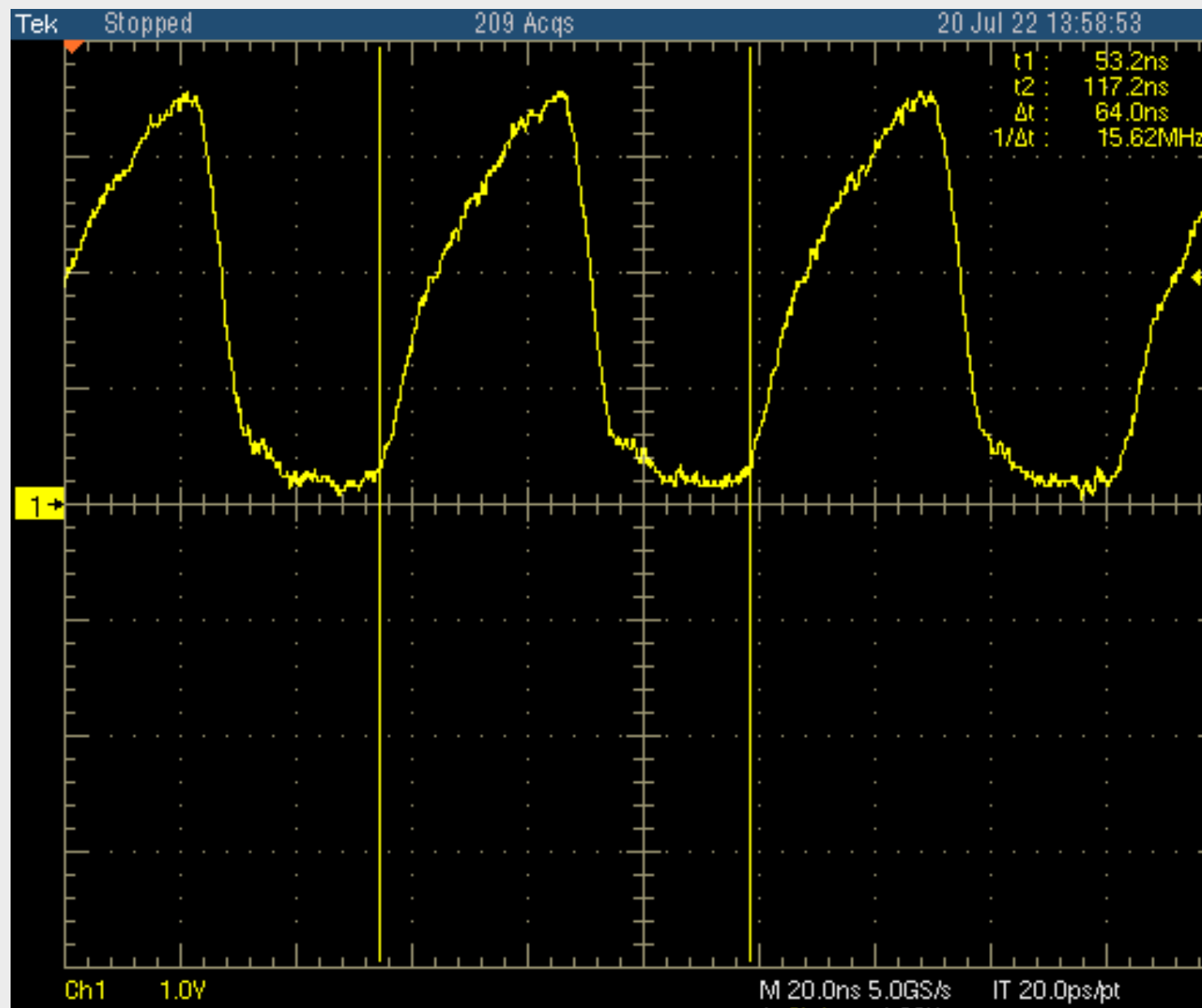


C3M ~3.9MHz. Note this clock signal jitters a bit.

03 Troubleshooting & Repair — Step 7

Clock Signal Scope Shots: C16M

The C16M should look like the following. C16M should read ~15.6672MHz.

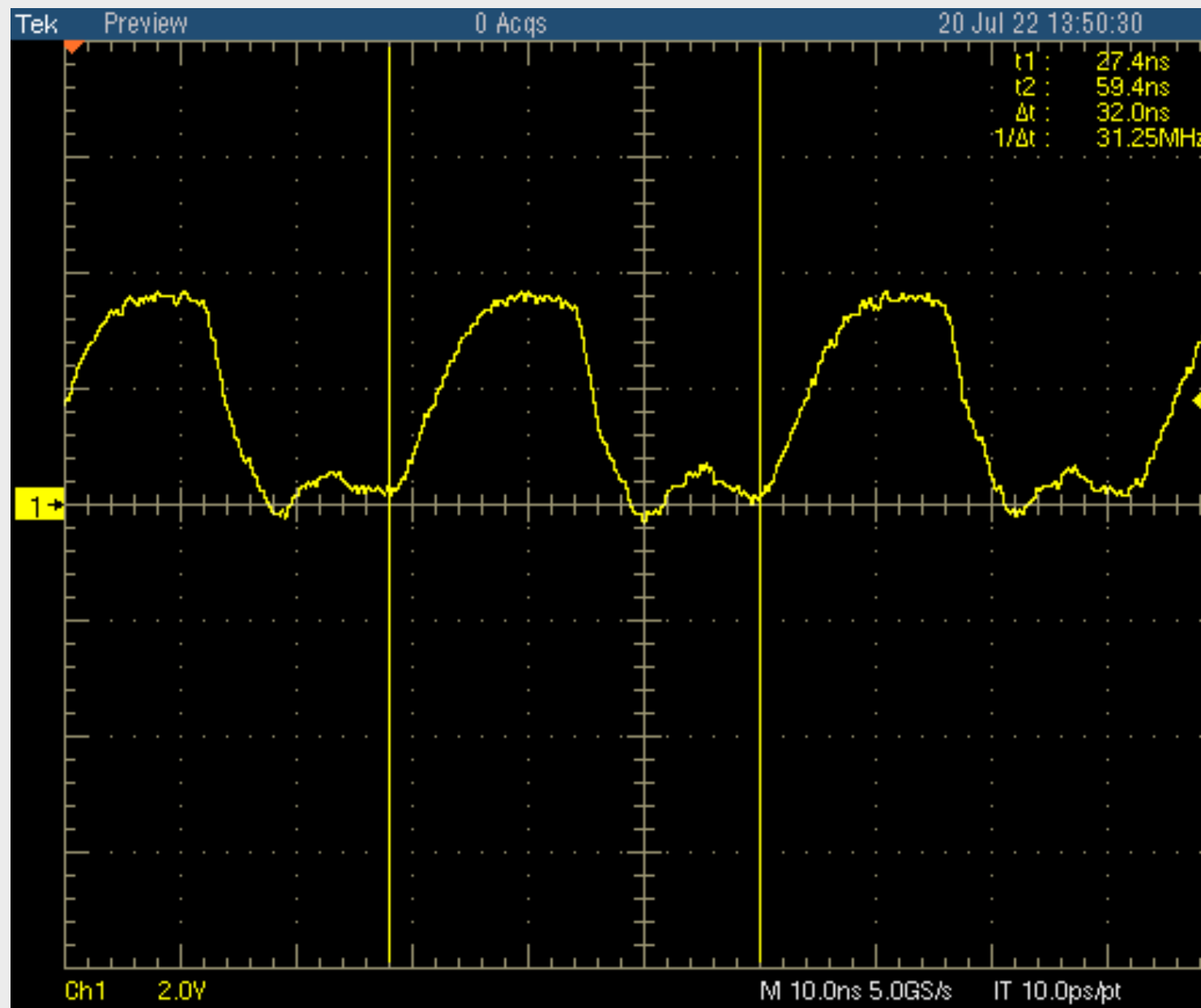


C16M ~15.6672MHz

03 Troubleshooting & Repair — Step 7

Clock Signal Scope Shots: C32M

The C32M should look like the following. C32M should read ~31.3344 MHz.

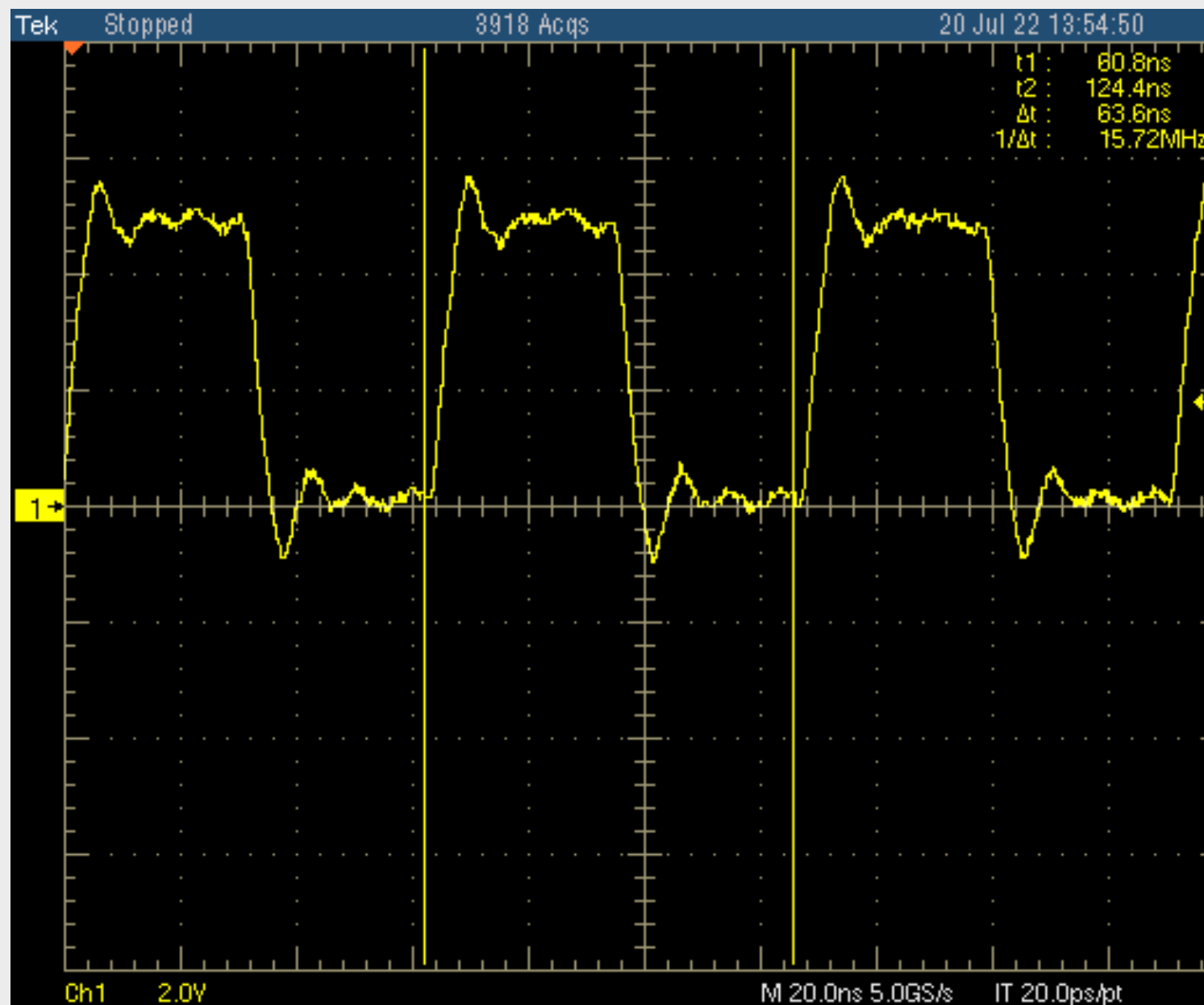


C32M ~31.3344 MHz

03 Troubleshooting & Repair — Step 7

Clock Signal Scope Shots: C16G

The C16G should look like the following. C16G should read ~15.72 MHz.

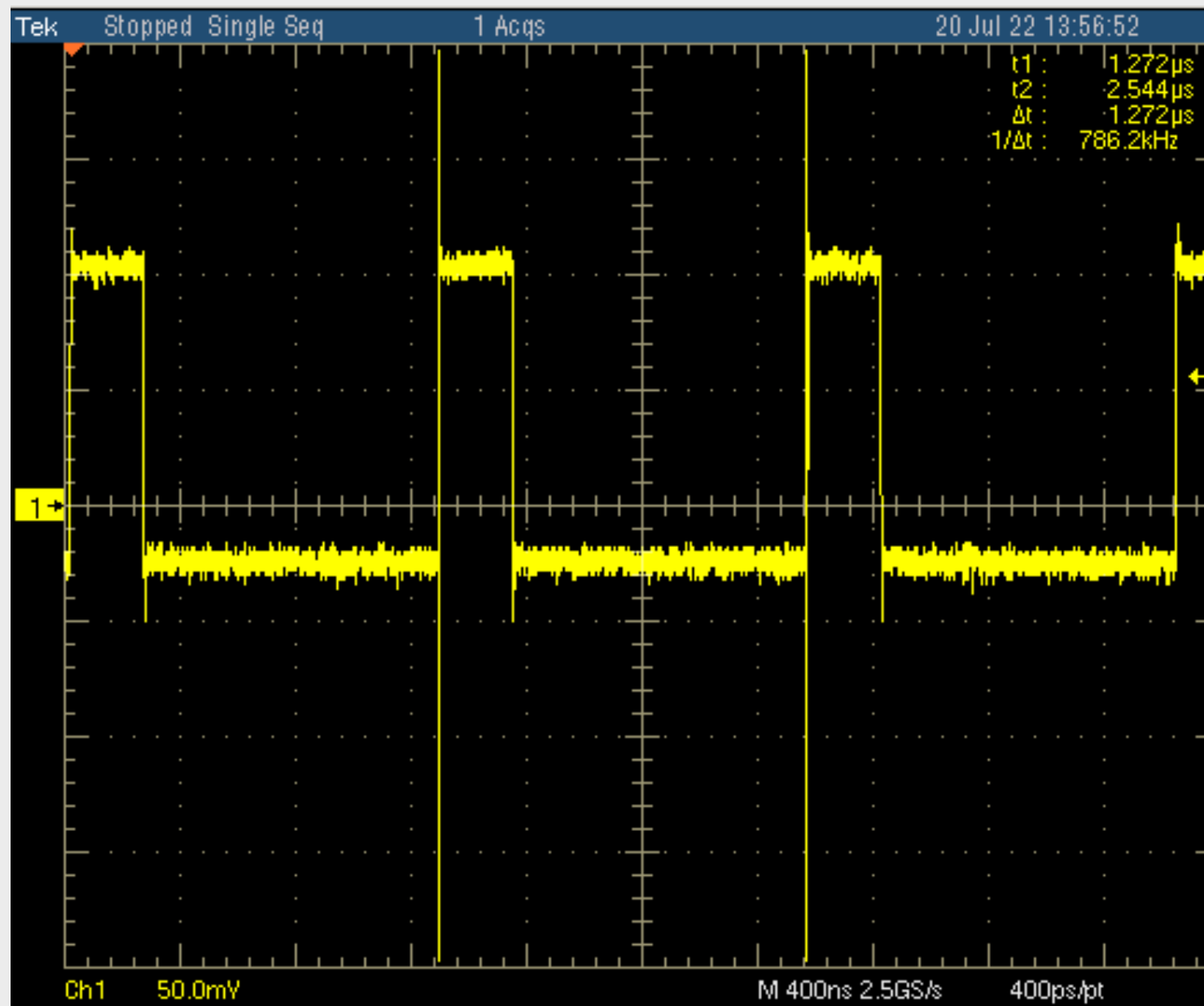


C16G ~15.72 MHz

03 Troubleshooting & Repair — Step 7

Clock Signal Scope Shots: E Clock

The E Clock should look like the following. E Clock should read ~786 kHz.



E Clock ~786 kHz

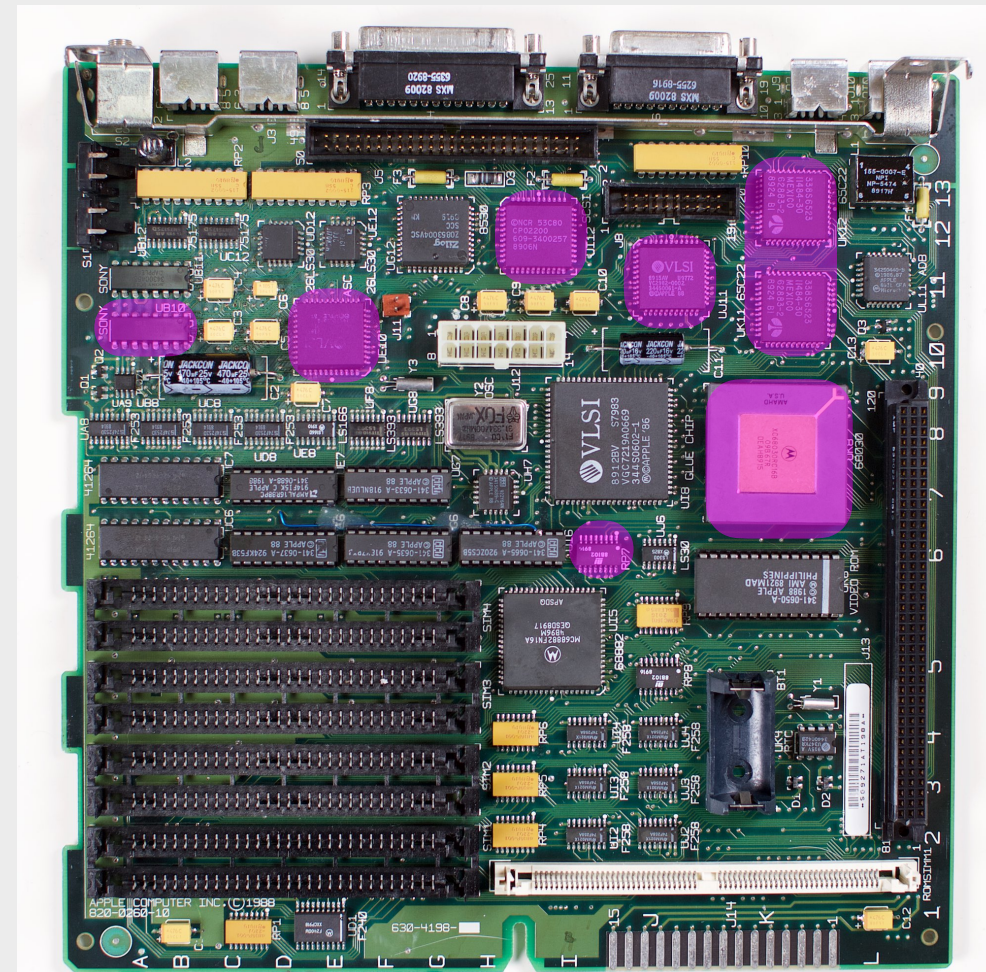
03 Troubleshooting & Repair — Step 7

Reset Circuit

A stuck or open reset circuit can prevent boot up. Check for continuity at all of the points below and test the reset switch itself to verify functionality. The reset line should normally be +5V and go to ground on reset.

Reset Circuit Pins To Test

Component	Pin
UK8 (CPU)	F12
UK12 (VIA1)	37
UK11 (VIA2)	37
UI12 (SCSI)	7
UJ11 (SWIM)	25
UE10 (DSC)	40
UB11 (Sony Sound)	5,6
RP7	2
S1 (Reset Switch)	Either



03 Troubleshooting & Repair — Step 7

ROM

With the ROM removed, the CPU will walk the bus from A(2) through A(31). On a working board, A(2) at ROM pin 4 will display a ~2.6 MHz square wave. Each address following should be half the frequency of the bit that precedes it. A(3) is ~1.3 MHz, A(4) is ~655 kHz and so on.

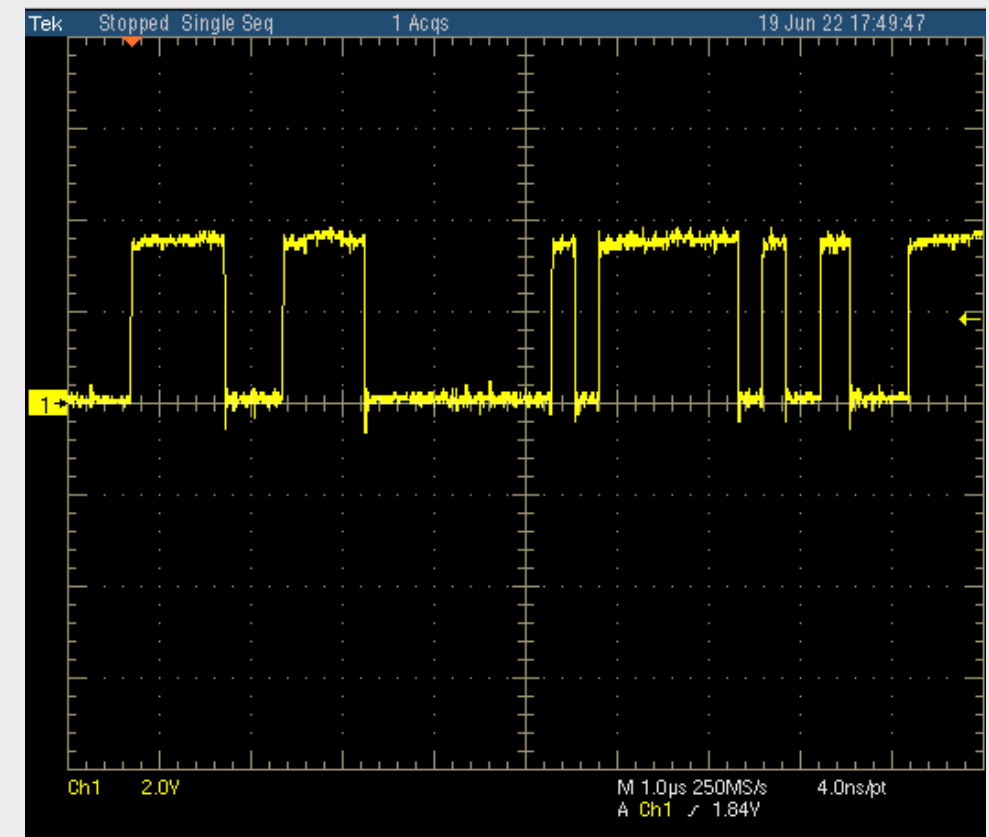
Abnormalities in frequency, missing frequency, or contention between two states is indicative of an issue on that address line.

If you see anything other than a clean square wave:

1. Test for continuity along the entire address line.
2. Test for shorts to ground and +5V. Clean the board and mask as needed.
3. Test or replace components along that line until a clean square wave is observed. Video and RAM muxes are common failure points.
4. Once A(2) through A(22) display clean square waves, install the ROM and verify those address lines now display proper TTL signals that are not under contention or loaded down.

Missing frequency is most likely due to a broken trace at one or more places on the address line.

Possible causes of contention are shorted video or RAM muxes due to solder blobs, capacitor electrolyte or internally failed components. A CPU failure is atypical, but also a possibility.

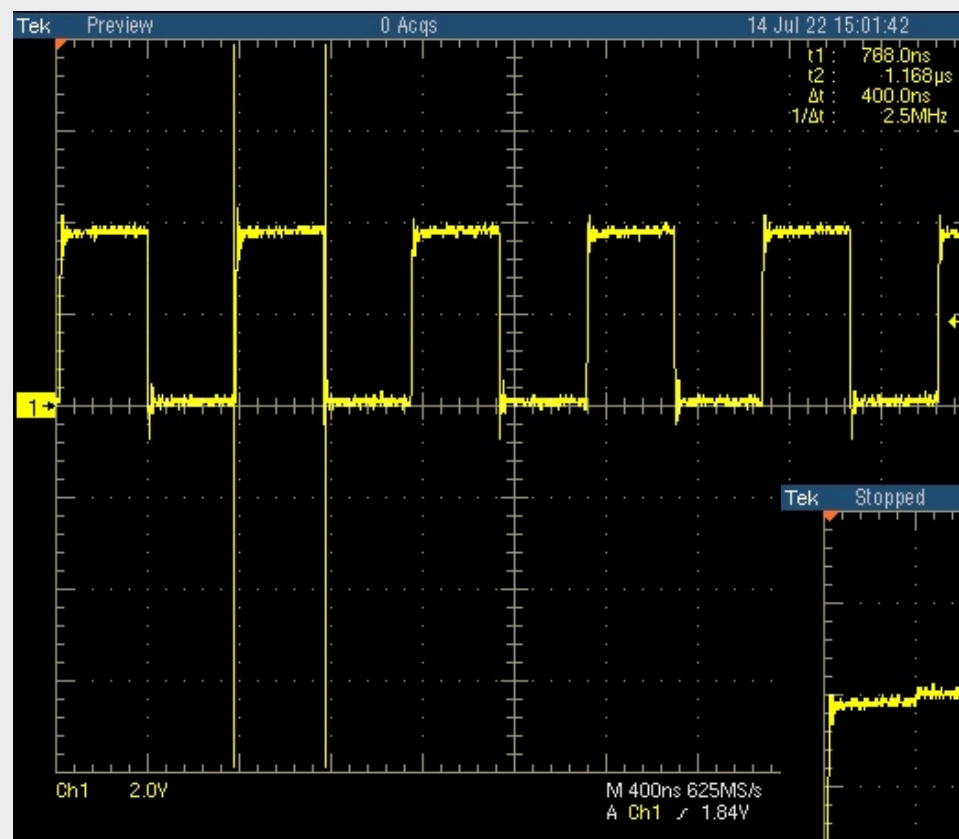


Example of normal TTL function at Address Line 4.

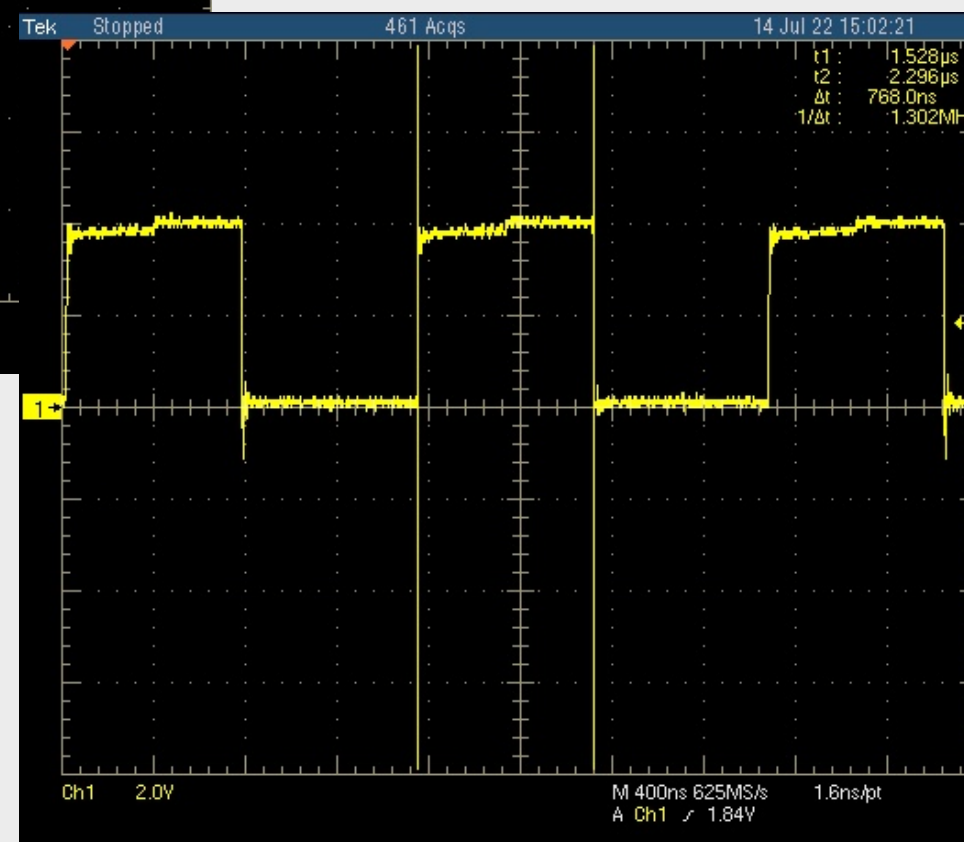
03 Troubleshooting & Repair — Step 7

ROM Address Walk Reference Table

Address	Pin	Frequency (Target)
A(0)	N/A	N/A
A(1)	N/A	N/A
A(2)	ROM 4	2.62 MHz
A(3)	ROM 5	1.31 MHz
A(4)	ROM 6	655.36 kHz
A(5)	ROM 7	327.68 kHz
A(6)	ROM 8	163.84 kHz
A(7)	ROM 9	81.92 kHz
A(8)	ROM 31	40.96 kHz
A(9)	ROM 32	20.48 kHz
A(10)	ROM 33	10.24 kHz
A(11)	ROM 34	5.12 kHz
A(12)	ROM 35	2.56 kHz
A(13)	ROM 36	1.28 kHz
A(14)	ROM 37	640.00 Hz
A(15)	ROM 38	320.00 Hz
A(16)	ROM 39	160.00 Hz
A(17)	ROM 40	80.00 Hz
A(18)	ROM 41	40.00 Hz
A(19)	ROM 42	20.00 Hz
A(20)	ROM 43	10.00 Hz
A(21)	ROM 44	5.00 Hz
A(22)	ROM 45	2.50 Hz
A(23)	UI4 2	1.25 Hz
A(24)	UI4 10	625 mHz
A(25)	UI4 11	312.5 mHz
A(26)	U18 55	156.25 mHz
A(27)	U18 39	78.13 mHz
A(28)	U18 37	39.06 mHz
A(29)	U18 36	19.53 mHz
A(30)	UI18 34	9.77 mHz
A(31)	UI18 31	4.88 mHz



Address Line 2 ~2.6MHz

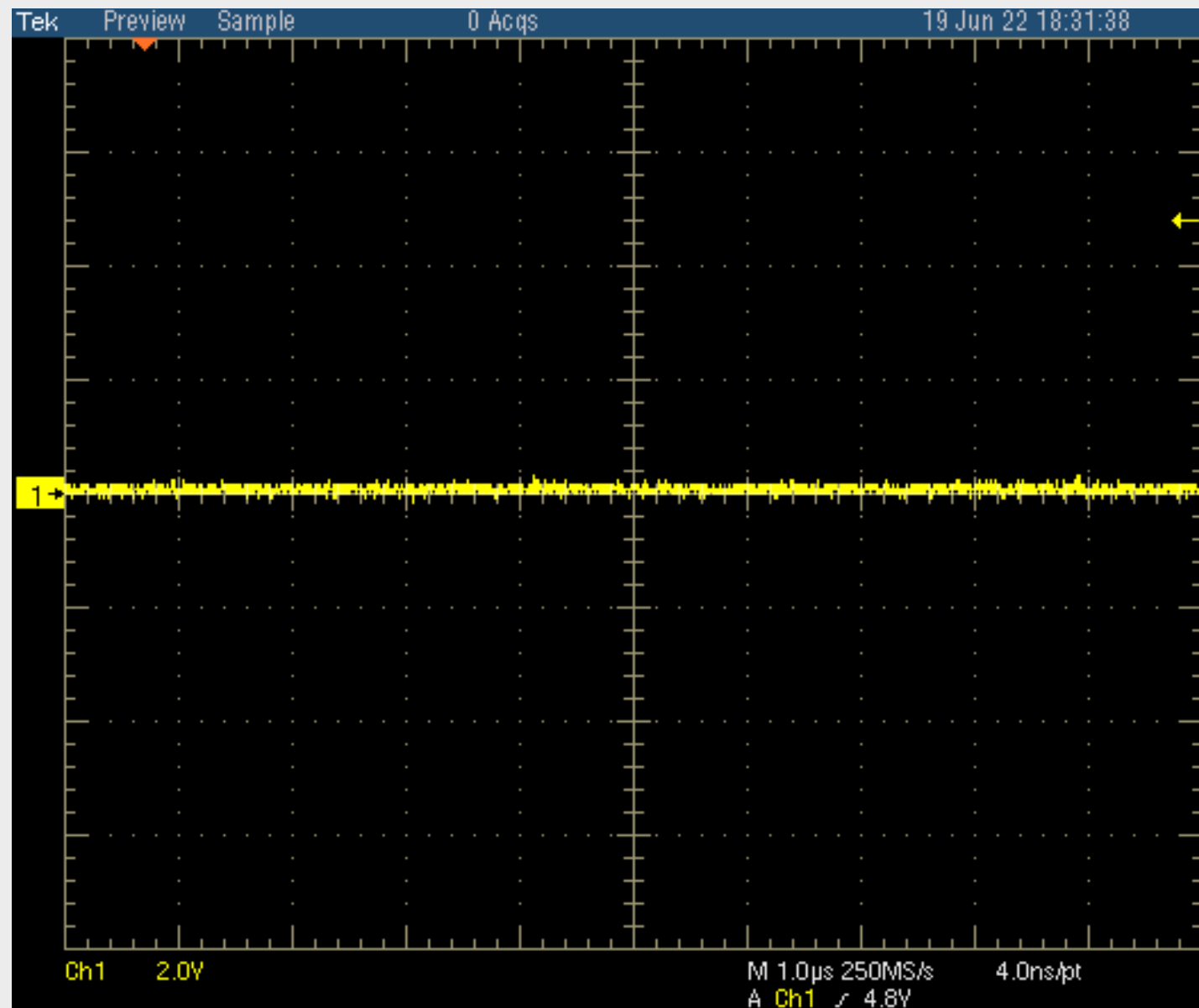


Address Line 3 ~1.3MHz

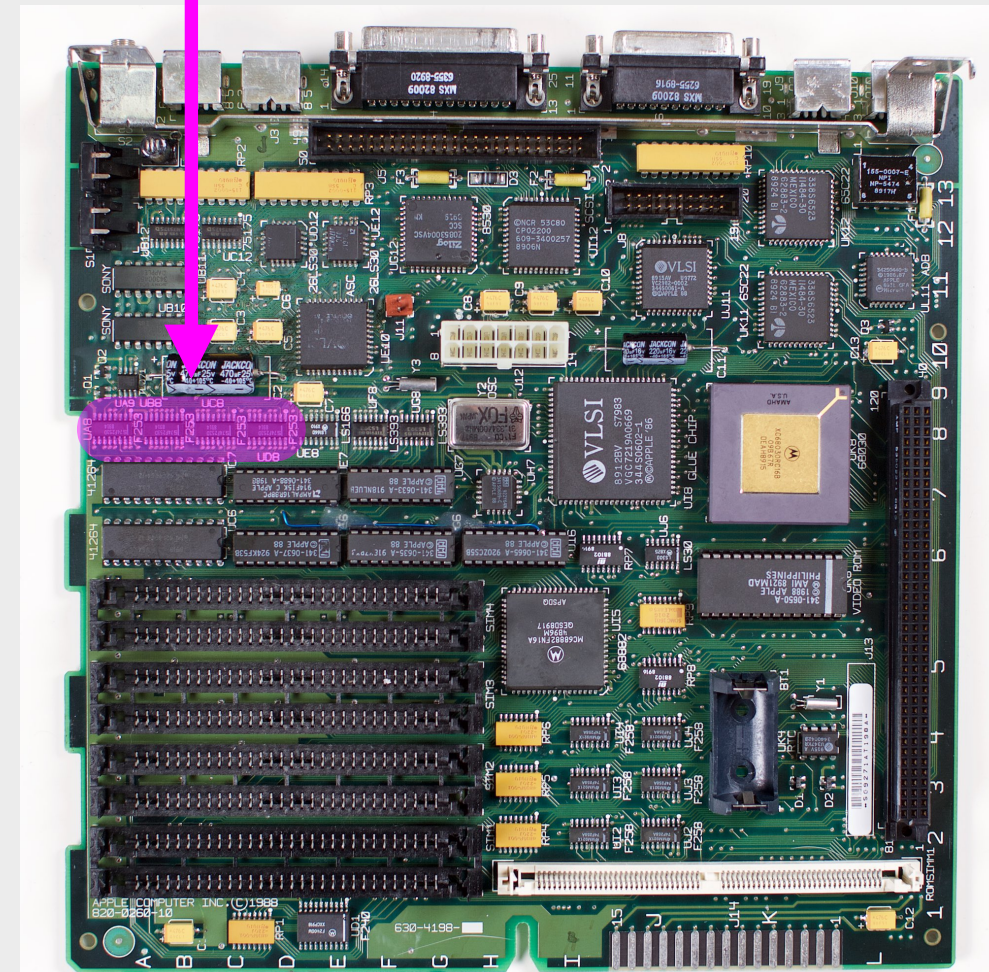
03 Troubleshooting & Repair — Step 7

Video Multiplexing Circuit: UA8, UB8, UC8 & UD8 Multiplexers

The TTL signals of functioning multiplexers should look like the following. Most scope shots were taken when the Mac was idling with a flashing question mark. Exceptions are noted in the captions when applicable. This page, and those that follow, show examples of how each signal should look, from pin 1 through pin 16. **UD8 Pin 01 is shown below.**



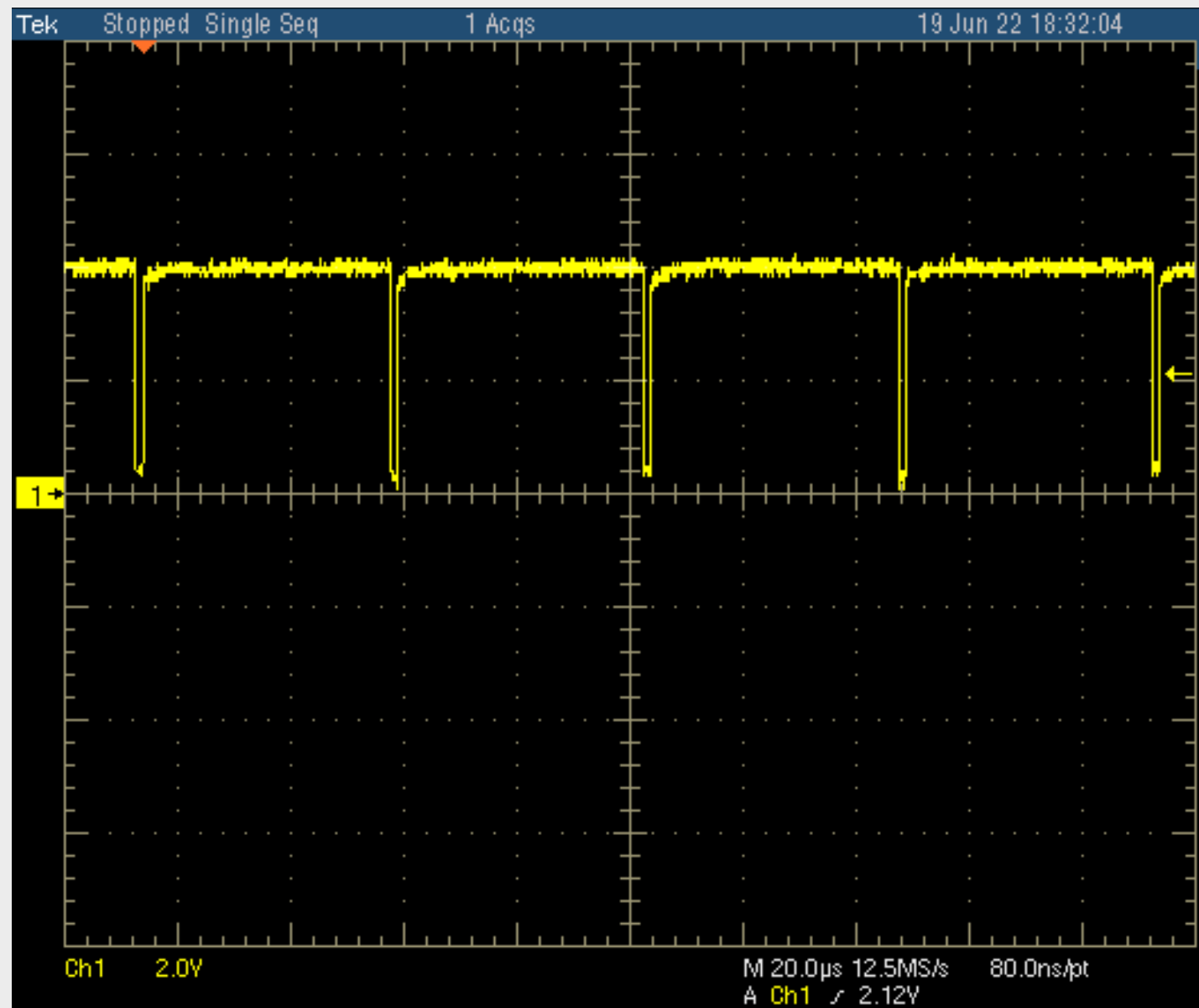
UD8 (74F253) Pin 01: Ground



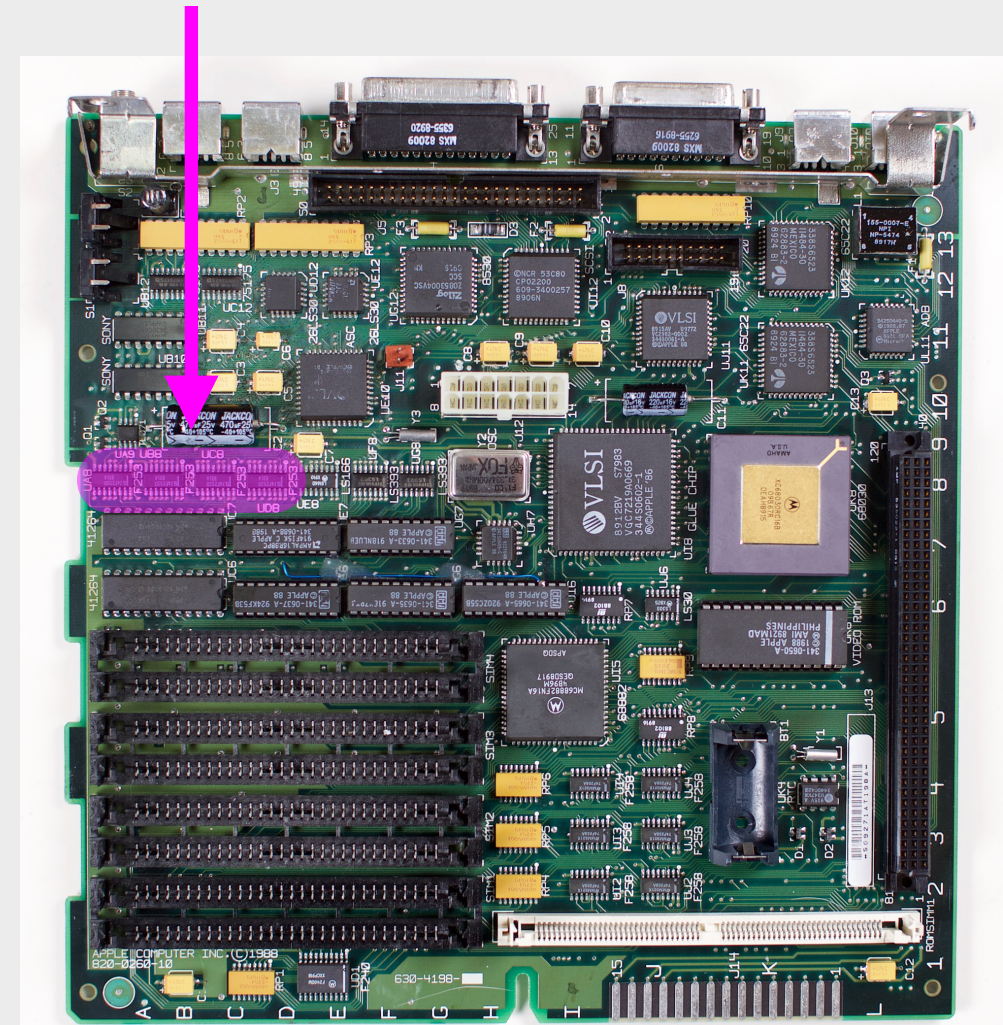
03 Troubleshooting & Repair — Step 7

Video Multiplexing Circuit: UA8, UB8, UC8 & UD8 Multiplexers

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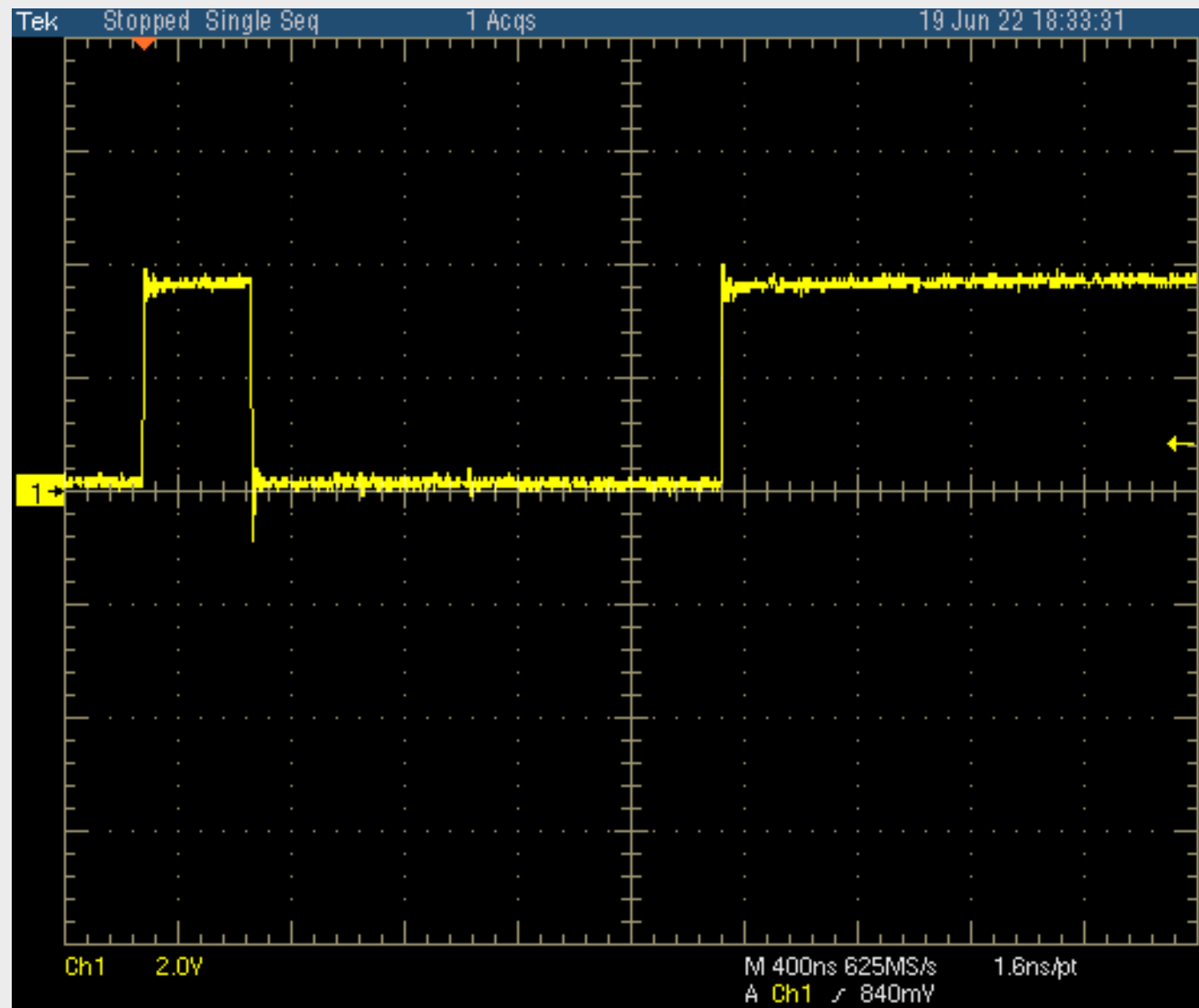
UD8 (74F253) Pin 02: Vid-V



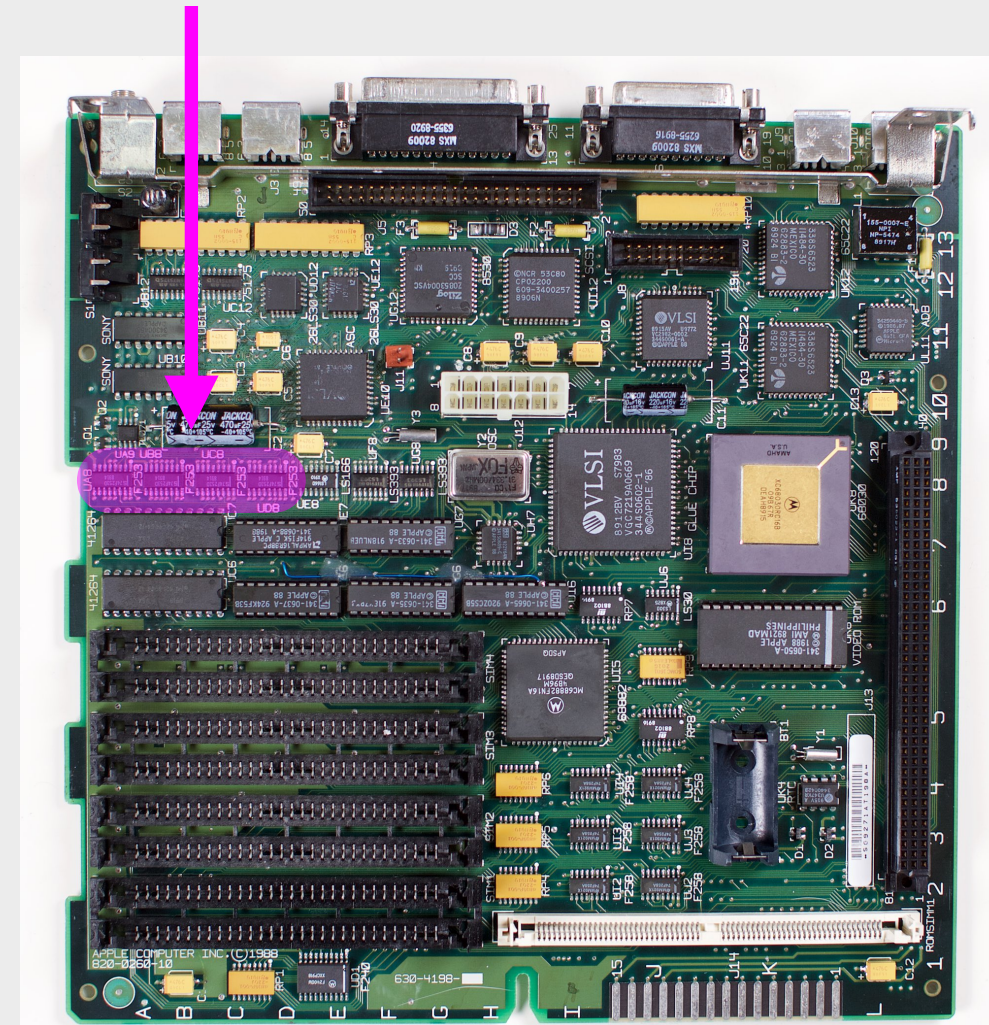
03 Troubleshooting & Repair — Step 7

Video Multiplexing Circuit: UA8, UB8, UC8 & UD8 Multiplexers

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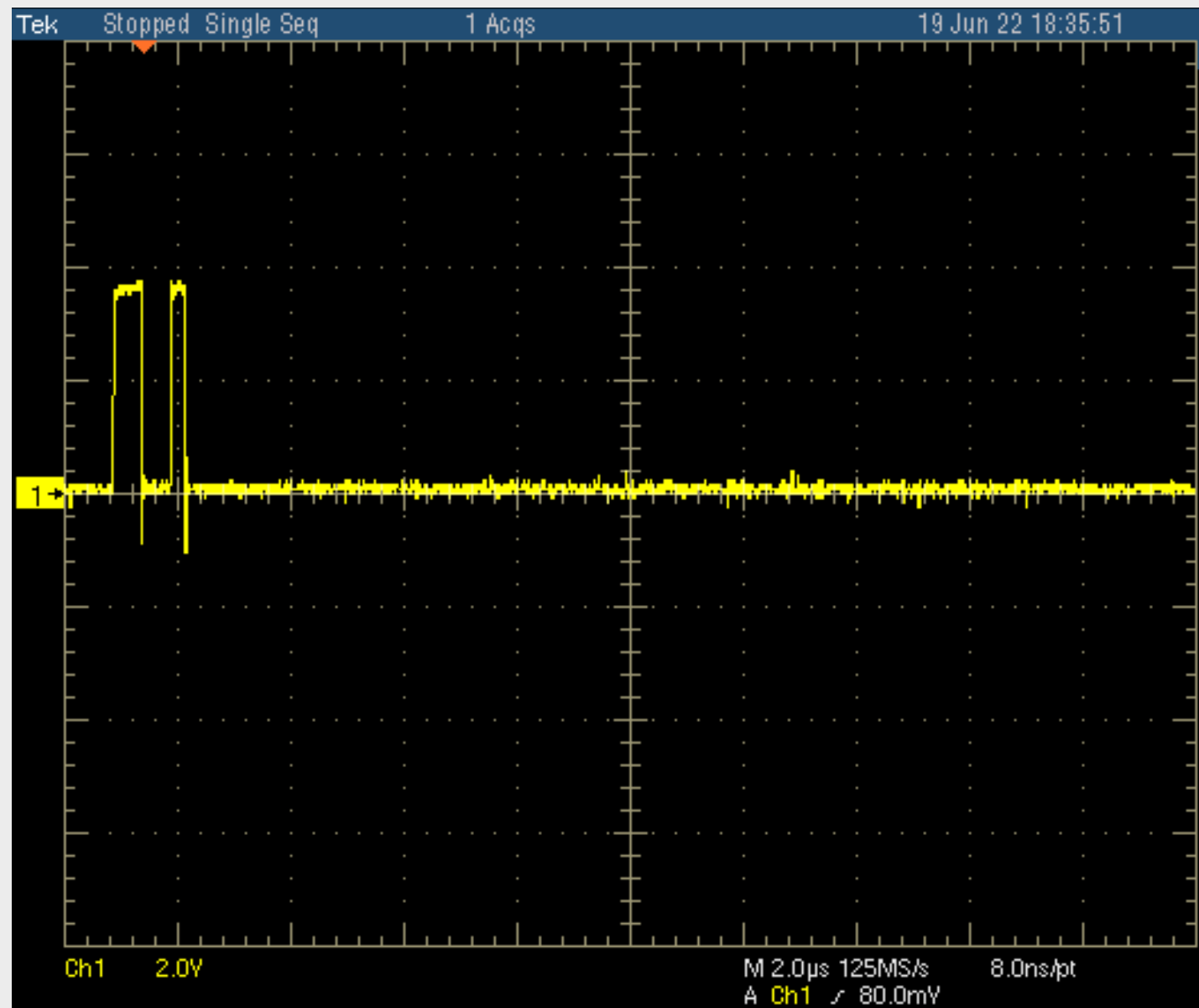
UD8 (74F253) Pin 03: Address Line 08



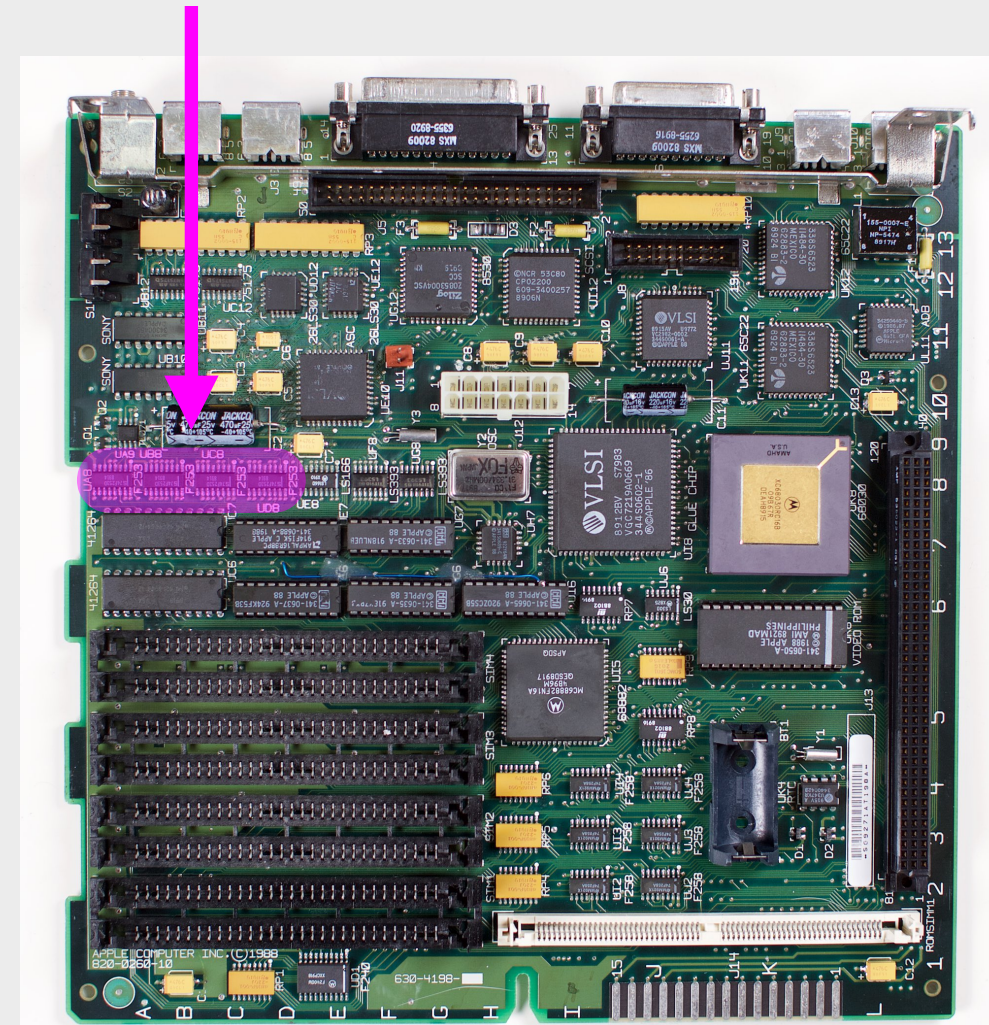
03 Troubleshooting & Repair — Step 7

Video Multiplexing Circuit: UA8, UB8, UC8 & UD8 Multiplexers

The TTL signals of functioning multiplexers should look like the following. Most scope shots were taken when the Mac was idling with a flashing question mark. Exceptions are noted in the captions when applicable. This page, and those that follow, show examples of how each signal should look, from pin 1 through pin 16. **UD8 Pin 04 is shown below.**



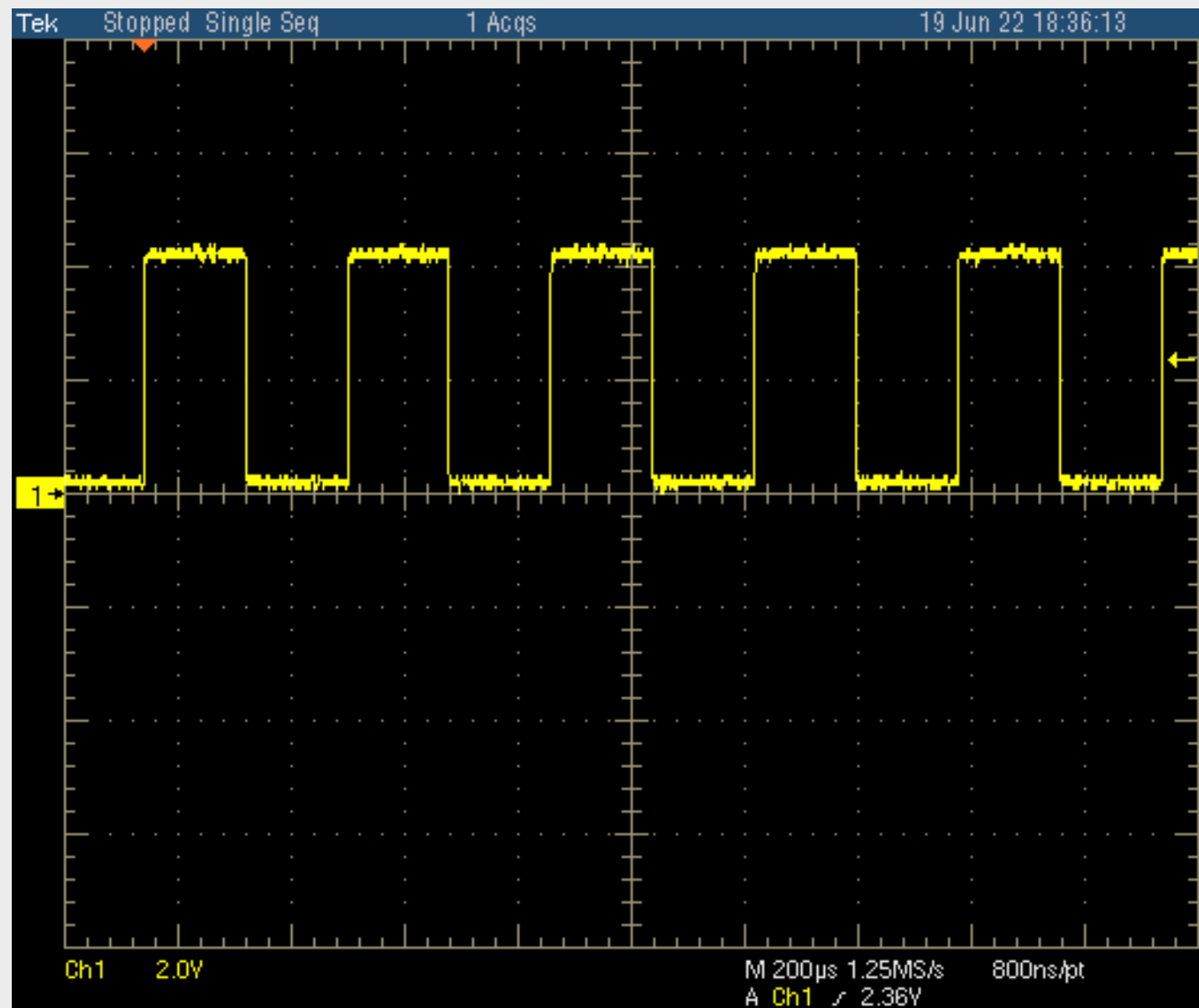
UD8 (74F253) Pin 04: Address Line 00



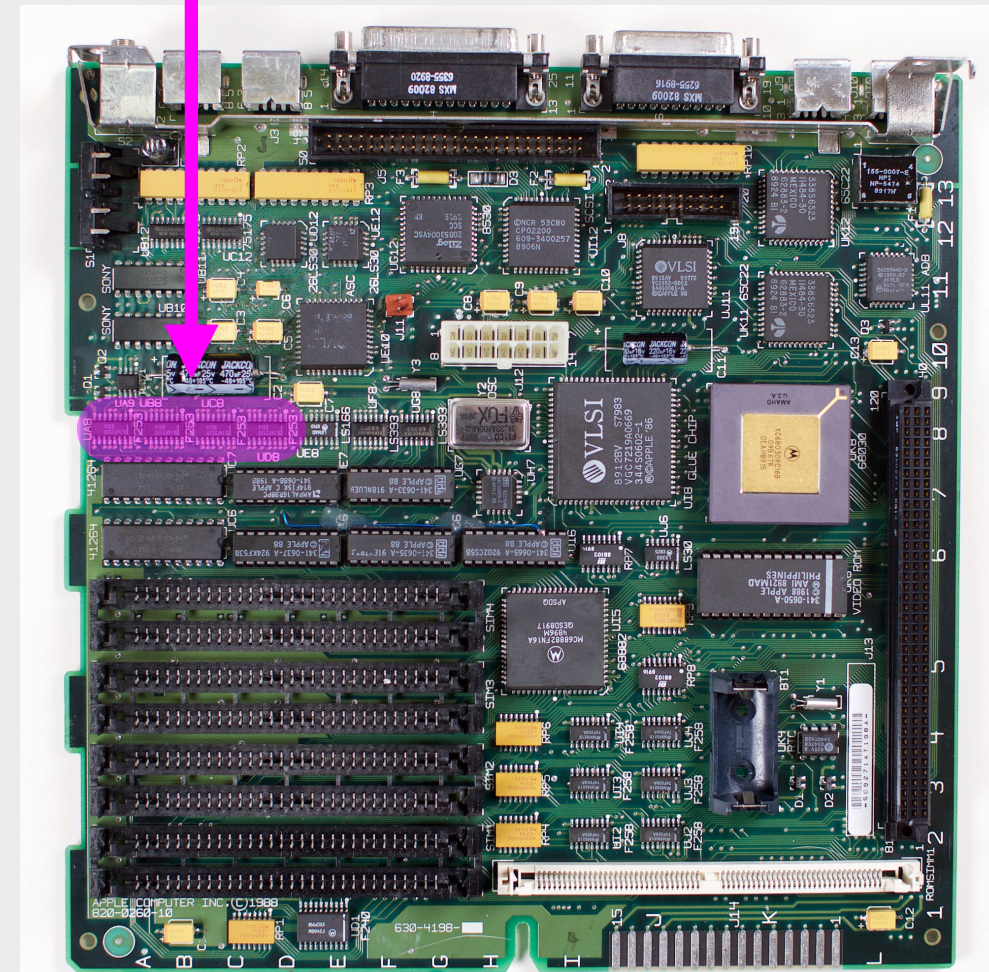
03 Troubleshooting & Repair — Step 7

Video Multiplexing Circuit: UA8, UB8, UC8 & UD8 Multiplexers

The TTL signals of functioning multiplexers should look like the following. Most scope shots were taken when the Mac was idling with a flashing question mark. Exceptions are noted in the captions when applicable. This page, and those that follow, show examples of how each signal should look, from pin 1 through pin 16. **UD8 Pin 05 is shown below.**



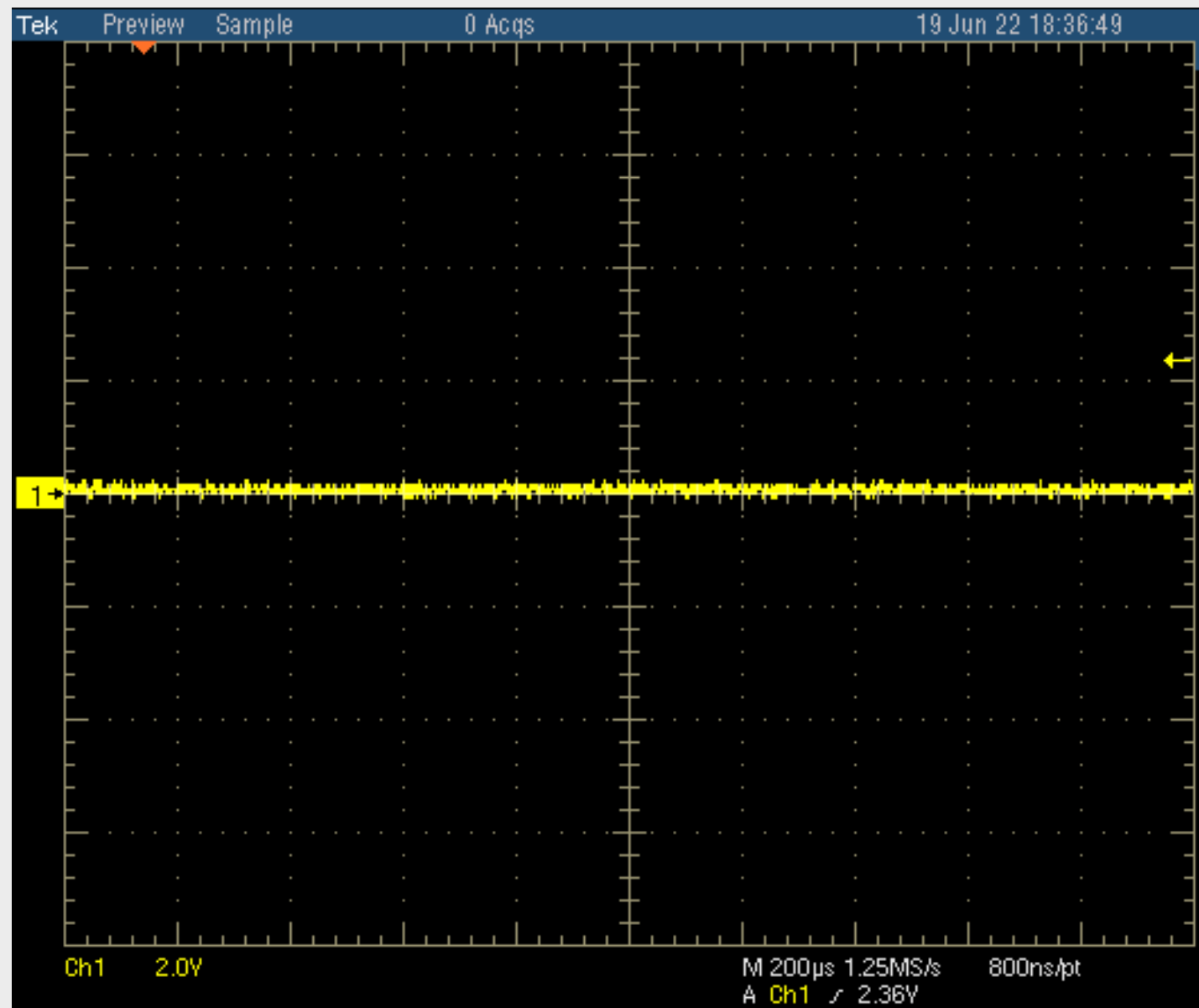
UD8 (74F253) Pin 05: VADR (1)



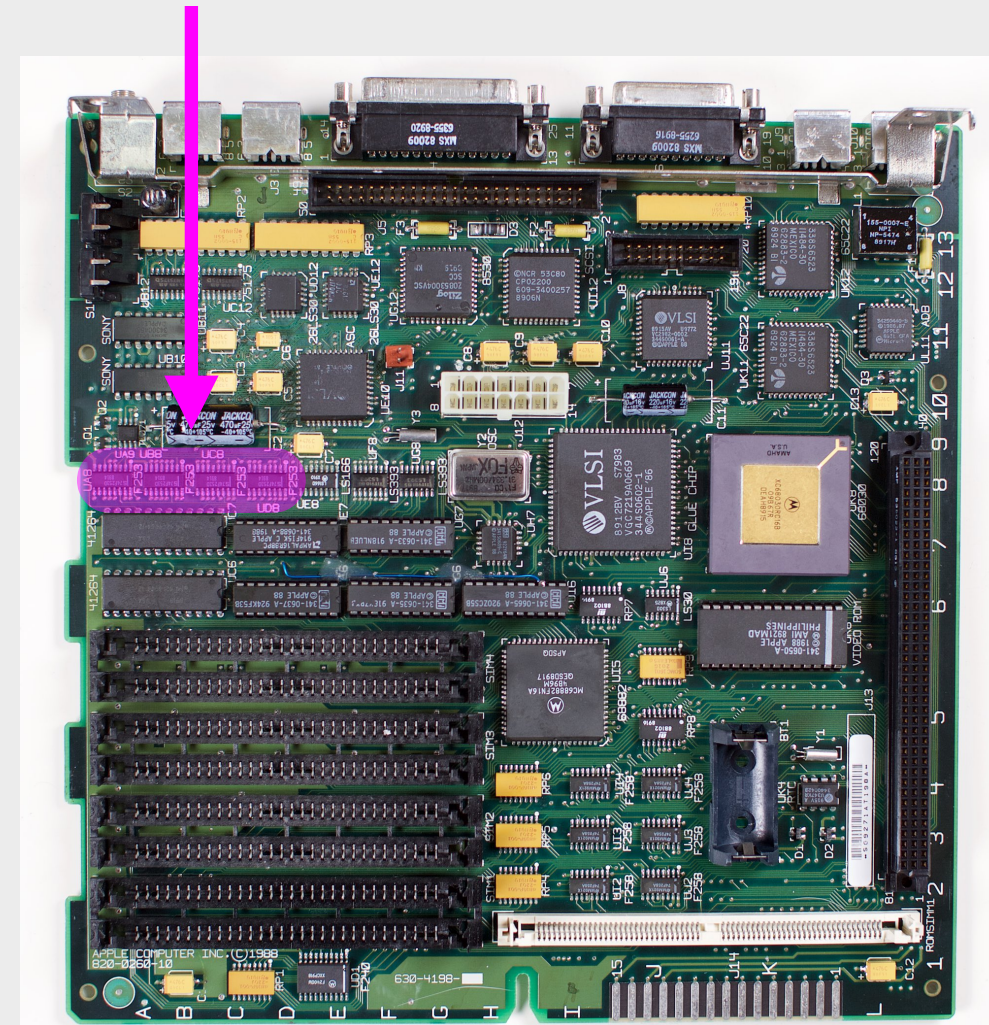
03 Troubleshooting & Repair — Step 7

Video Multiplexing Circuit: UA8, UB8, UC8 & UD8 Multiplexers

The TTL signals of functioning multiplexers should look like the following. Most scope shots were taken when the Mac was idling with a flashing question mark. Exceptions are noted in the captions when applicable. This page, and those that follow, show examples of how each signal should look, from pin 1 through pin 16. **UD8 Pin 06 is shown below.**



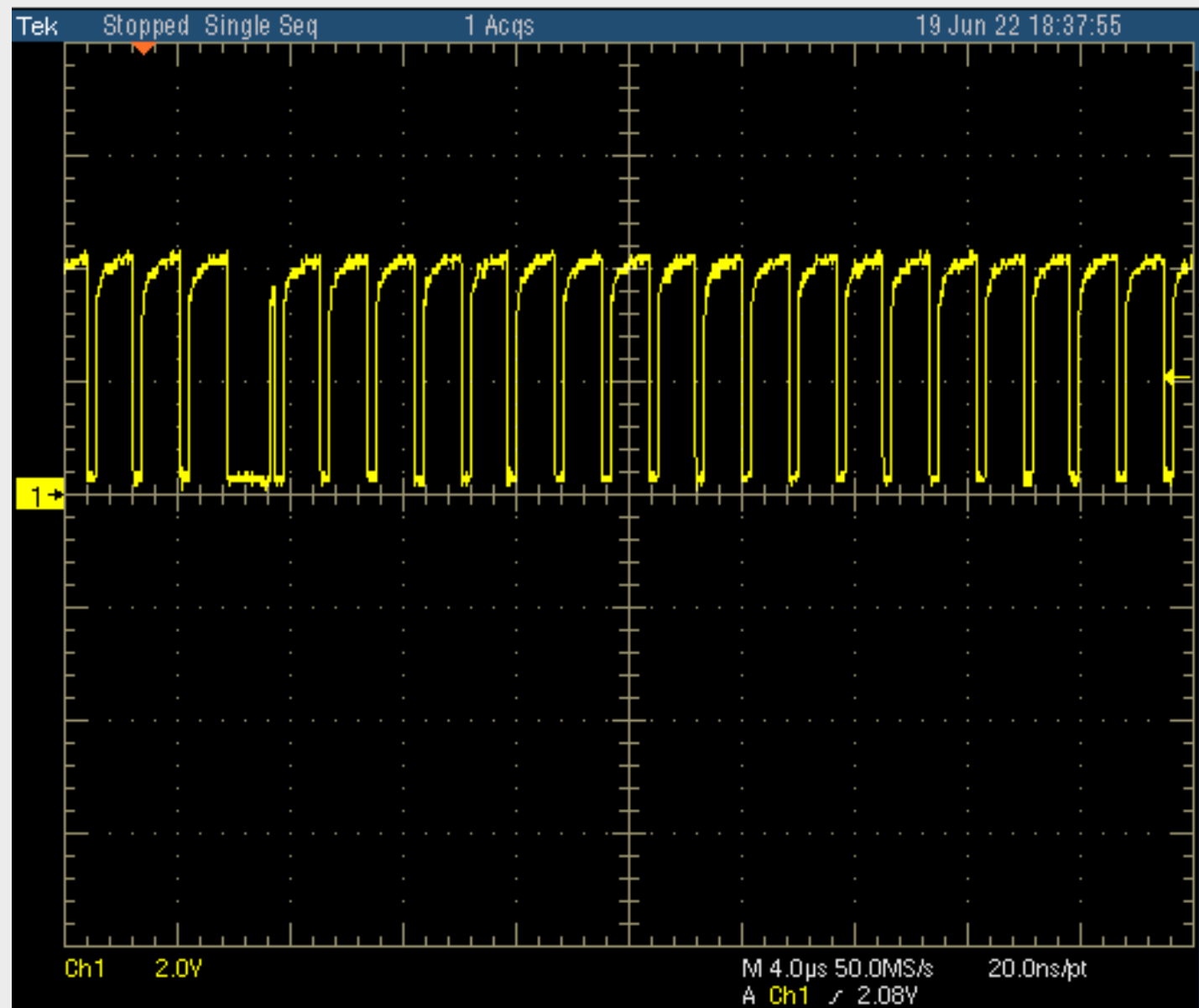
UD8 (74F253) Pin 06: Ground



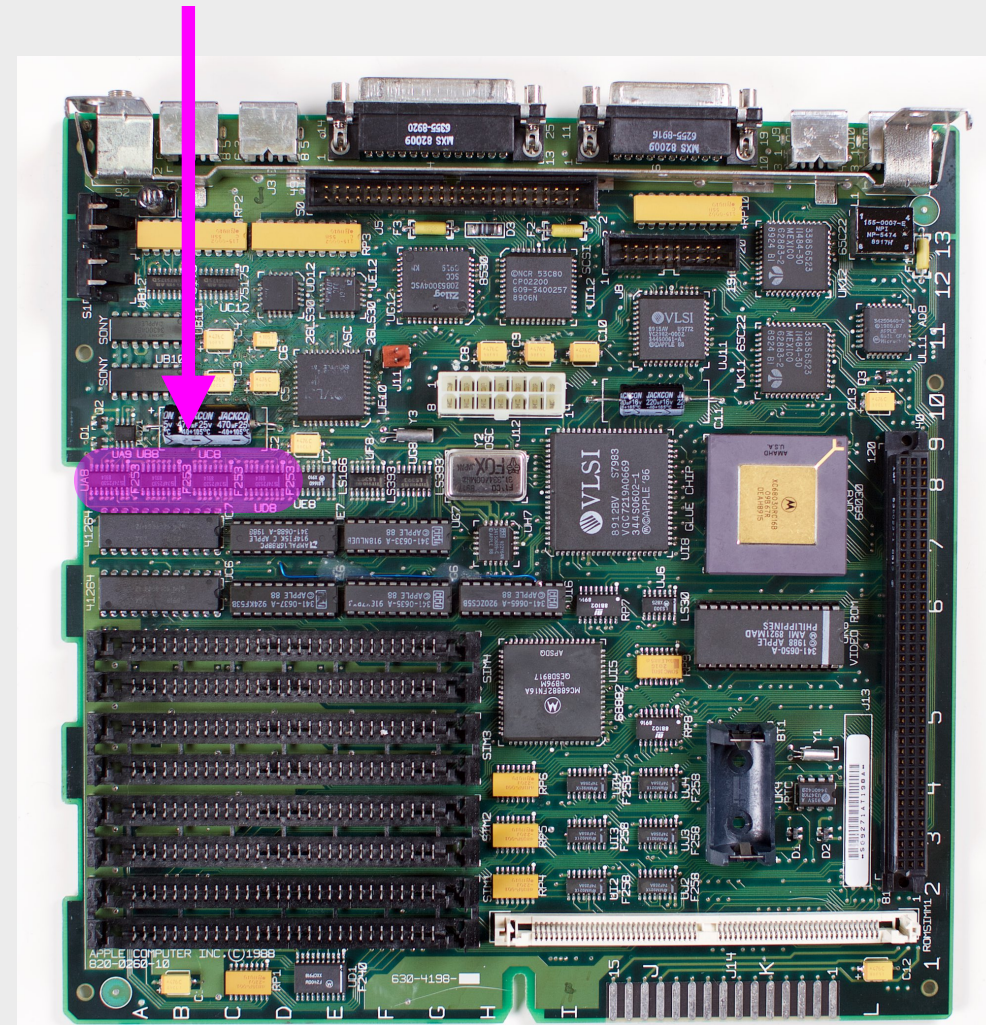
03 Troubleshooting & Repair — Step 7

Video Multiplexing Circuit: UA8, UB8, UC8 & UD8 Multiplexers

The TTL signals of functioning multiplexers should look like the following. Most scope shots were taken when the Mac was idling with a flashing question mark. Exceptions are noted in the captions when applicable. This page, and those that follow, show examples of how each signal should look, from pin 1 through pin 16. **UD8 Pin 07 is shown below.**



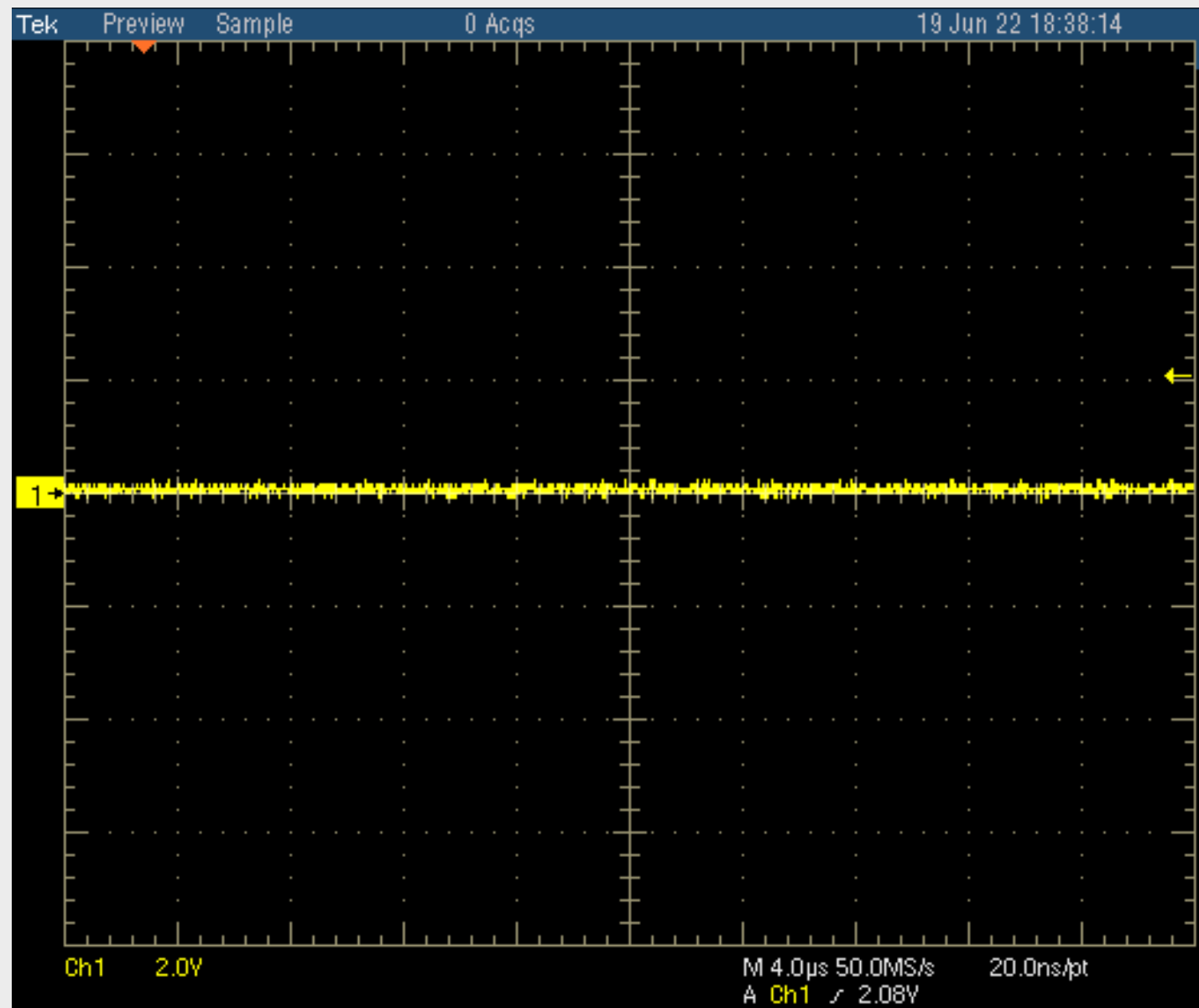
UD8 (74F253) Pin 07: RA (0). Shot taken during reset.



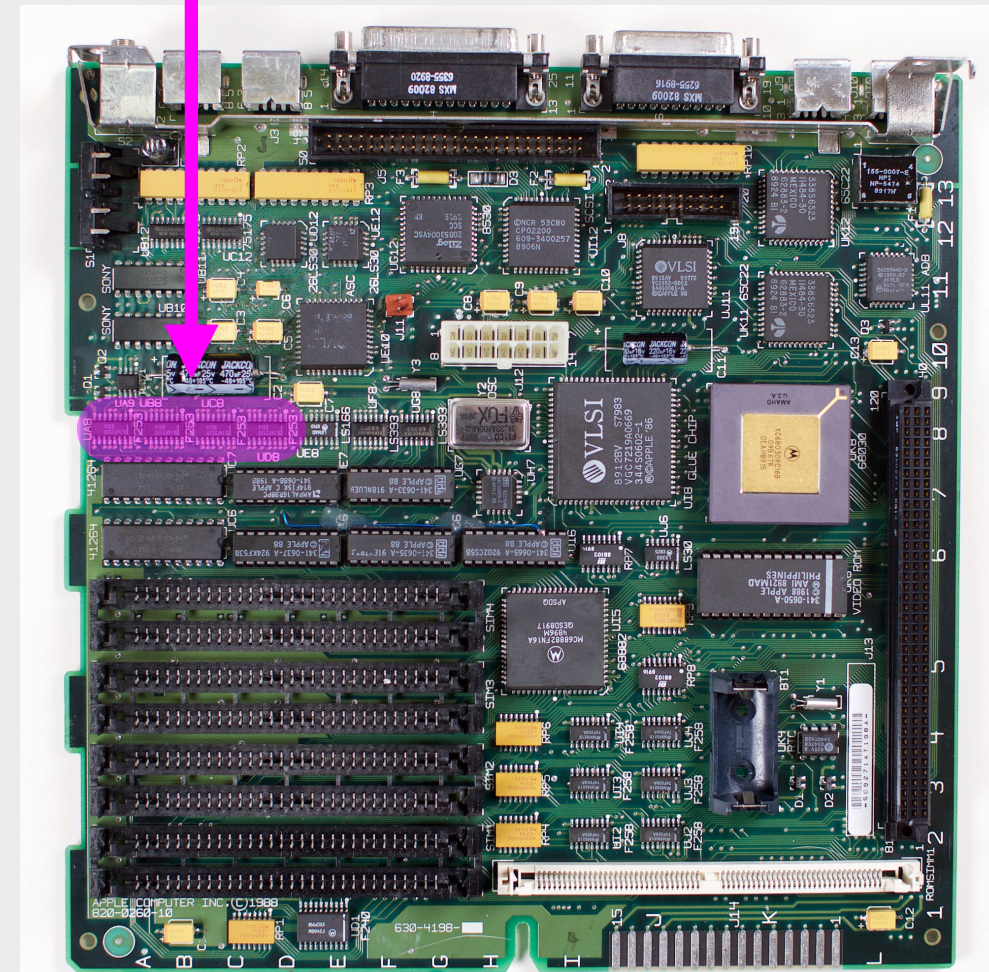
03 Troubleshooting & Repair — Step 7

Video Multiplexing Circuit: UA8, UB8, UC8 & UD8 Multiplexers

The TTL signals of functioning multiplexers should look like the following. Most scope shots were taken when the Mac was idling with a flashing question mark. Exceptions are noted in the captions when applicable. This page, and those that follow, show examples of how each signal should look, from pin 1 through pin 16. **UD8 Pin 08 is shown below.**



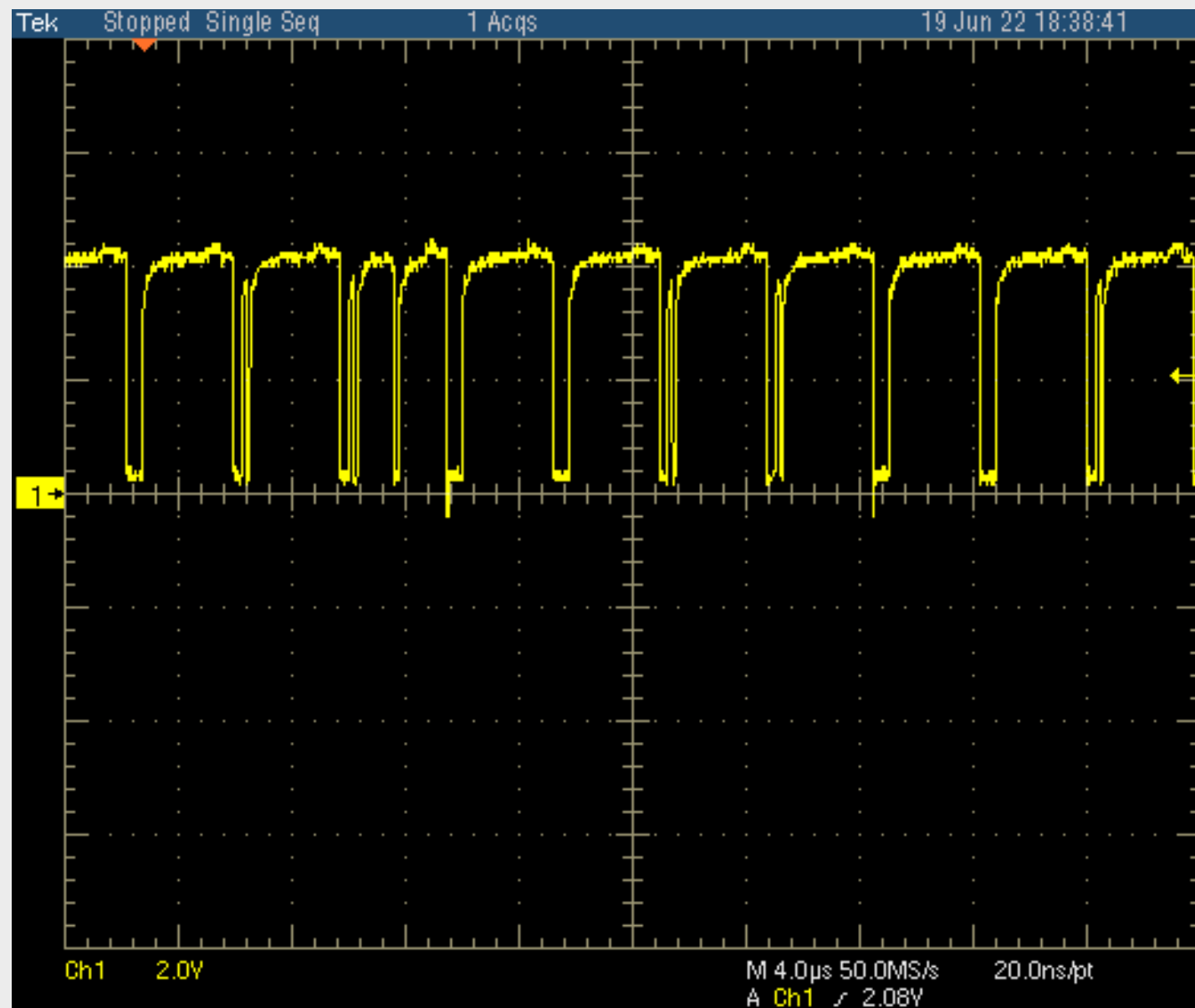
UD8 (74F253) Pin 08: Ground



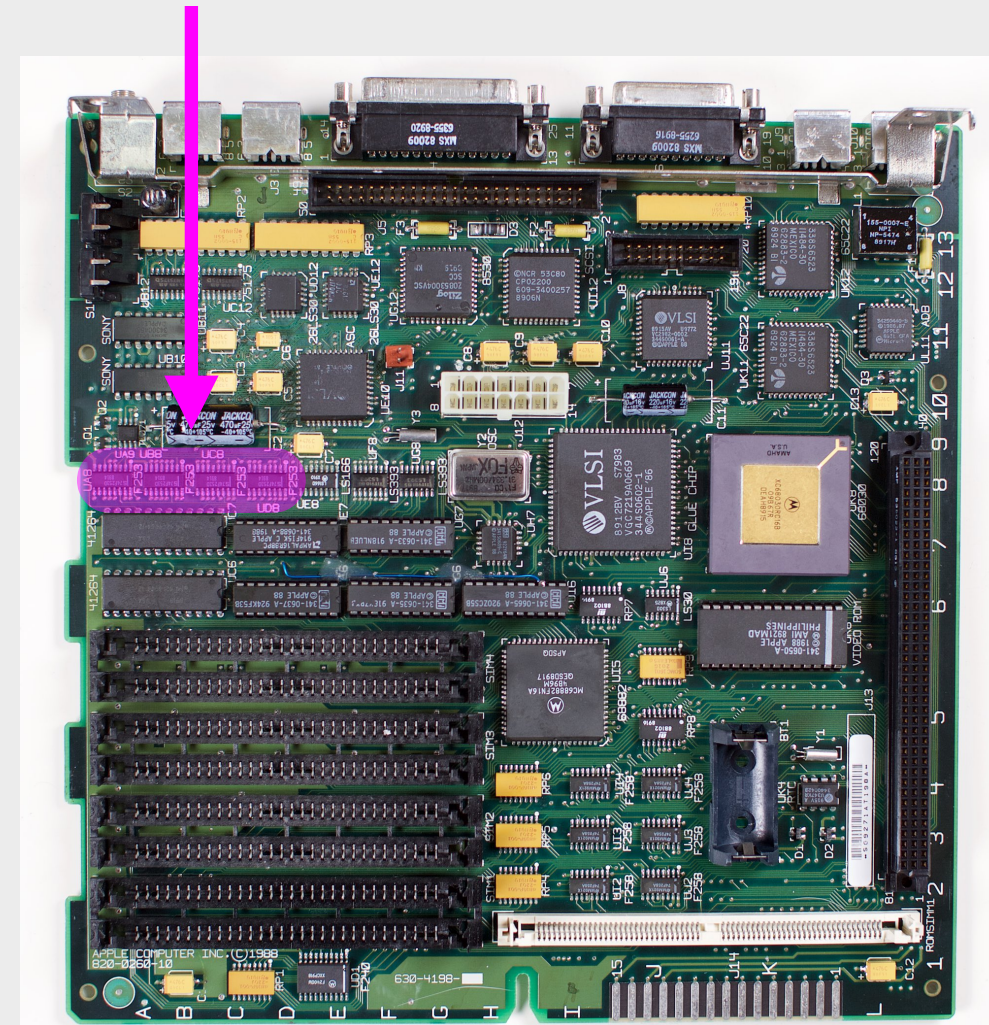
03 Troubleshooting & Repair — Step 7

Video Multiplexing Circuit: UA8, UB8, UC8 & UD8 Multiplexers

The TTL signals of functioning multiplexers should look like the following. Most scope shots were taken when the Mac was idling with a flashing question mark. Exceptions are noted in the captions when applicable. This page, and those that follow, show examples of how each signal should look, from pin 1 through pin 16. **UD8 Pin 09 is shown below.**



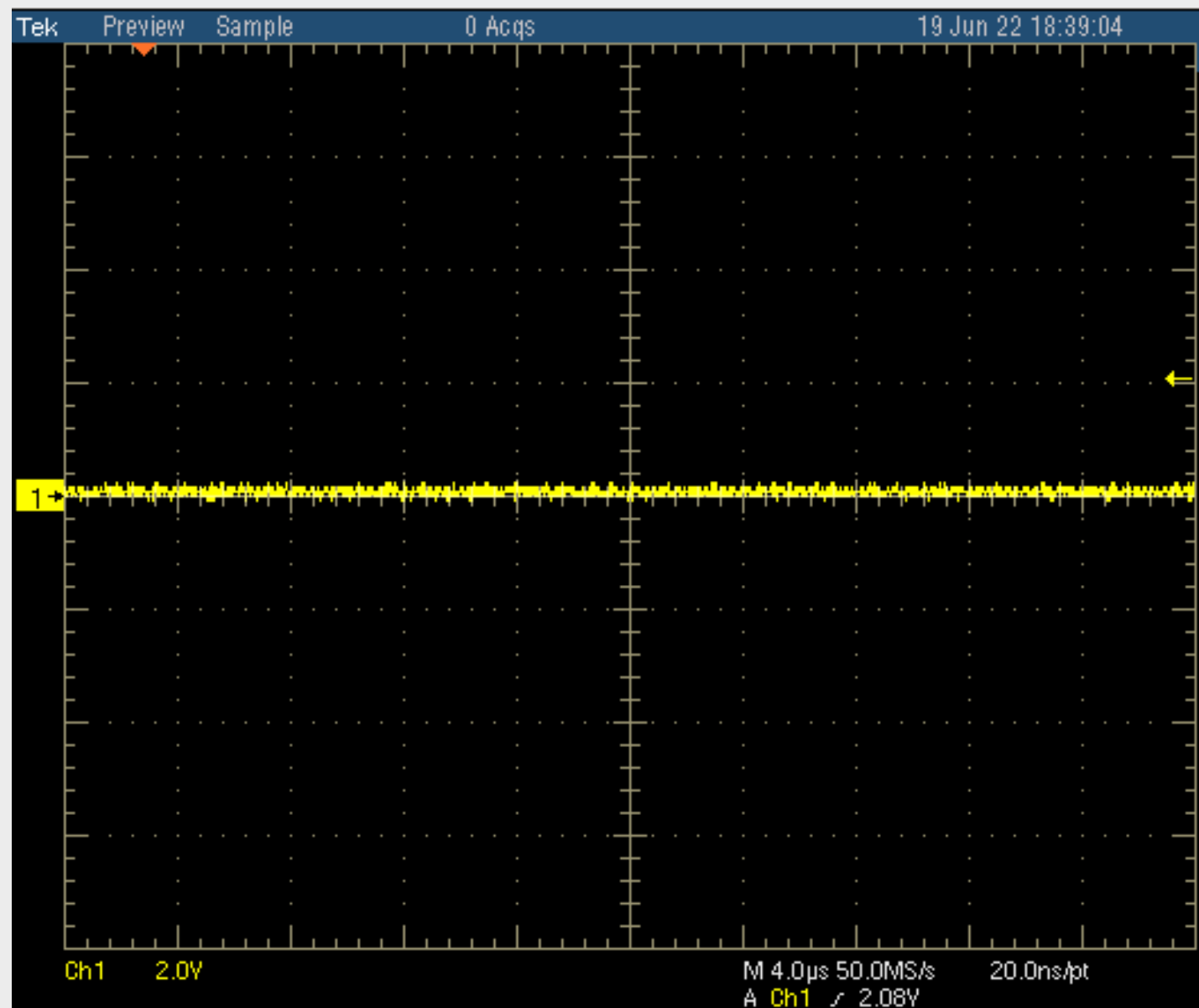
UD8 (74F253) Pin 09: RA (1). Shot taken during reset.



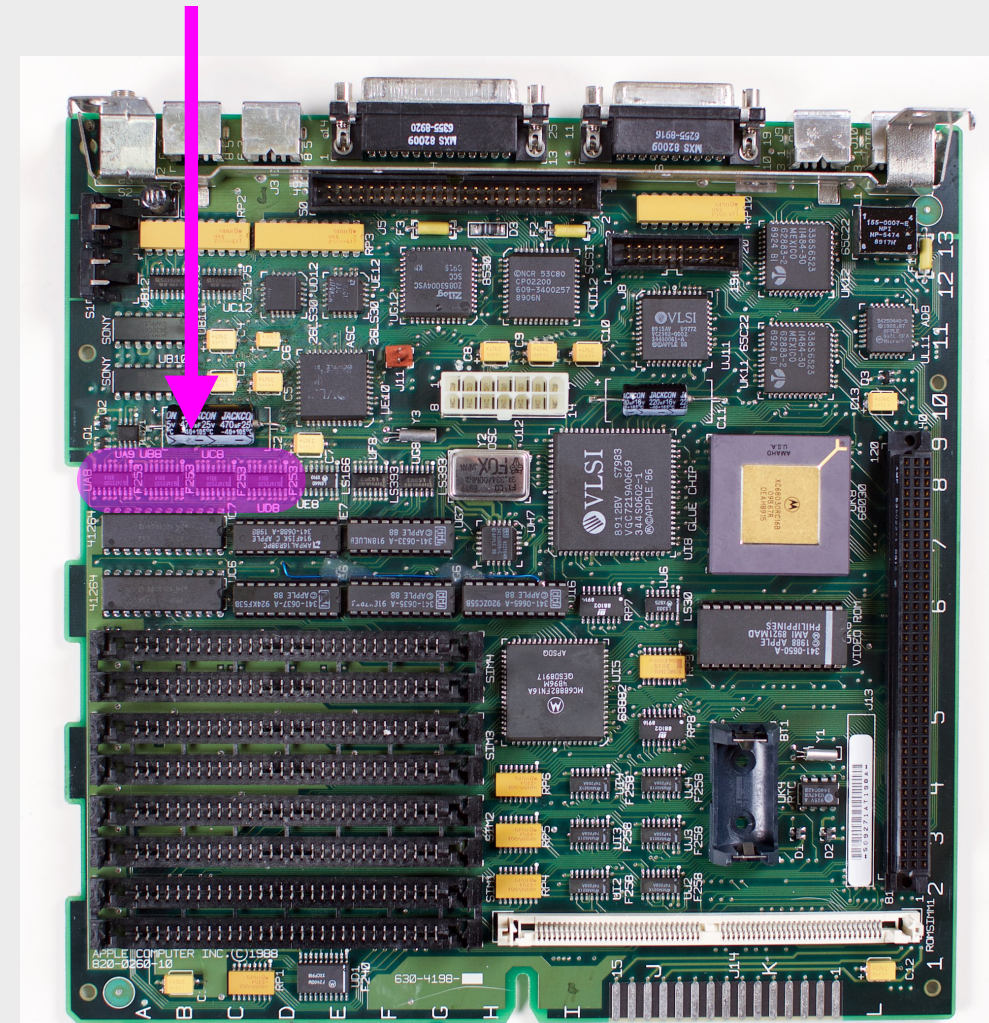
03 Troubleshooting & Repair — Step 7

Video Multiplexing Circuit: UA8, UB8, UC8 & UD8 Multiplexers

The TTL signals of functioning multiplexers should look like the following. Most scope shots were taken when the Mac was idling with a flashing question mark. Exceptions are noted in the captions when applicable. This page, and those that follow, show examples of how each signal should look, from pin 1 through pin 16. **UD8 Pin 10 is shown below.**



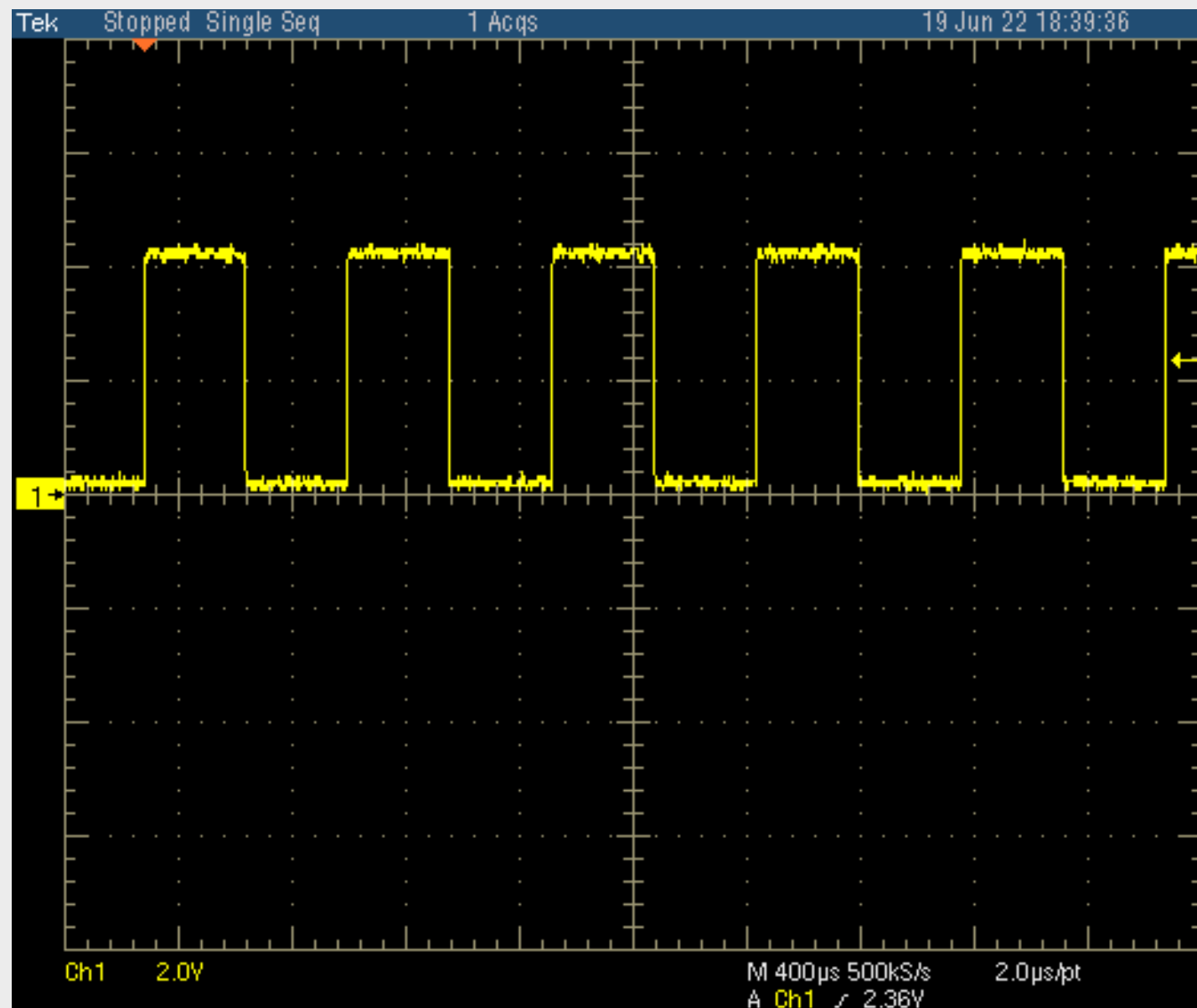
UD8 (74F253) Pin 10: Ground



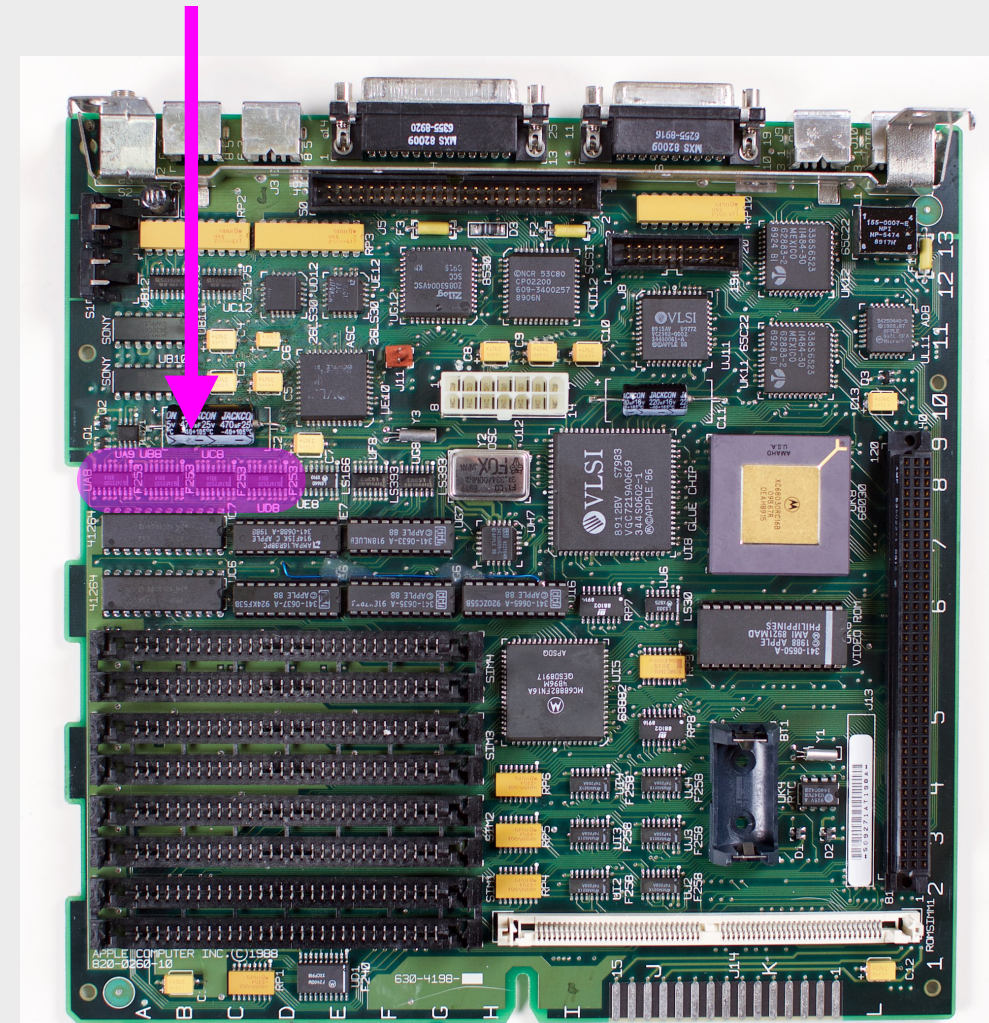
03 Troubleshooting & Repair — Step 7

Video Multiplexing Circuit: UA8, UB8, UC8 & UD8 Multiplexers

The TTL signals of functioning multiplexers should look like the following. Most scope shots were taken when the Mac was idling with a flashing question mark. Exceptions are noted in the captions when applicable. This page, and those that follow, show examples of how each signal should look, from pin 1 through pin 16. **UD8 Pin 11 is shown below.**



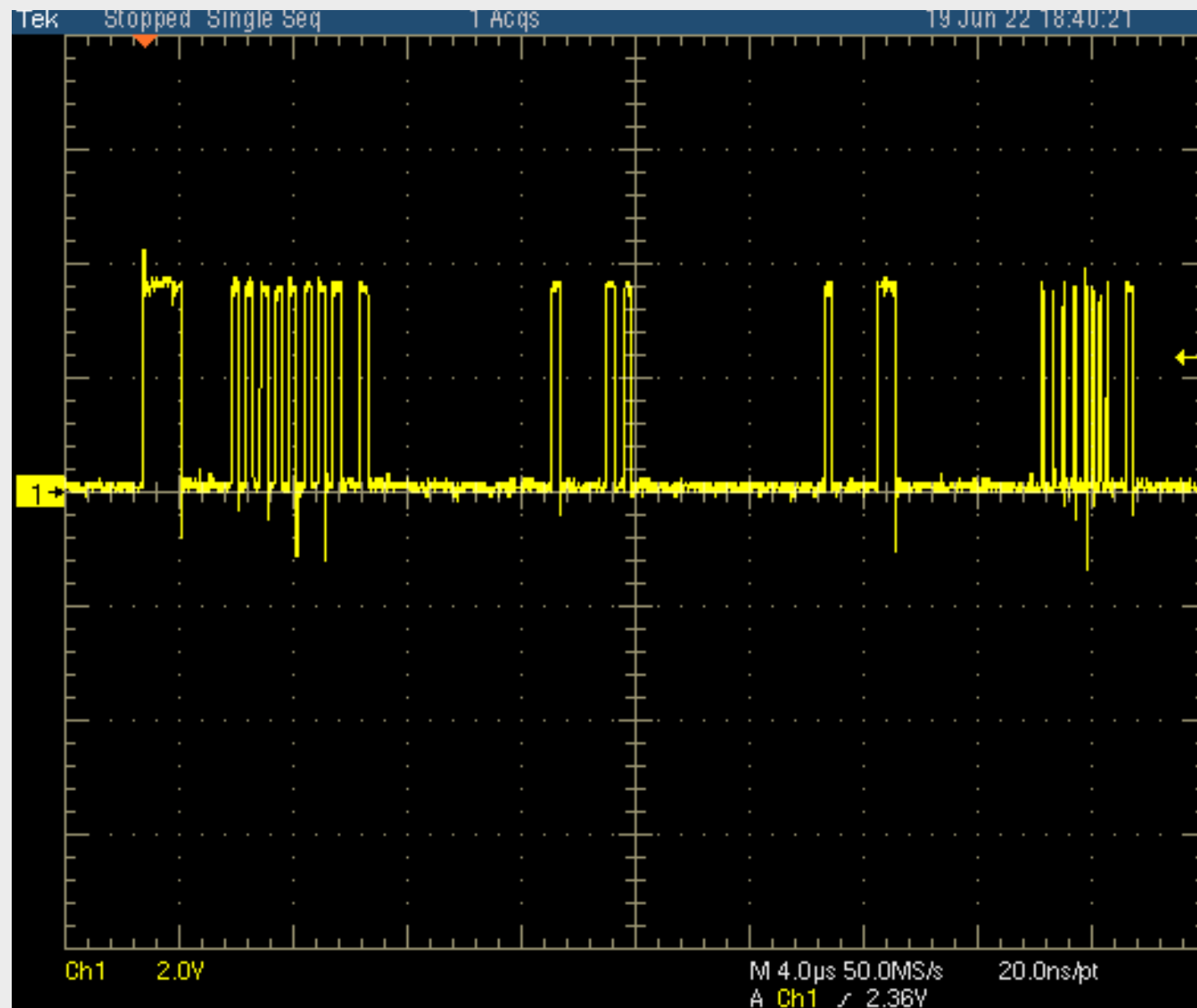
UD8 (74F253) Pin 11: VADR(2)



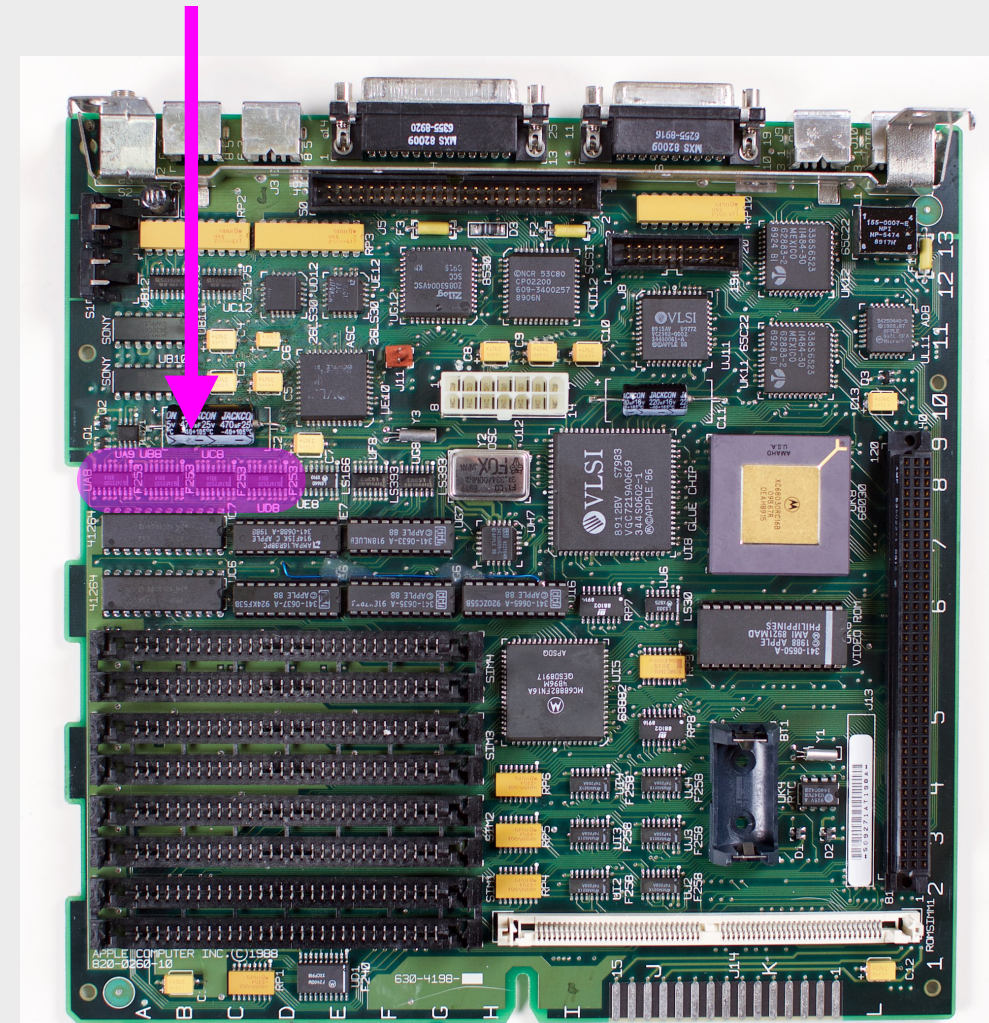
03 Troubleshooting & Repair — Step 7

Video Multiplexing Circuit: UA8, UB8, UC8 & UD8 Multiplexers

The TTL signals of functioning multiplexers should look like the following. Most scope shots were taken when the Mac was idling with a flashing question mark. Exceptions are noted in the captions when applicable. This page, and those that follow, show examples of how each signal should look, from pin 1 through pin 16. **UD8 Pin 12 is shown below.**



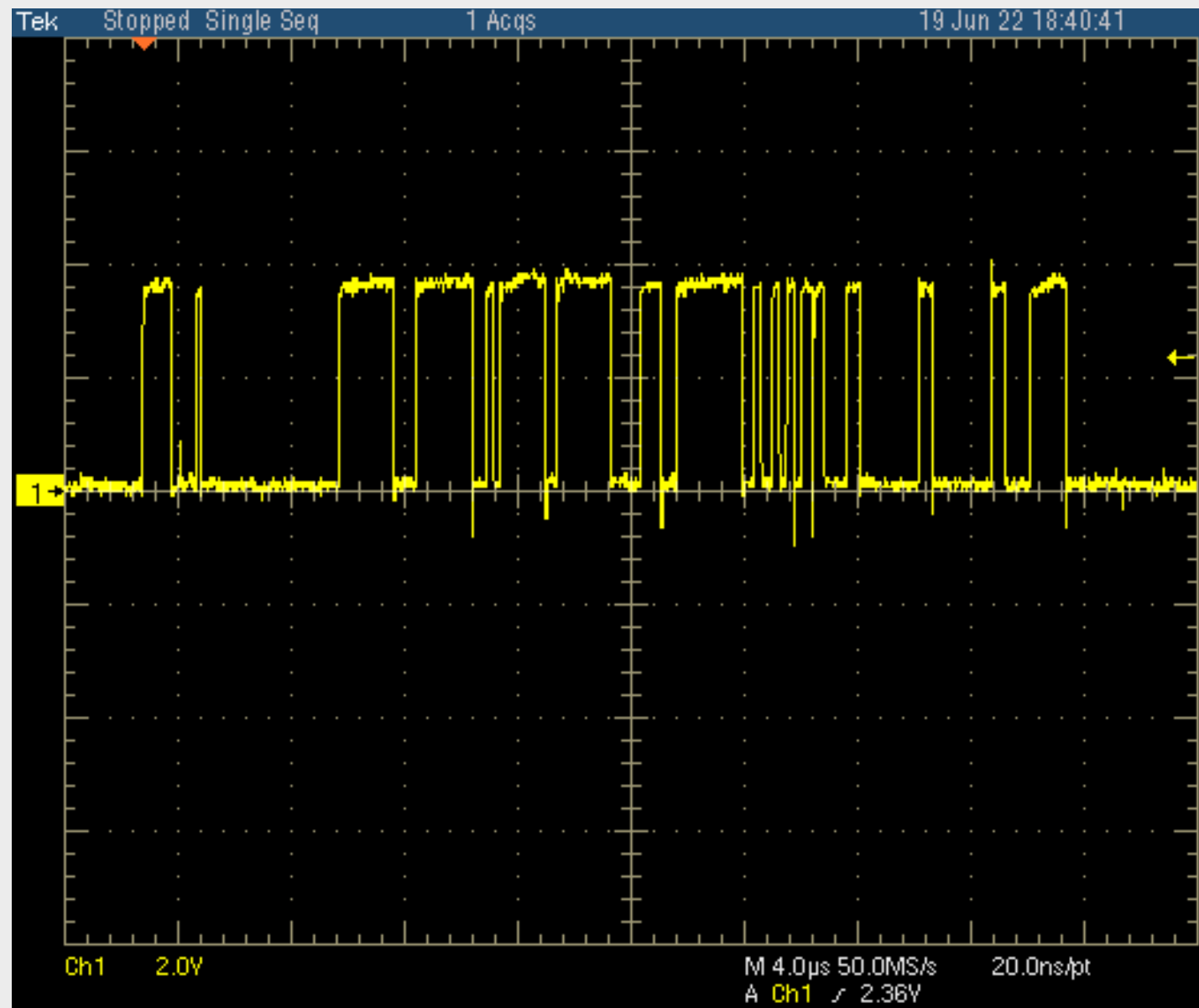
UD8 (74F253) Pin 12: Address Line 01



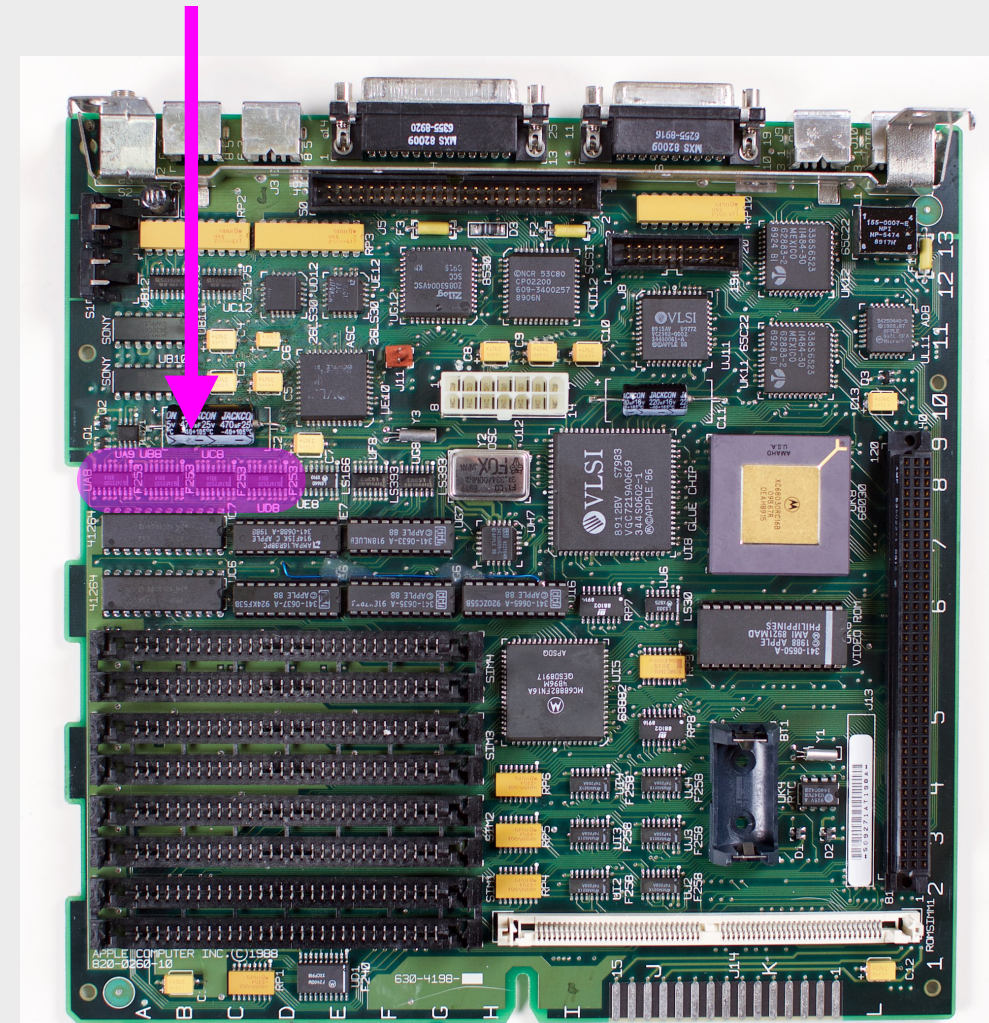
03 Troubleshooting & Repair — Step 7

Video Multiplexing Circuit: UA8, UB8, UC8 & UD8 Multiplexers

The TTL signals of functioning multiplexers should look like the following. Most scope shots were taken when the Mac was idling with a flashing question mark. Exceptions are noted in the captions when applicable. This page, and those that follow, show examples of how each signal should look, from pin 1 through pin 16. **UD8 Pin 13 is shown below.**



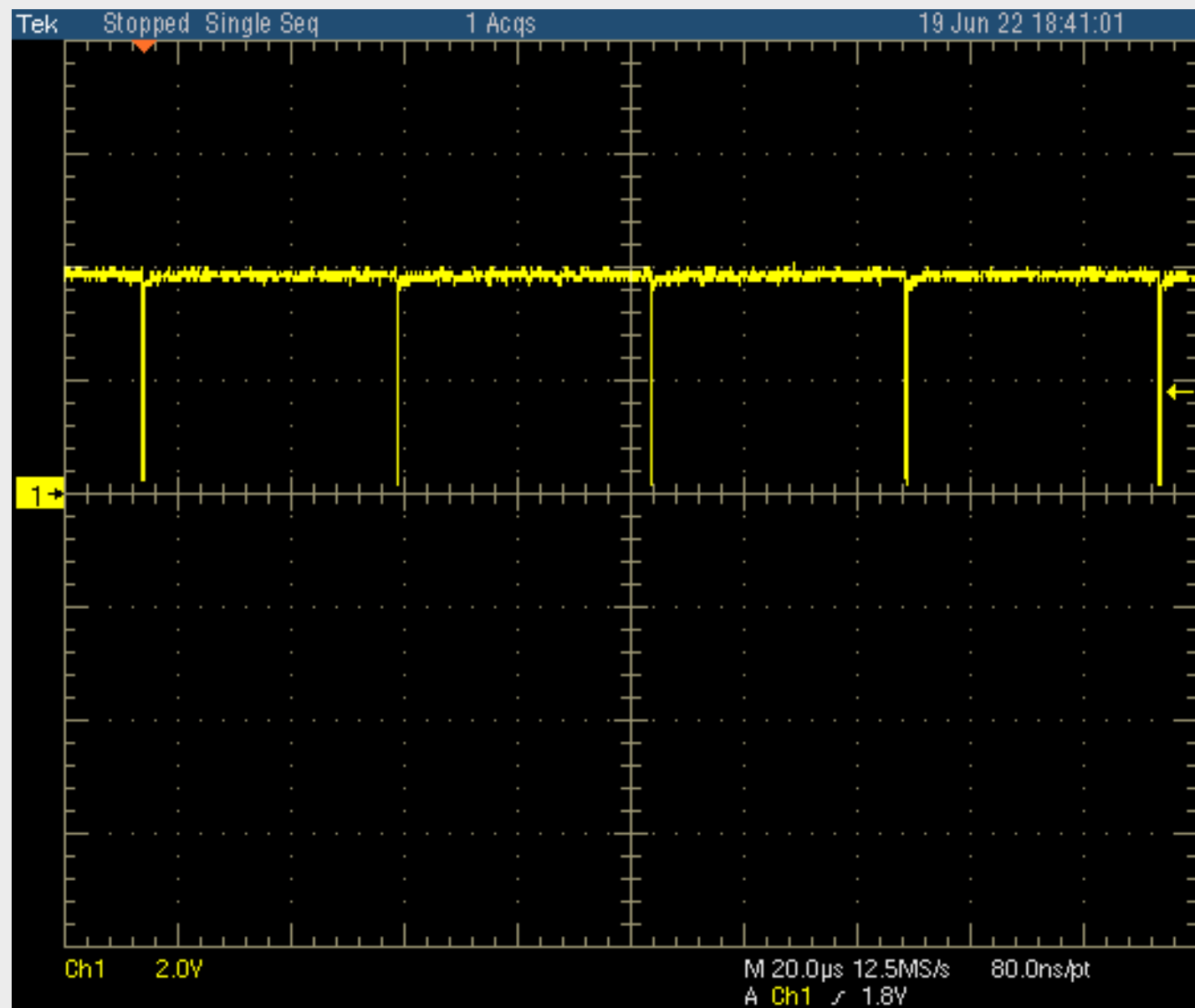
UD8 (74F253) Pin 13: Address Line 09



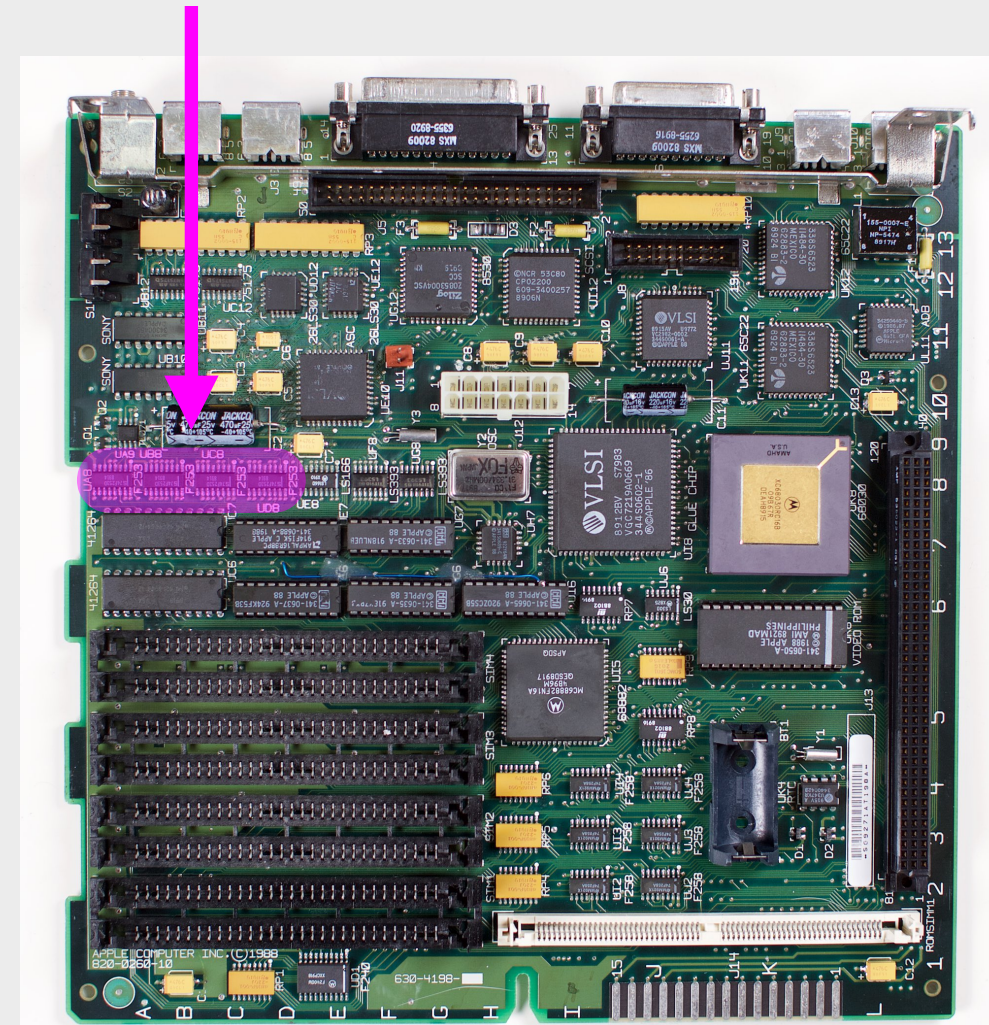
03 Troubleshooting & Repair — Step 7

Video Multiplexing Circuit: UA8, UB8, UC8 & UD8 Multiplexers

The TTL signals of functioning multiplexers should look like the following. Most scope shots were taken when the Mac was idling with a flashing question mark. Exceptions are noted in the captions when applicable. This page, and those that follow, show examples of how each signal should look, from pin 1 through pin 16. **UD8 Pin 14 is shown below.**



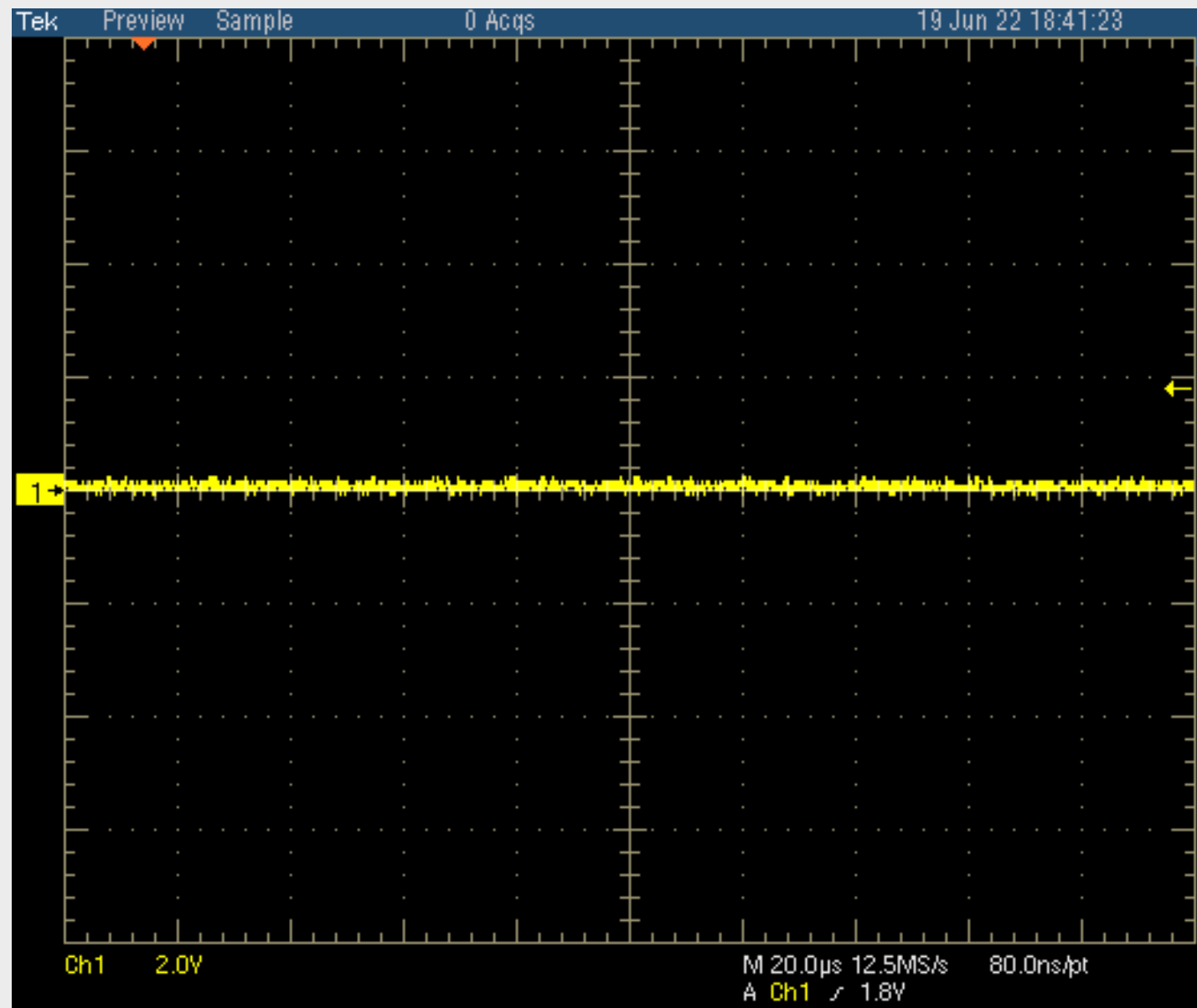
UD8 (74F253) Pin 14: VIDMUX



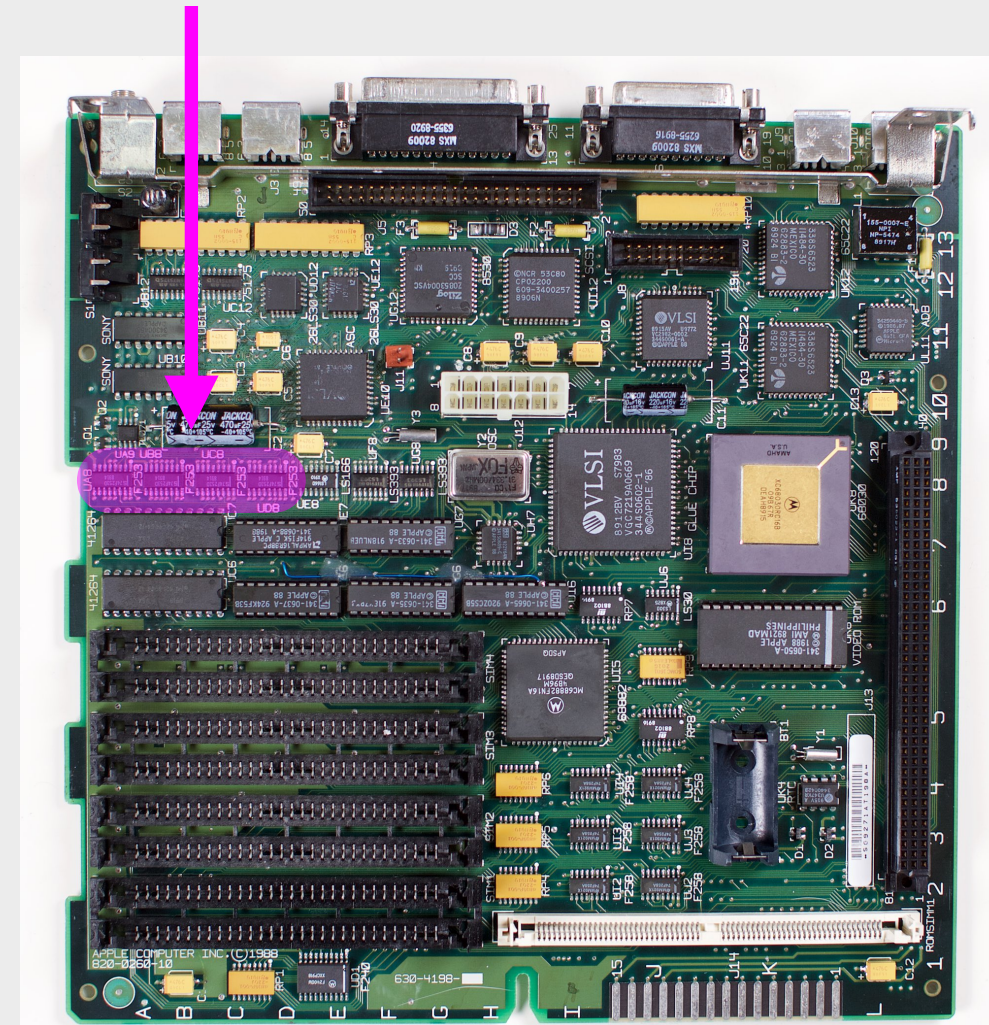
03 Troubleshooting & Repair — Step 7

Video Multiplexing Circuit: UA8, UB8, UC8 & UD8 Multiplexers

The TTL signals of functioning multiplexers should look like the following. Most scope shots were taken when the Mac was idling with a flashing question mark. Exceptions are noted in the captions when applicable. This page, and those that follow, show examples of how each signal should look, from pin 1 through pin 16. **UD8 Pin 15 is shown below.**



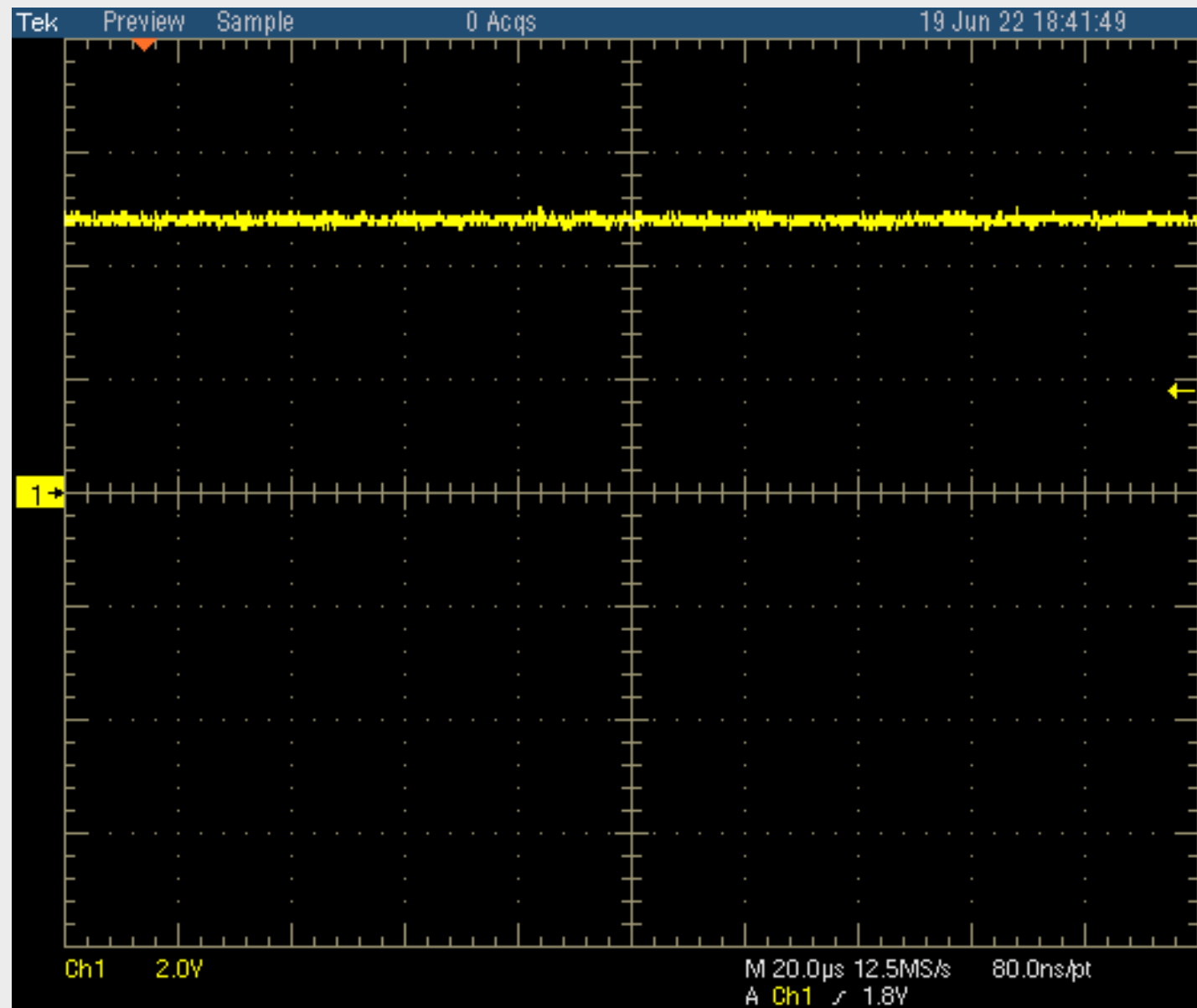
UD8 (74F253) Pin 15: Ground



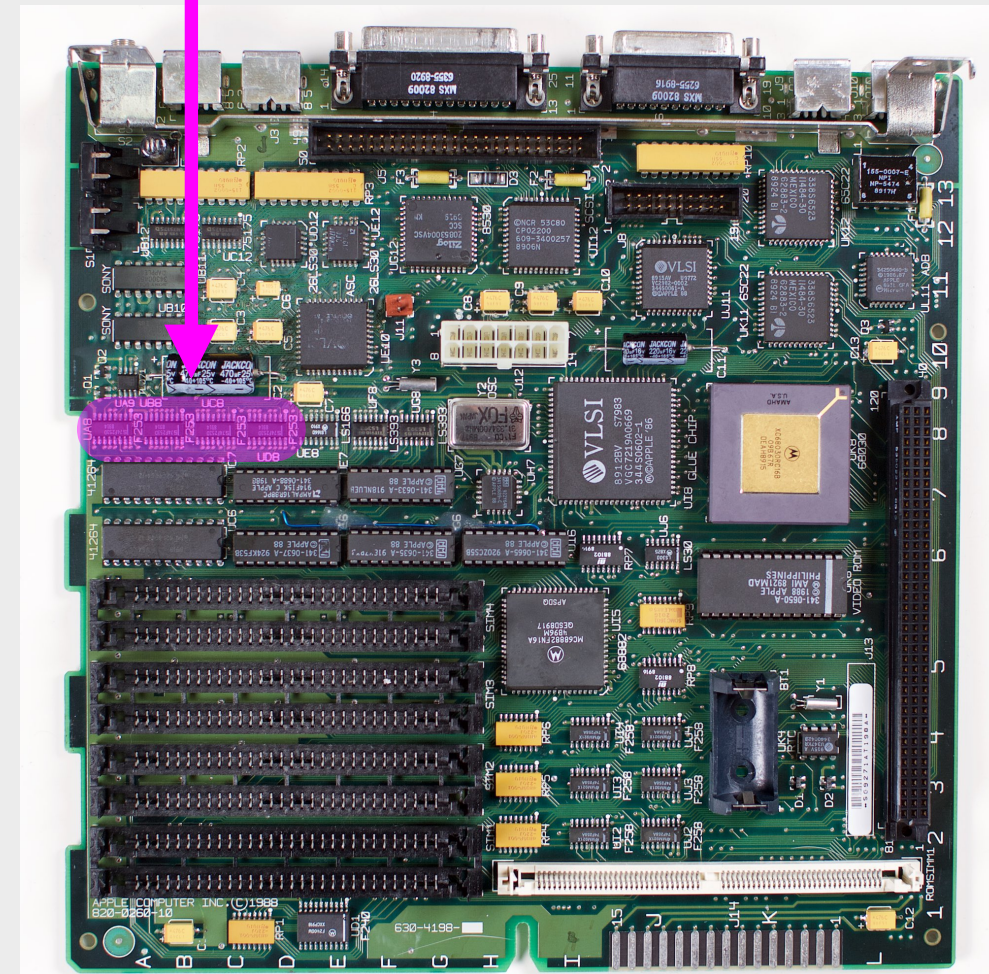
03 Troubleshooting & Repair — Step 7

Video Multiplexing Circuit: UA8, UB8, UC8 & UD8 Multiplexers

The TTL signals of functioning multiplexers should look like the following. Most scope shots were taken when the Mac was idling with a flashing question mark. Exceptions are noted in the captions when applicable. This page, and those that follow, show examples of how each signal should look, from pin 1 through pin 16. **UD8 Pin 16 is shown below.**



UD8 (74F253) Pin 16: +5V



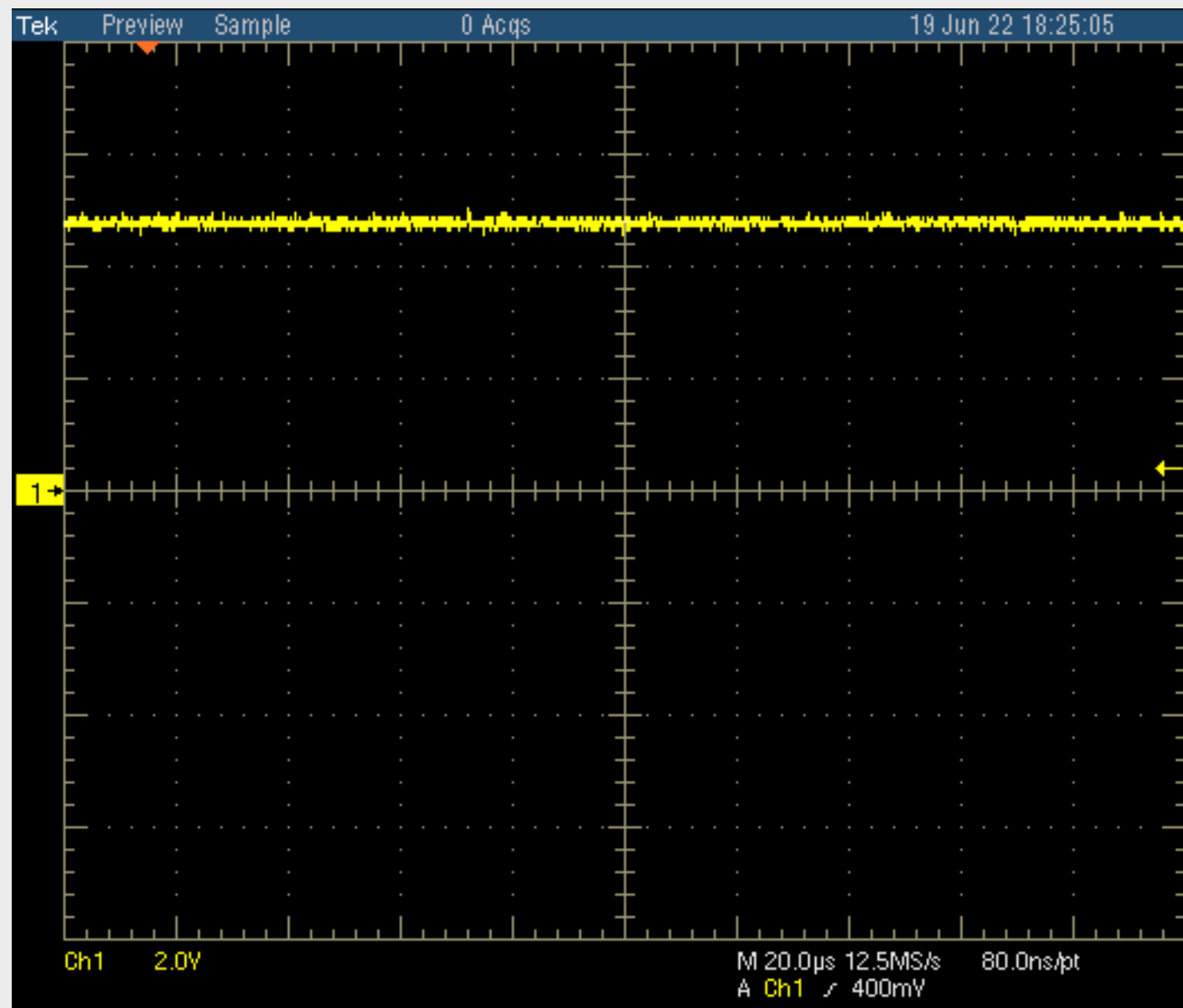
03 Troubleshooting & Repair — Step 7

Video Multiplexing Circuit: UE8 Shift Register - Pin 01

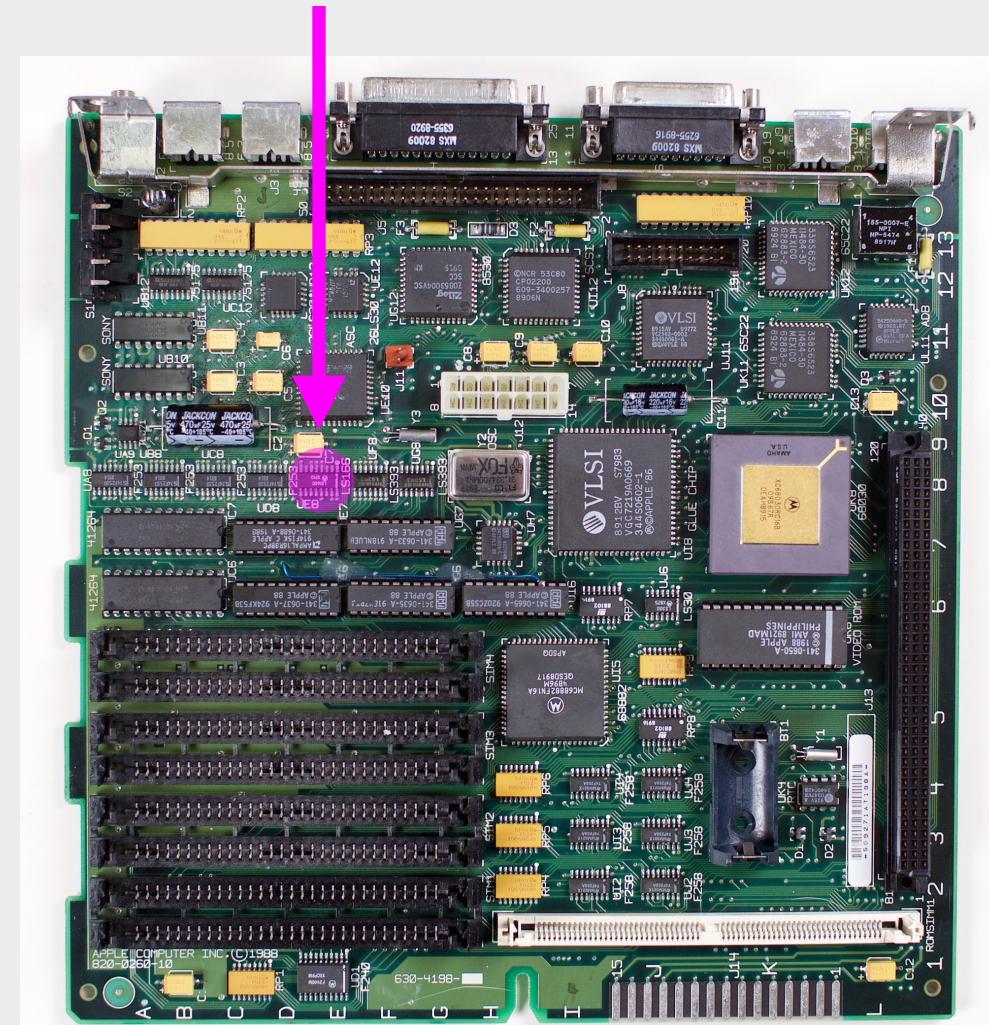
The TTL signals of a functioning shift register should look like the following when the Mac is idling with a flashing question mark.

This page, and those that follow, will show examples of how each signal should look, from pin 1 through pin 16.

Please focus on the image caption below.



UE8 (74F253) Pin 01: PU2

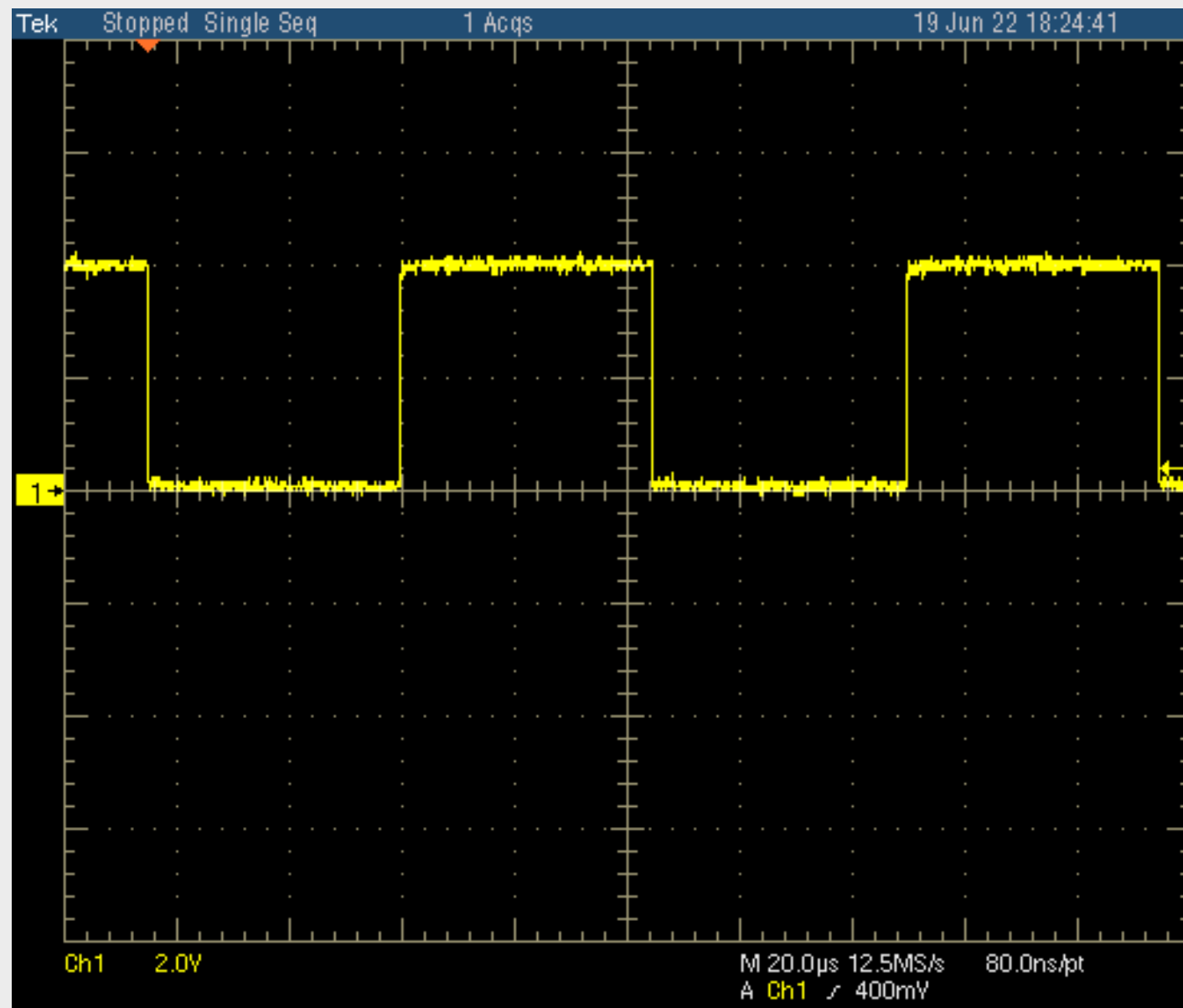


03 Troubleshooting & Repair — Step 7

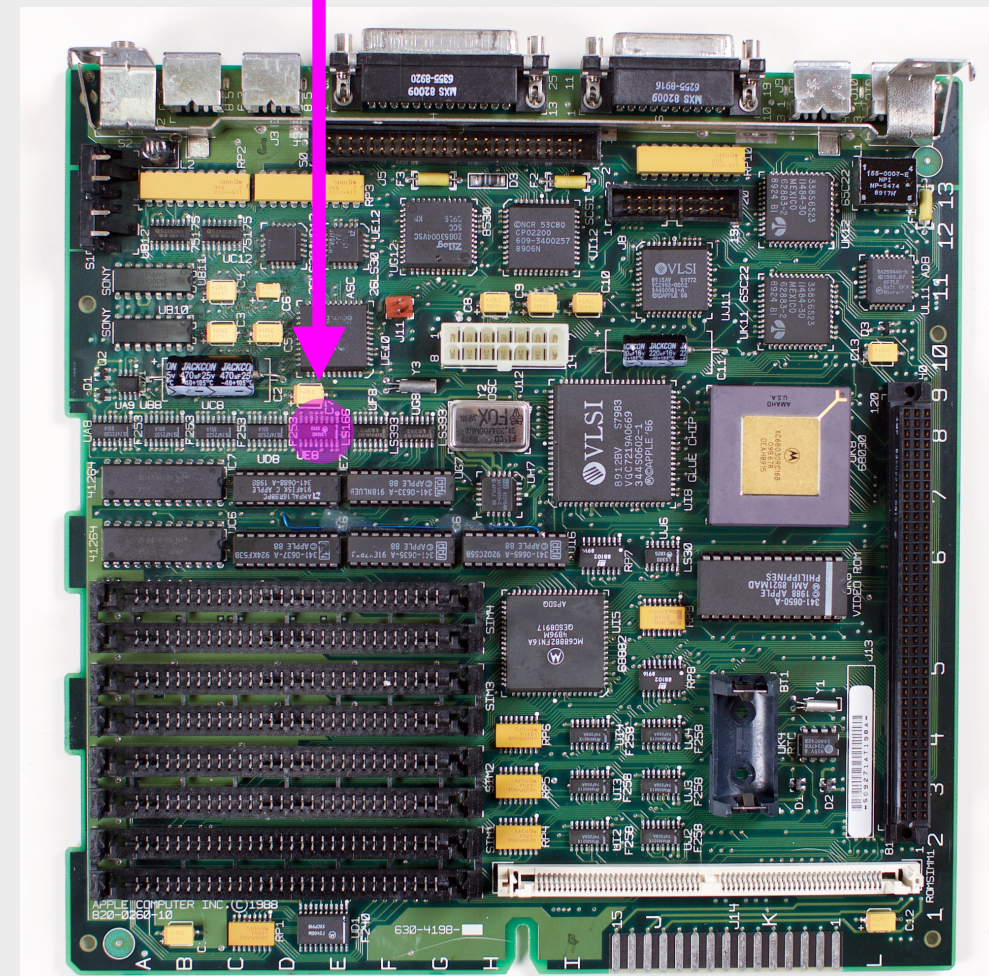
Video Multiplexing Circuit: UE8 Shift Register - Pin 02

The TTL signals of a functioning shift register should look like the following when the Mac is idling with a flashing question mark. This page, and those that follow, will show examples of how each signal should look, from pin 1 through pin 16.

Please focus on the image caption below.



UE8 (74F253) Pin 02: VID(0)

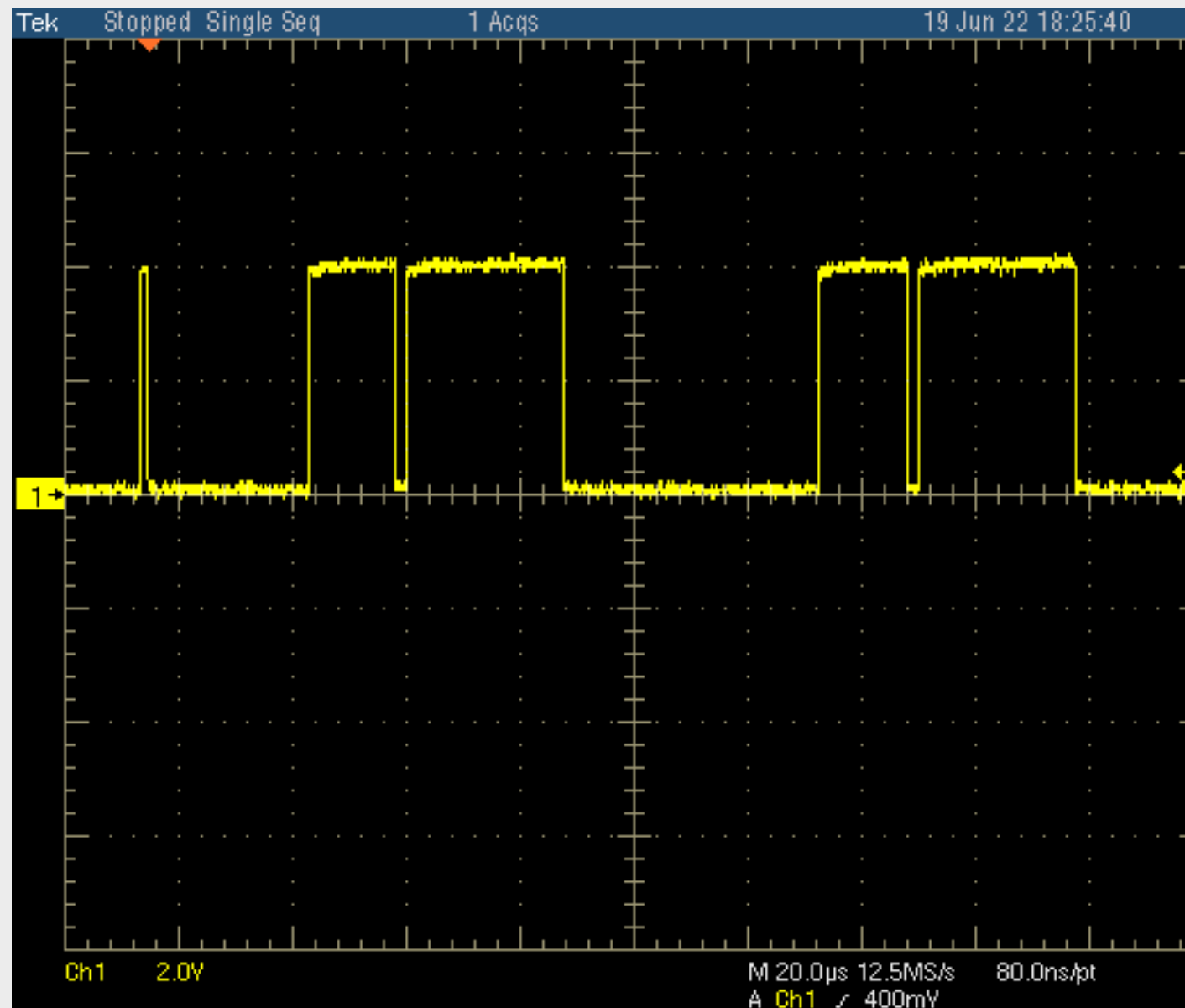


03 Troubleshooting & Repair — Step 7

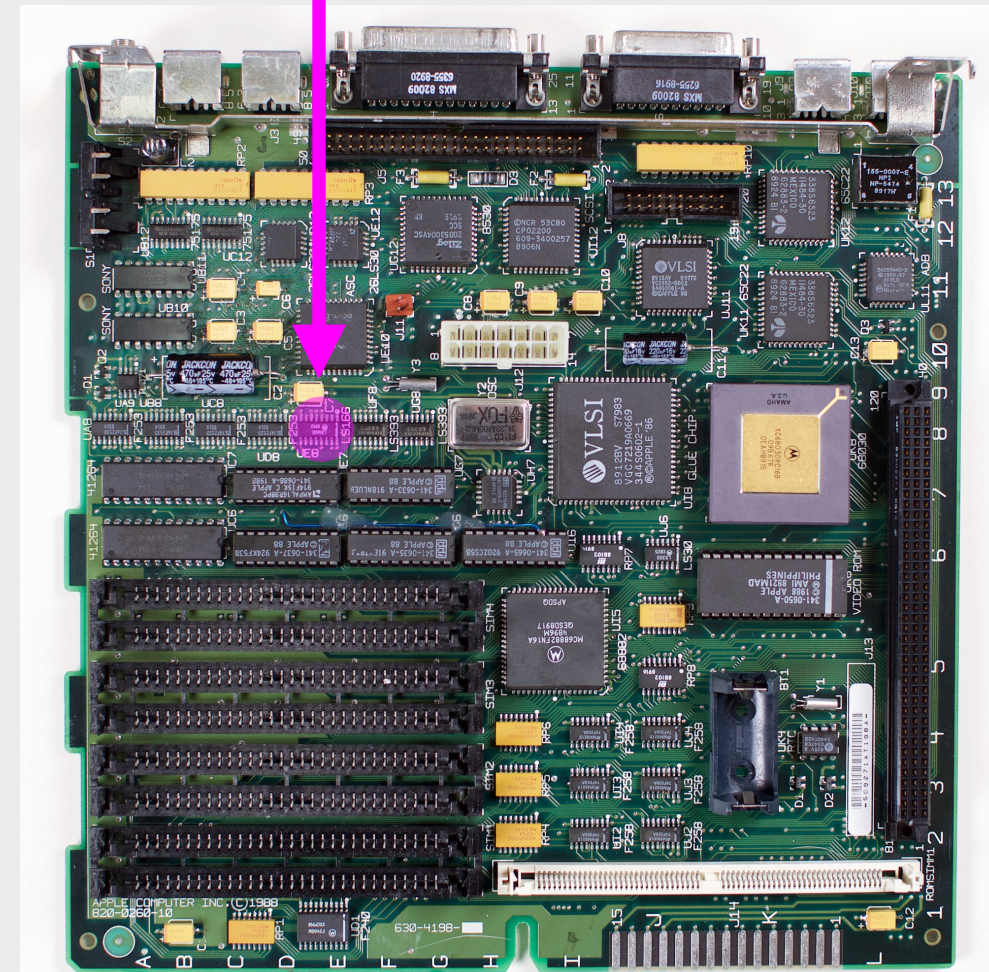
Video Multiplexing Circuit: UE8 Shift Register - Pin 03

The TTL signals of a functioning shift register should look like the following when the Mac is idling with a flashing question mark. This page, and those that follow, will show examples of how each signal should look, from pin 1 through pin 16.

Please focus on the image caption below.



UE8 (74F253) Pin 03: VID(1)

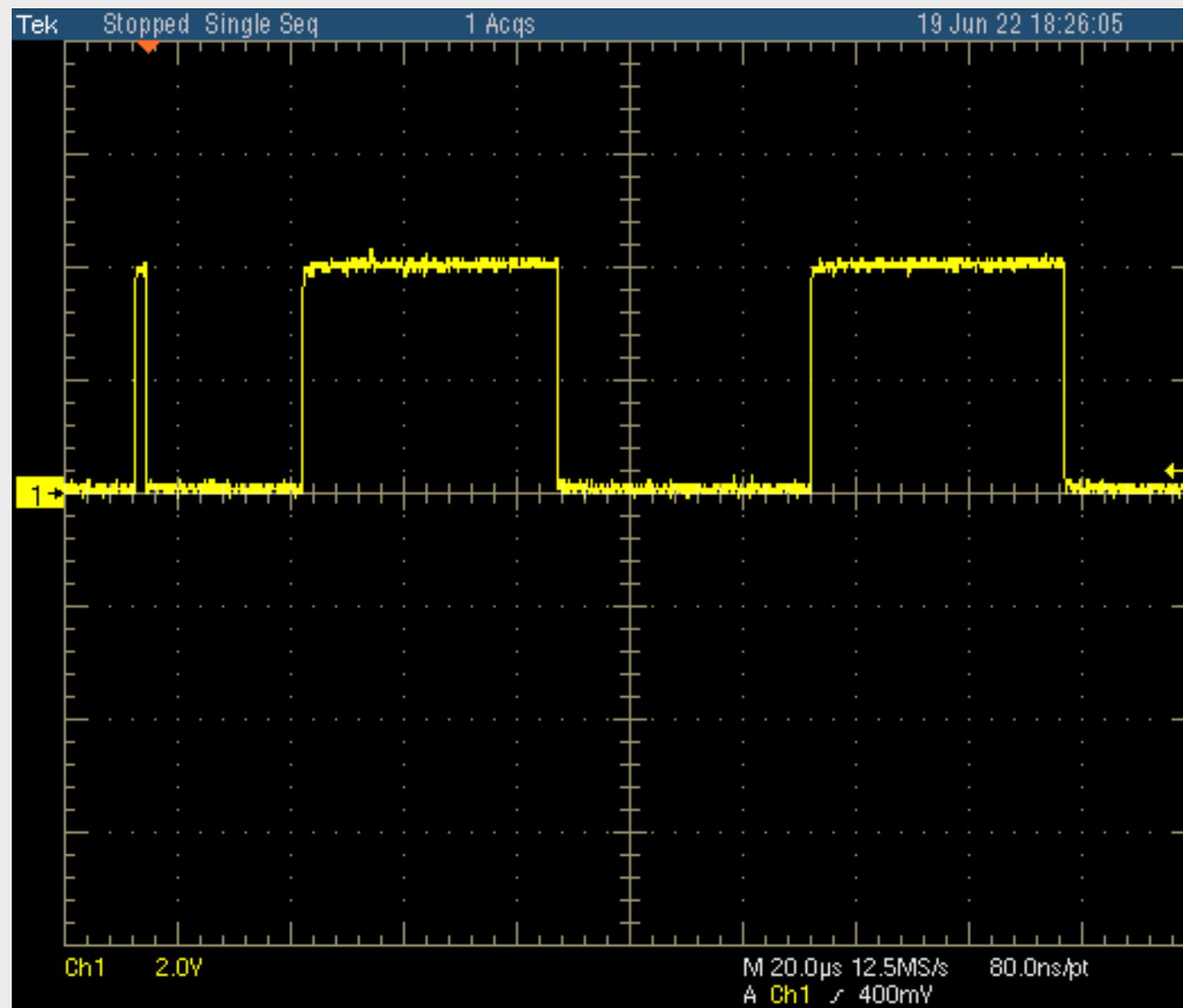


03 Troubleshooting & Repair — Step 7

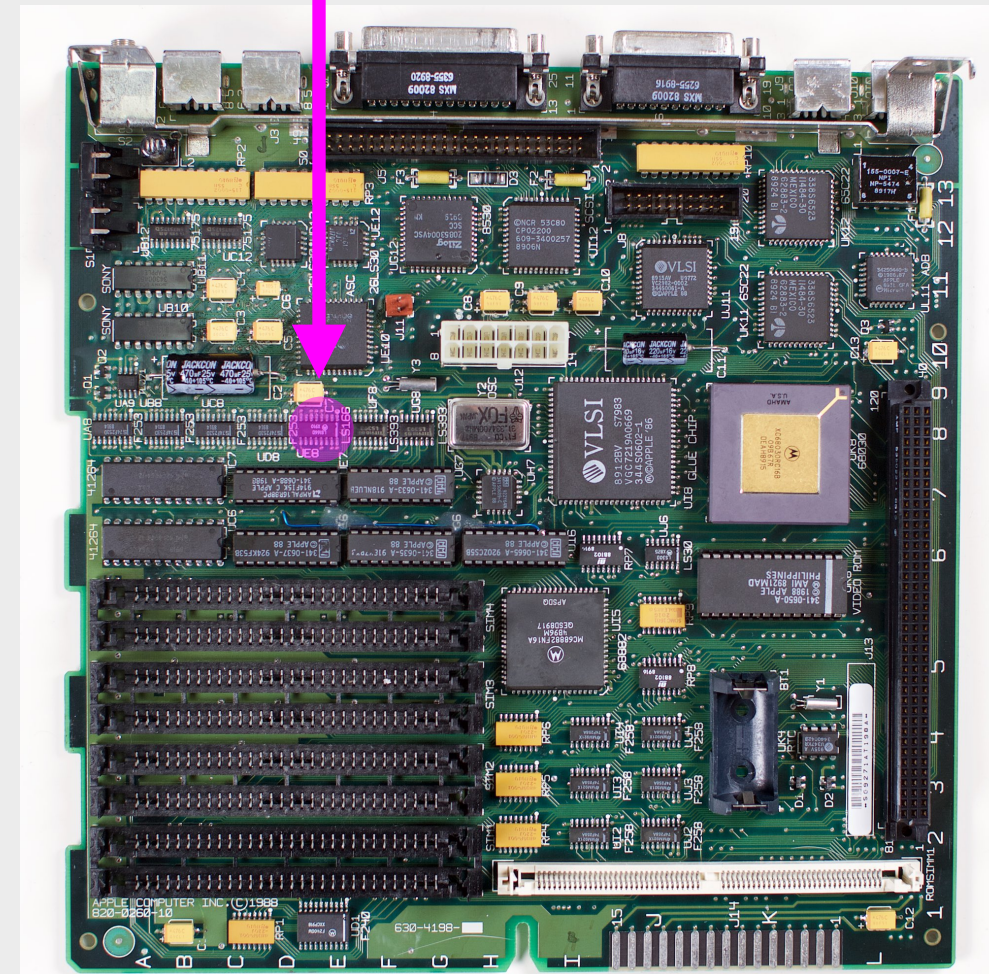
Video Multiplexing Circuit: UE8 Shift Register - Pin 04

The TTL signals of a functioning shift register should look like the following when the Mac is idling with a flashing question mark. This page, and those that follow, will show examples of how each signal should look, from pin 1 through pin 16.

Please focus on the image caption below.



UE8 (74F253) Pin 04: VID(2)

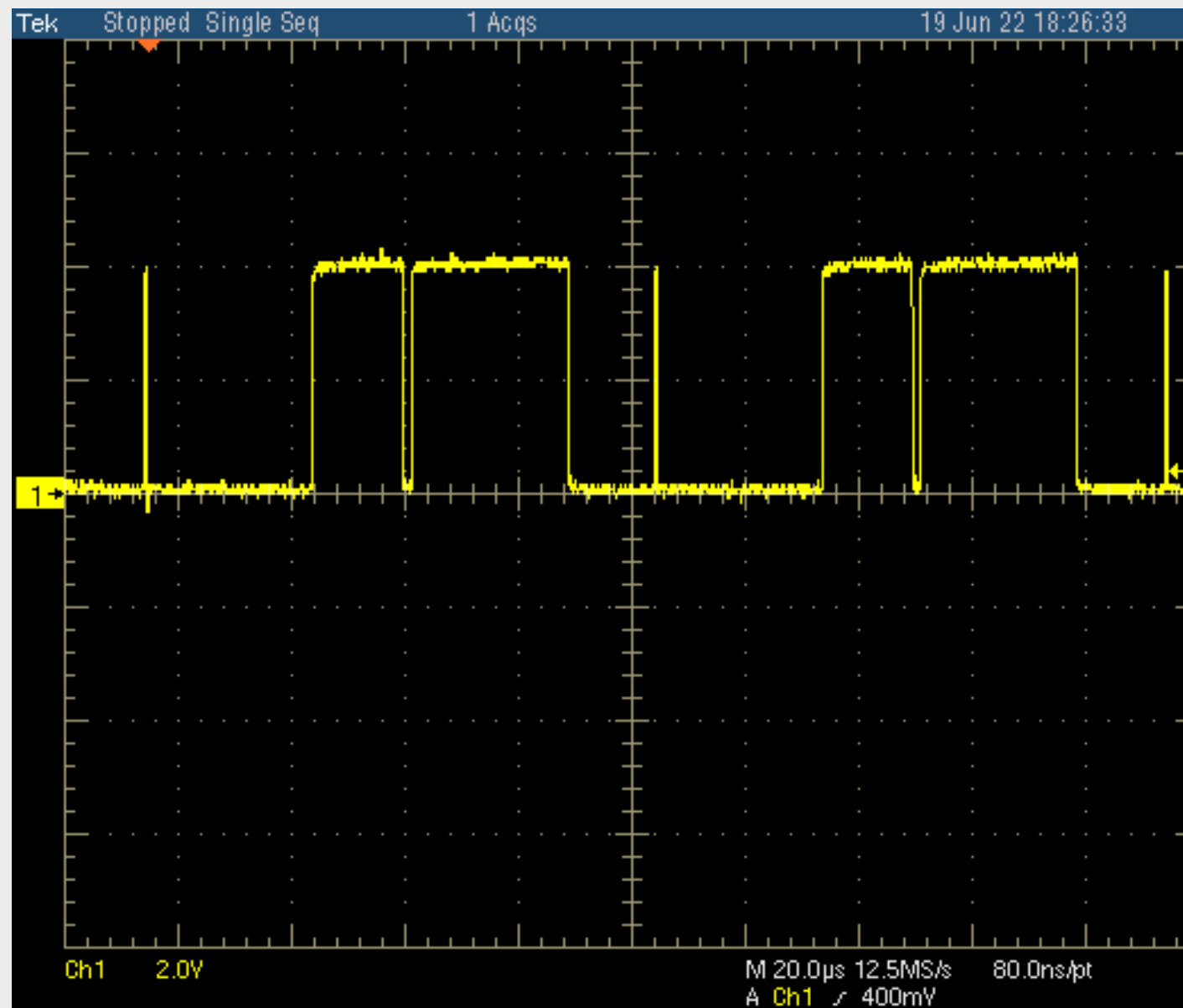


03 Troubleshooting & Repair — Step 7

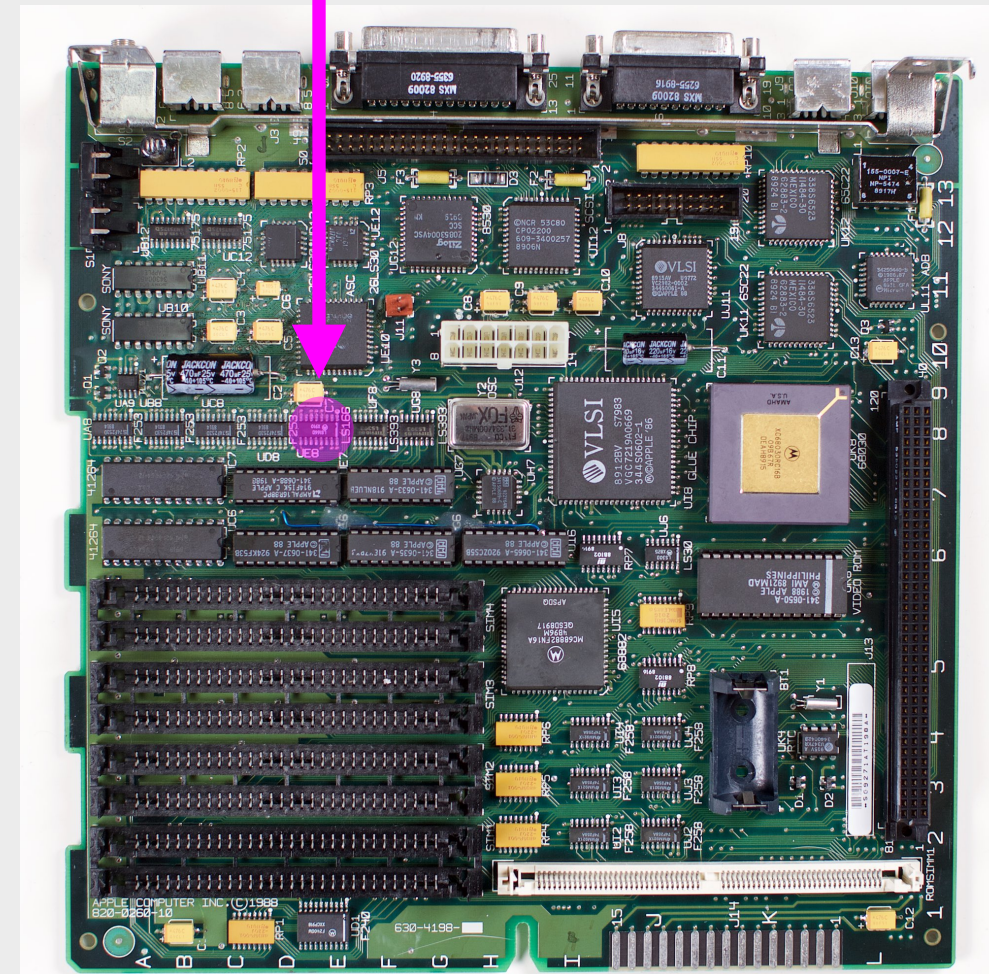
Video Multiplexing Circuit: UE8 Shift Register - Pin 05

The TTL signals of a functioning shift register should look like the following when the Mac is idling with a flashing question mark. This page, and those that follow, will show examples of how each signal should look, from pin 1 through pin 16.

Please focus on the image caption below.



UE8 (74F253) Pin 05: VID(3)

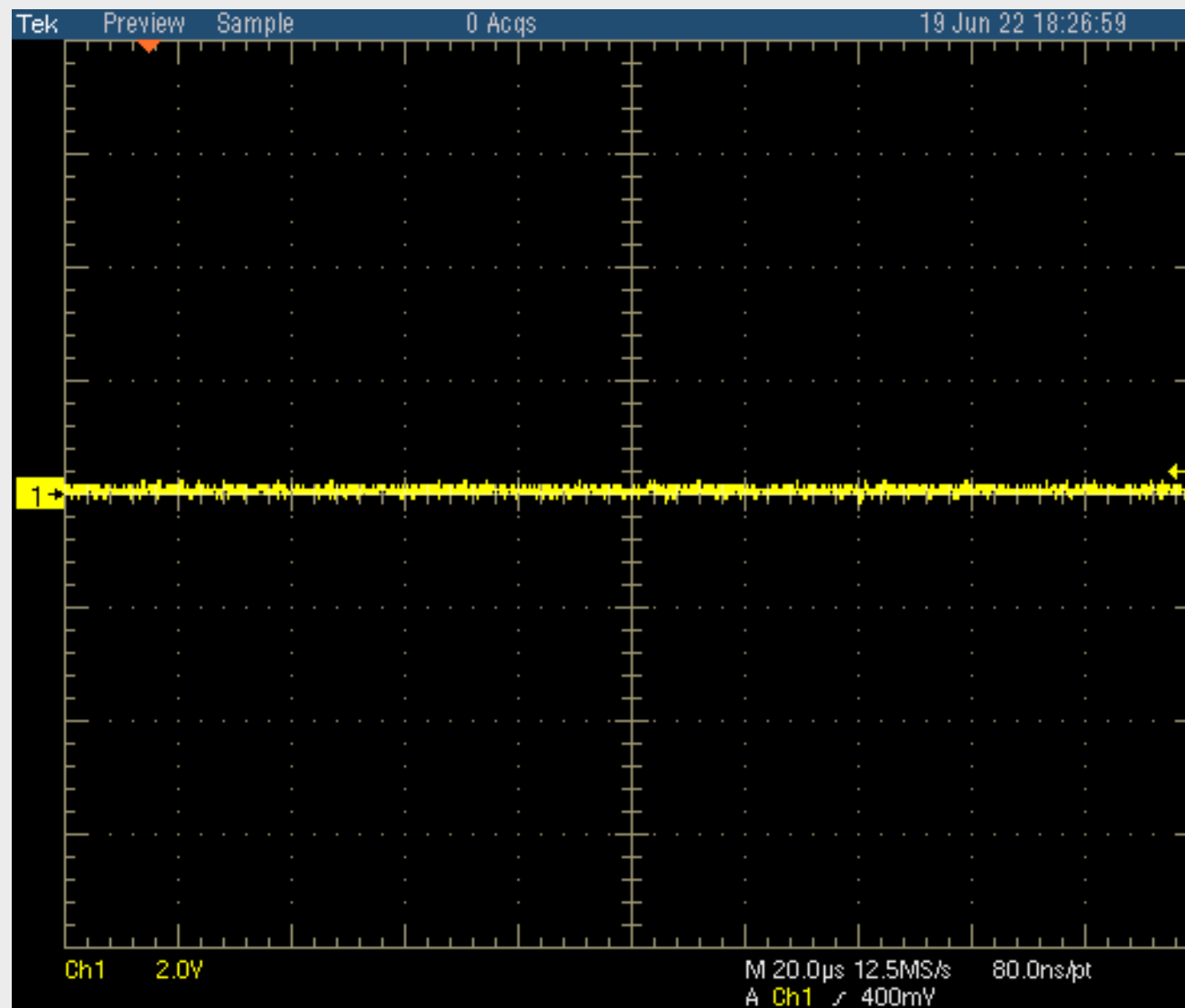


03 Troubleshooting & Repair — Step 7

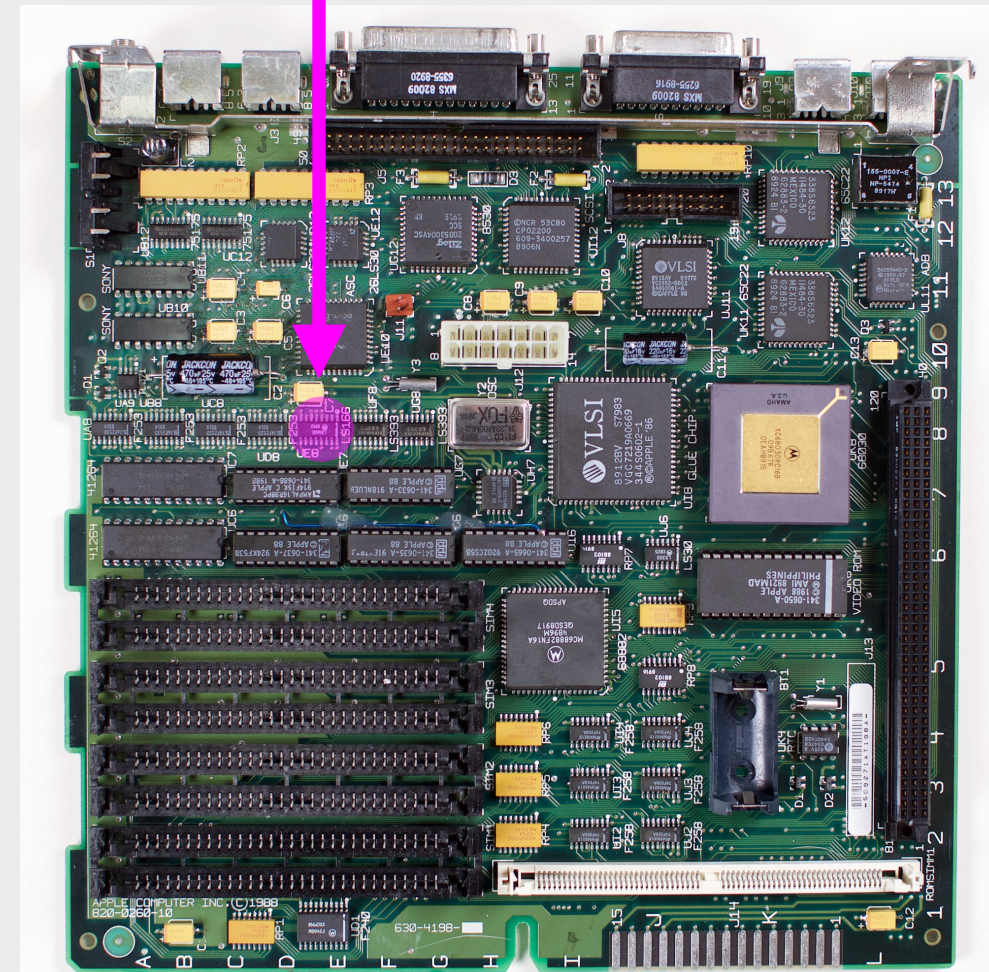
Video Multiplexing Circuit: UE8 Shift Register - Pin 06

The TTL signals of a functioning shift register should look like the following when the Mac is idling with a flashing question mark. This page, and those that follow, will show examples of how each signal should look, from pin 1 through pin 16.

Please focus on the image caption below.



UE8 (74F253) Pin 06: Ground

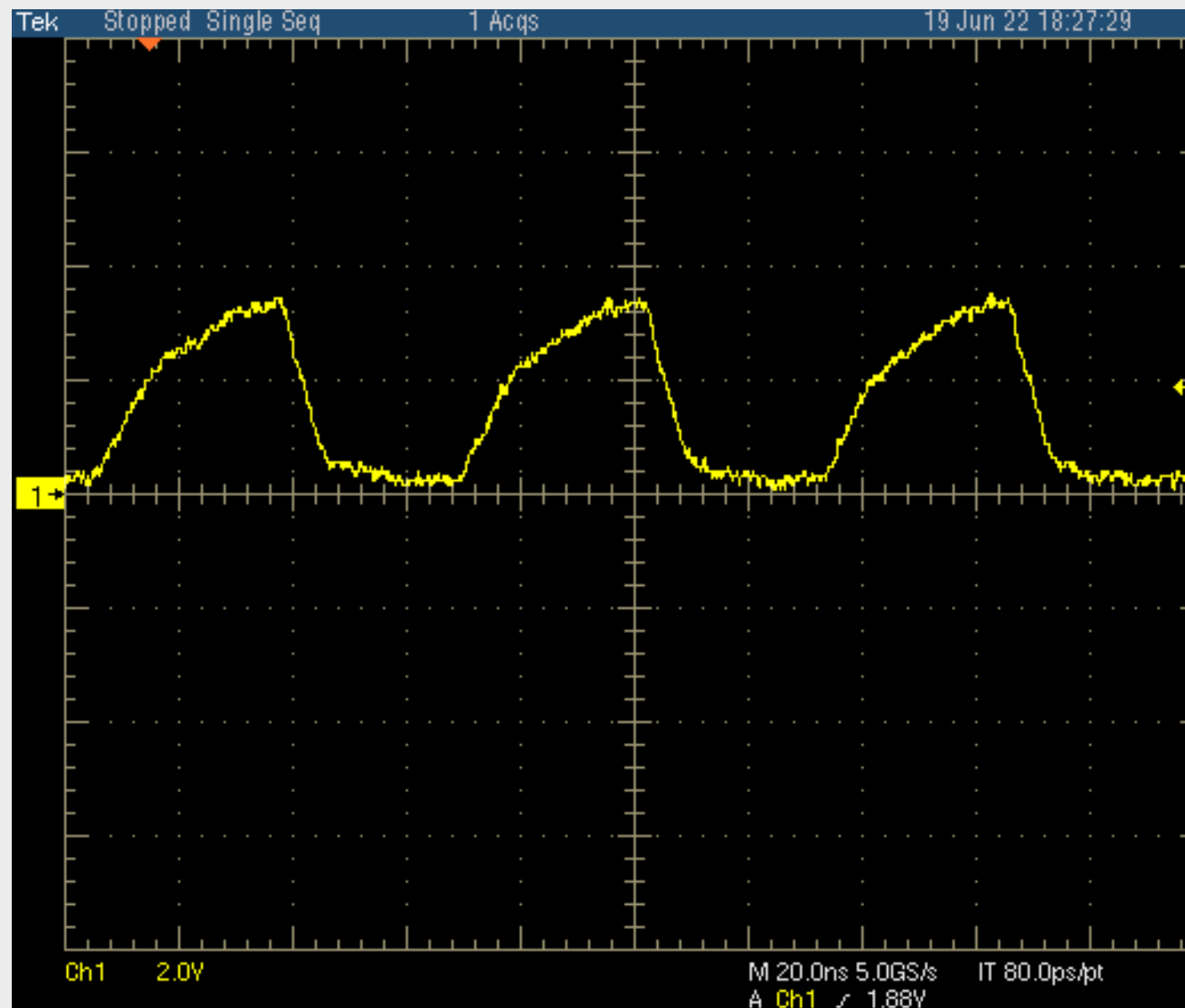


03 Troubleshooting & Repair — Step 7

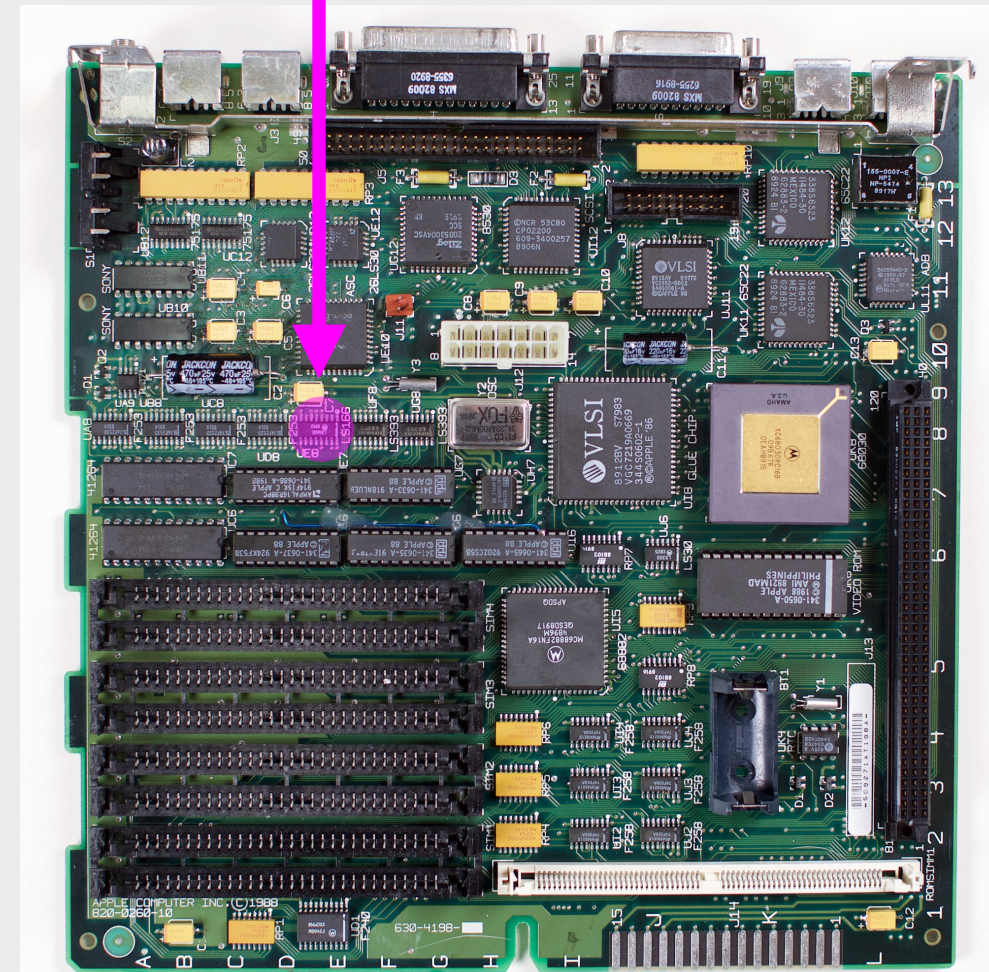
Video Multiplexing Circuit: UE8 Shift Register - Pin 07

The TTL signals of a functioning shift register should look like the following when the Mac is idling with a flashing question mark. This page, and those that follow, will show examples of how each signal should look, from pin 1 through pin 16.

Please focus on the image caption below.



UE8 (74F253) Pin 07: C16M (Clock)



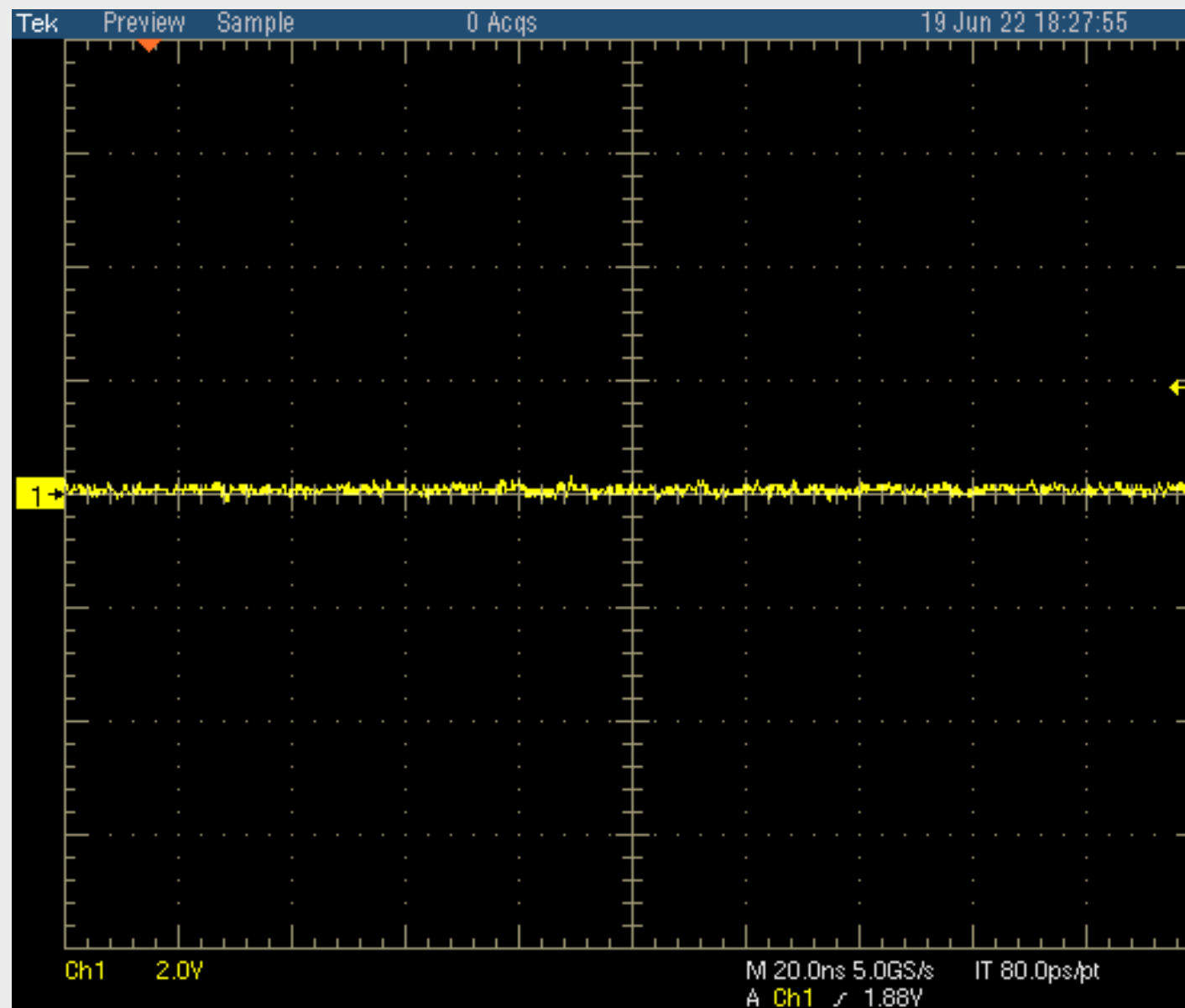
03 Troubleshooting & Repair — Step 7

Video Multiplexing Circuit: UE8 Shift Register - Pin 08

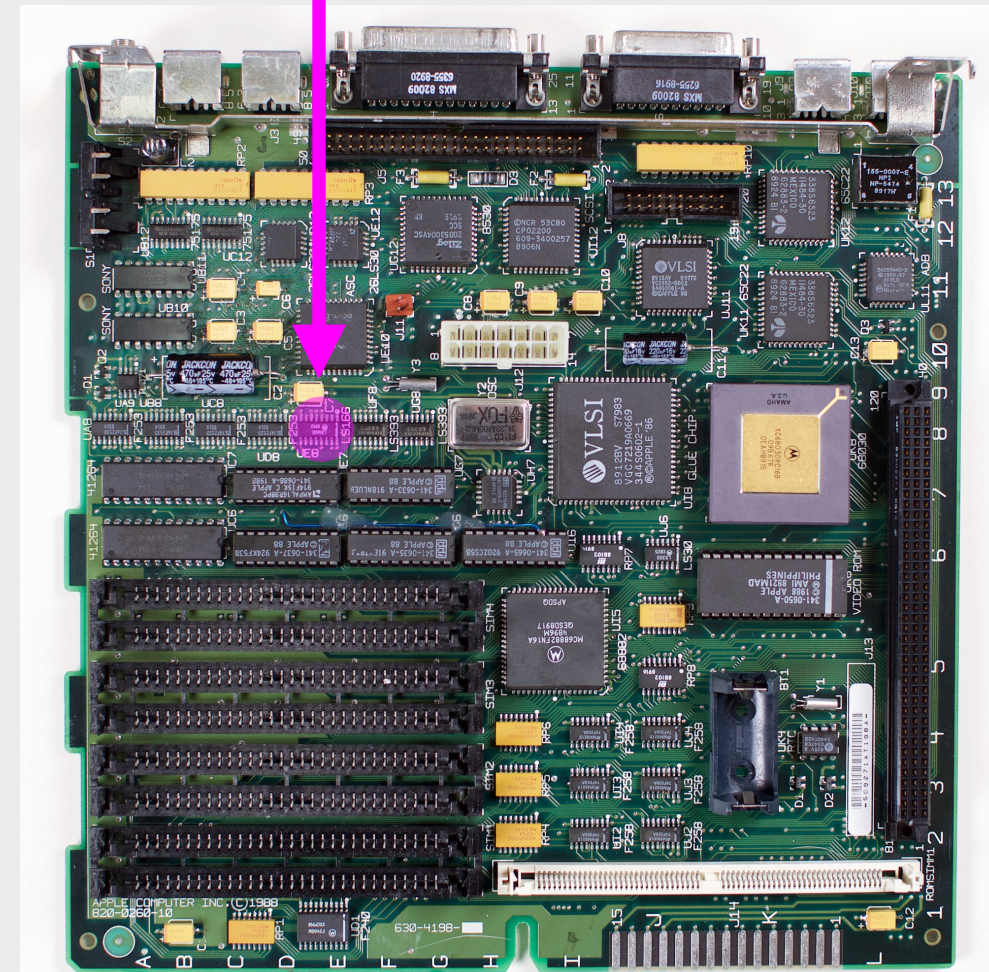
The TTL signals of a functioning shift register should look like the following when the Mac is idling with a flashing question mark.

This page, and those that follow, will show examples of how each signal should look, from pin 1 through pin 16.

Please focus on the image caption below.



UE8 (74F253) Pin 08: Ground

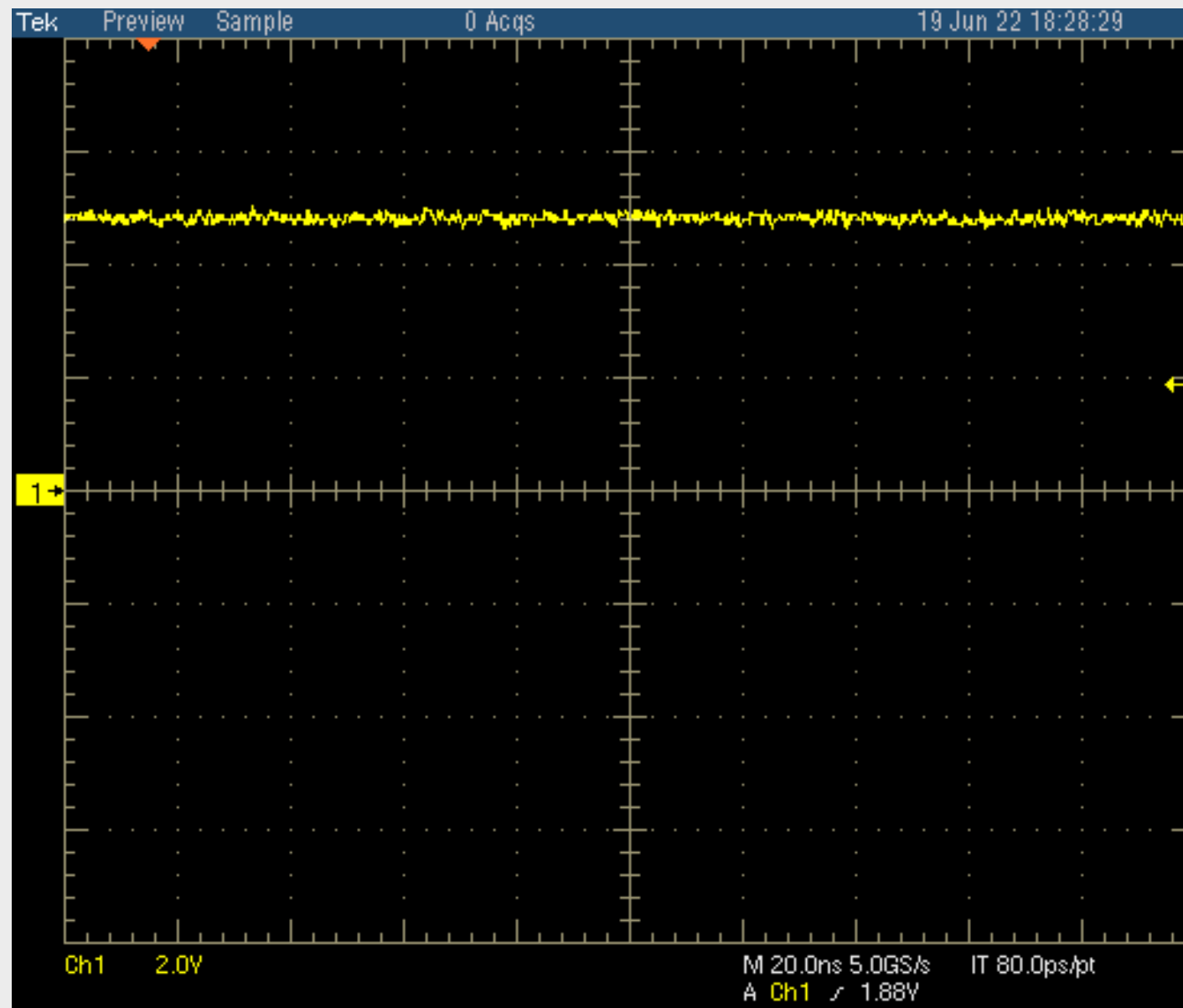


03 Troubleshooting & Repair — Step 7

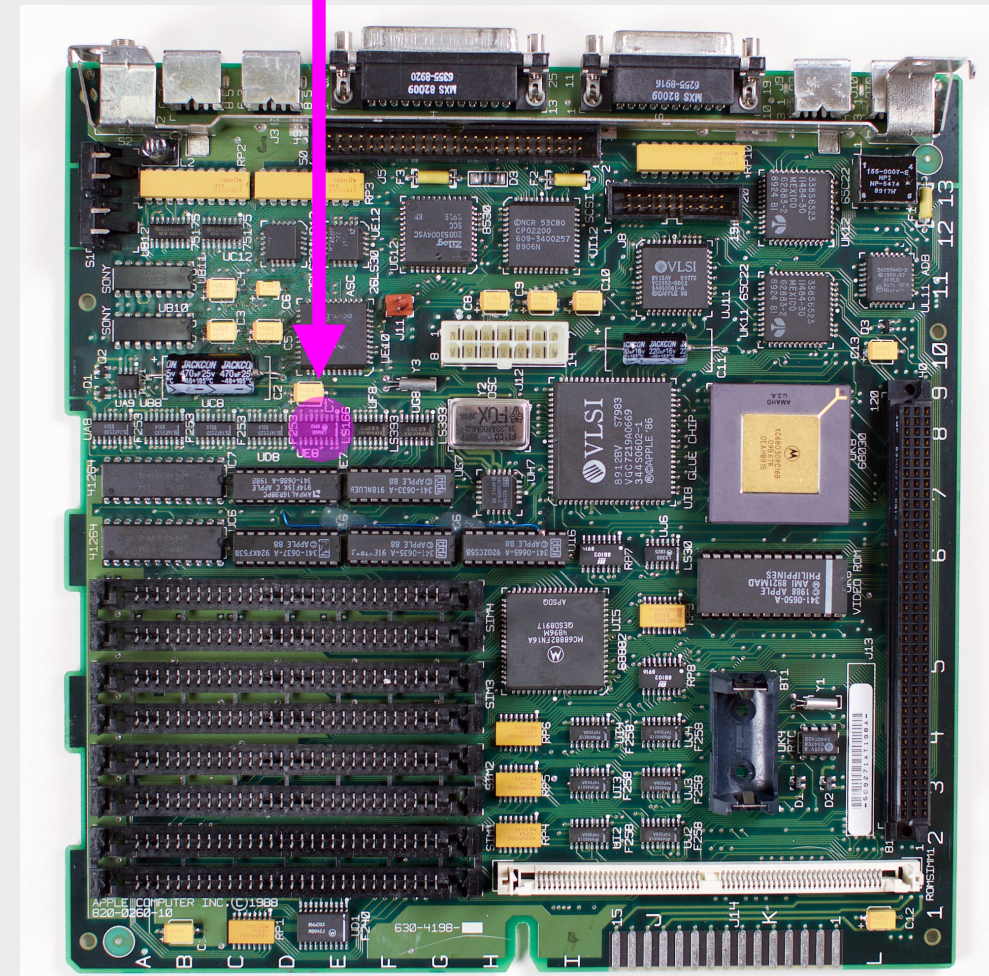
Video Multiplexing Circuit: UE8 Shift Register - Pin 09

The TTL signals of a functioning shift register should look like the following when the Mac is idling with a flashing question mark. This page, and those that follow, will show examples of how each signal should look, from pin 1 through pin 16.

Please focus on the image caption below.



UE8 (74F253) Pin 09: PU2

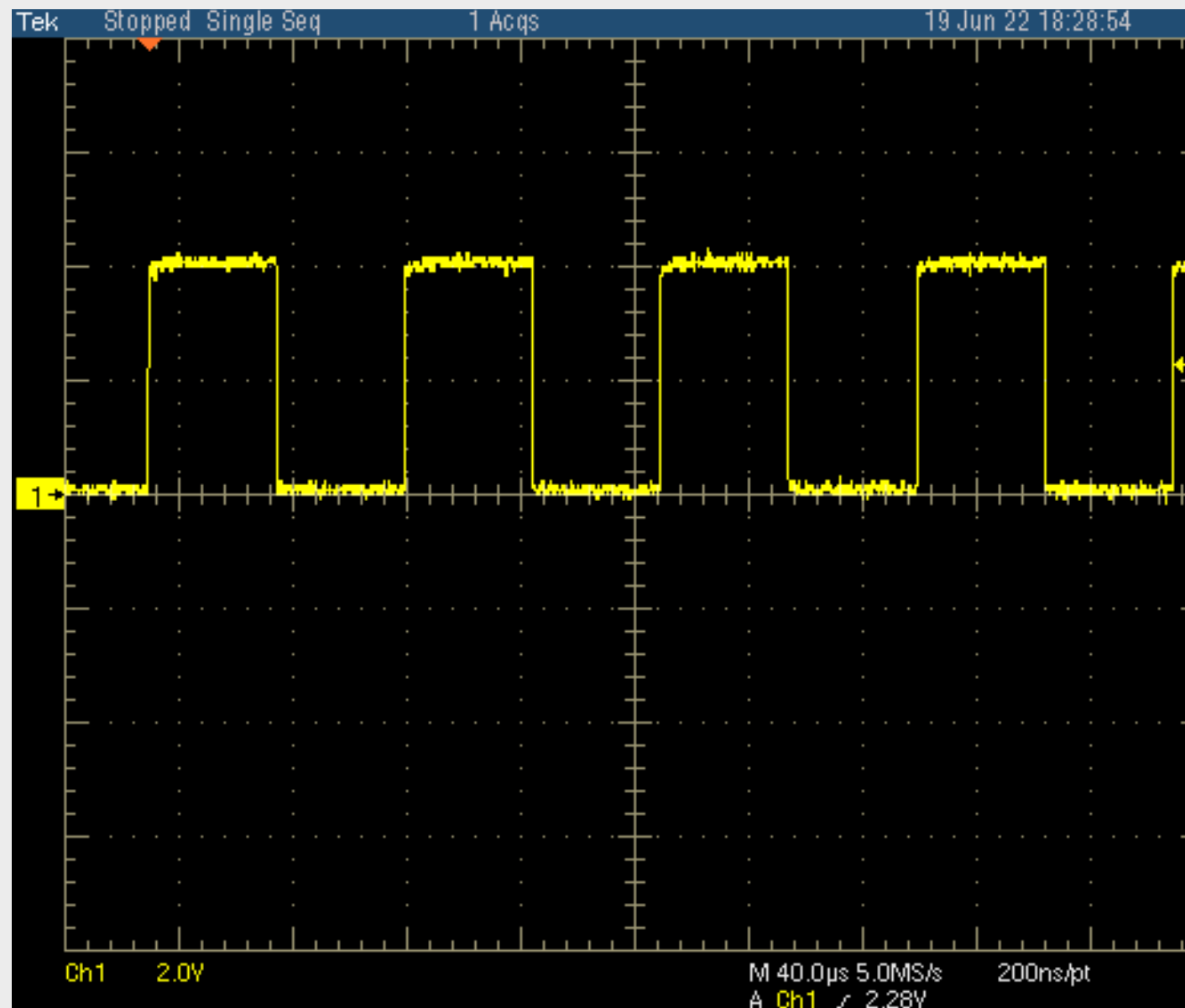


03 Troubleshooting & Repair — Step 7

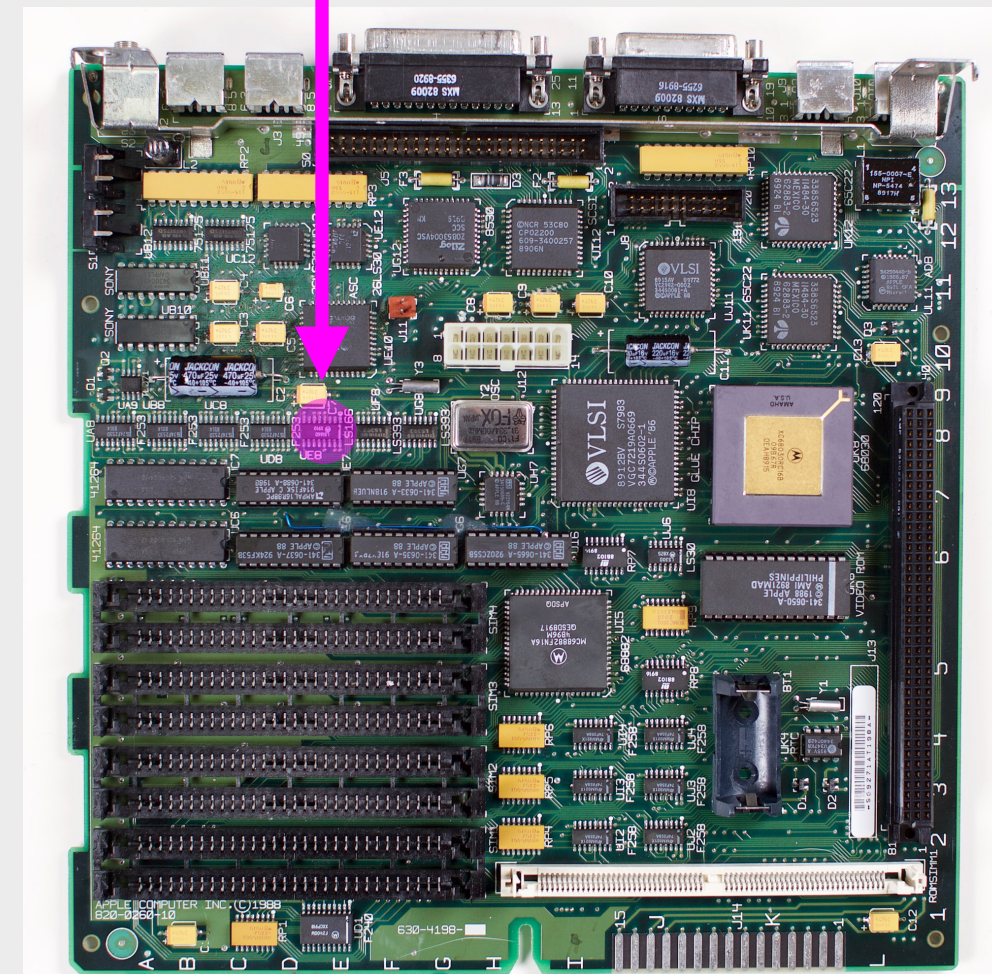
Video Multiplexing Circuit: UE8 Shift Register - Pin 10

The TTL signals of a functioning shift register should look like the following when the Mac is idling with a flashing question mark. This page, and those that follow, will show examples of how each signal should look, from pin 1 through pin 16.

Please focus on the image caption below.



UE8 (74F253) Pin 10: VID(4)

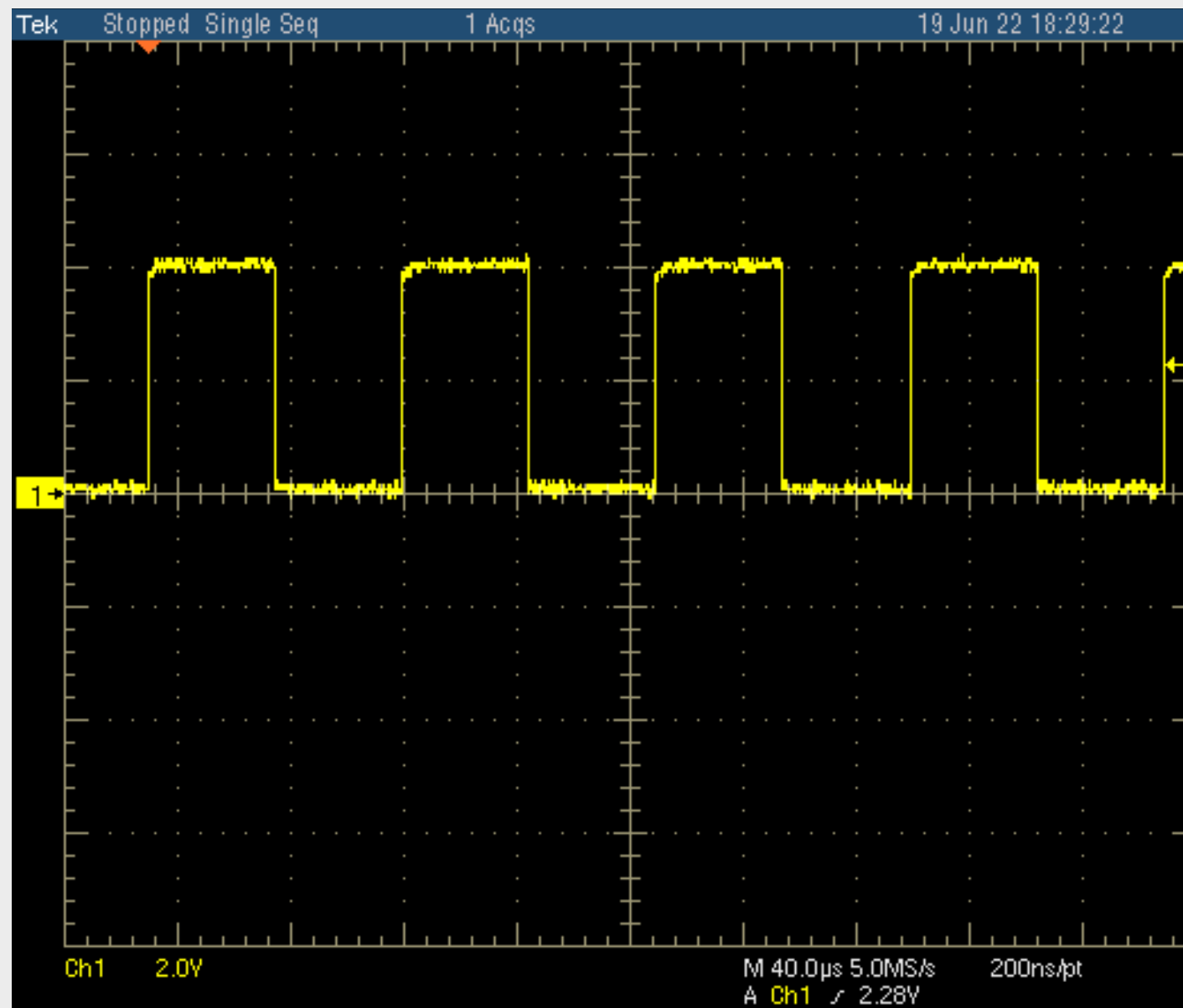


03 Troubleshooting & Repair — Step 7

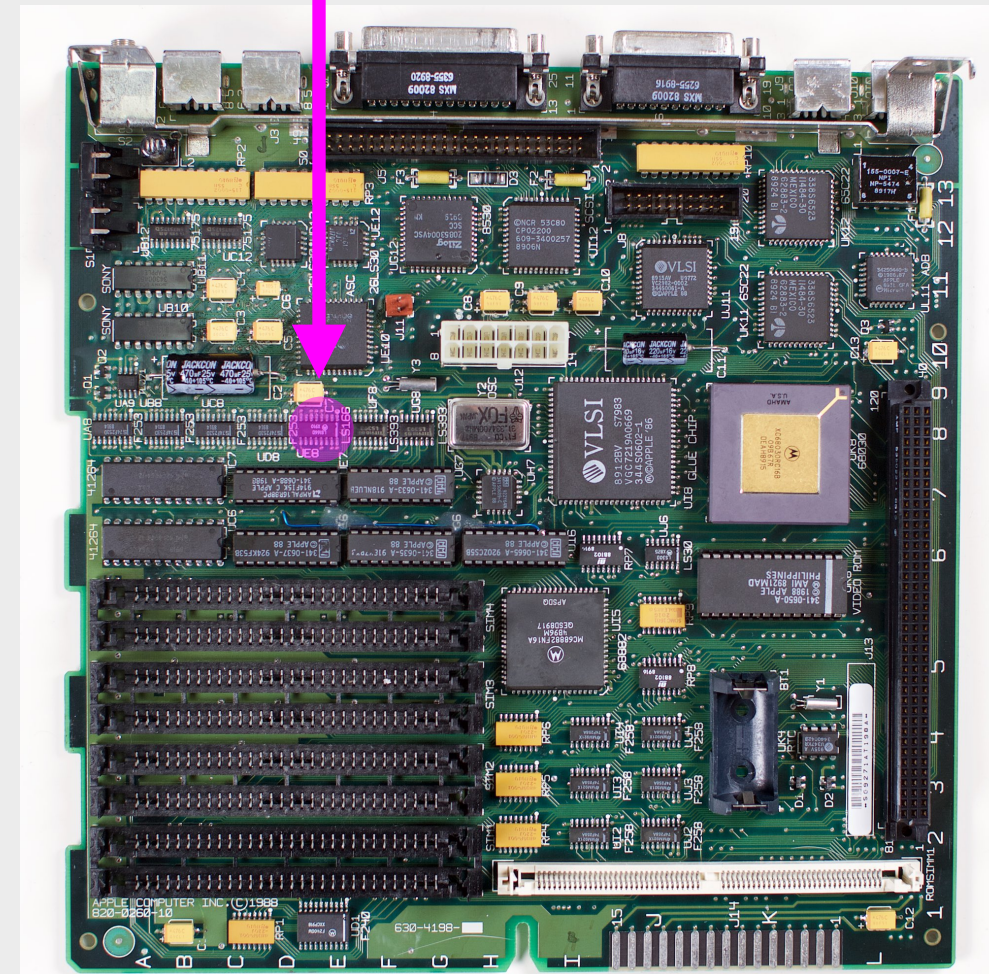
Video Multiplexing Circuit: UE8 Shift Register - Pin 11

The TTL signals of a functioning shift register should look like the following when the Mac is idling with a flashing question mark. This page, and those that follow, will show examples of how each signal should look, from pin 1 through pin 16.

Please focus on the image caption below.



UE8 (74F253) Pin 11: VID(5)

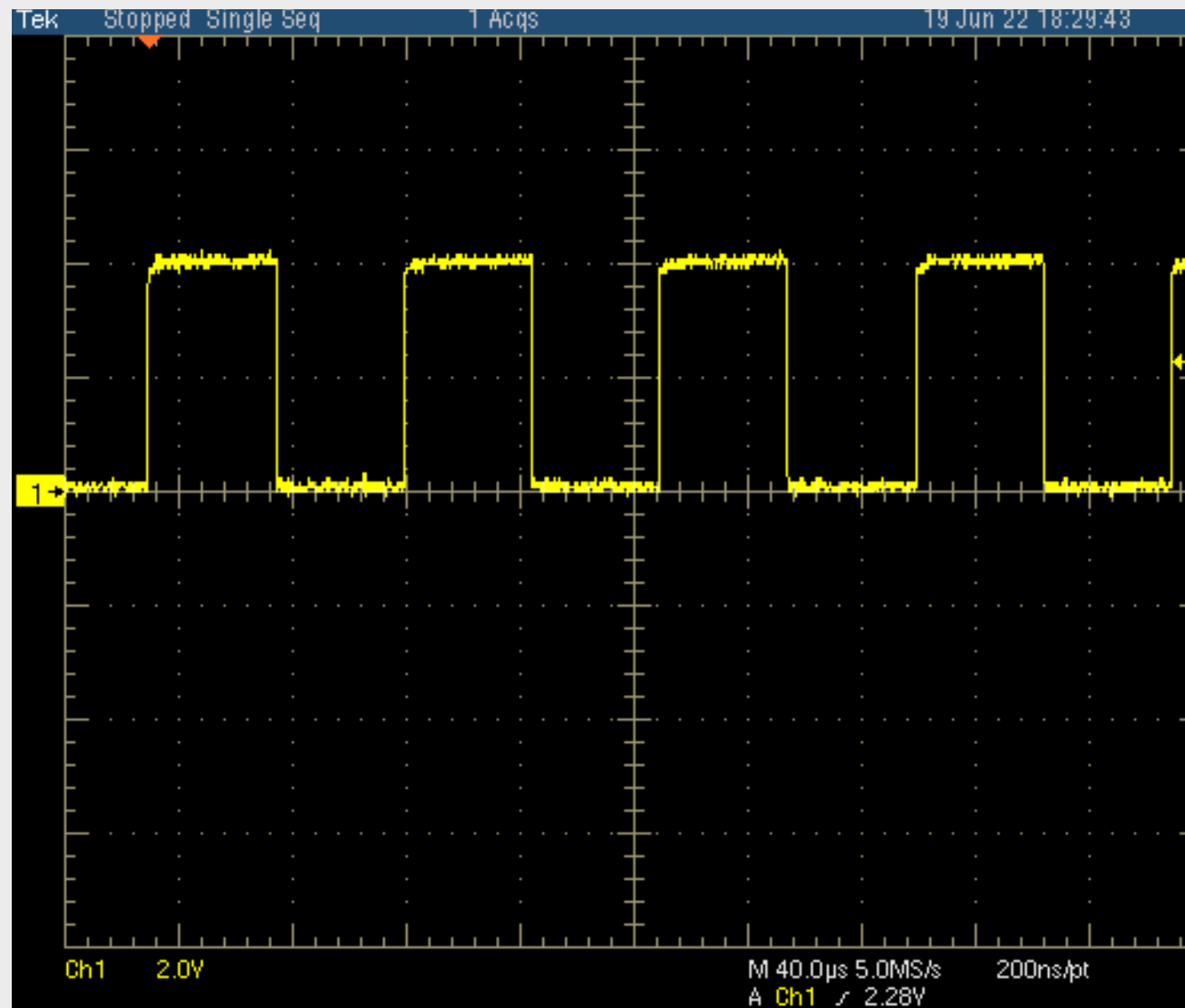


03 Troubleshooting & Repair — Step 7

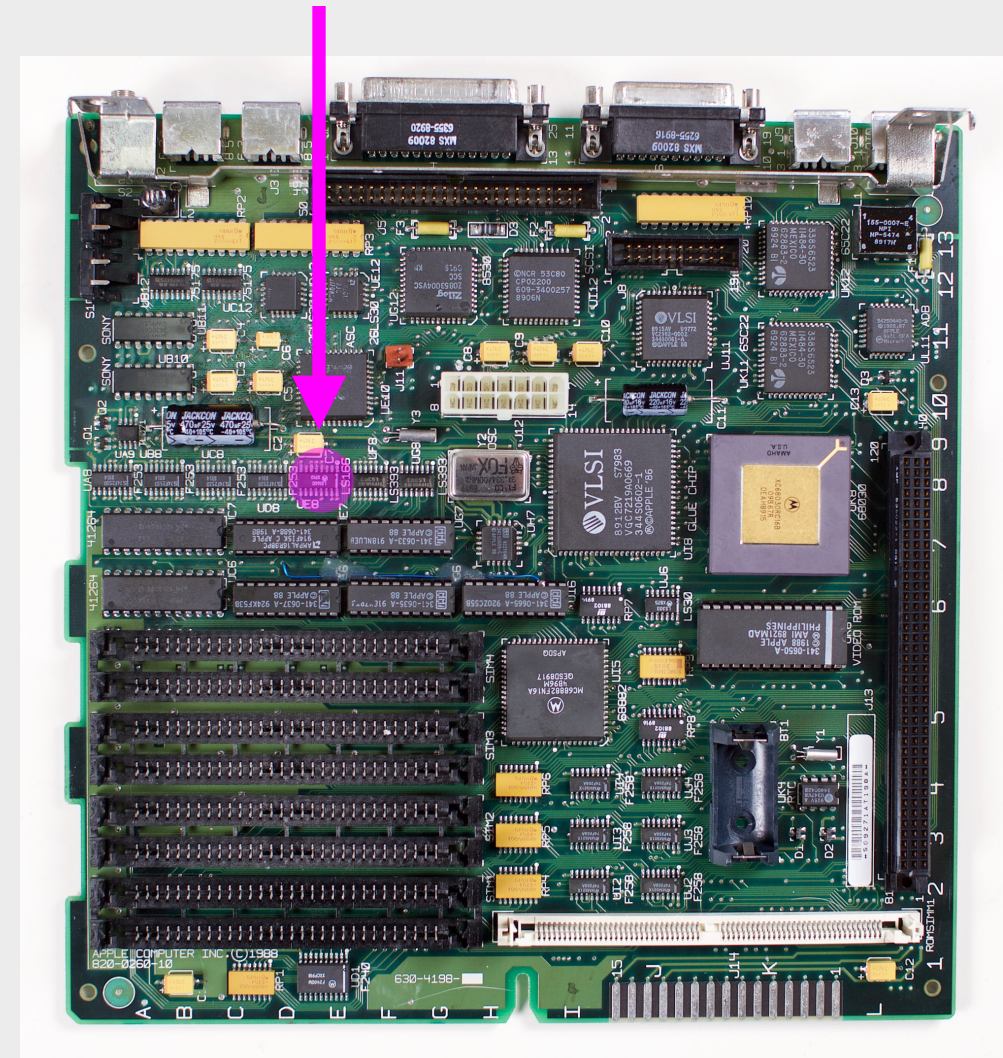
Video Multiplexing Circuit: UE8 Shift Register - Pin 12

The TTL signals of a functioning shift register should look like the following when the Mac is idling with a flashing question mark. This page, and those that follow, will show examples of how each signal should look, from pin 1 through pin 16.

Please focus on the image caption below.



UE8 (74F253) Pin 12: VID(6)

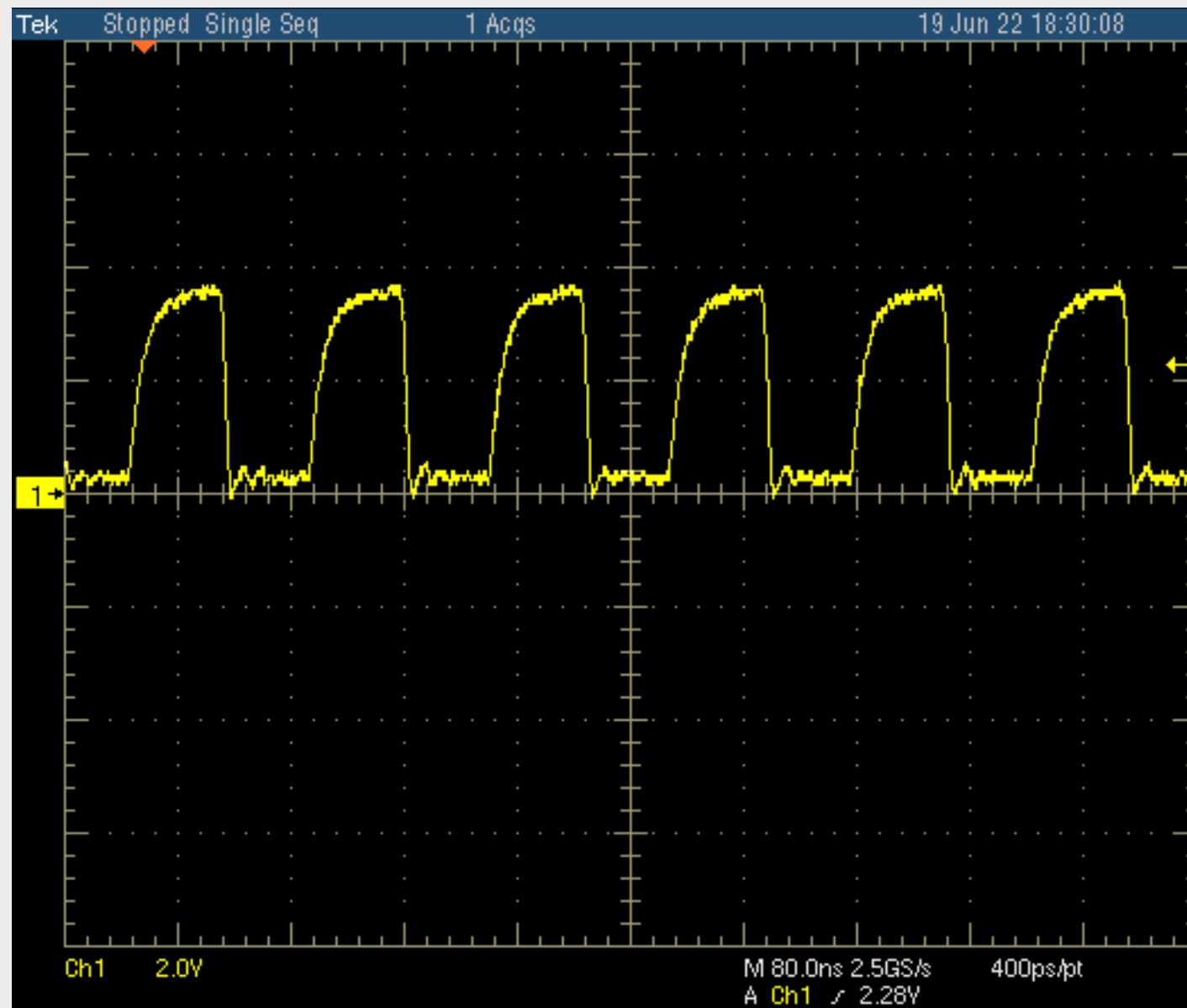


03 Troubleshooting & Repair — Step 7

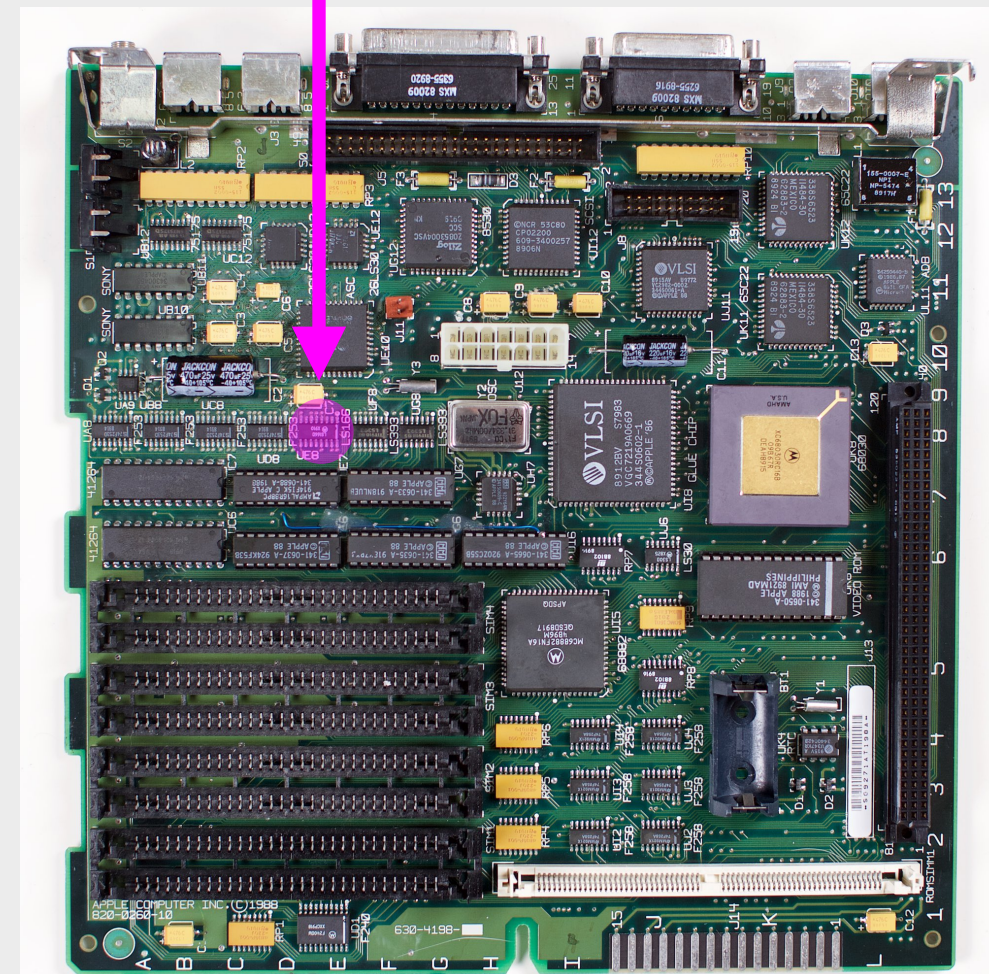
Video Multiplexing Circuit: UE8 Shift Register - Pin 13

The TTL signals of a functioning shift register should look like the following when the Mac is idling with a flashing question mark. This page, and those that follow, will show examples of how each signal should look, from pin 1 through pin 16.

Please focus on the image caption below.



UE8 (74F253) Pin 13: SERVID (Output)

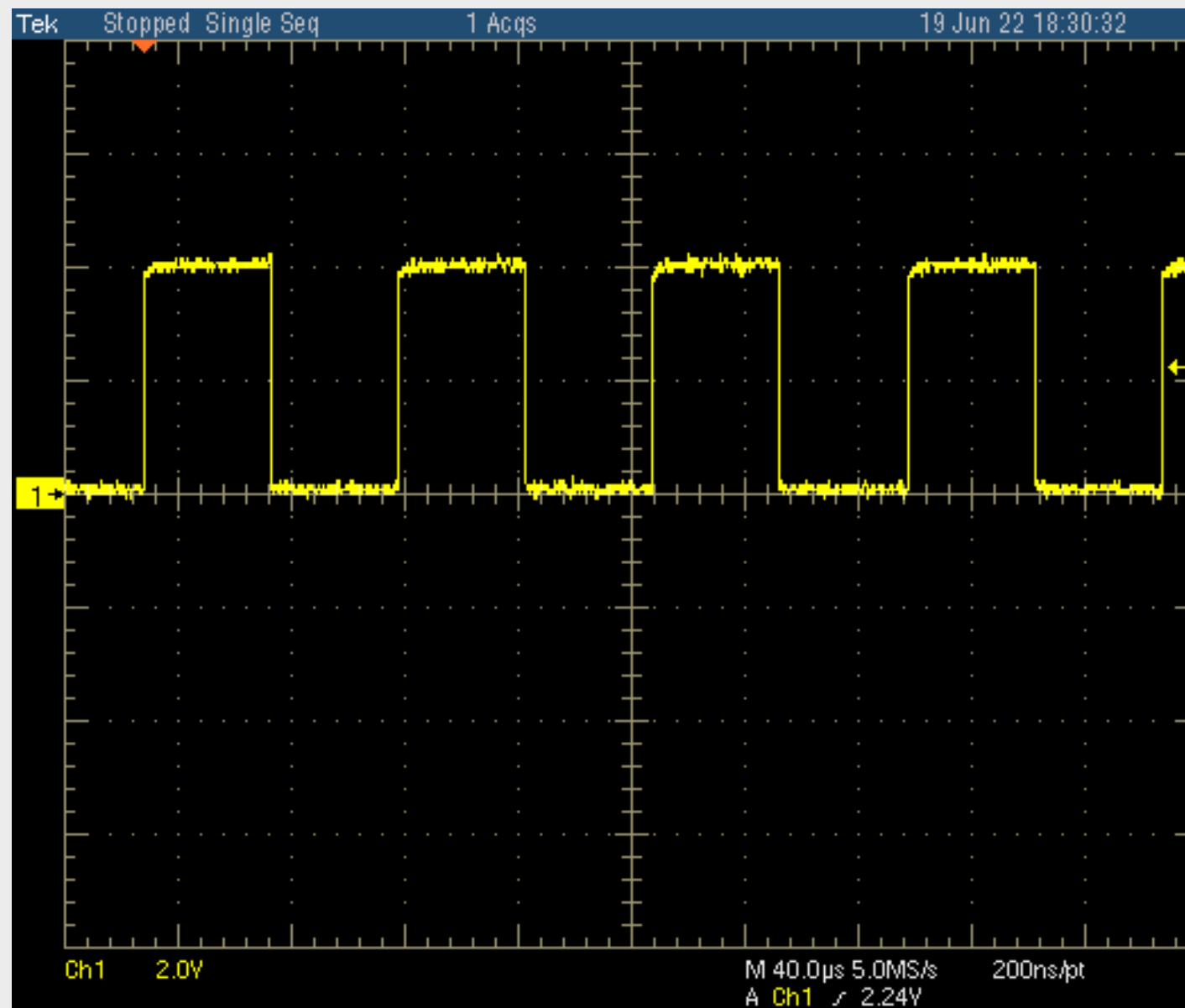


03 Troubleshooting & Repair — Step 7

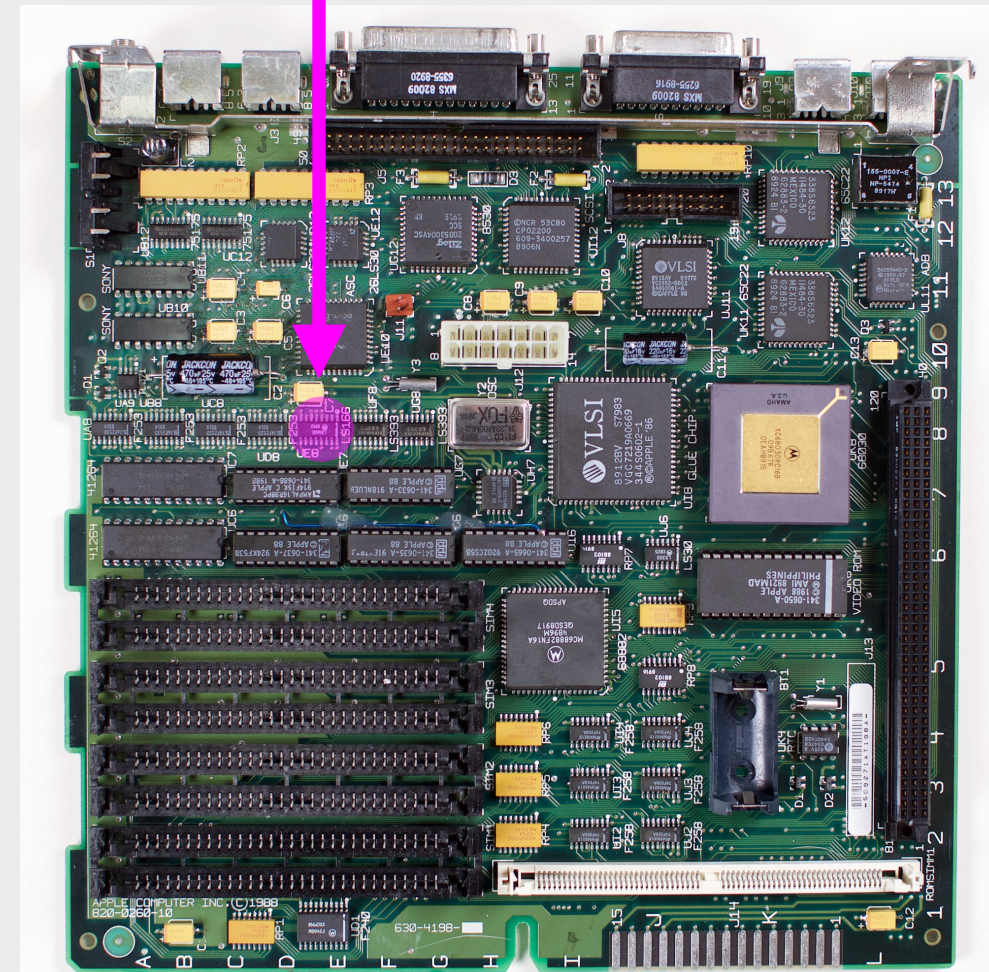
Video Multiplexing Circuit: UE8 Shift Register - Pin 14

The TTL signals of a functioning shift register should look like the following when the Mac is idling with a flashing question mark. This page, and those that follow, will show examples of how each signal should look, from pin 1 through pin 16.

Please focus on the image caption below.



UE8 (74F253) Pin 14: VID(7)

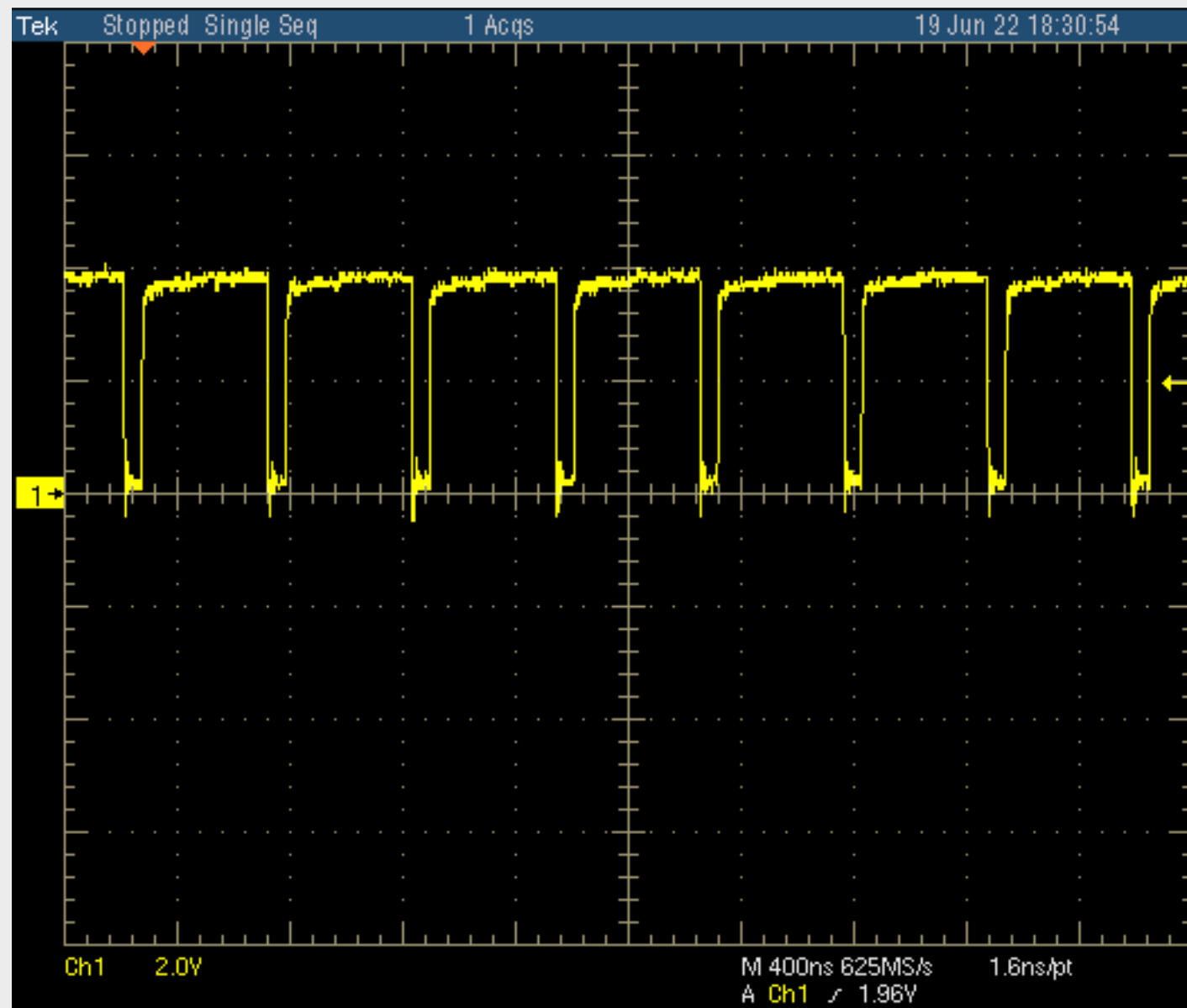


03 Troubleshooting & Repair — Step 7

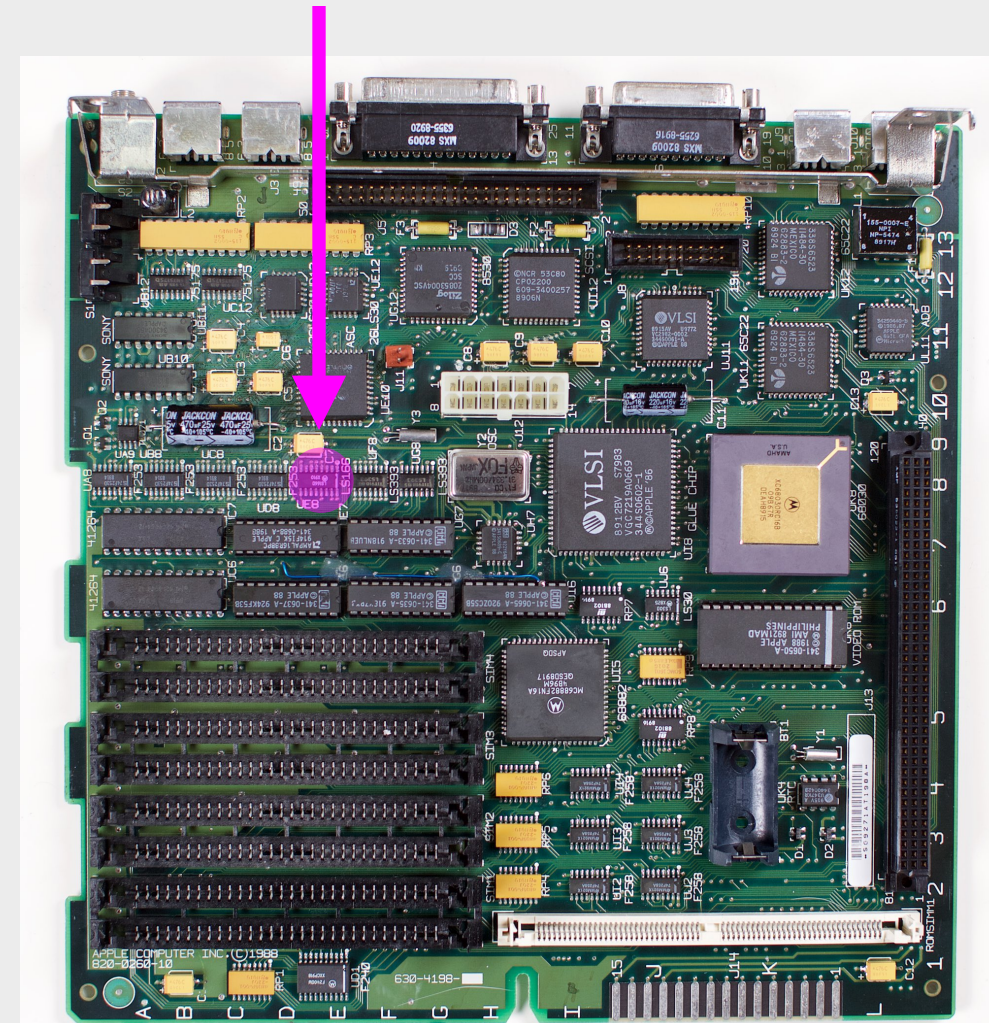
Video Multiplexing Circuit: UE8 Shift Register - Pin 15

The TTL signals of a functioning shift register should look like the following when the Mac is idling with a flashing question mark. This page, and those that follow, will show examples of how each signal should look, from pin 1 through pin 16.

Please focus on the image caption below.



UE8 (74F253) Pin 15: SREGLD (Shift register load)

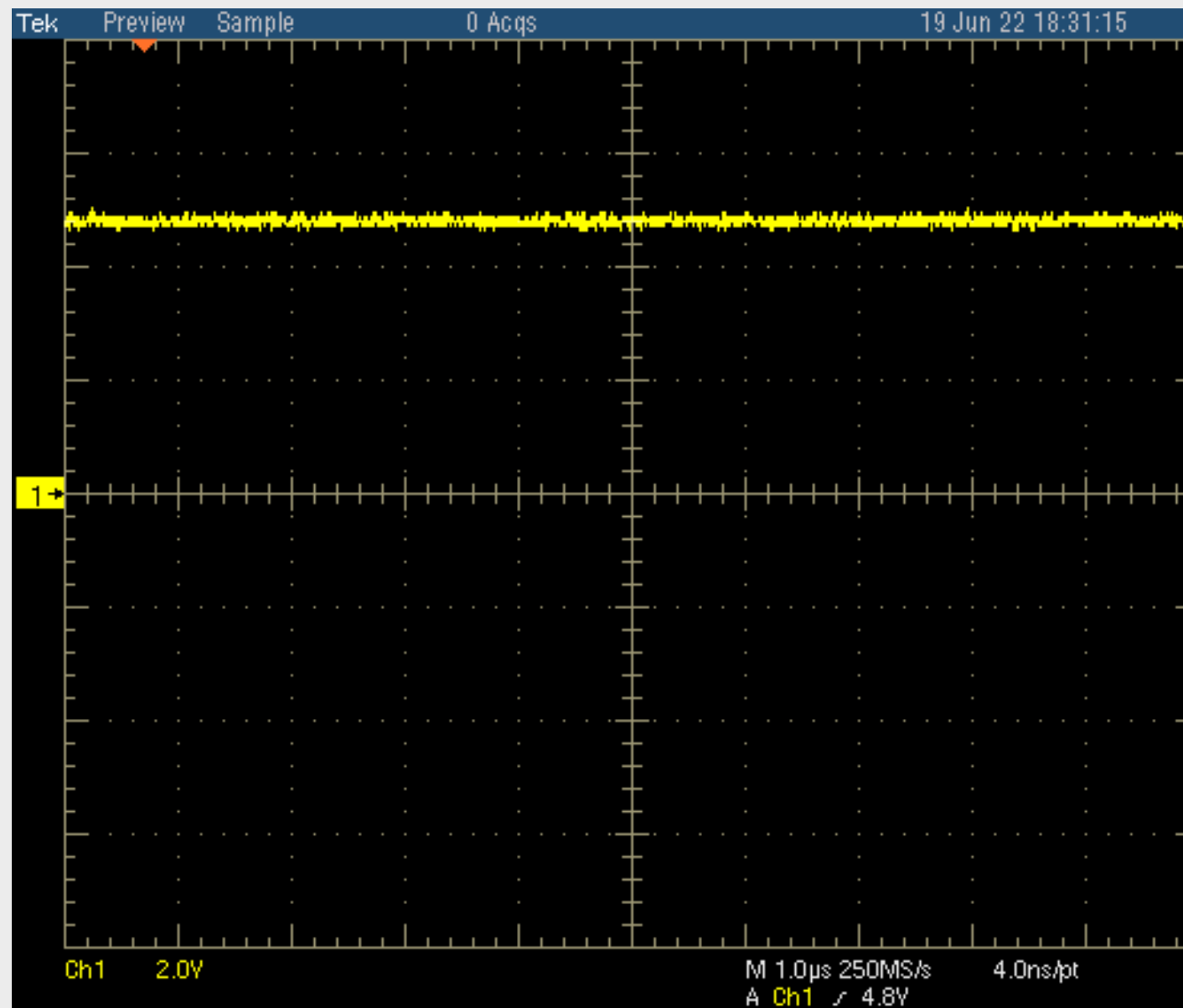


03 Troubleshooting & Repair — Step 7

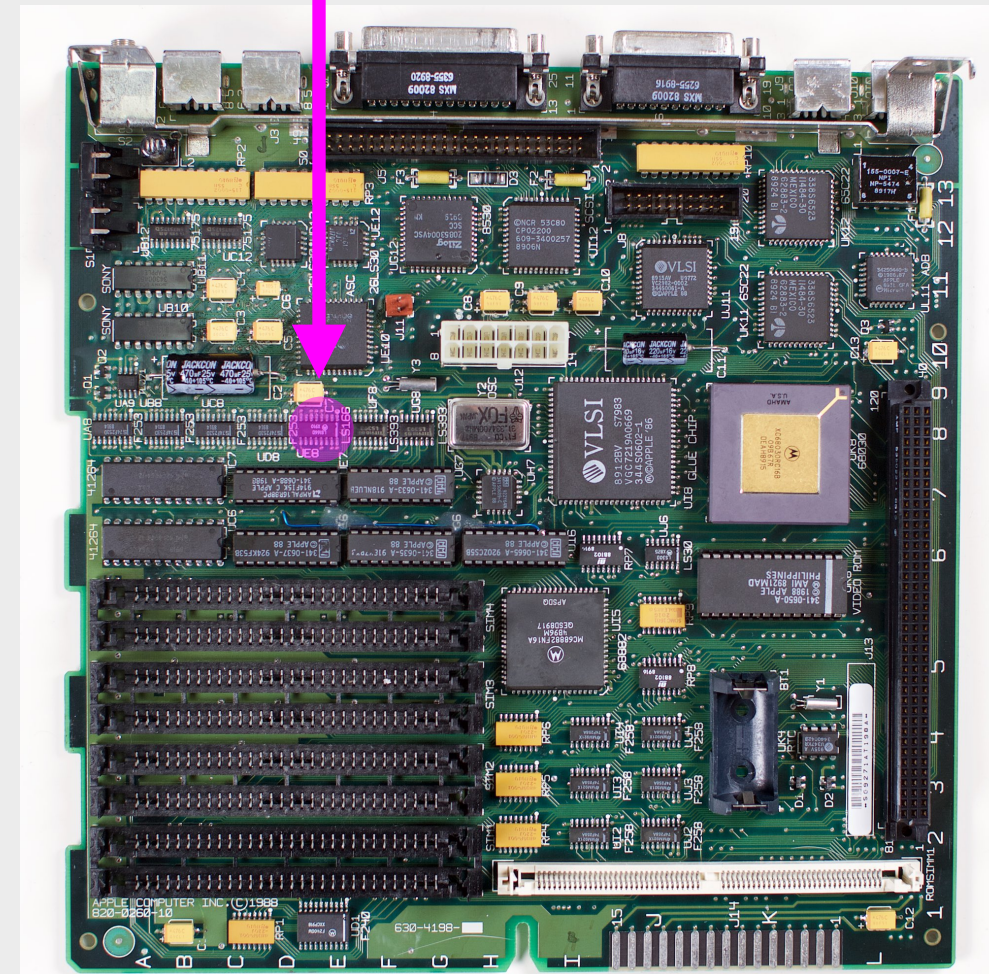
Video Multiplexing Circuit: UE8 Shift Register - Pin 16

The TTL signals of a functioning shift register should look like the following when the Mac is idling with a flashing question mark. This page, and those that follow, will show examples of how each signal should look, from pin 1 through pin 16.

Please focus on the image caption below.



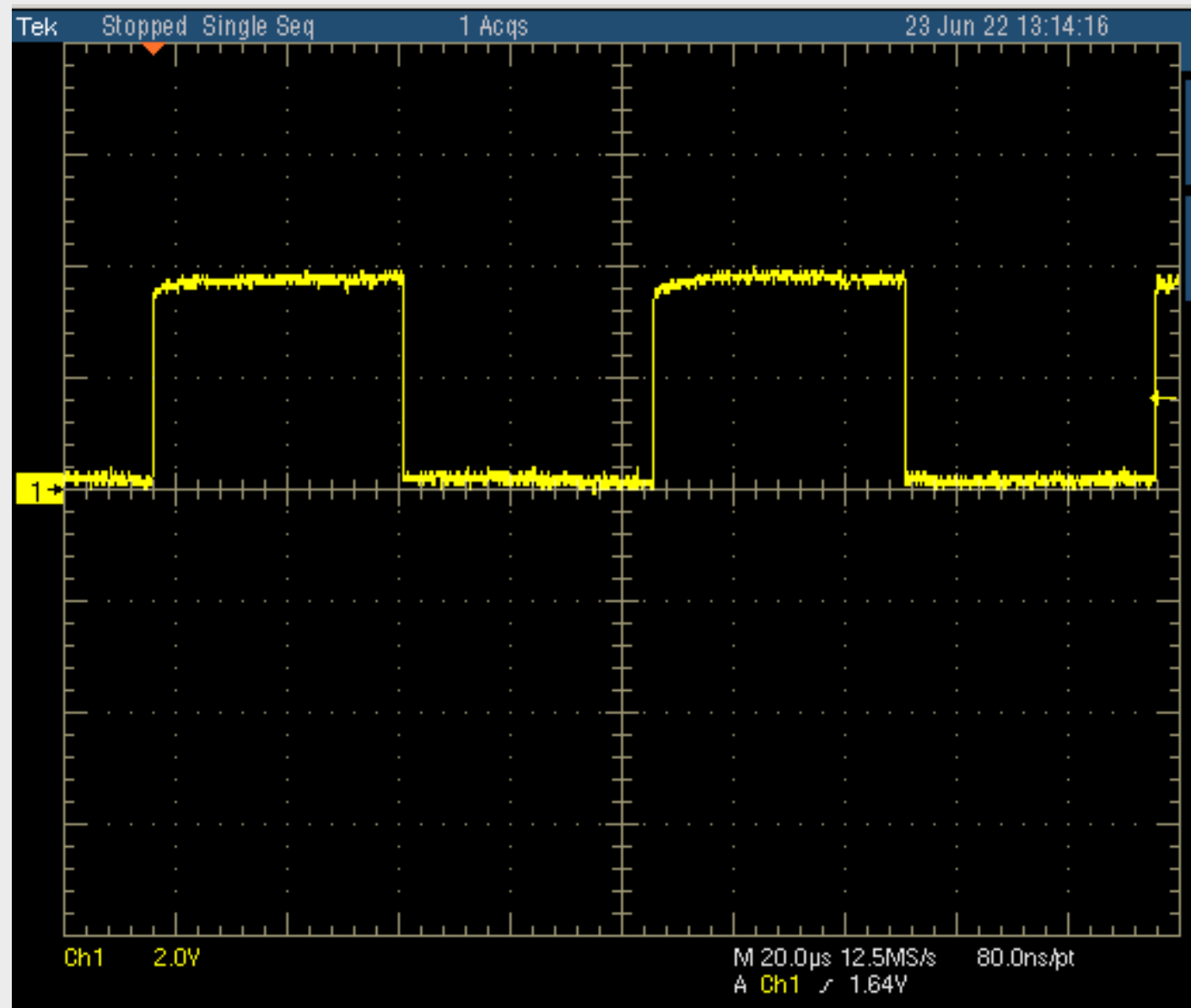
UE8 (74F253) Pin 16: +5V



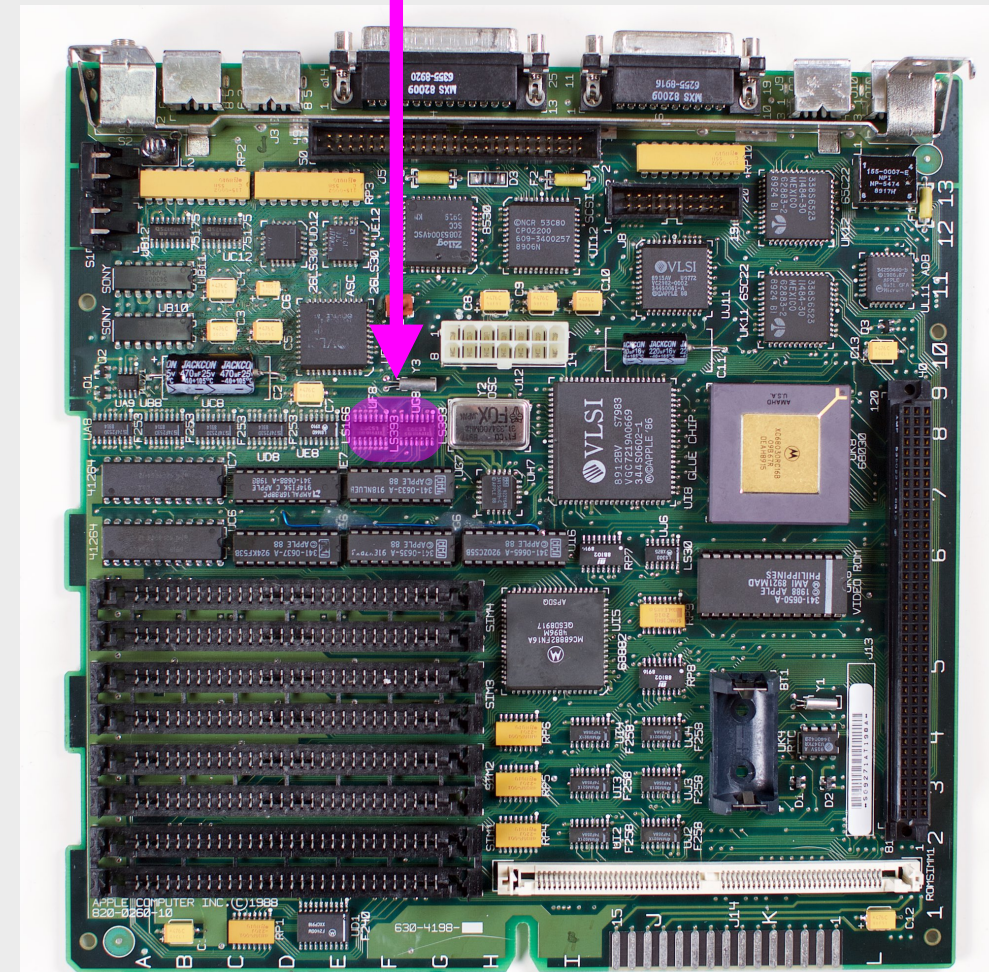
03 Troubleshooting & Repair — Step 7

Video Multiplexing Circuit: UF8 & UG8 Binary Counters - Pin 01

The TTL signals of functioning binary counters should look like the following when the Mac is idling with a flashing question mark. **UF8 Pin 01** is shown below.



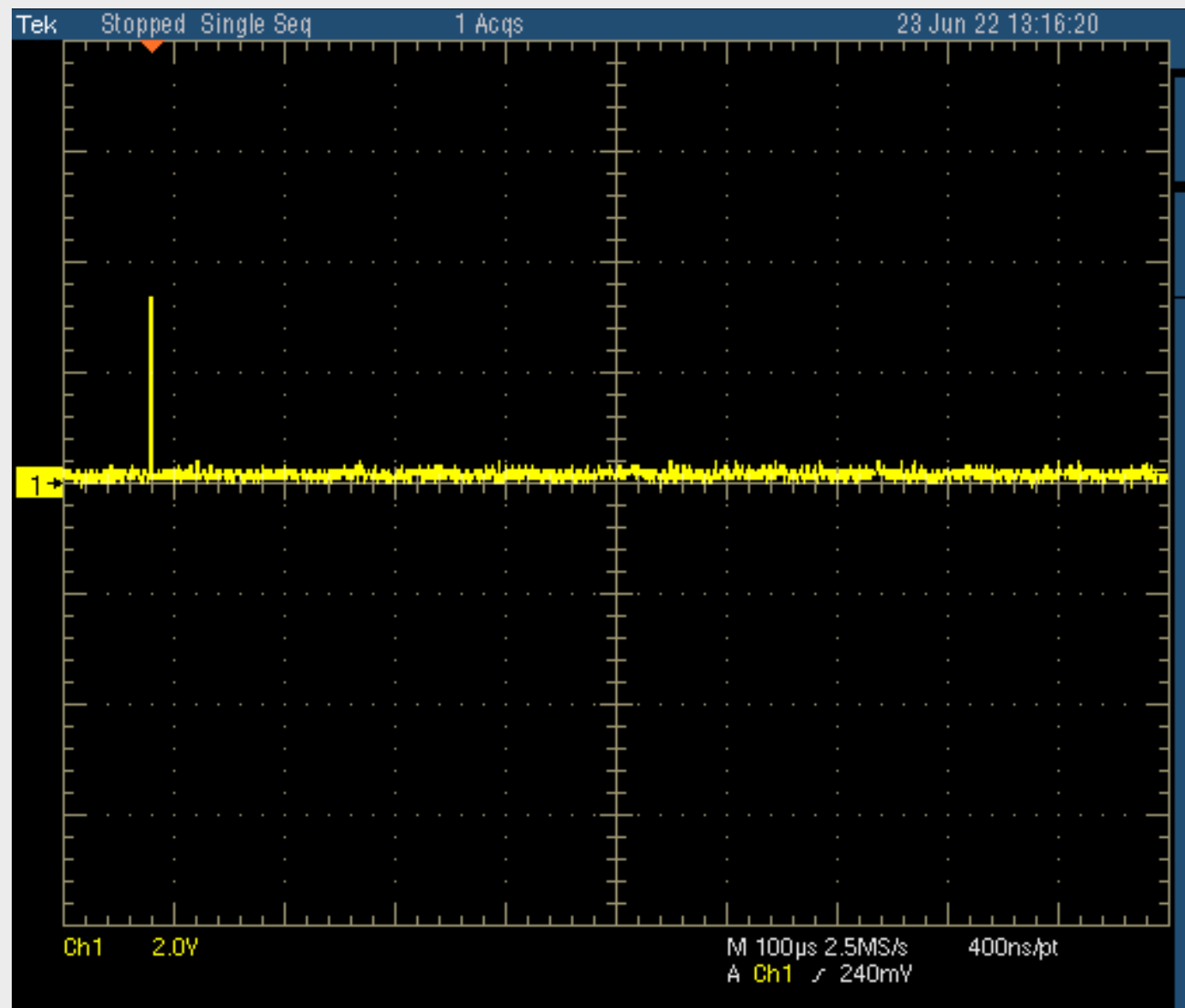
UF8 Pin 01



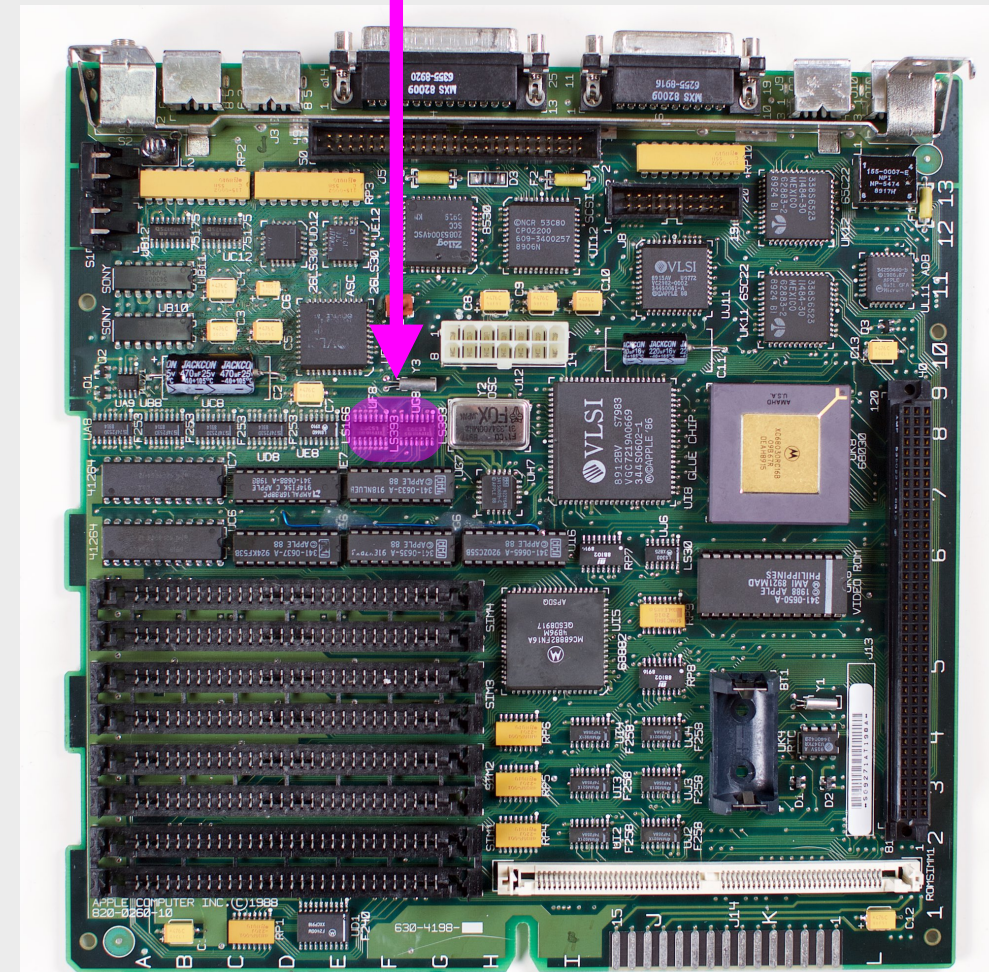
03 Troubleshooting & Repair — Step 7

Video Multiplexing Circuit: UF8 & UG8 Binary Counters - Pin 02

The TTL signals of functioning binary counters should look like the following when the Mac is idling with a flashing question mark. **UF8 Pin 02** is shown below.



UF8 Pin 02

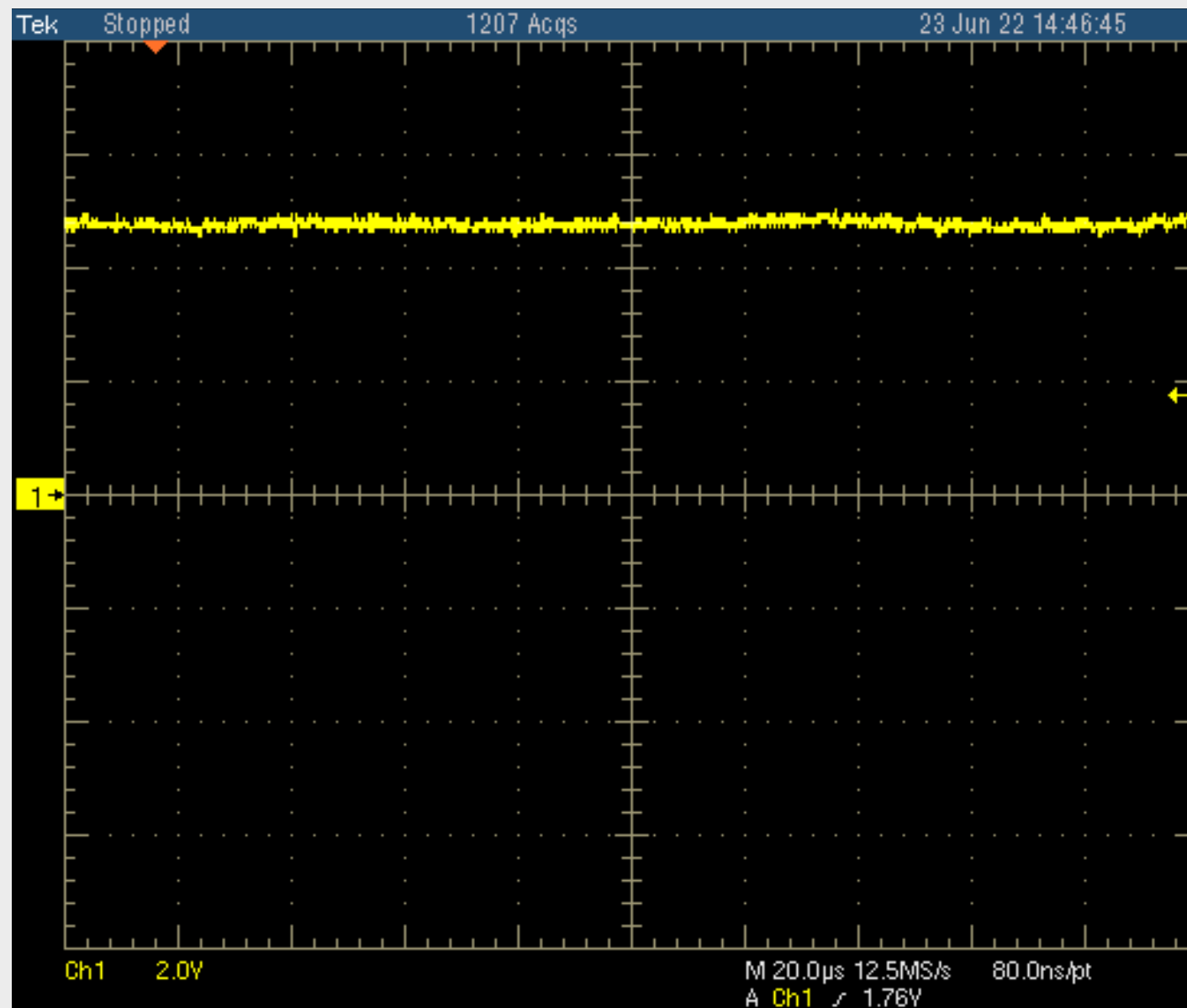


03 Troubleshooting & Repair — Step 7

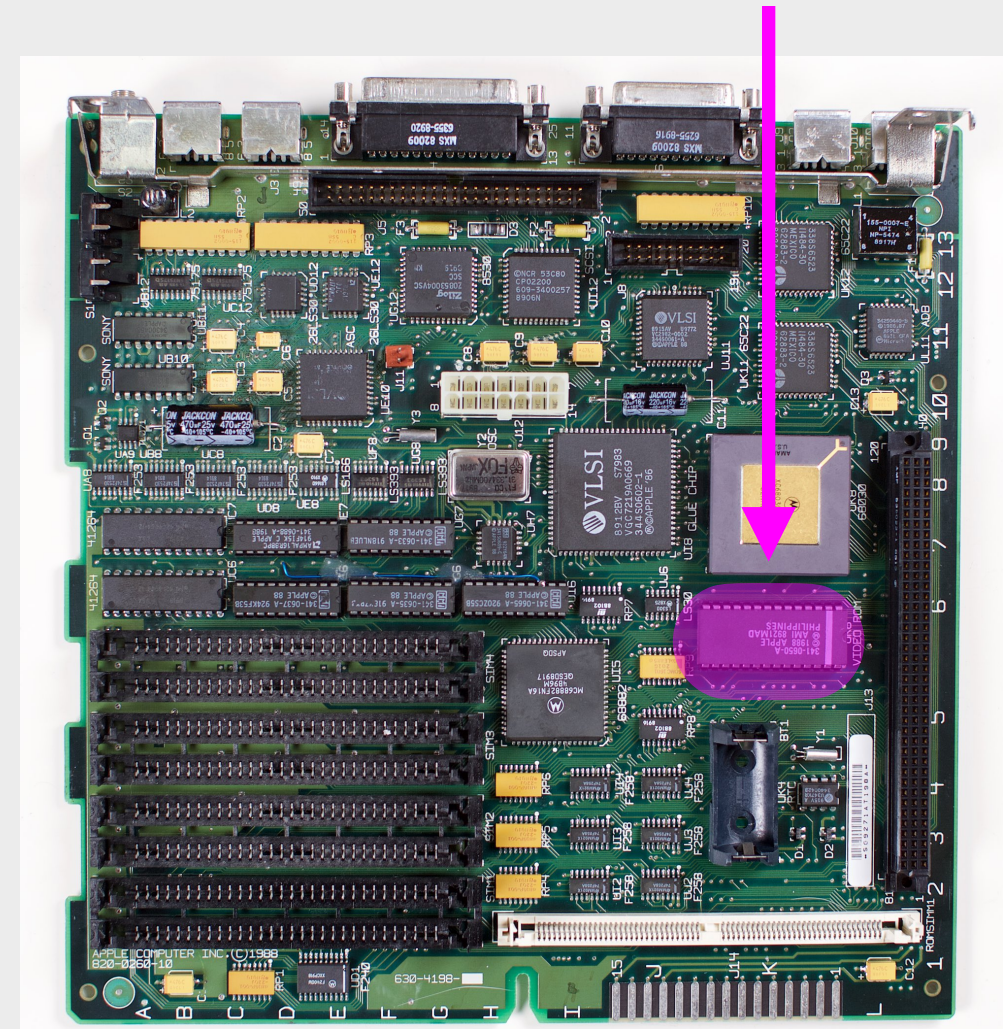
Video ROM (UK6) - Pin 01

A functioning video ROM look like the following when the Mac is idling with a flashing question mark. This page, and those that follow, will show examples of how each signal should look, from pin 1 through pin 28.

Please focus on the image caption below.



Video ROM Pin 01: +5V

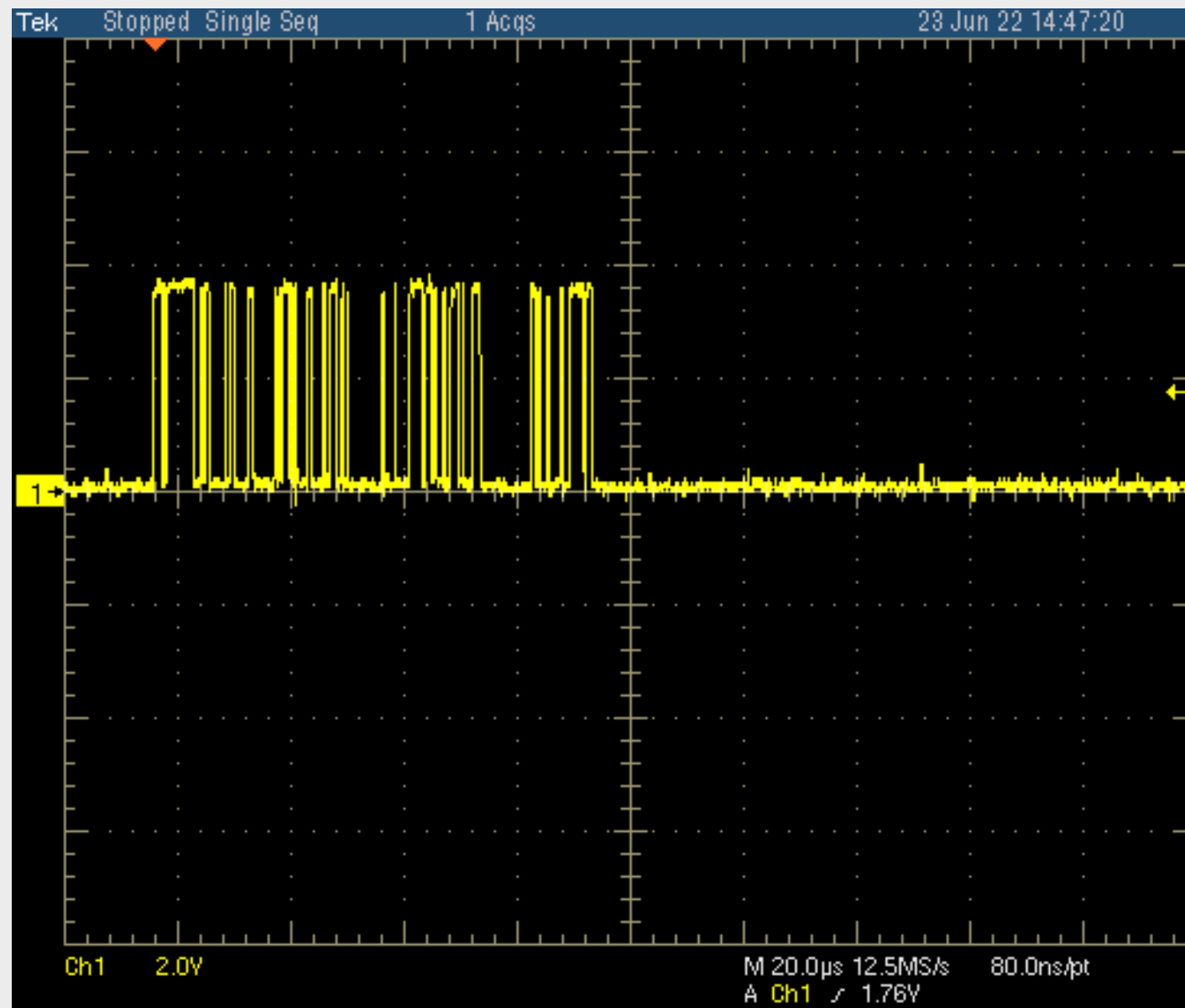


03 Troubleshooting & Repair — Step 7

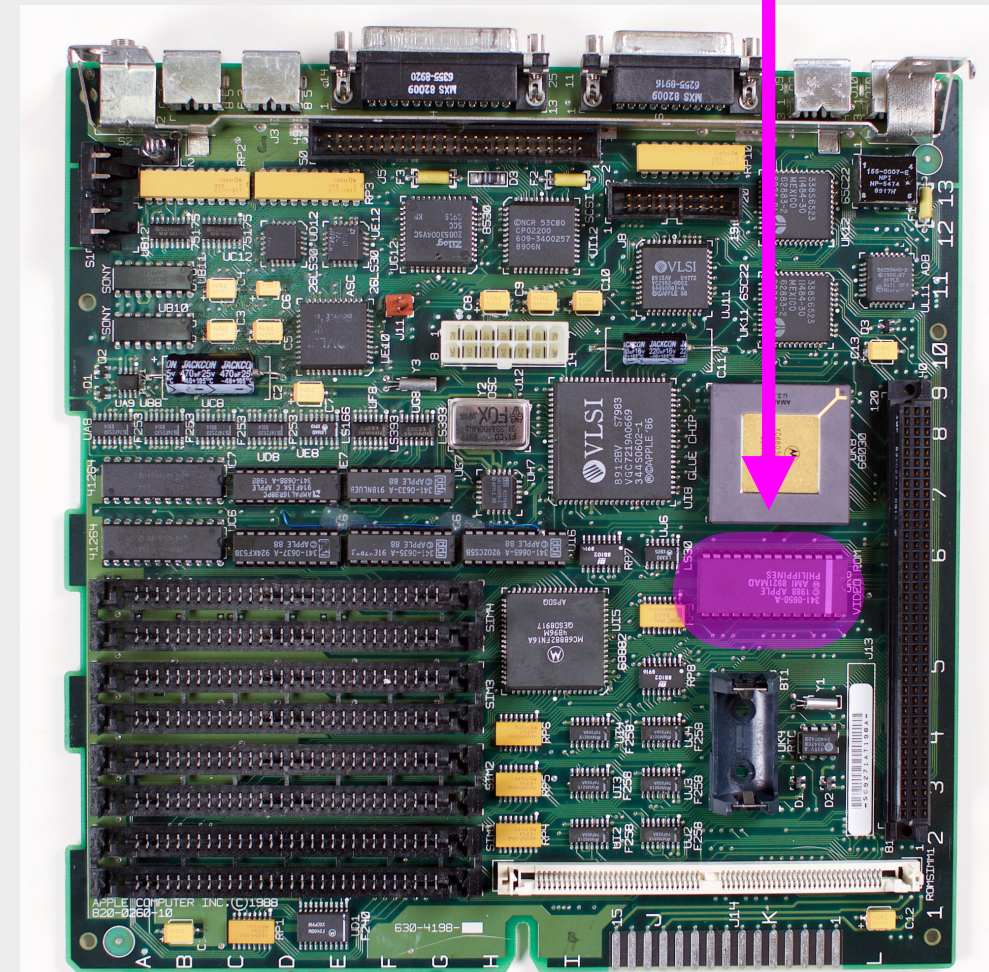
Video ROM (UK6) - Pin 02

A functioning video ROM look like the following when the Mac is idling with a flashing question mark. This page, and those that follow, will show examples of how each signal should look, from pin 1 through pin 28.

Please focus on the image caption below.



Video ROM Pin 02: A(12)

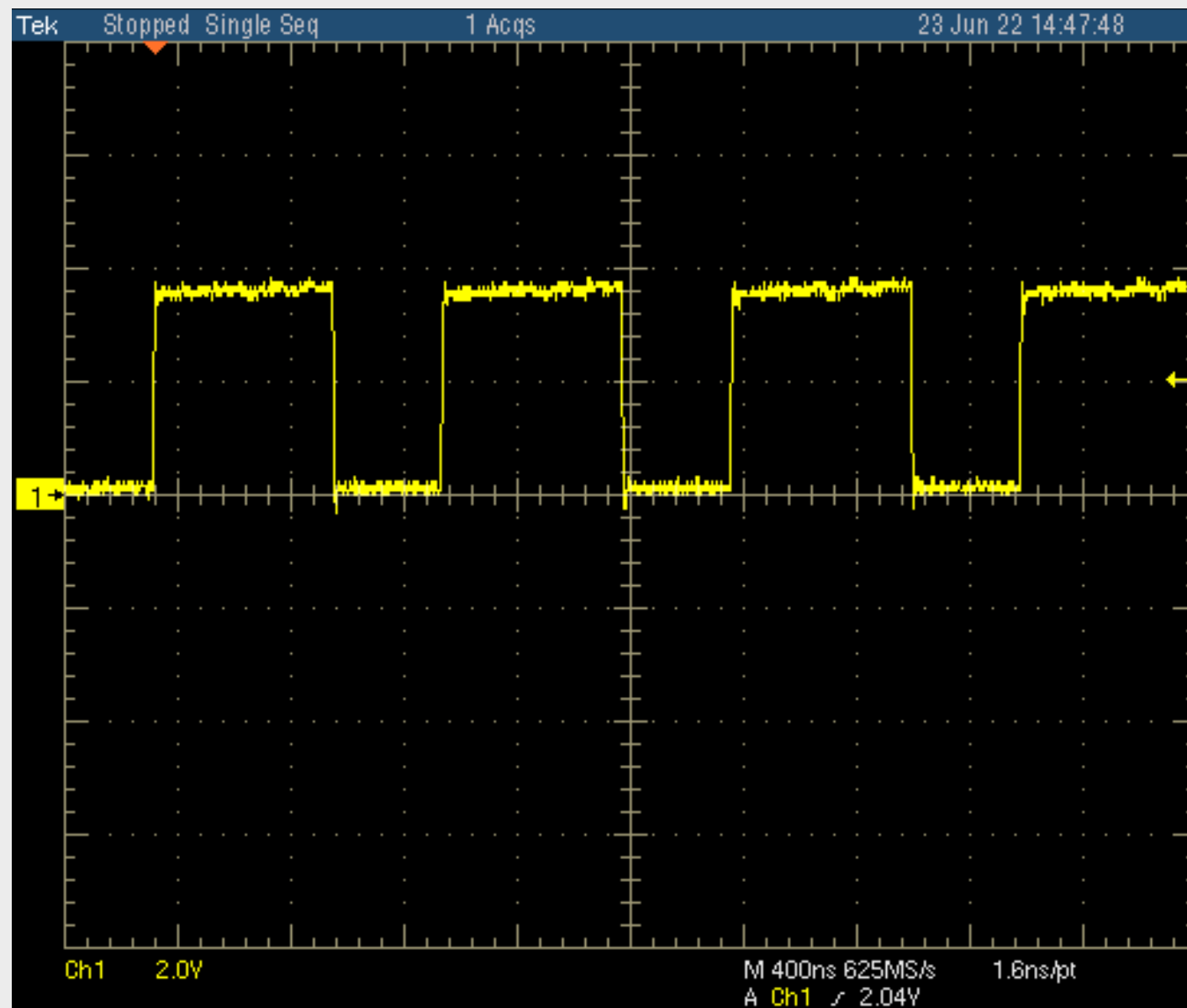


03 Troubleshooting & Repair — Step 7

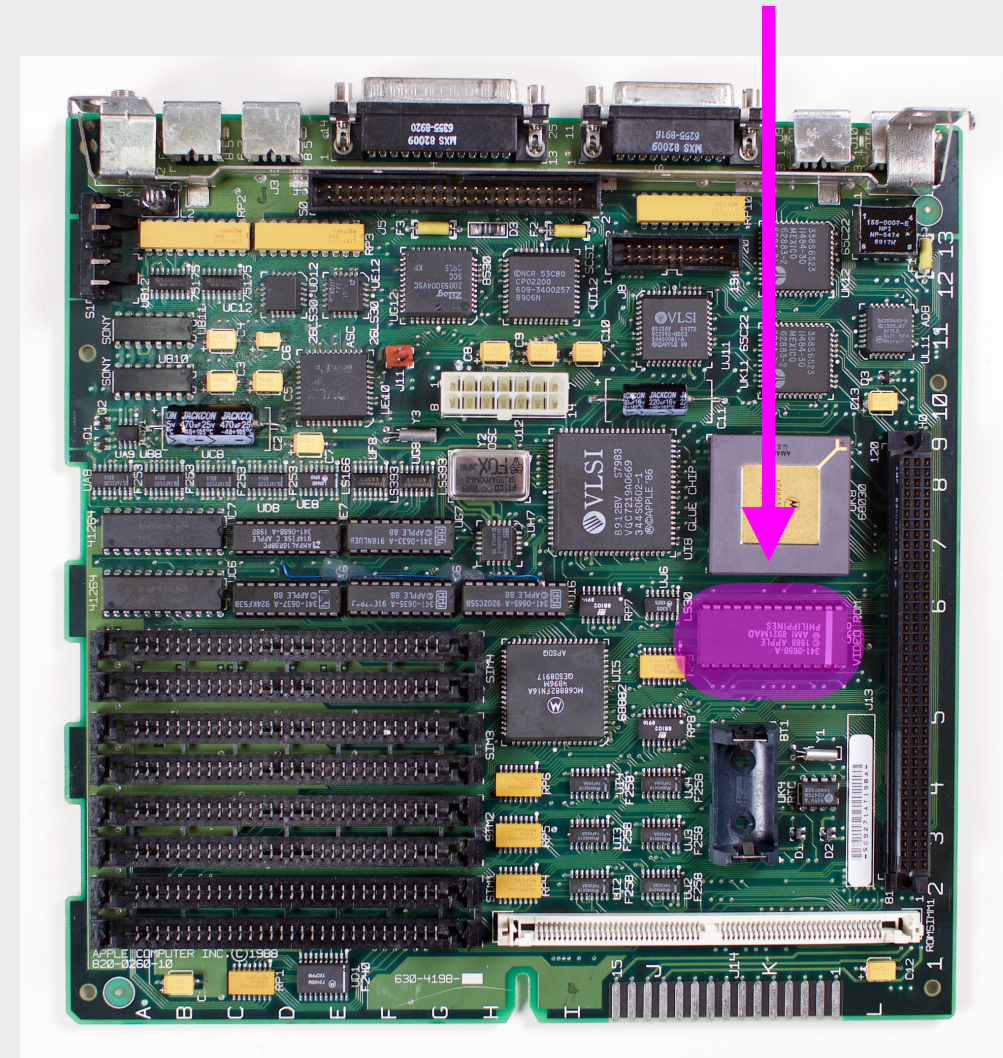
Video ROM (UK6) - Pin 03

A functioning video ROM look like the following when the Mac is idling with a flashing question mark. This page, and those that follow, will show examples of how each signal should look, from pin 1 through pin 28.

Please focus on the image caption below.



Video ROM Pin 03: A(7)

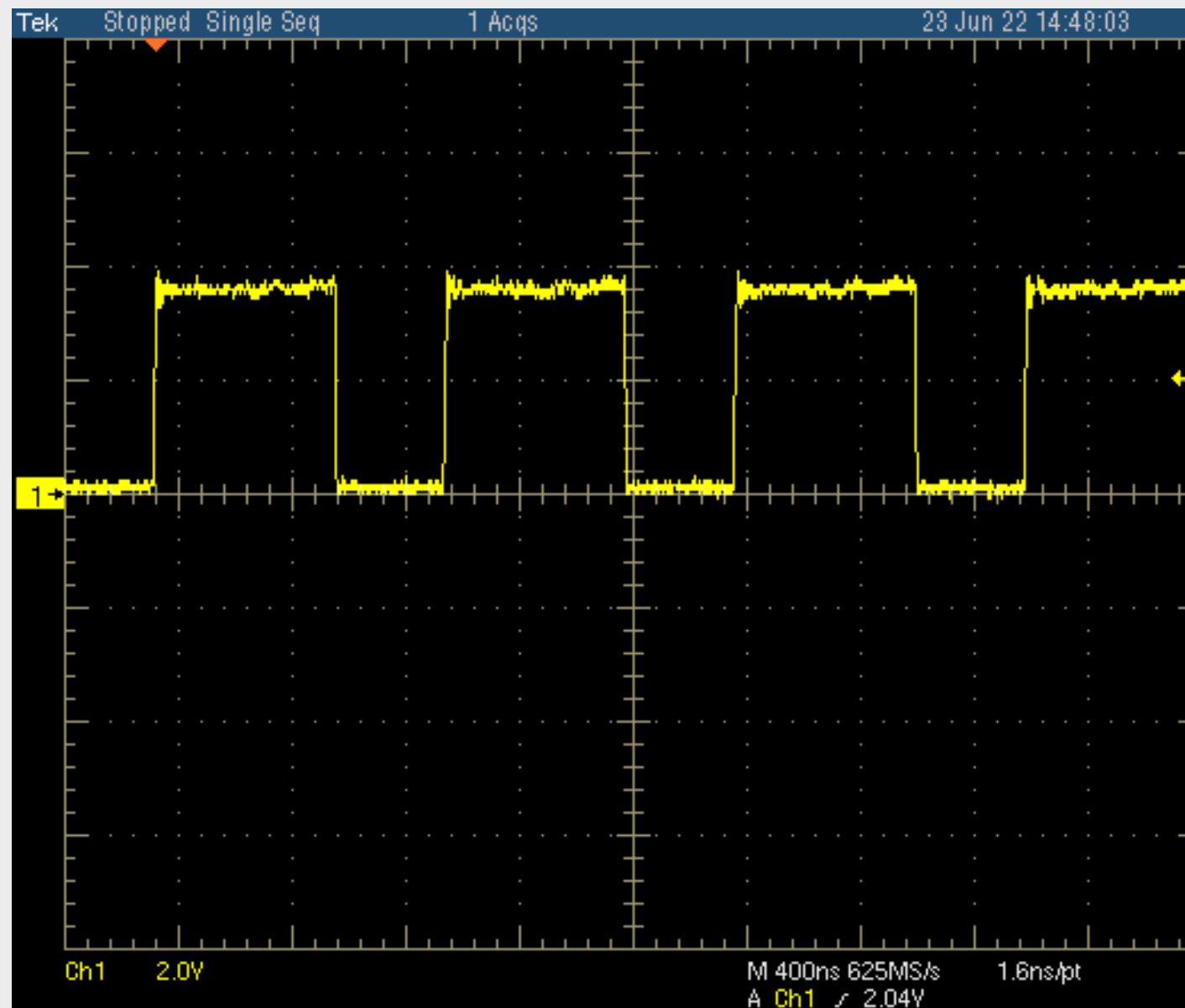


03 Troubleshooting & Repair — Step 7

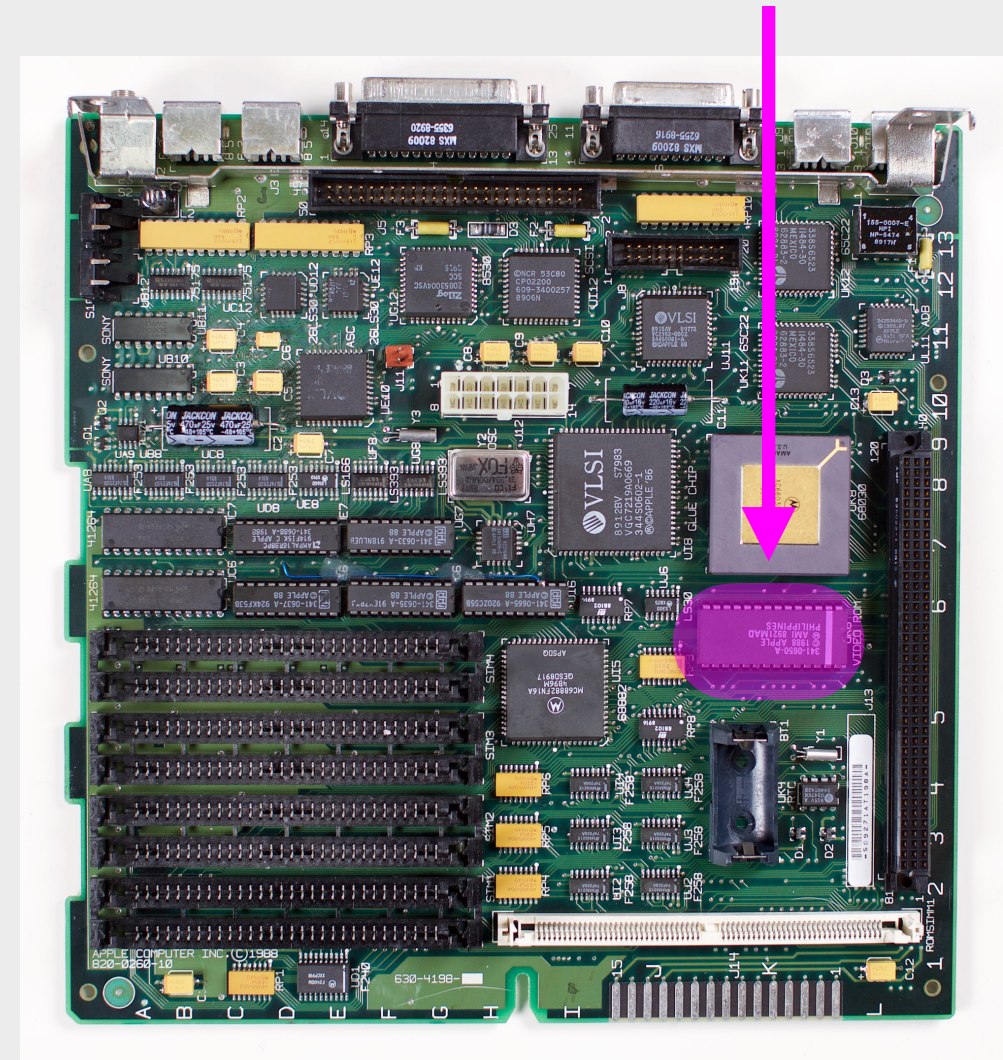
Video ROM (UK6) - Pin 04

A functioning video ROM look like the following when the Mac is idling with a flashing question mark. This page, and those that follow, will show examples of how each signal should look, from pin 1 through pin 28.

Please focus on the image caption below.



Video ROM Pin 04: A(6)

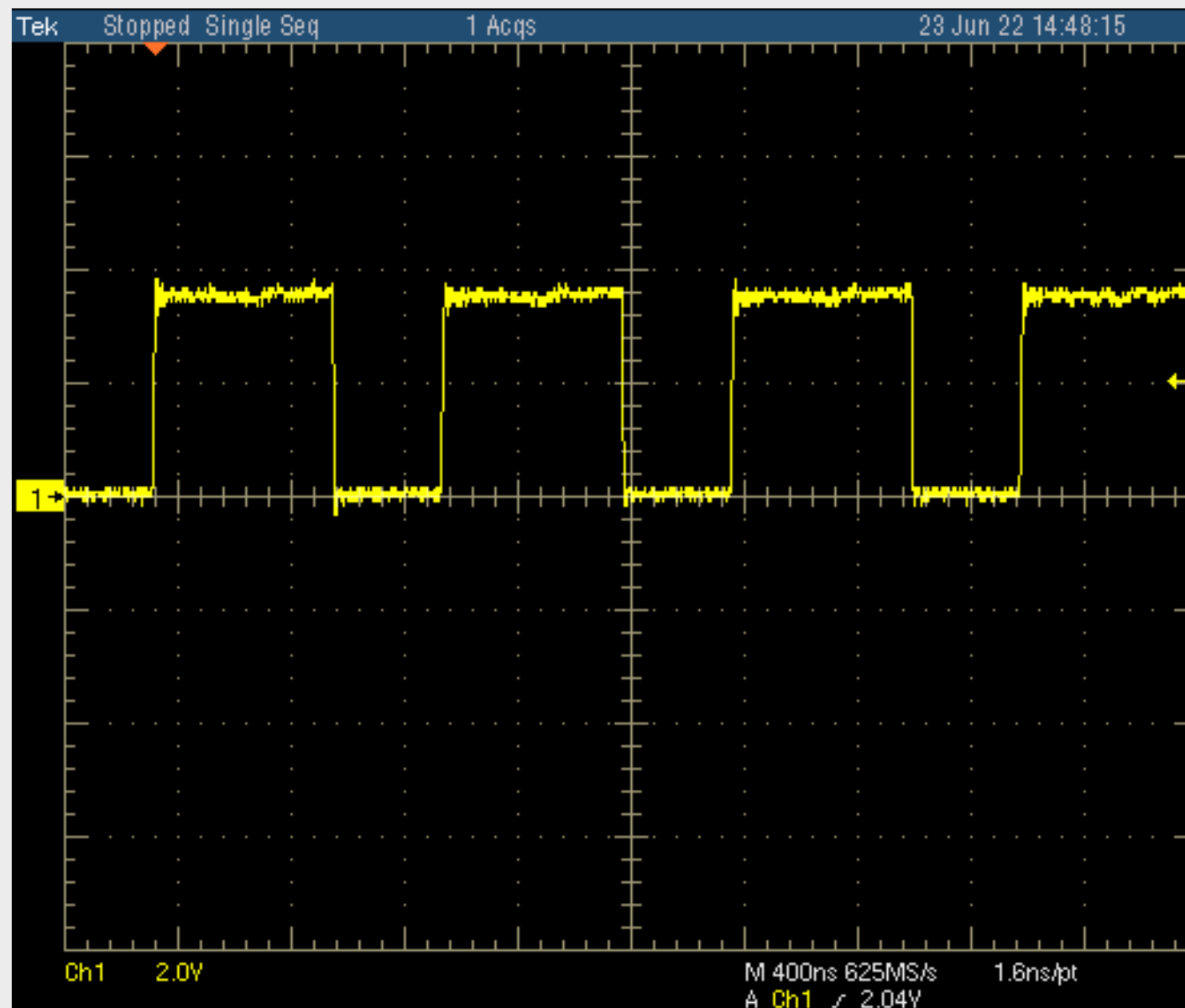


03 Troubleshooting & Repair — Step 7

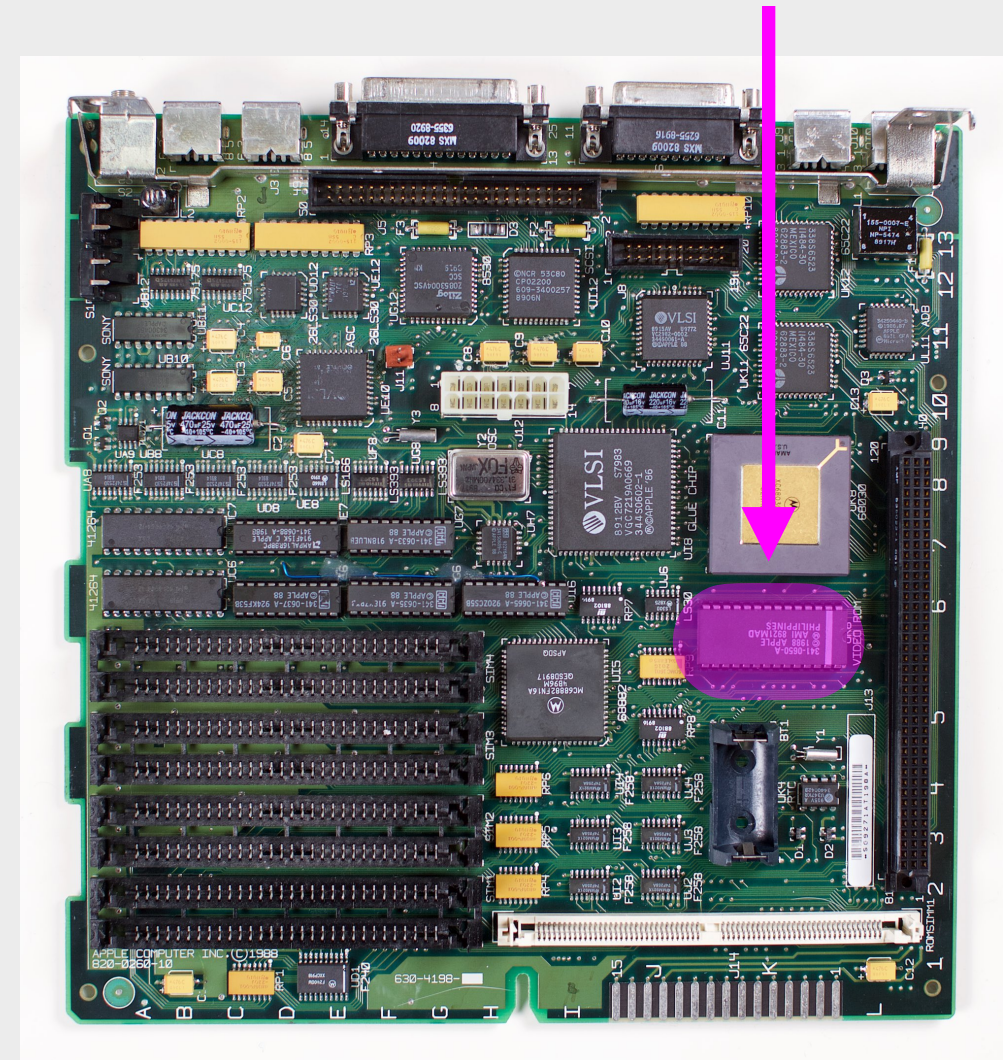
Video ROM (UK6) - Pin 05

A functioning video ROM look like the following when the Mac is idling with a flashing question mark. This page, and those that follow, will show examples of how each signal should look, from pin 1 through pin 28.

Please focus on the image caption below.



Video ROM Pin 05: A(5)

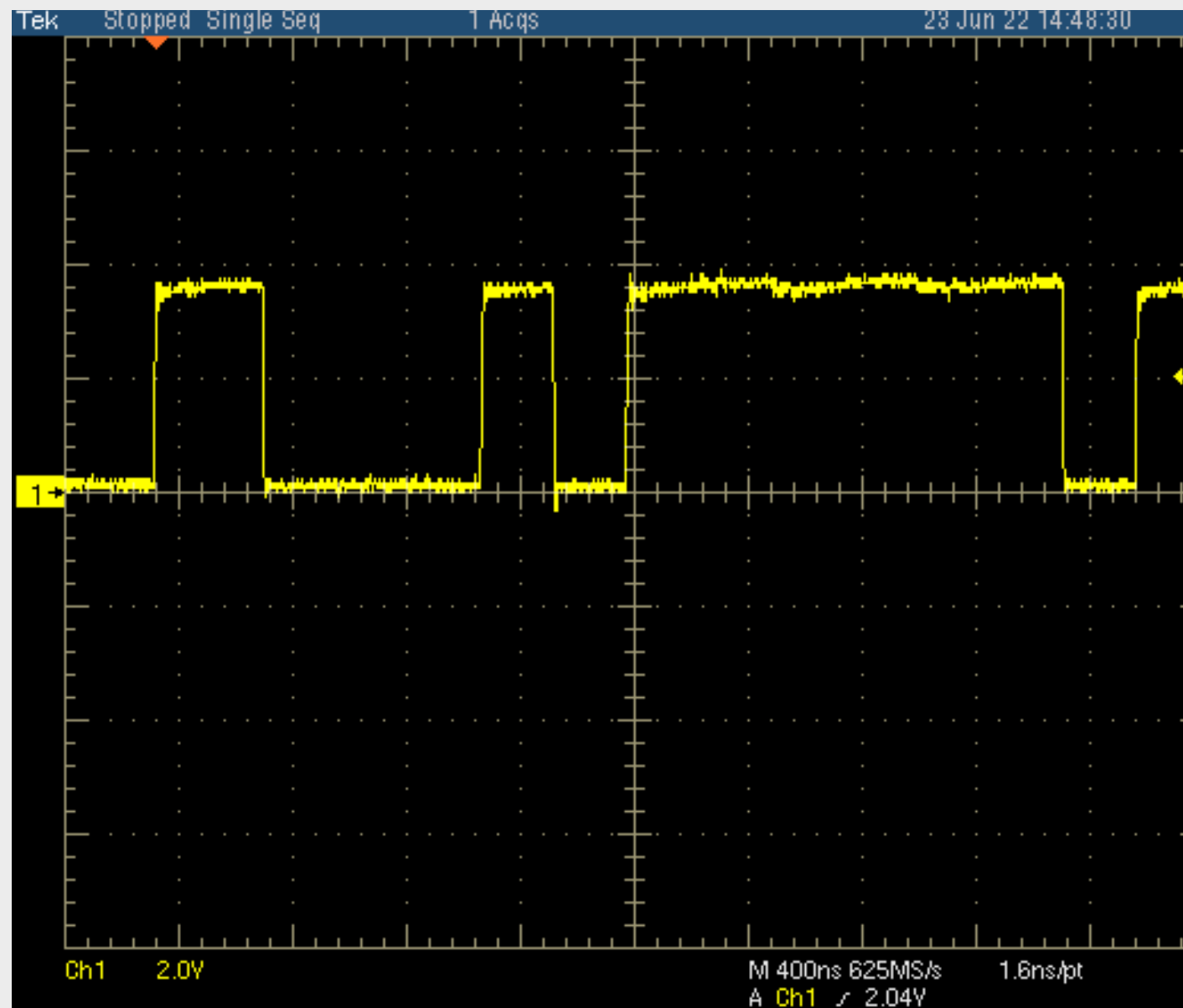


03 Troubleshooting & Repair — Step 7

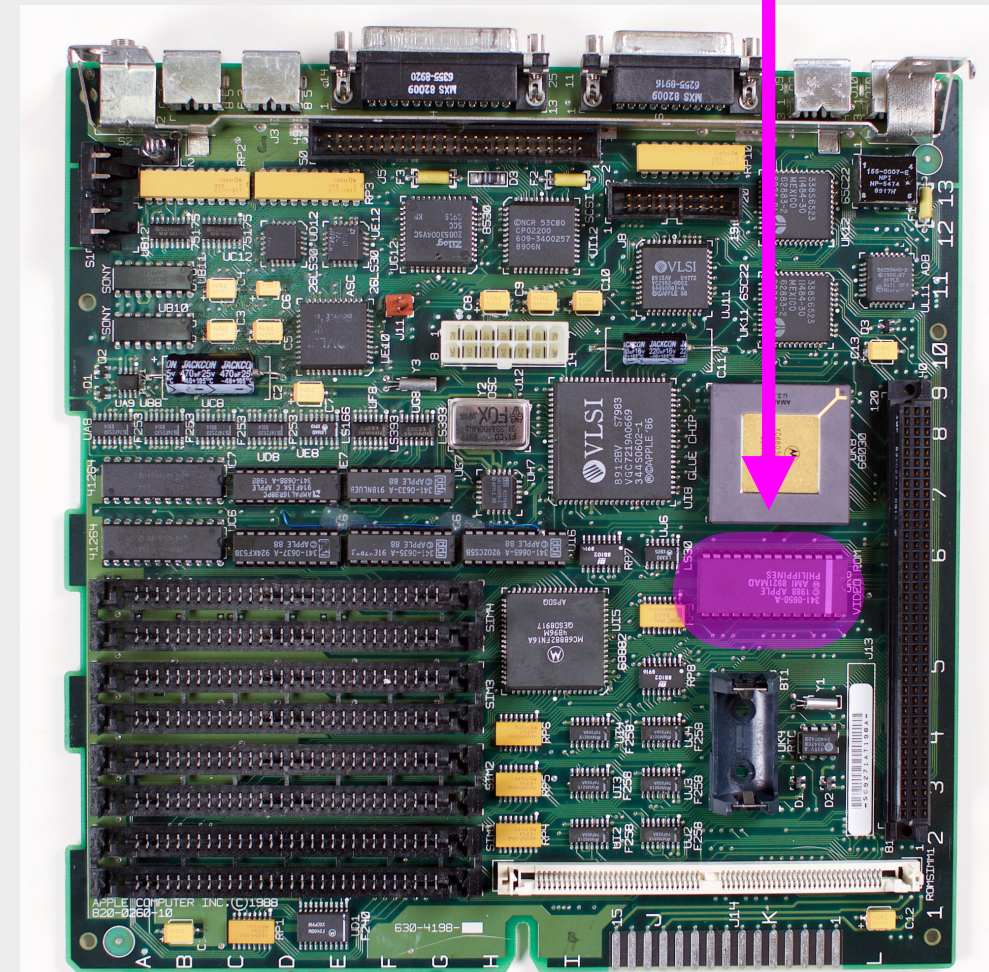
Video ROM (UK6) - Pin 06

A functioning video ROM look like the following when the Mac is idling with a flashing question mark. This page, and those that follow, will show examples of how each signal should look, from pin 1 through pin 28.

Please focus on the image caption below.



Video ROM Pin 06: A(4)

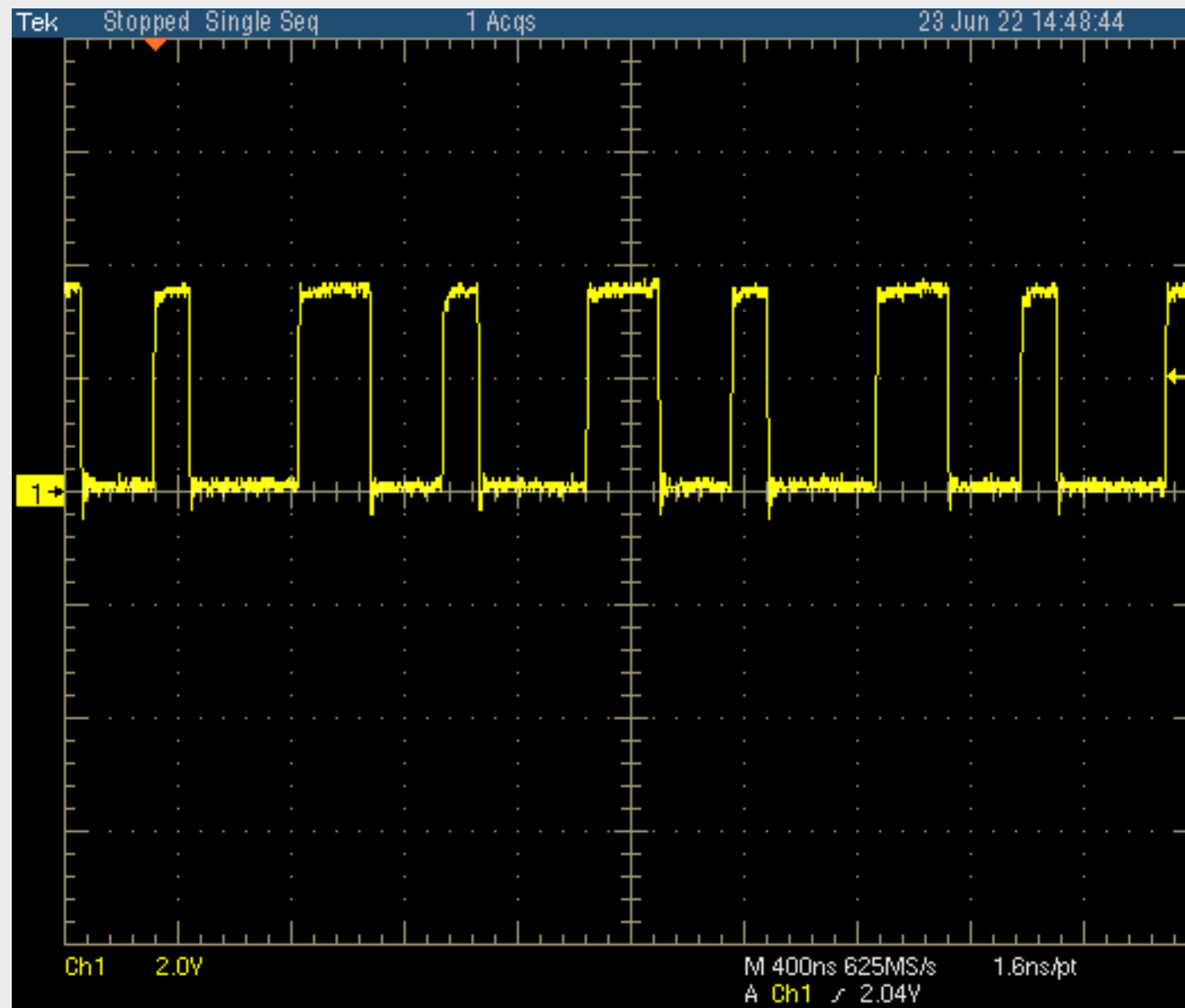


03 Troubleshooting & Repair — Step 7

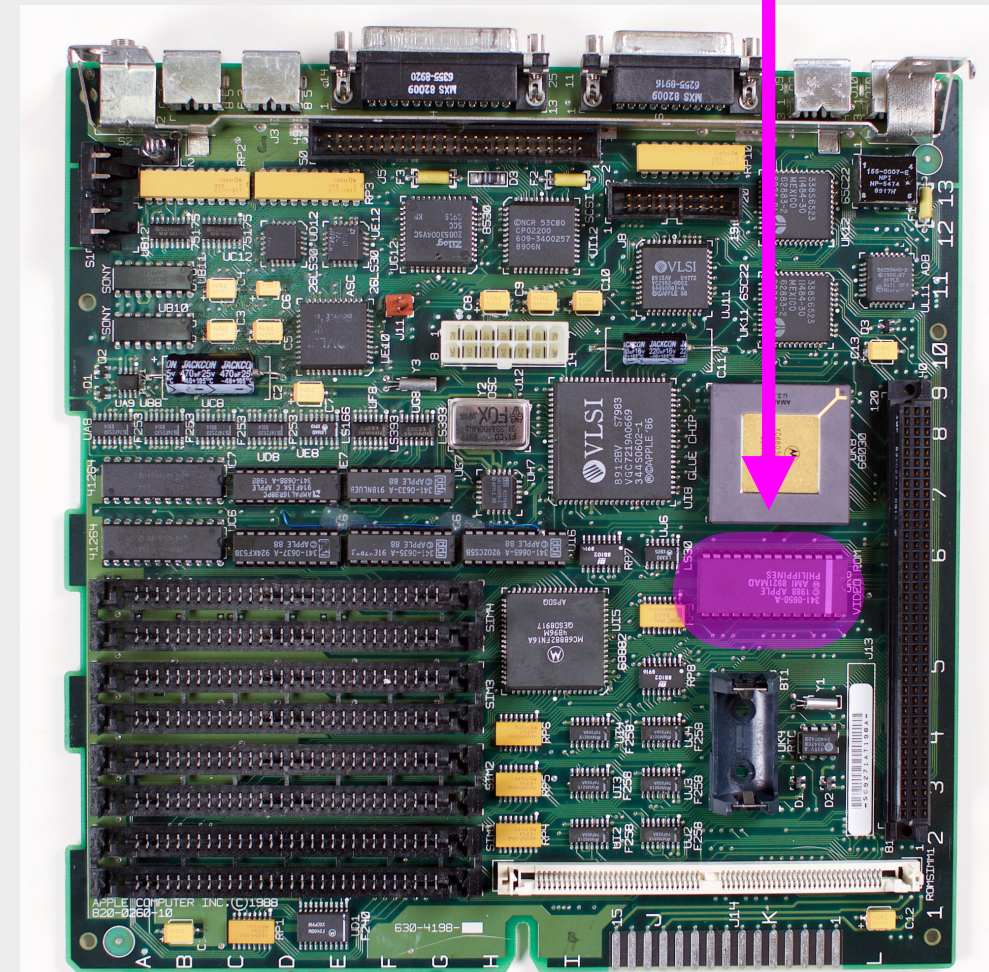
Video ROM (UK6) - Pin 07

A functioning video ROM look like the following when the Mac is idling with a flashing question mark. This page, and those that follow, will show examples of how each signal should look, from pin 1 through pin 28.

Please focus on the image caption below.



Video ROM Pin 07: A(3)

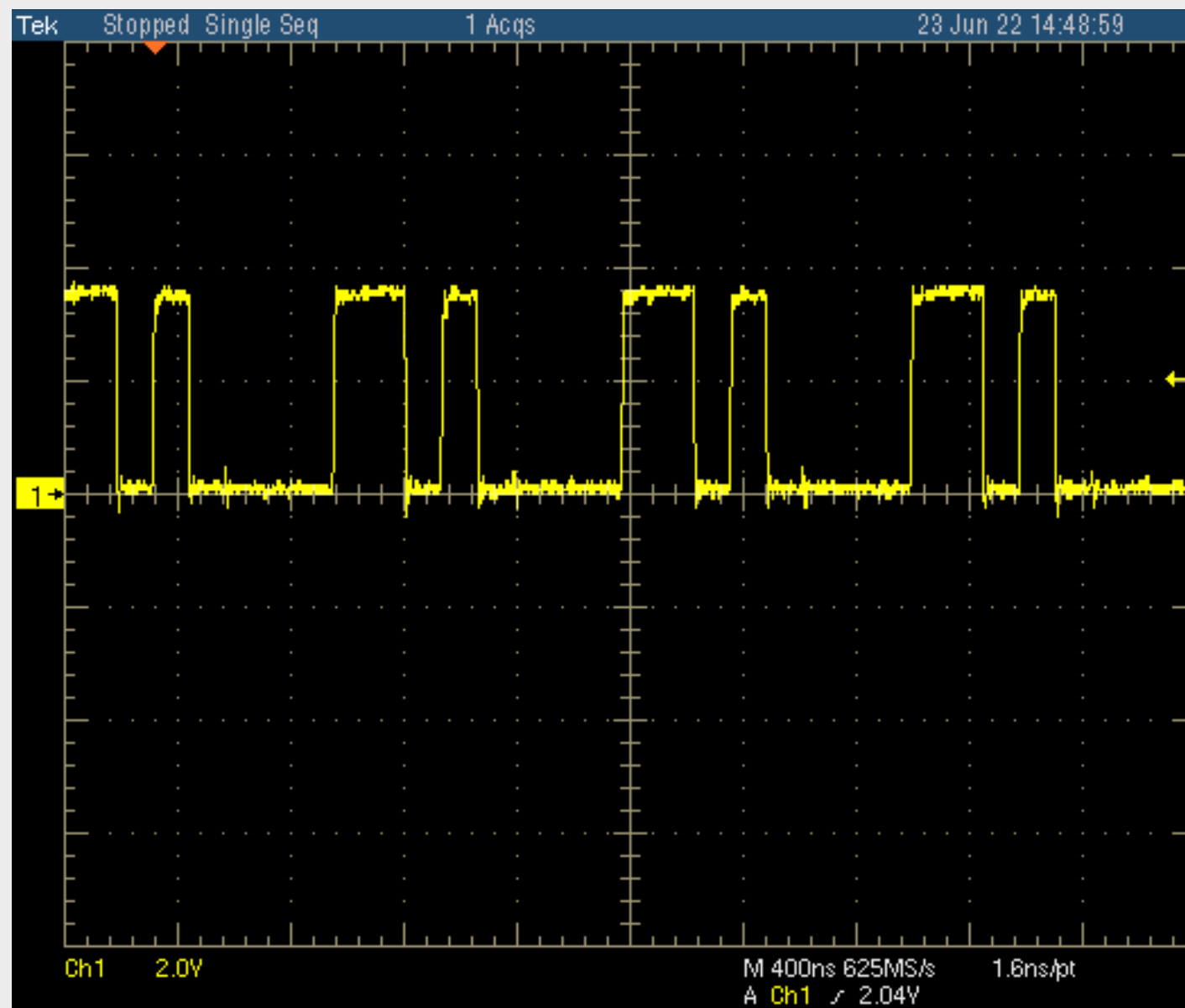


03 Troubleshooting & Repair — Step 7

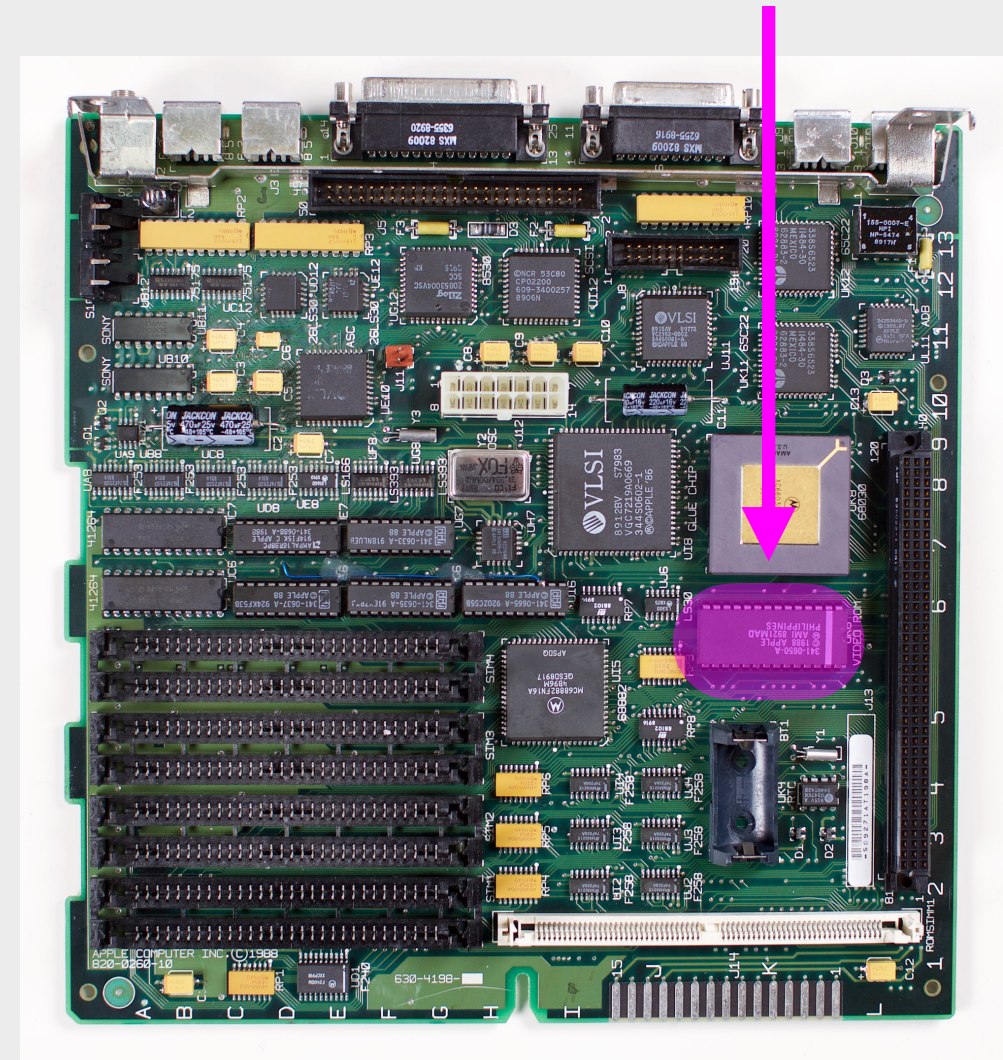
Video ROM (UK6) - Pin 08

A functioning video ROM look like the following when the Mac is idling with a flashing question mark. This page, and those that follow, will show examples of how each signal should look, from pin 1 through pin 28.

Please focus on the image caption below.



Video ROM Pin 08: A(2)

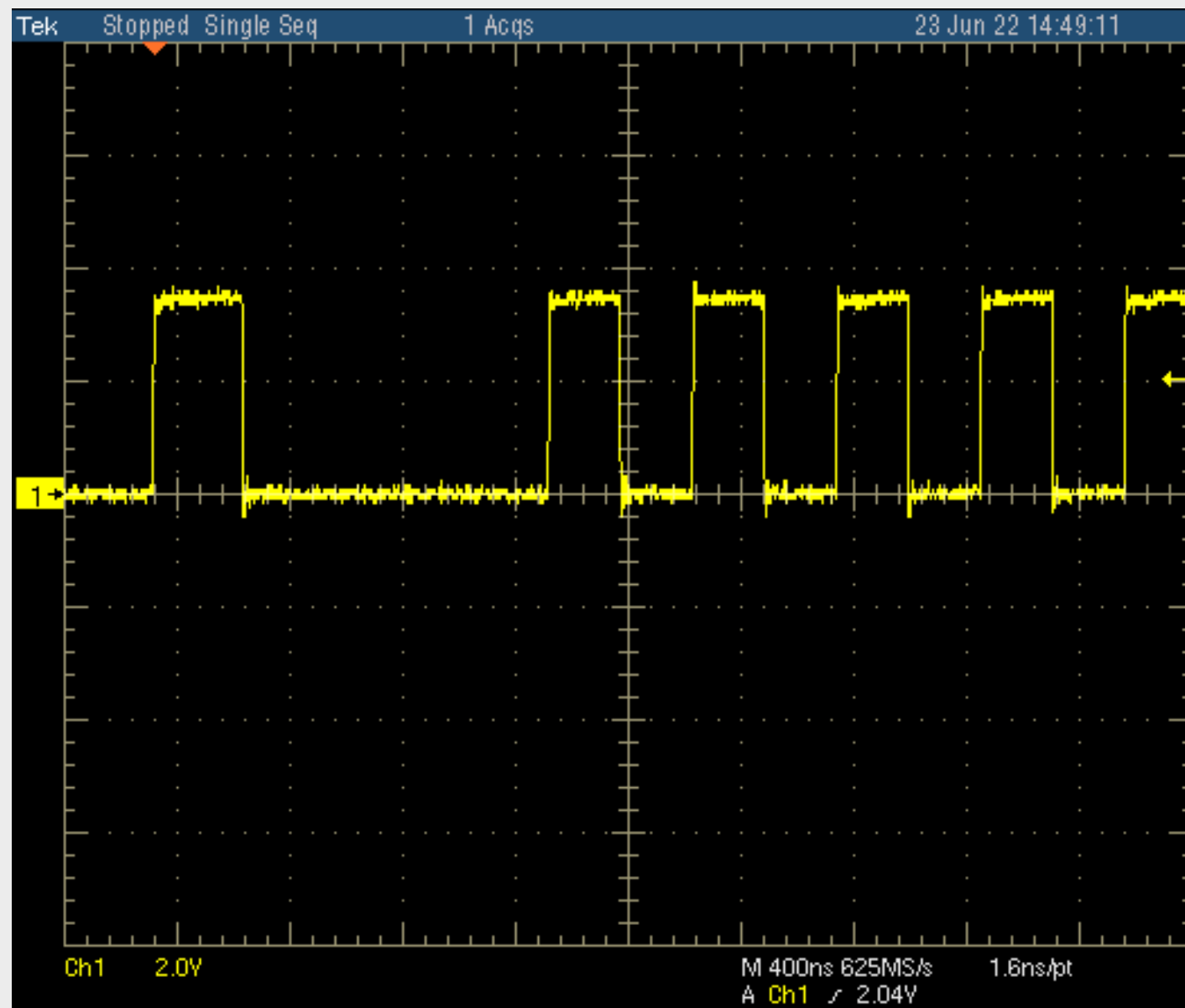


03 Troubleshooting & Repair — Step 7

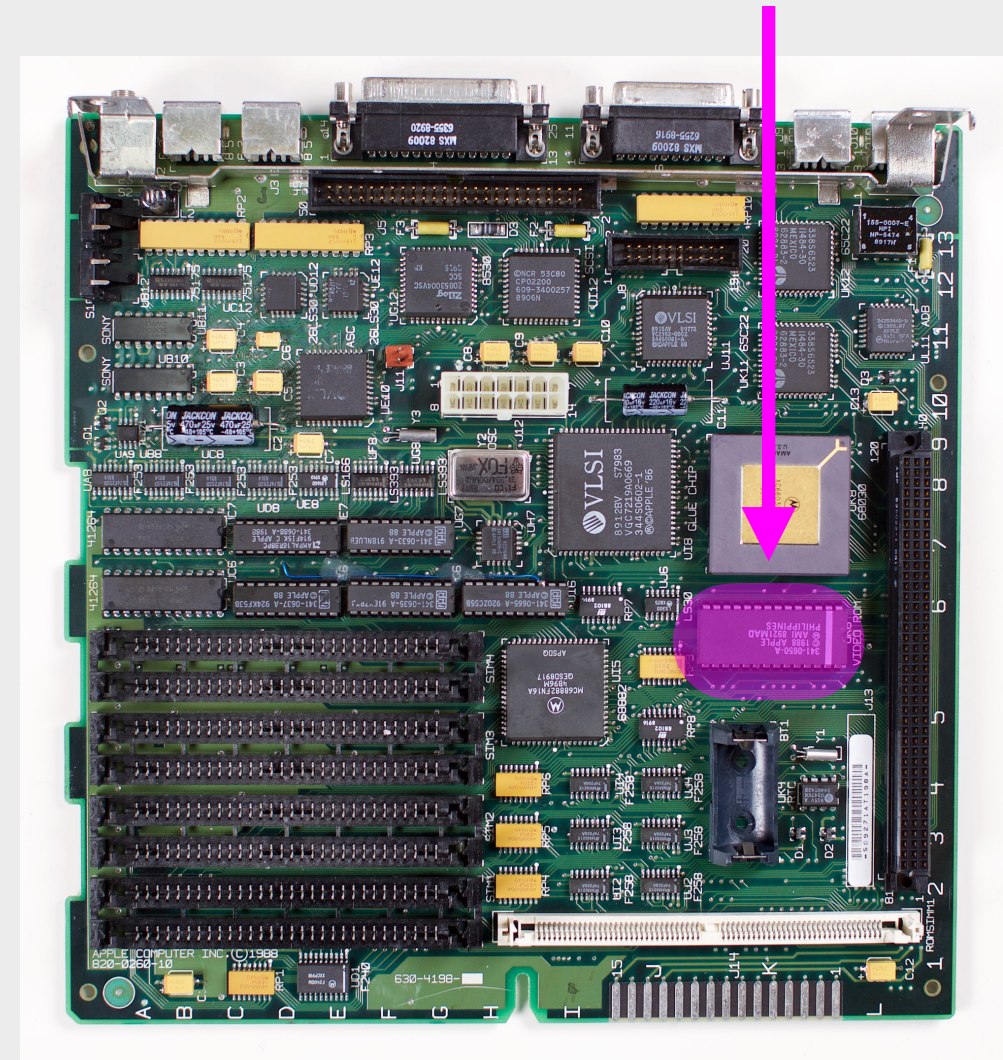
Video ROM (UK6) - Pin 09

A functioning video ROM look like the following when the Mac is idling with a flashing question mark. This page, and those that follow, will show examples of how each signal should look, from pin 1 through pin 28.

Please focus on the image caption below.



Video ROM Pin 09: A(1)

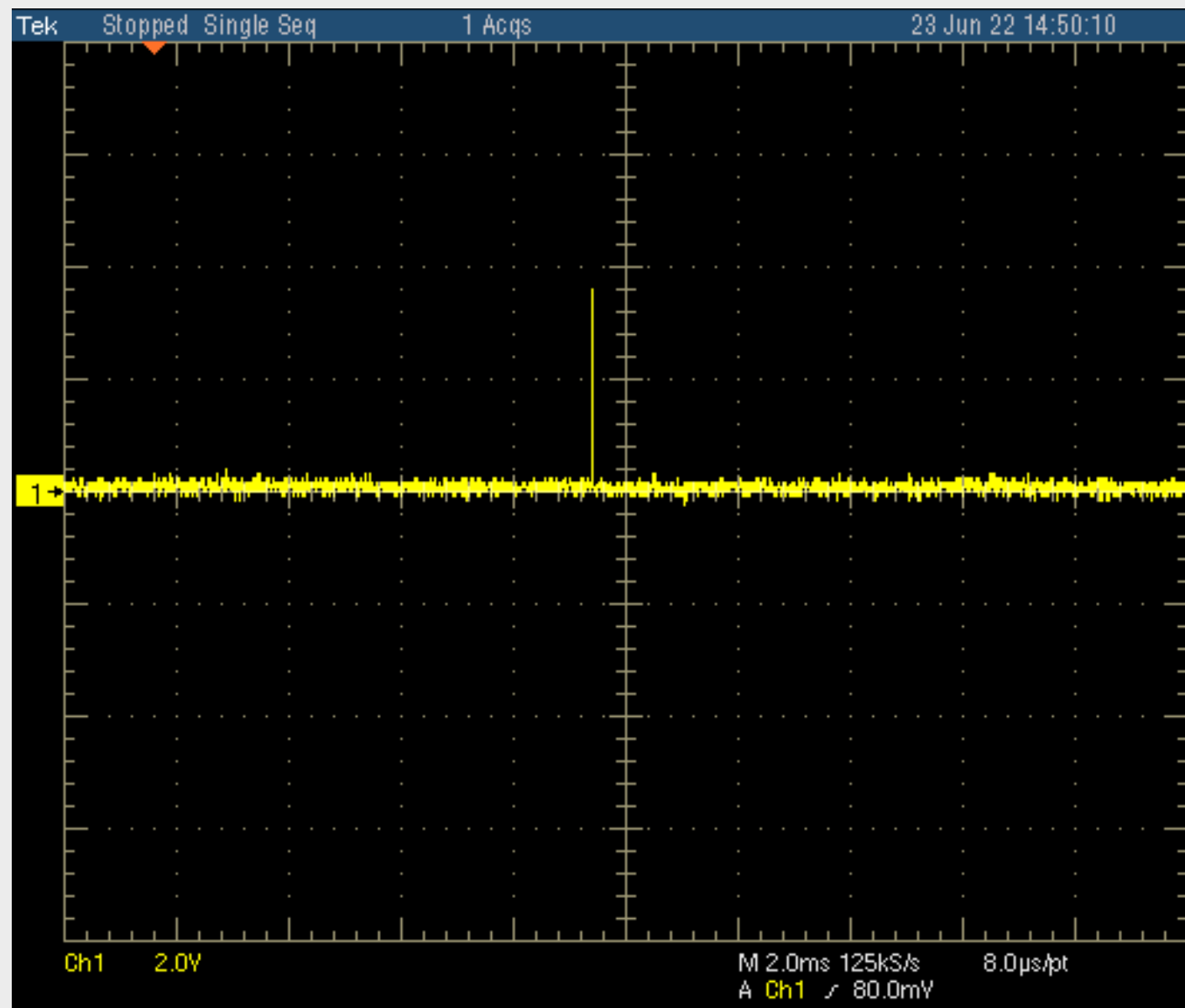


03 Troubleshooting & Repair — Step 7

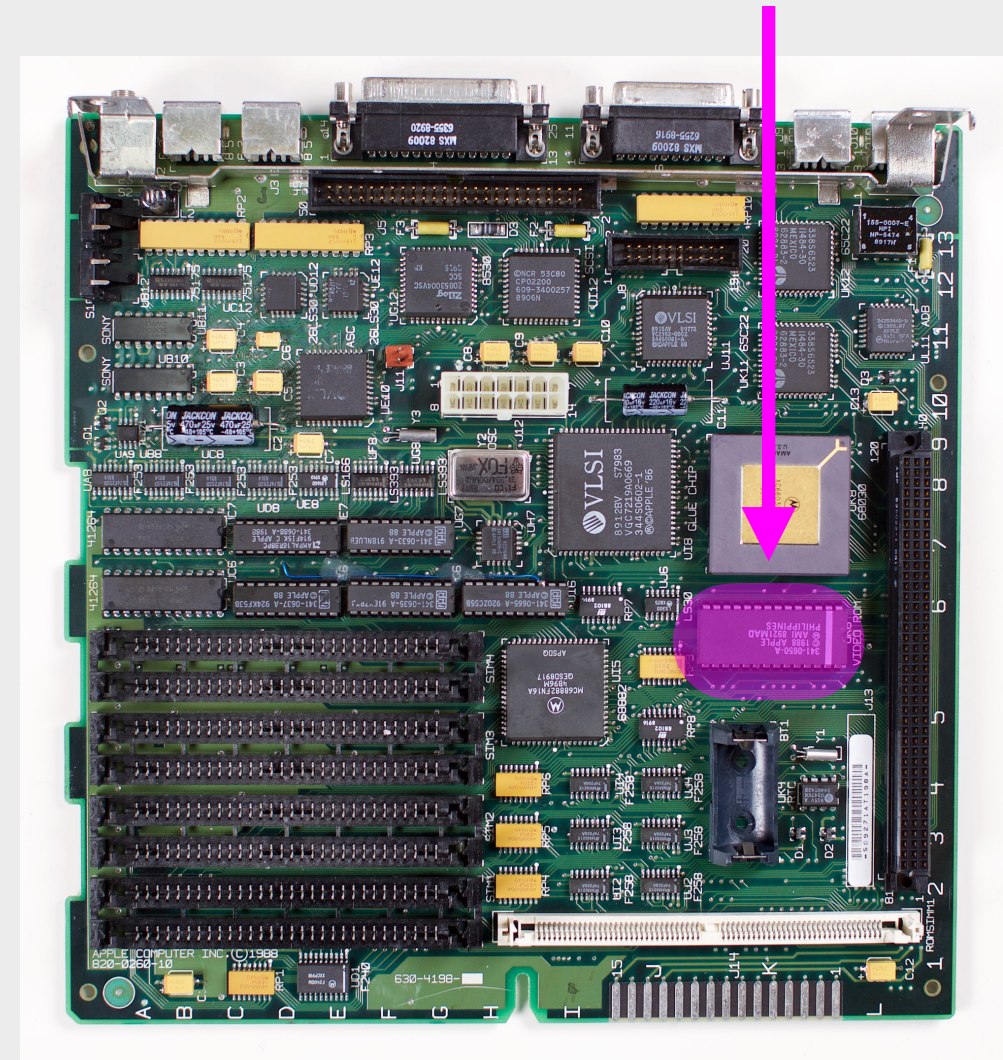
Video ROM (UK6) - Pin 10

A functioning video ROM look like the following when the Mac is idling with a flashing question mark. This page, and those that follow, will show examples of how each signal should look, from pin 1 through pin 28.

Please focus on the image caption below.



Video ROM Pin 10: A(0)

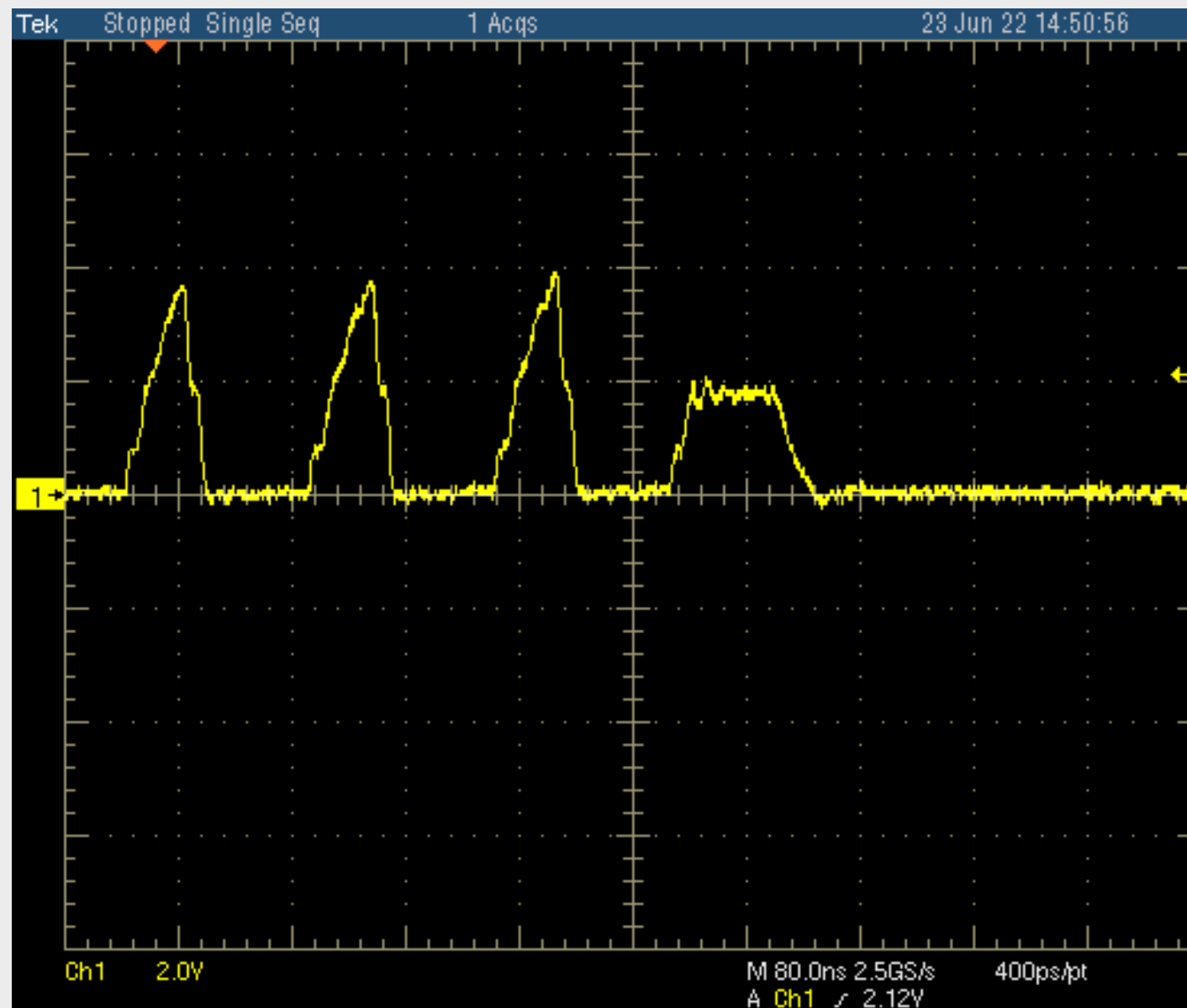


03 Troubleshooting & Repair — Step 7

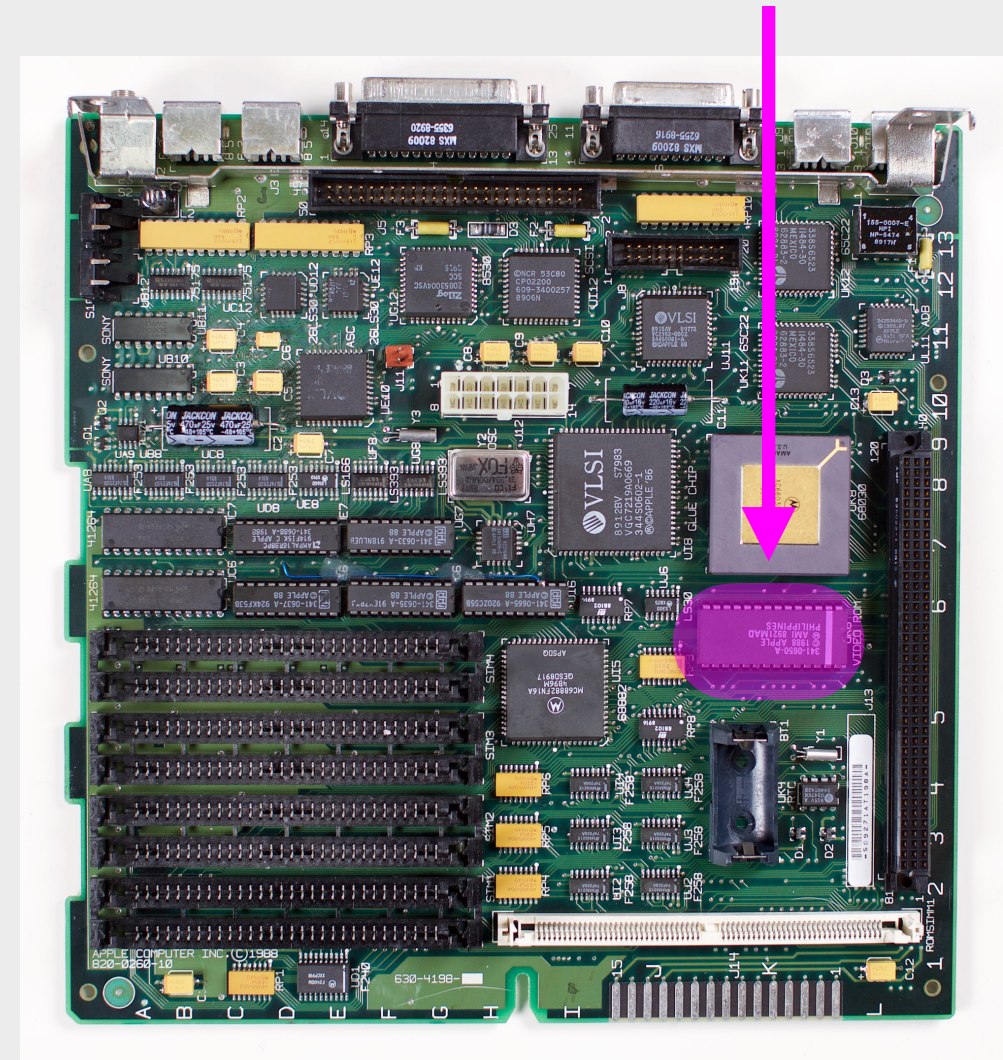
Video ROM (UK6) - Pin 11

A functioning video ROM look like the following when the Mac is idling with a flashing question mark. This page, and those that follow, will show examples of how each signal should look, from pin 1 through pin 28.

Please focus on the image caption below.



Video ROM Pin 11: D(24)

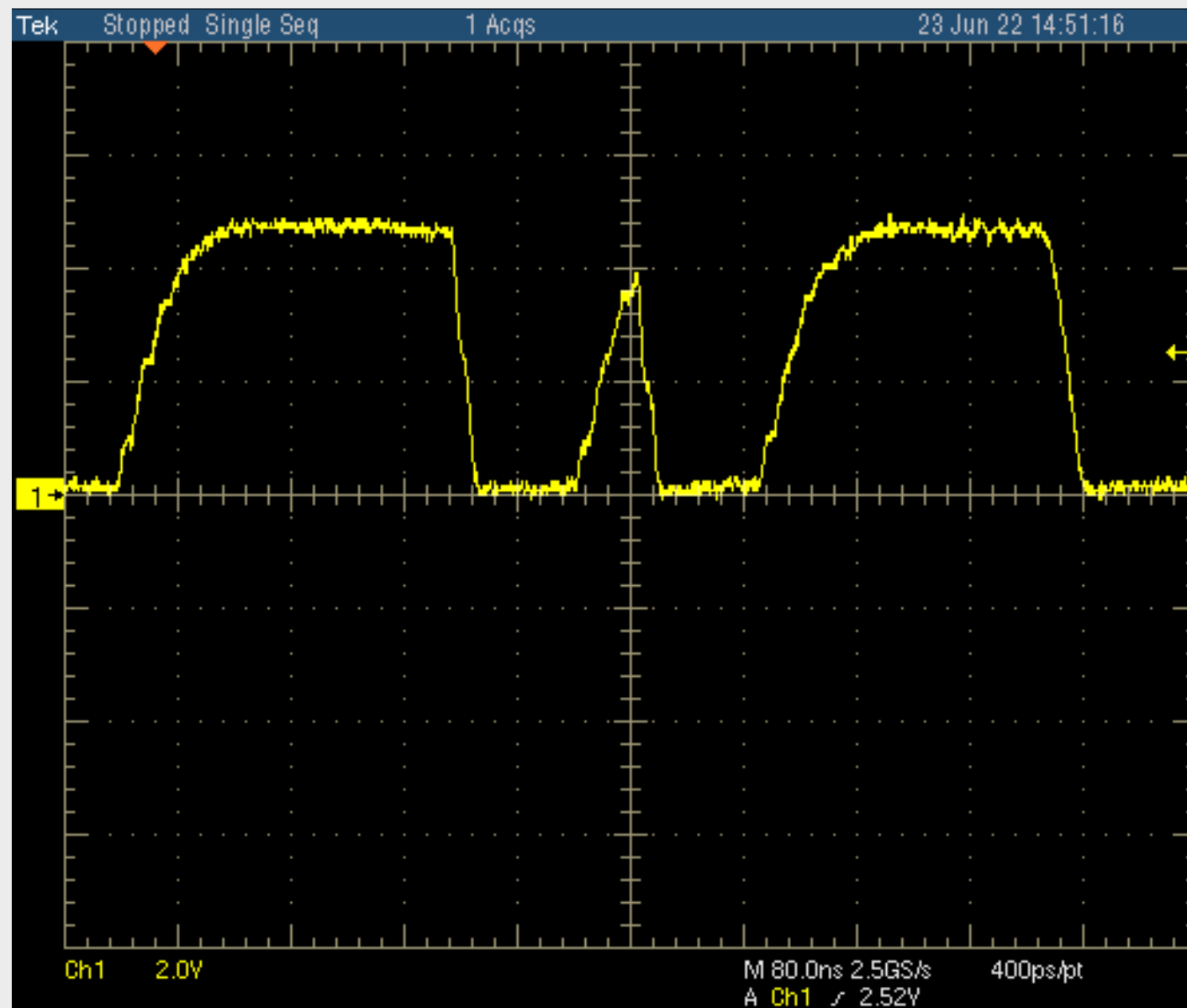


03 Troubleshooting & Repair — Step 7

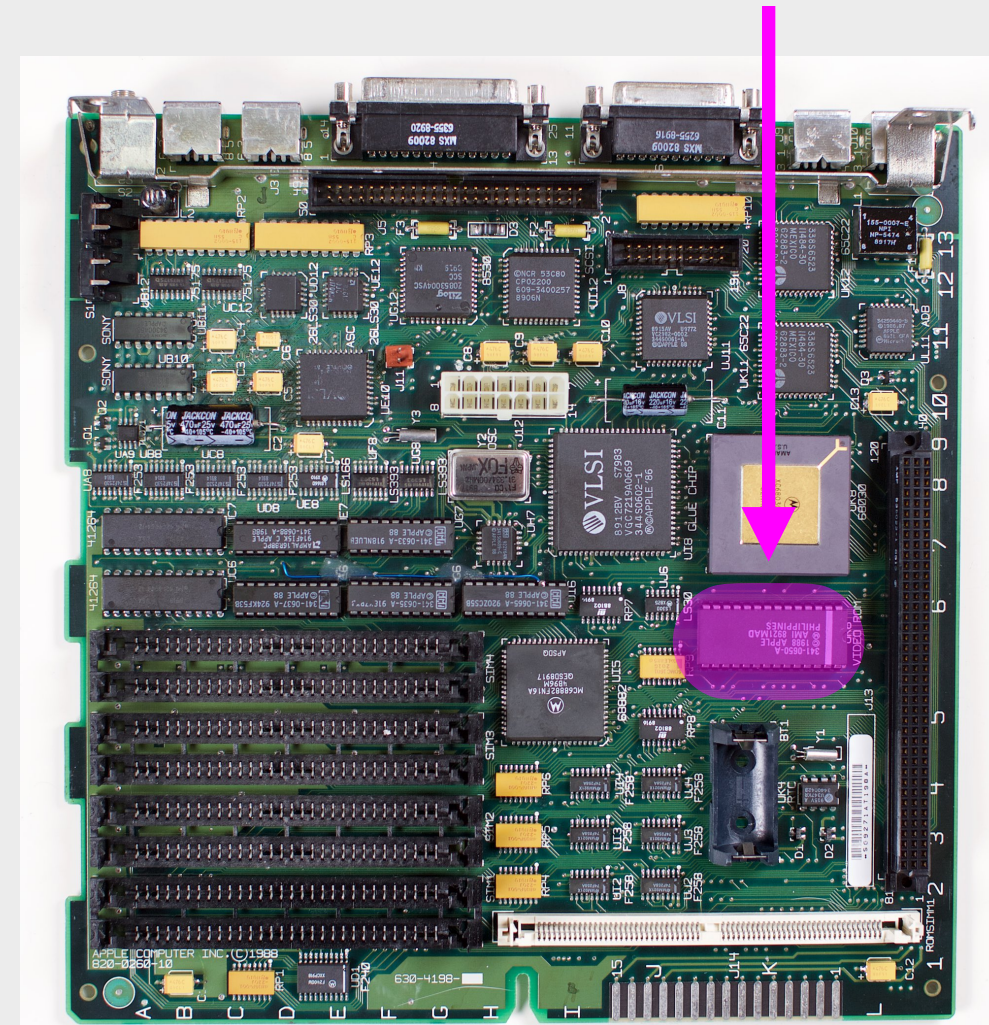
Video ROM (UK6) - Pin 12

A functioning video ROM look like the following when the Mac is idling with a flashing question mark. This page, and those that follow, will show examples of how each signal should look, from pin 1 through pin 28.

Please focus on the image caption below.



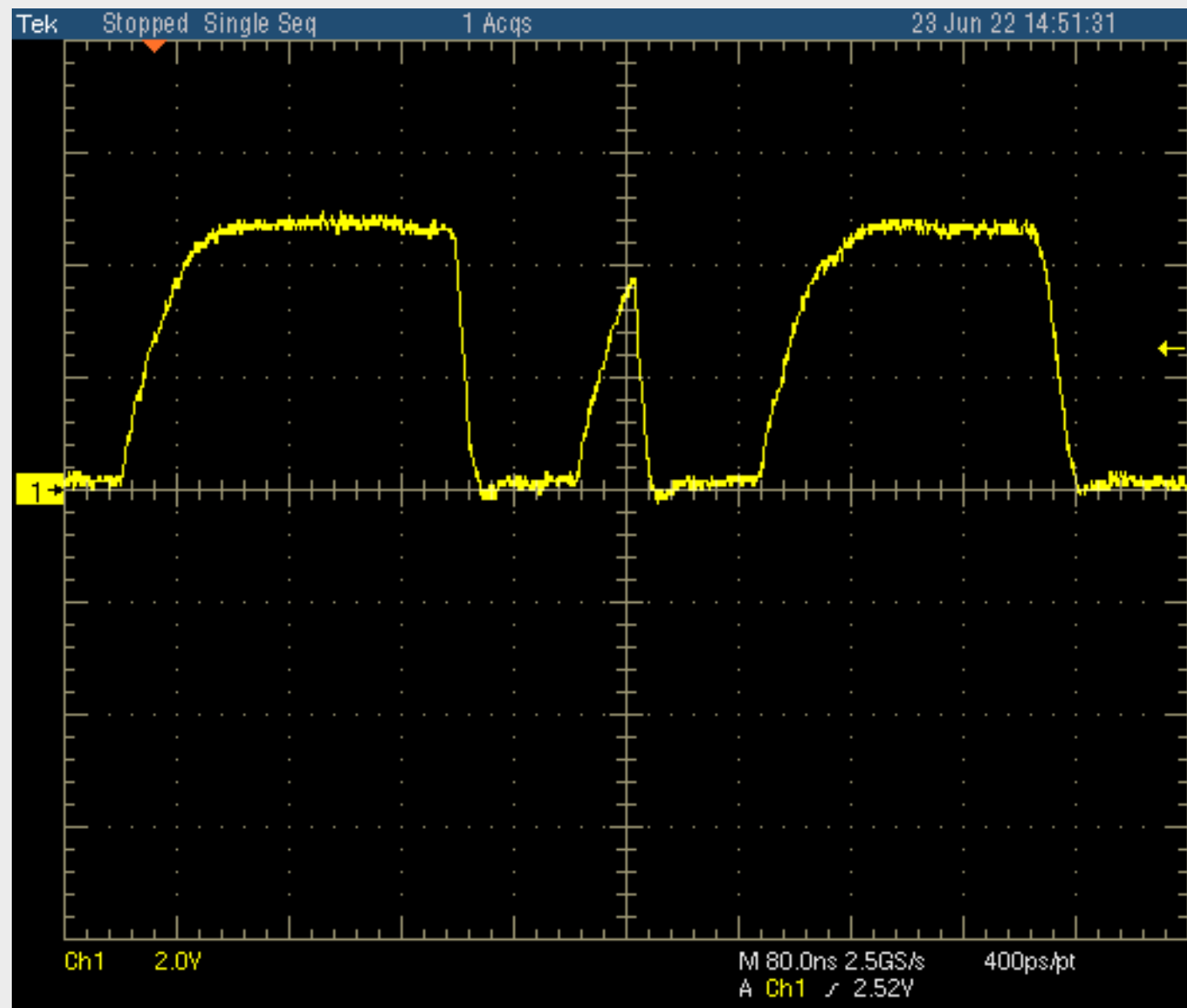
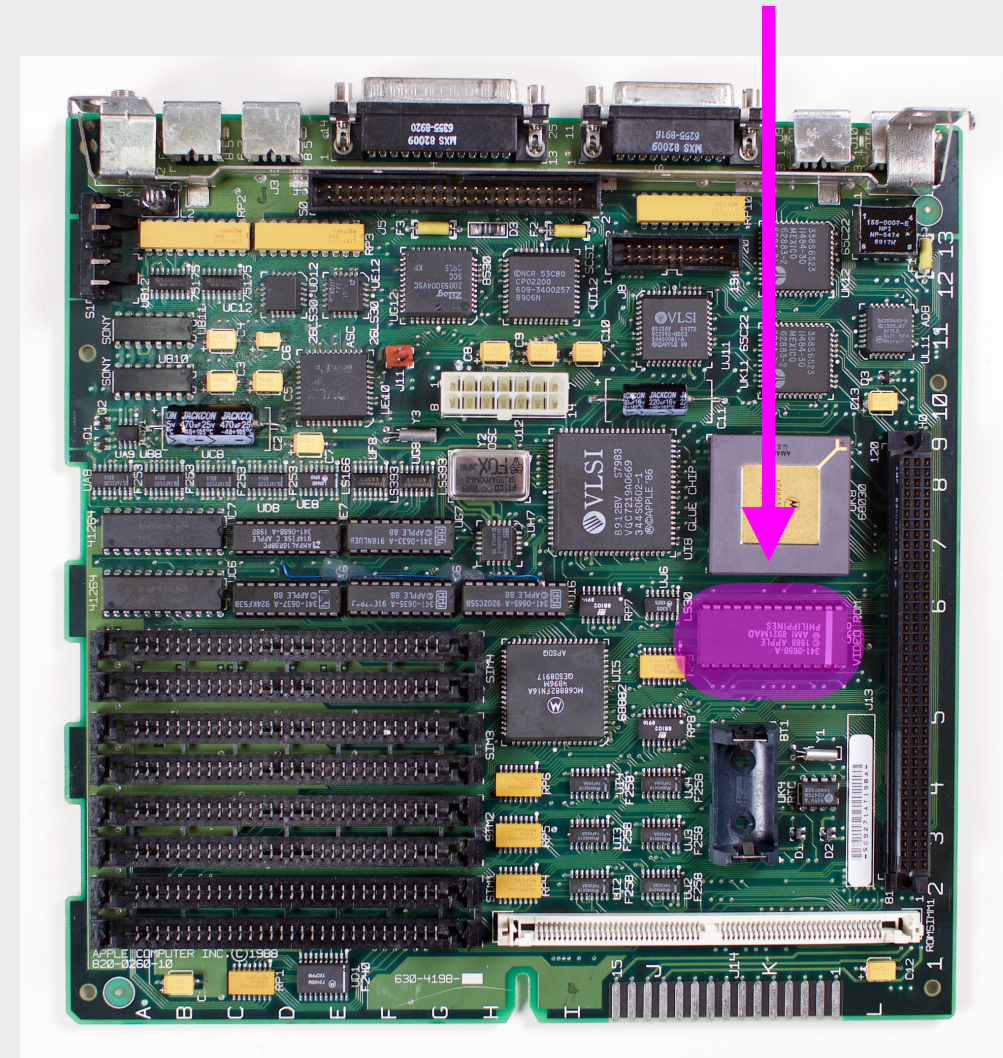
Video ROM Pin 12: D(25)



Video ROM (UK6) - Pin 13

A functioning video ROM look like the following when the Mac is idling with a flashing question mark. This page, and those that follow, will show examples of how each signal should look, from pin 1 through pin 28.

Please focus on the image caption below.



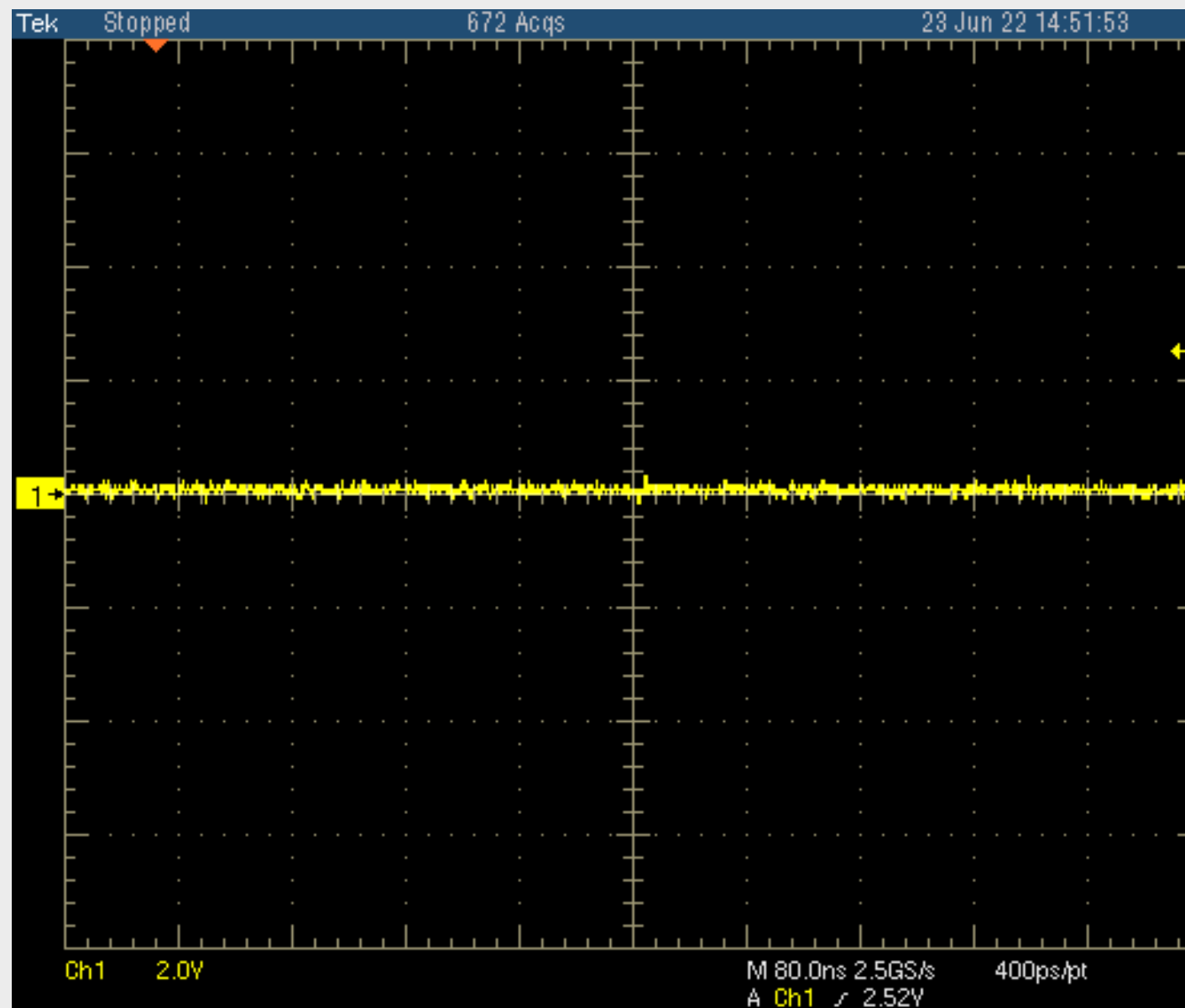
Video ROM Pin 13: D(26)

03 Troubleshooting & Repair — Step 7

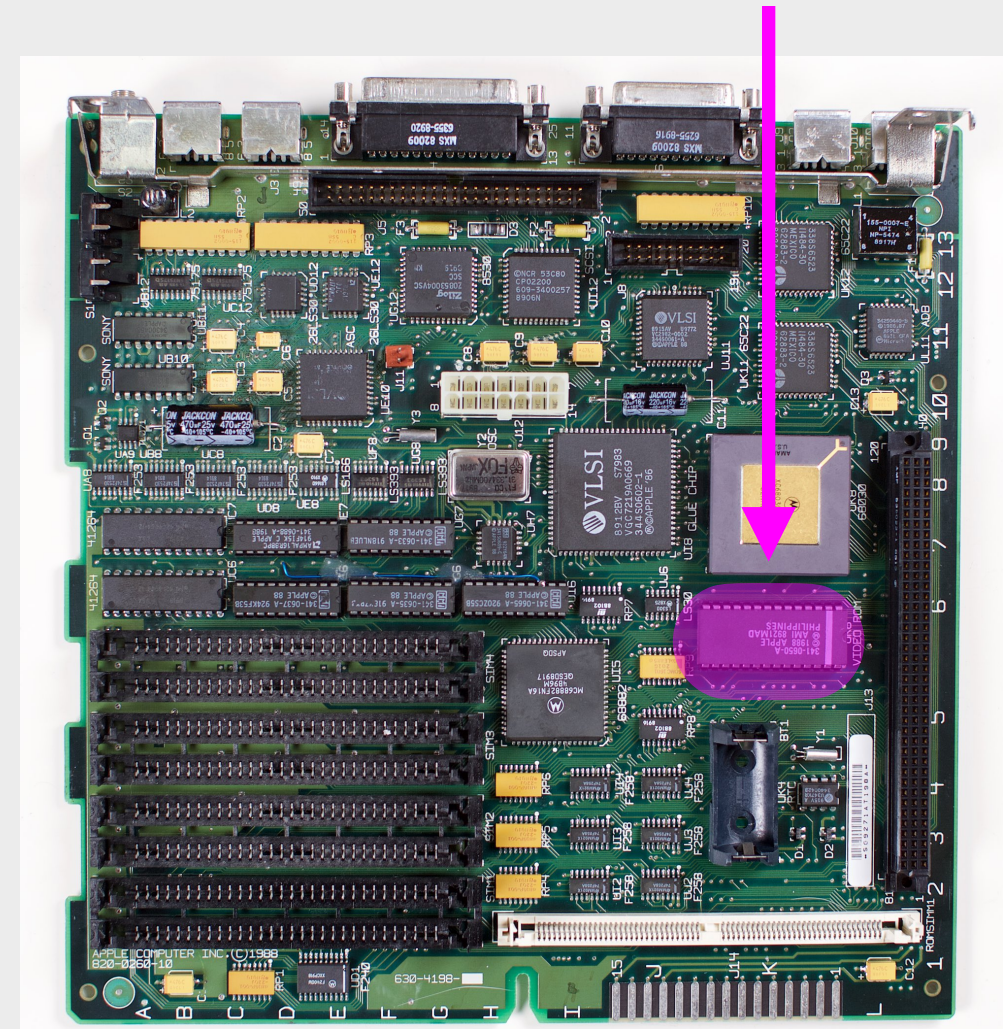
Video ROM (UK6) - Pin 14

A functioning video ROM look like the following when the Mac is idling with a flashing question mark. This page, and those that follow, will show examples of how each signal should look, from pin 1 through pin 28.

Please focus on the image caption below.



Video ROM Pin 14: Ground

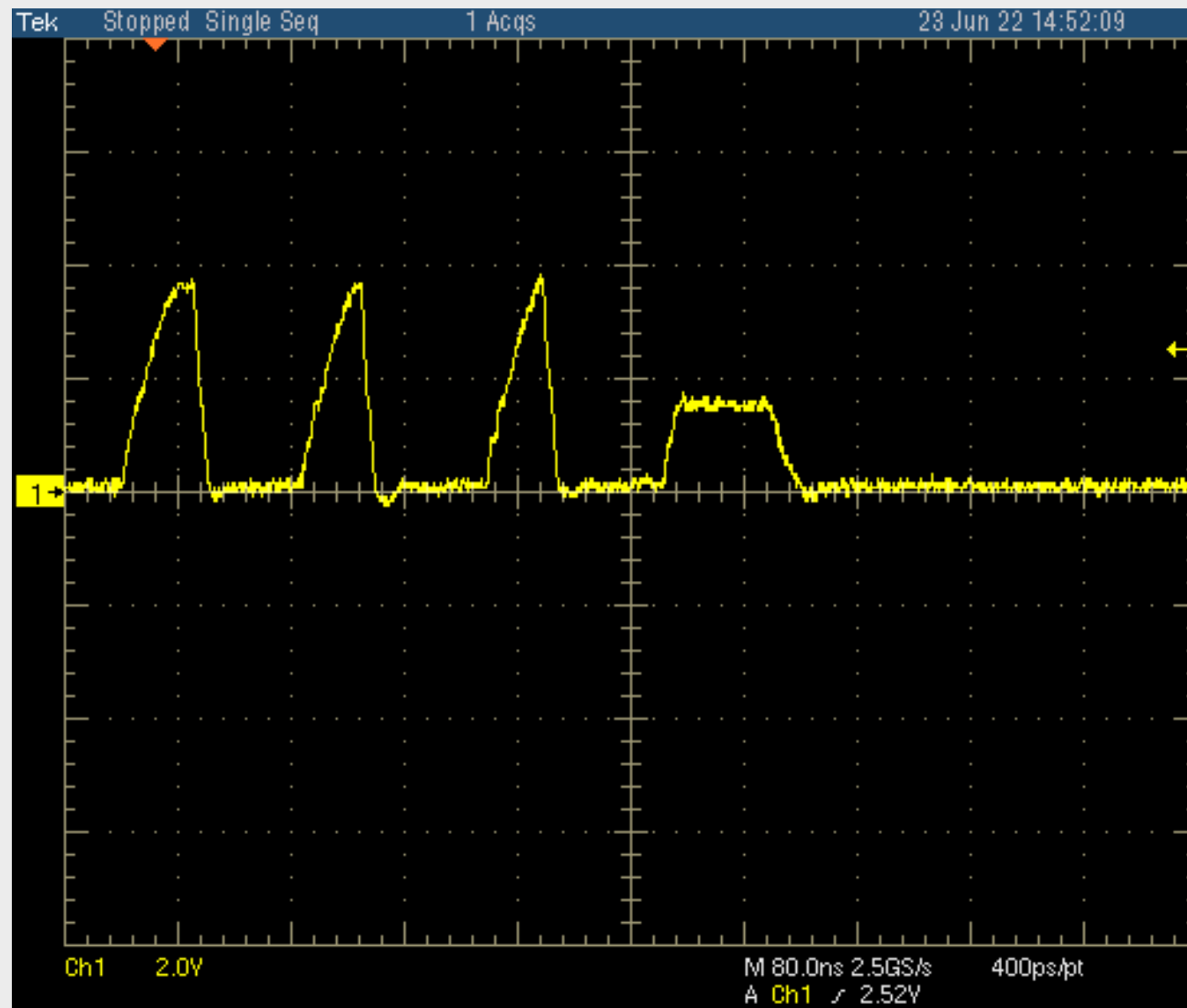


03 Troubleshooting & Repair — Step 7

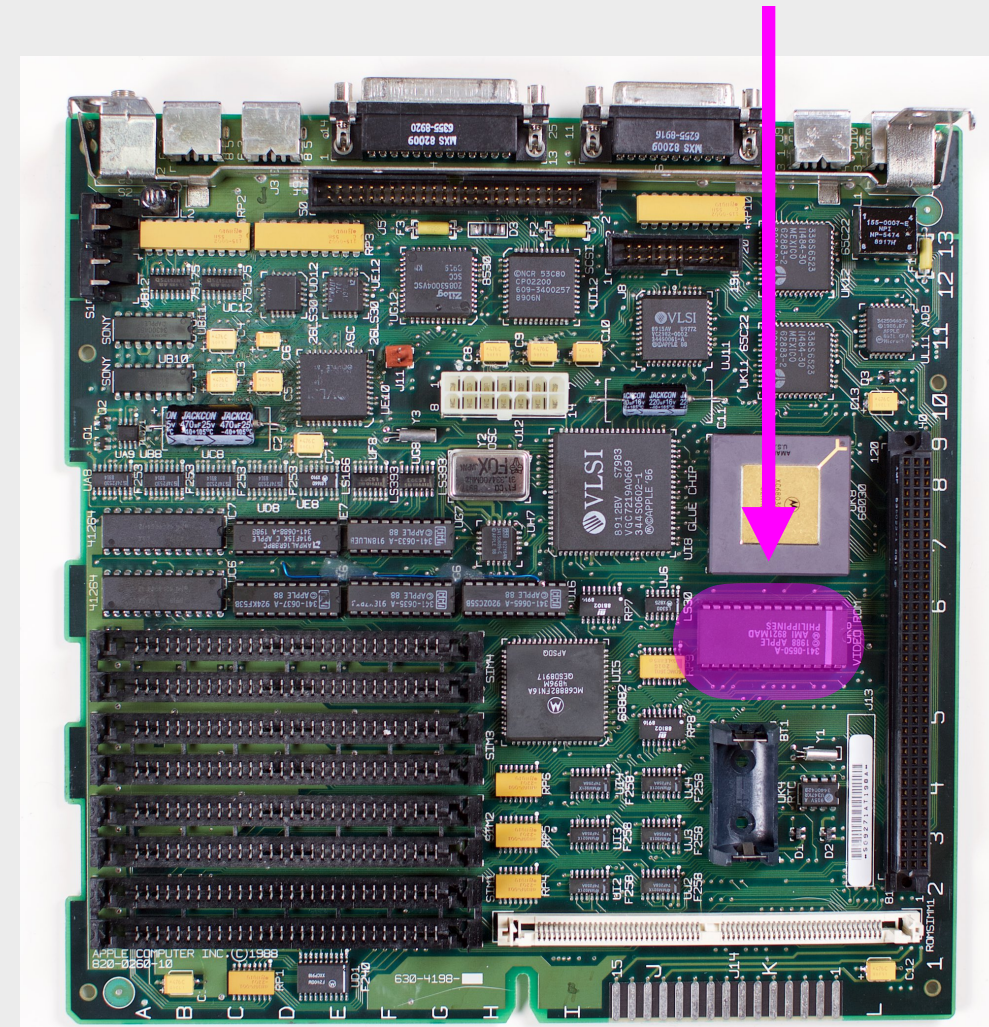
Video ROM (UK6) - Pin 15

A functioning video ROM look like the following when the Mac is idling with a flashing question mark. This page, and those that follow, will show examples of how each signal should look, from pin 1 through pin 28.

Please focus on the image caption below.



Video ROM Pin 15: D(27)

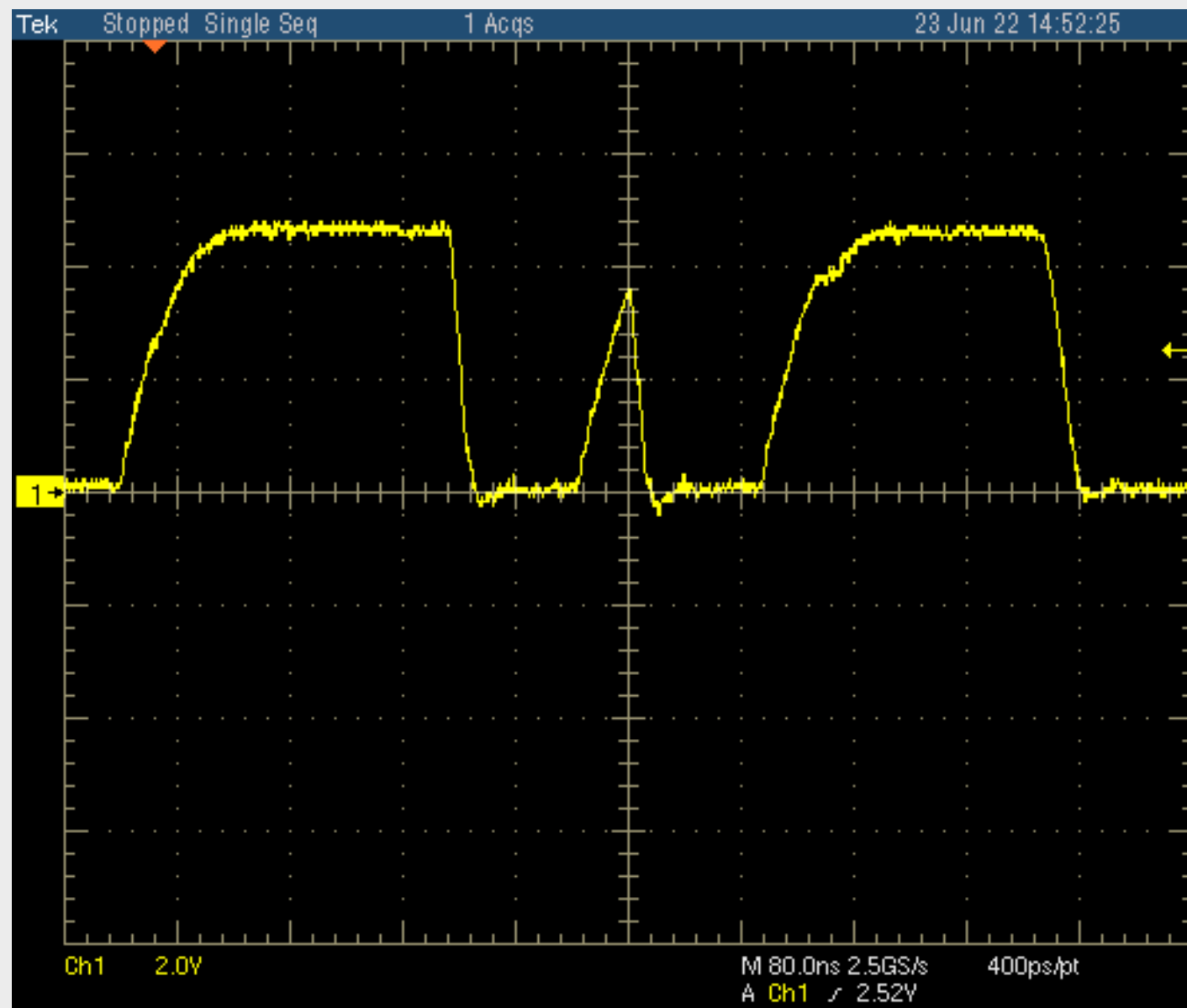


03 Troubleshooting & Repair — Step 7

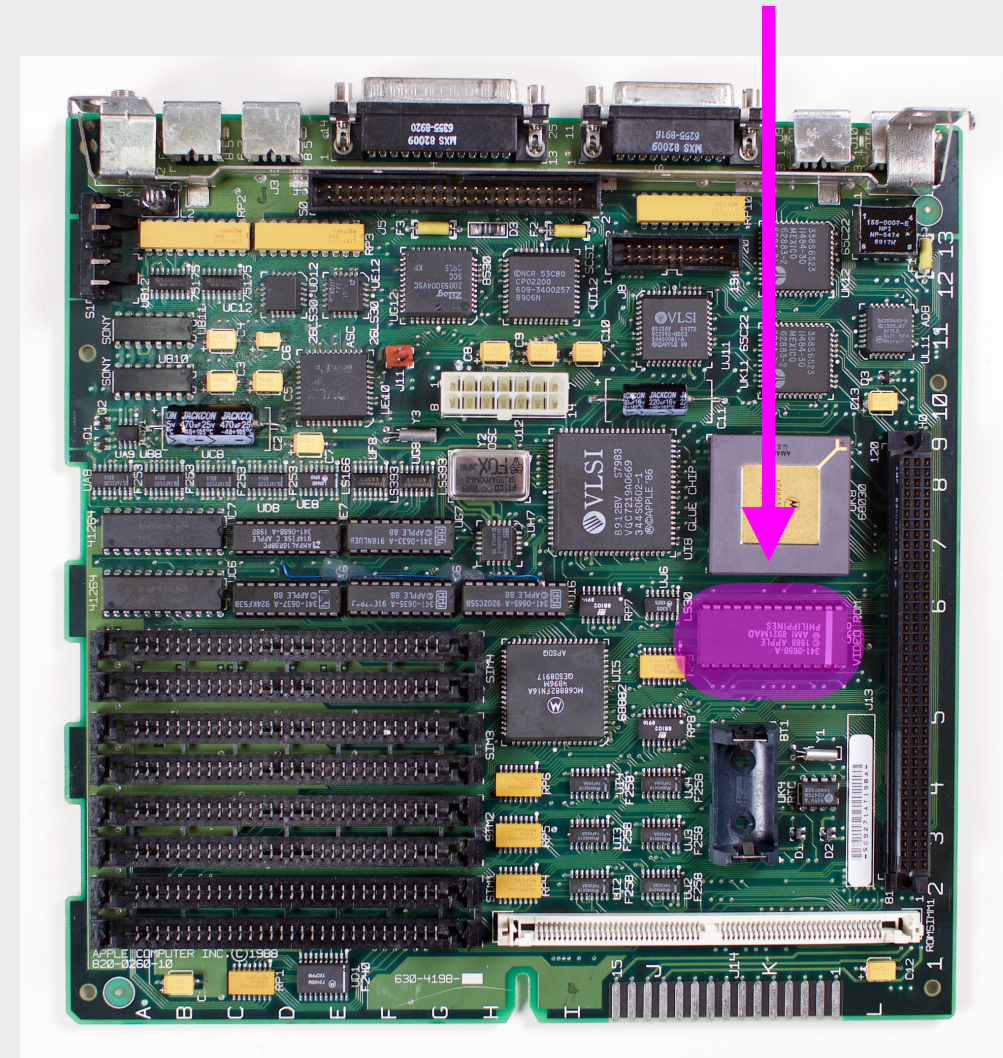
Video ROM (UK6) - Pin 16

A functioning video ROM look like the following when the Mac is idling with a flashing question mark. This page, and those that follow, will show examples of how each signal should look, from pin 1 through pin 28.

Please focus on the image caption below.



Video ROM Pin 16: D(28)

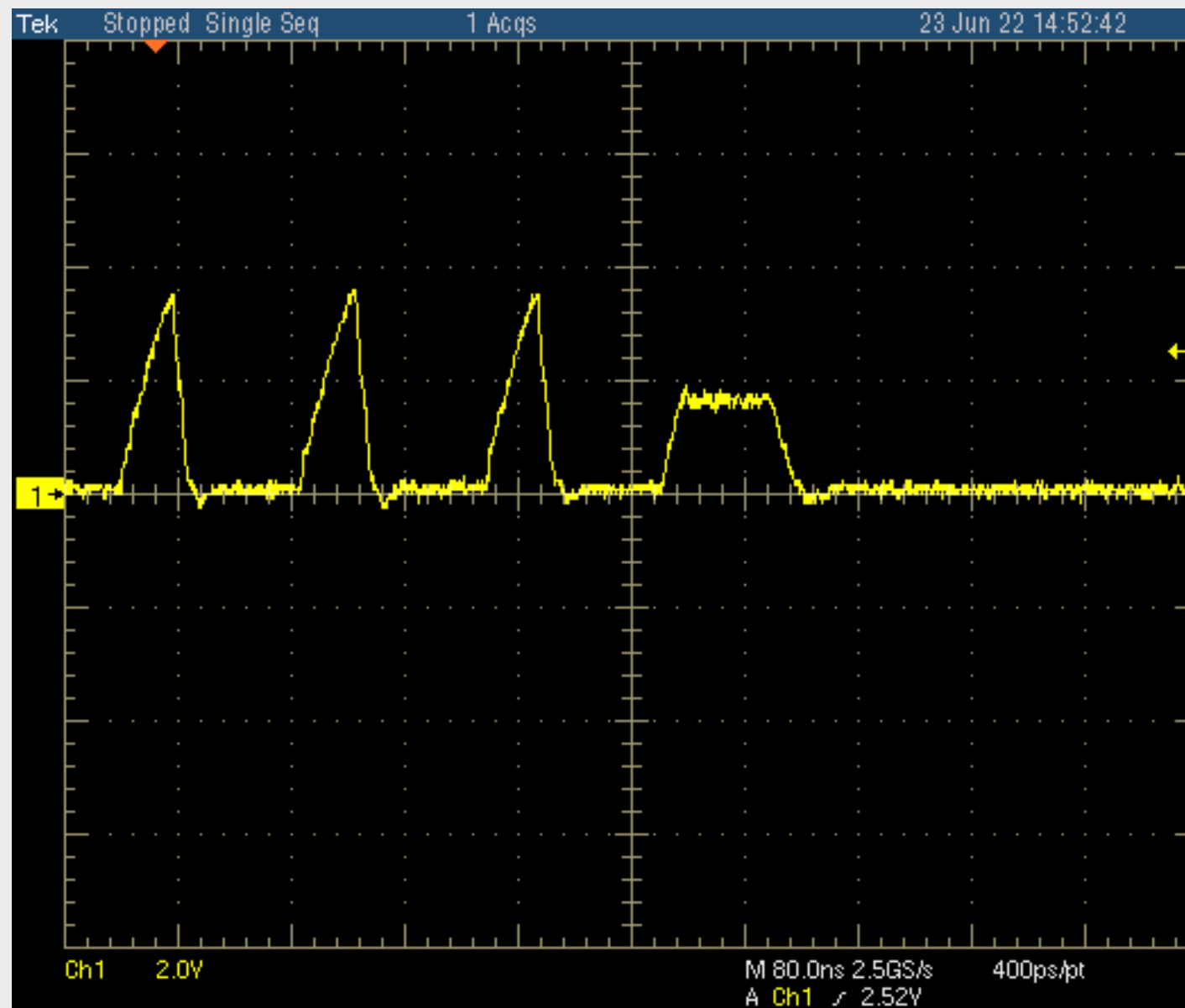


03 Troubleshooting & Repair — Step 7

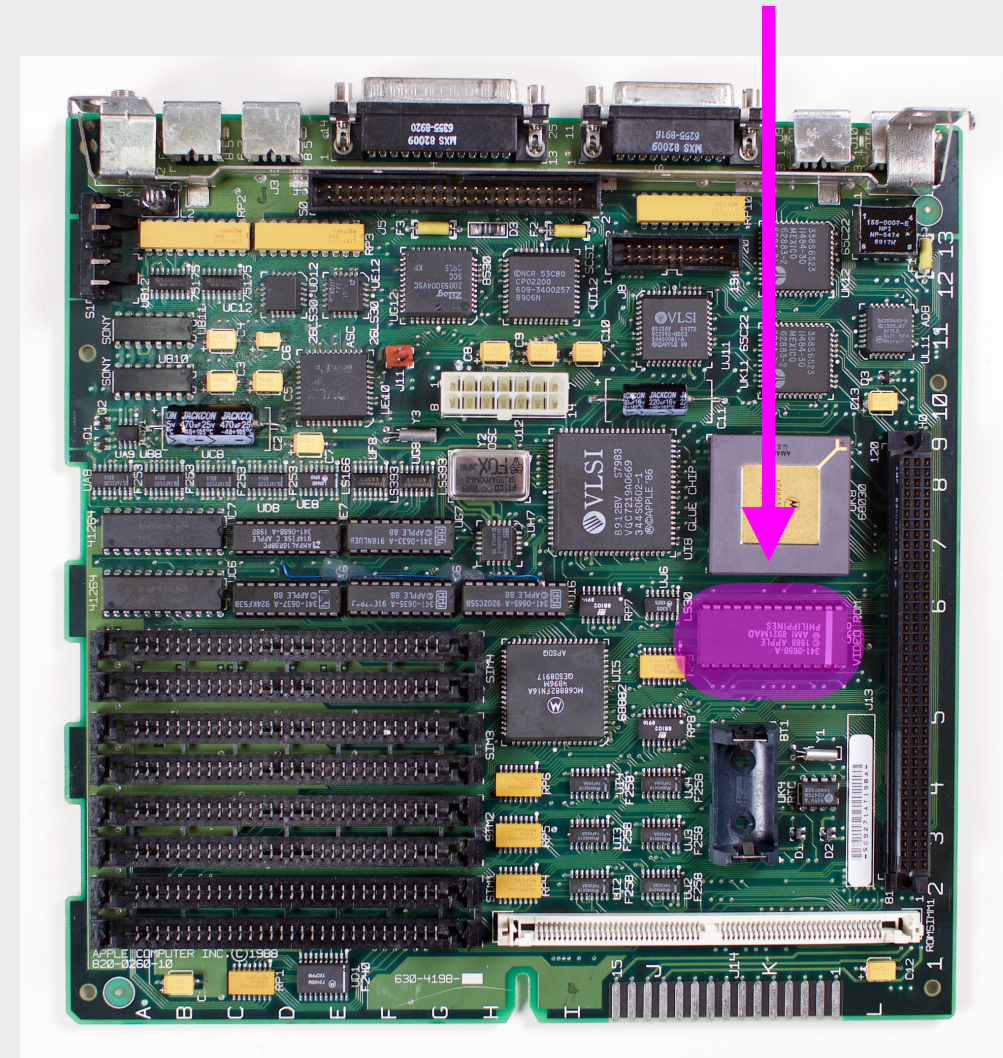
Video ROM (UK6) - Pin 17

A functioning video ROM look like the following when the Mac is idling with a flashing question mark. This page, and those that follow, will show examples of how each signal should look, from pin 1 through pin 28.

Please focus on the image caption below.



Video ROM Pin 17: D(29)

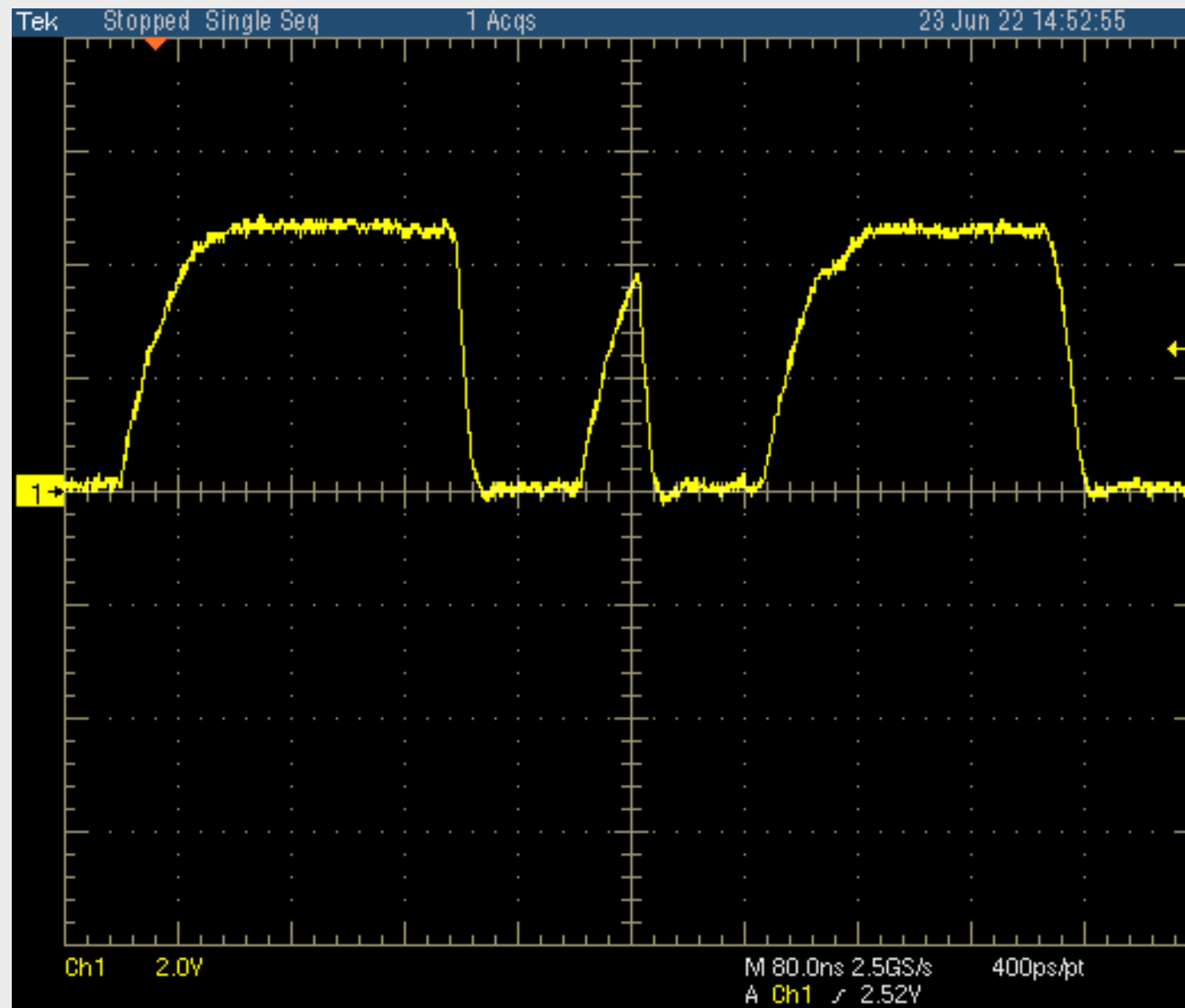


03 Troubleshooting & Repair — Step 7

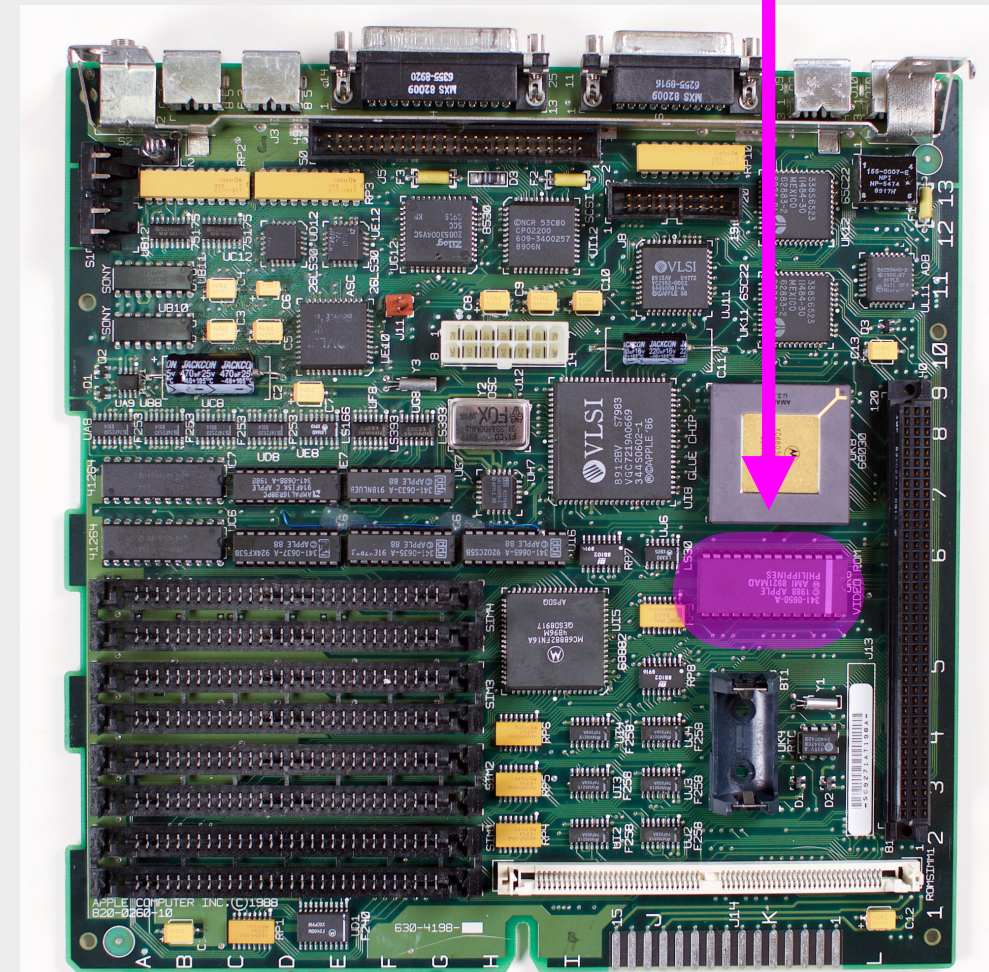
Video ROM (UK6) - Pin 18

A functioning video ROM look like the following when the Mac is idling with a flashing question mark. This page, and those that follow, will show examples of how each signal should look, from pin 1 through pin 28.

Please focus on the image caption below.



Video ROM Pin 18: D(30)

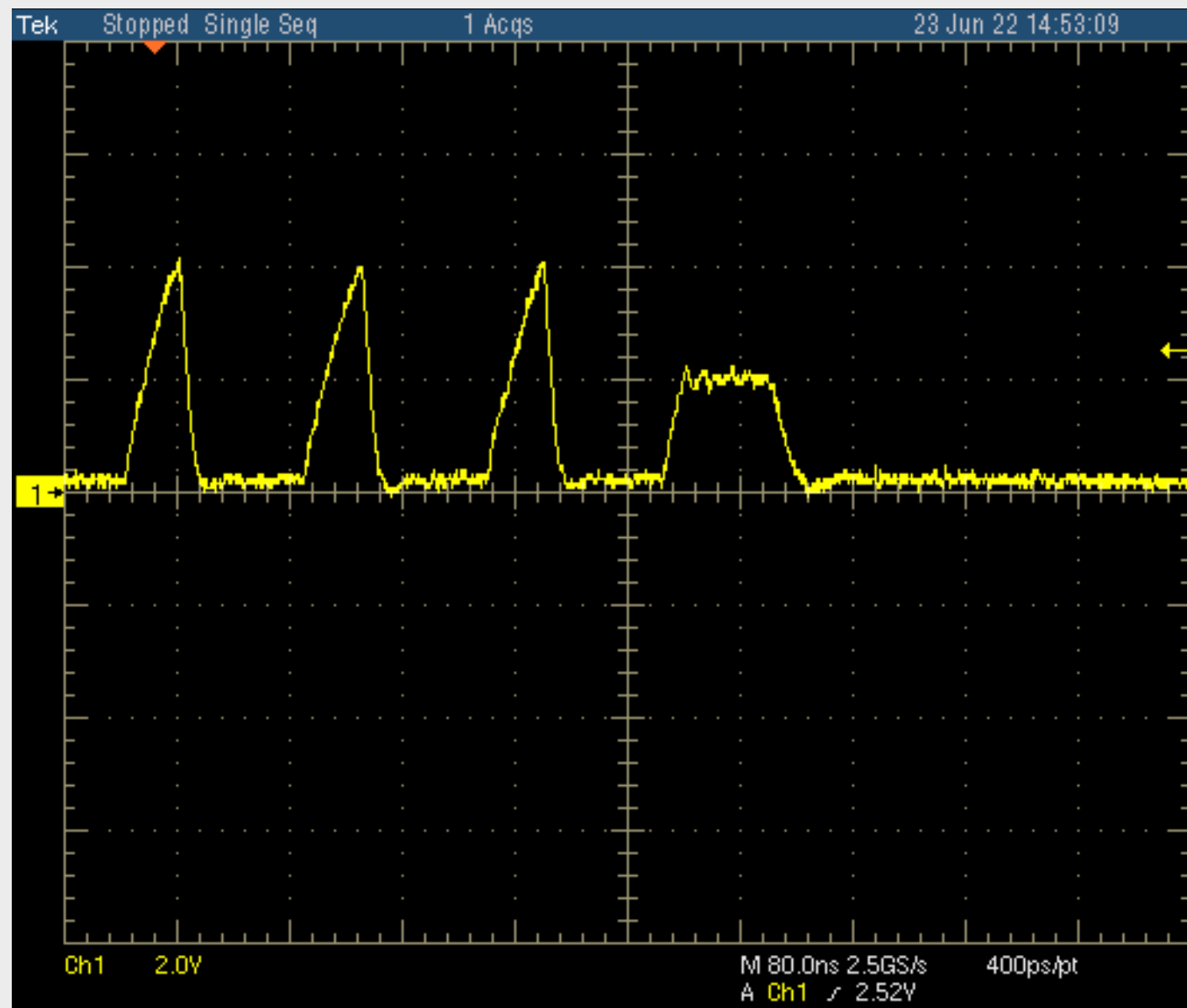


03 Troubleshooting & Repair — Step 7

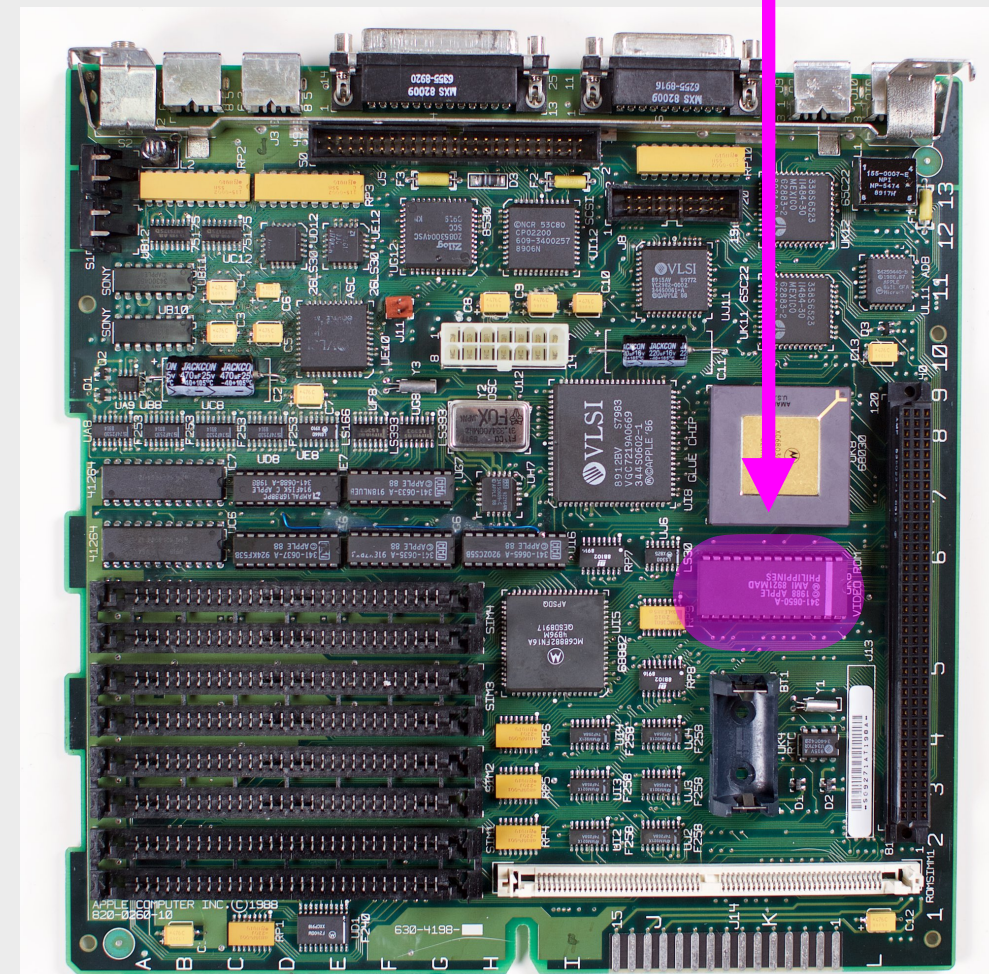
Video ROM (UK6) - Pin 19

A functioning video ROM look like the following when the Mac is idling with a flashing question mark. This page, and those that follow, will show examples of how each signal should look, from pin 1 through pin 28.

Please focus on the image caption below.



Video ROM Pin 19: D(31)

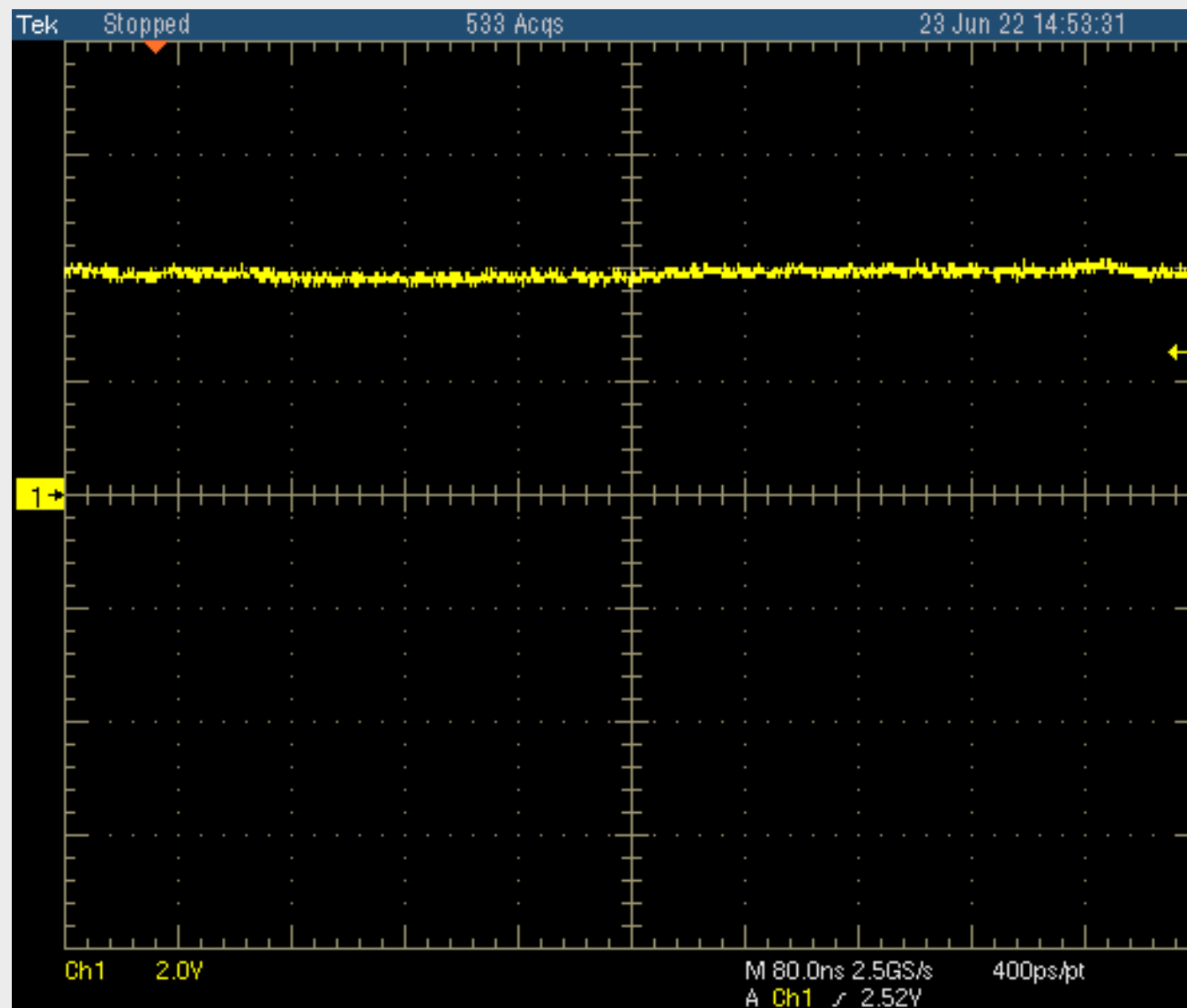


03 Troubleshooting & Repair — Step 7

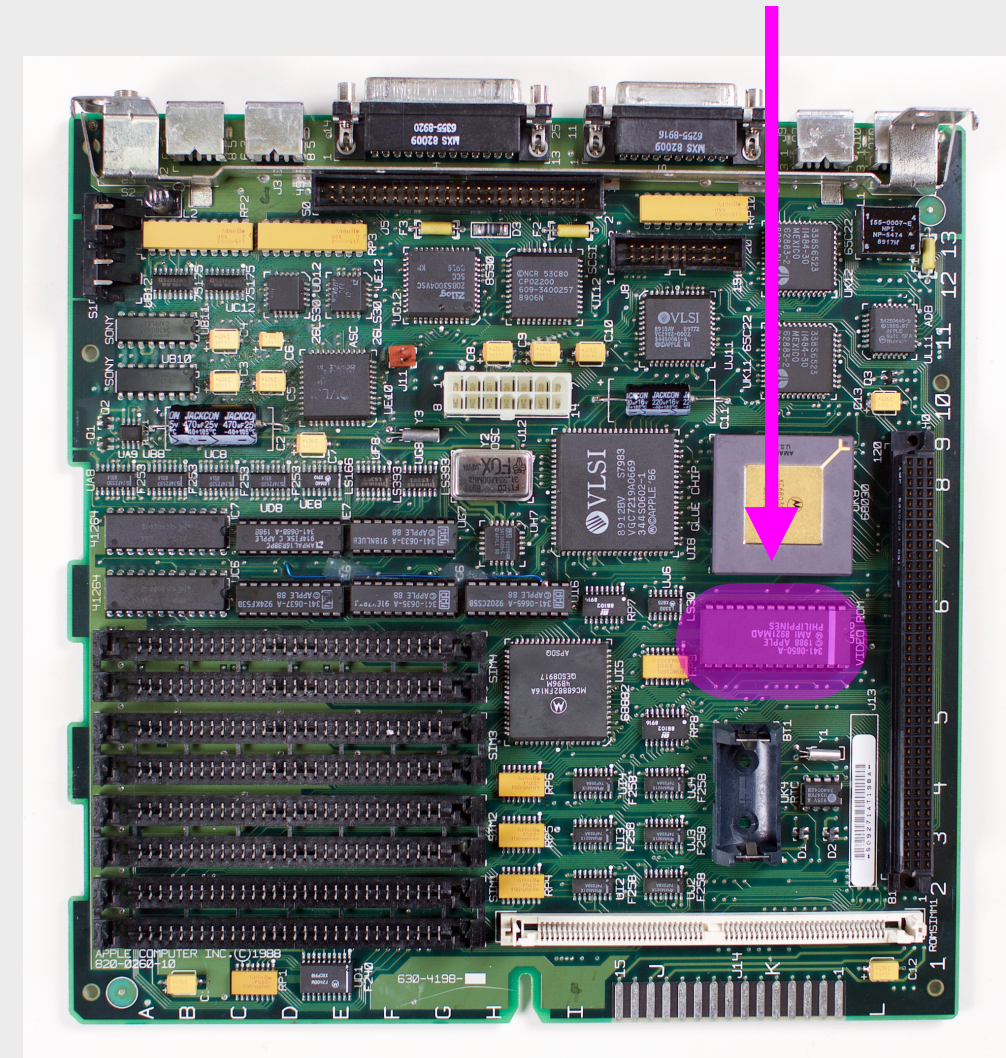
Video ROM (UK6) - Pin 20

A functioning video ROM look like the following when the Mac is idling with a flashing question mark. This page, and those that follow, will show examples of how each signal should look, from pin 1 through pin 28.

Please focus on the image caption below.



Video ROM Pin 20: CE

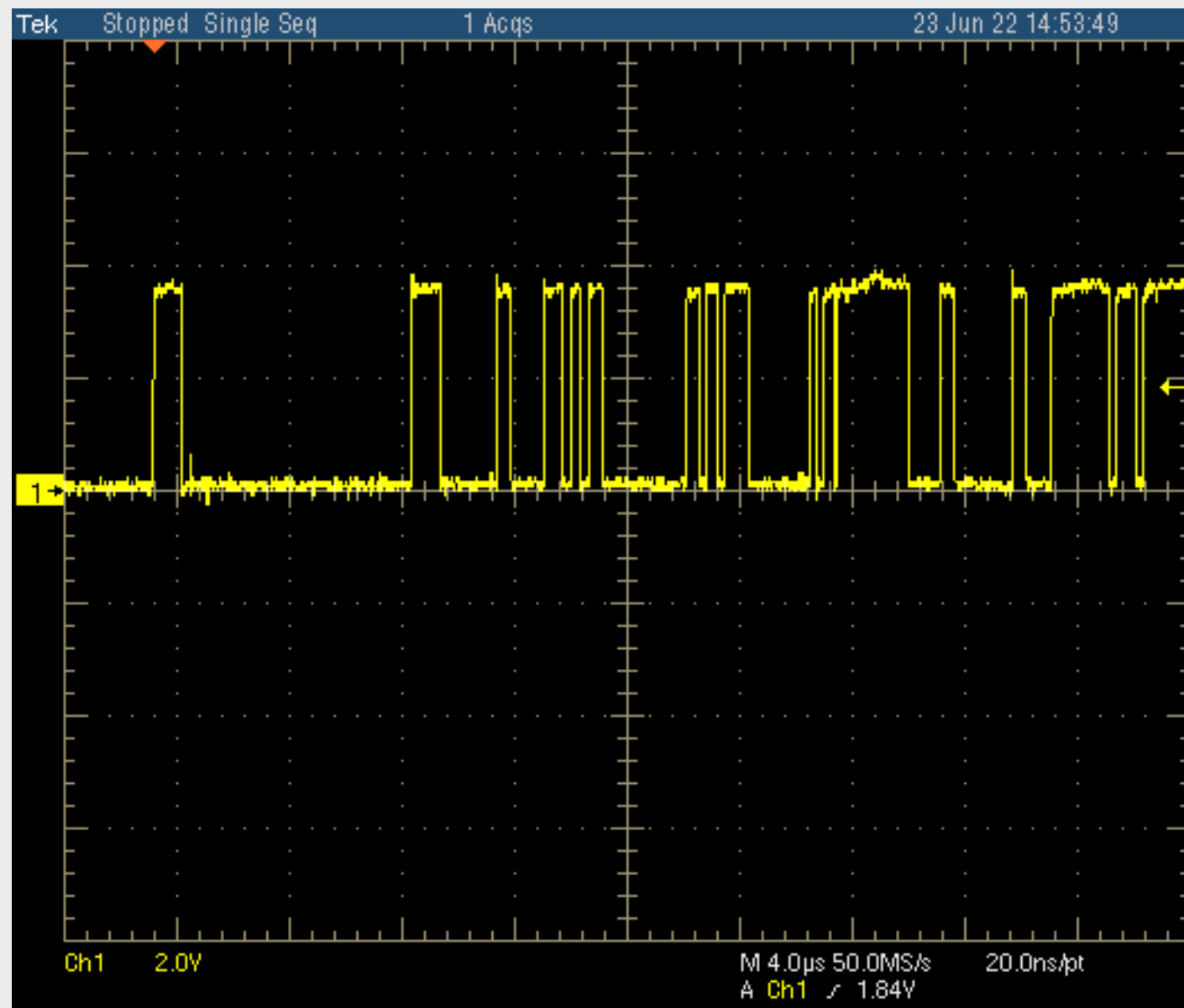


03 Troubleshooting & Repair — Step 7

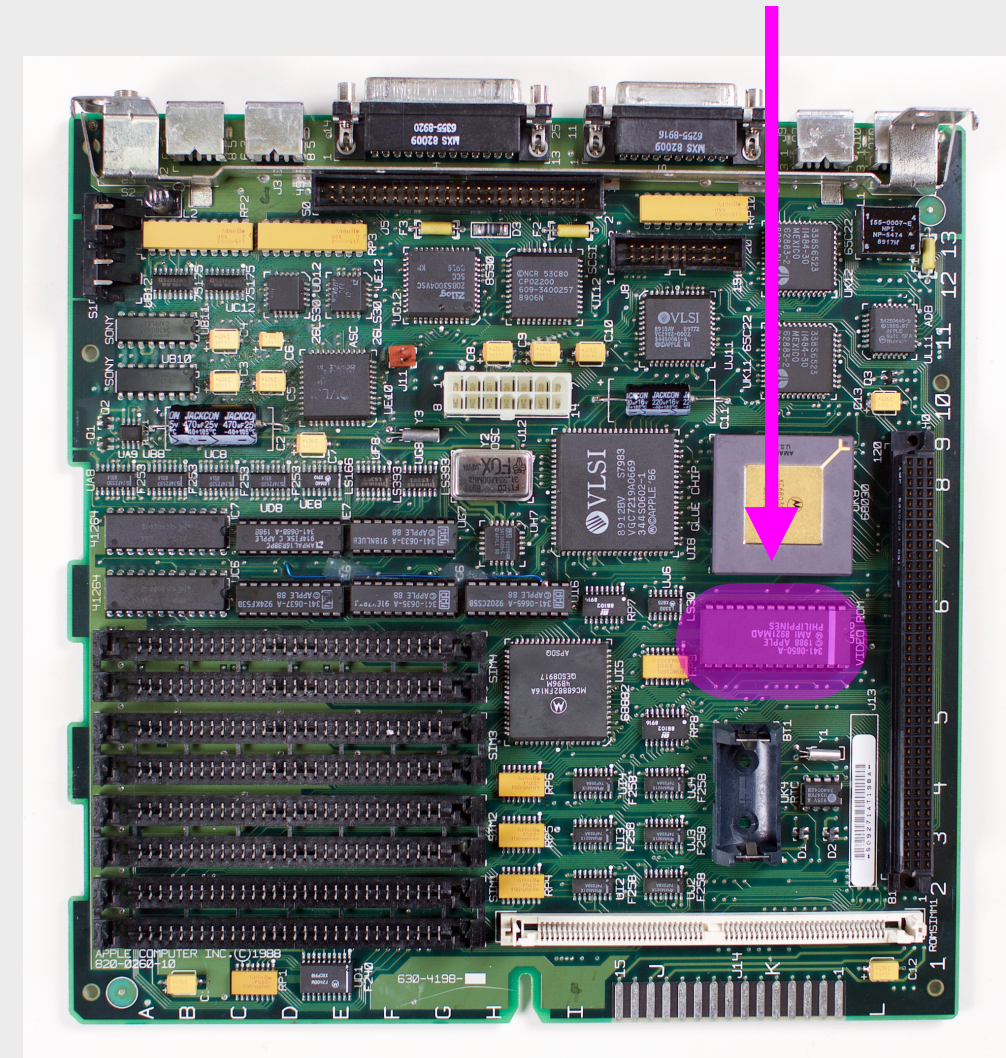
Video ROM (UK6) - Pin 21

A functioning video ROM look like the following when the Mac is idling with a flashing question mark. This page, and those that follow, will show examples of how each signal should look, from pin 1 through pin 28.

Please focus on the image caption below.



Video ROM Pin 21: A(10)

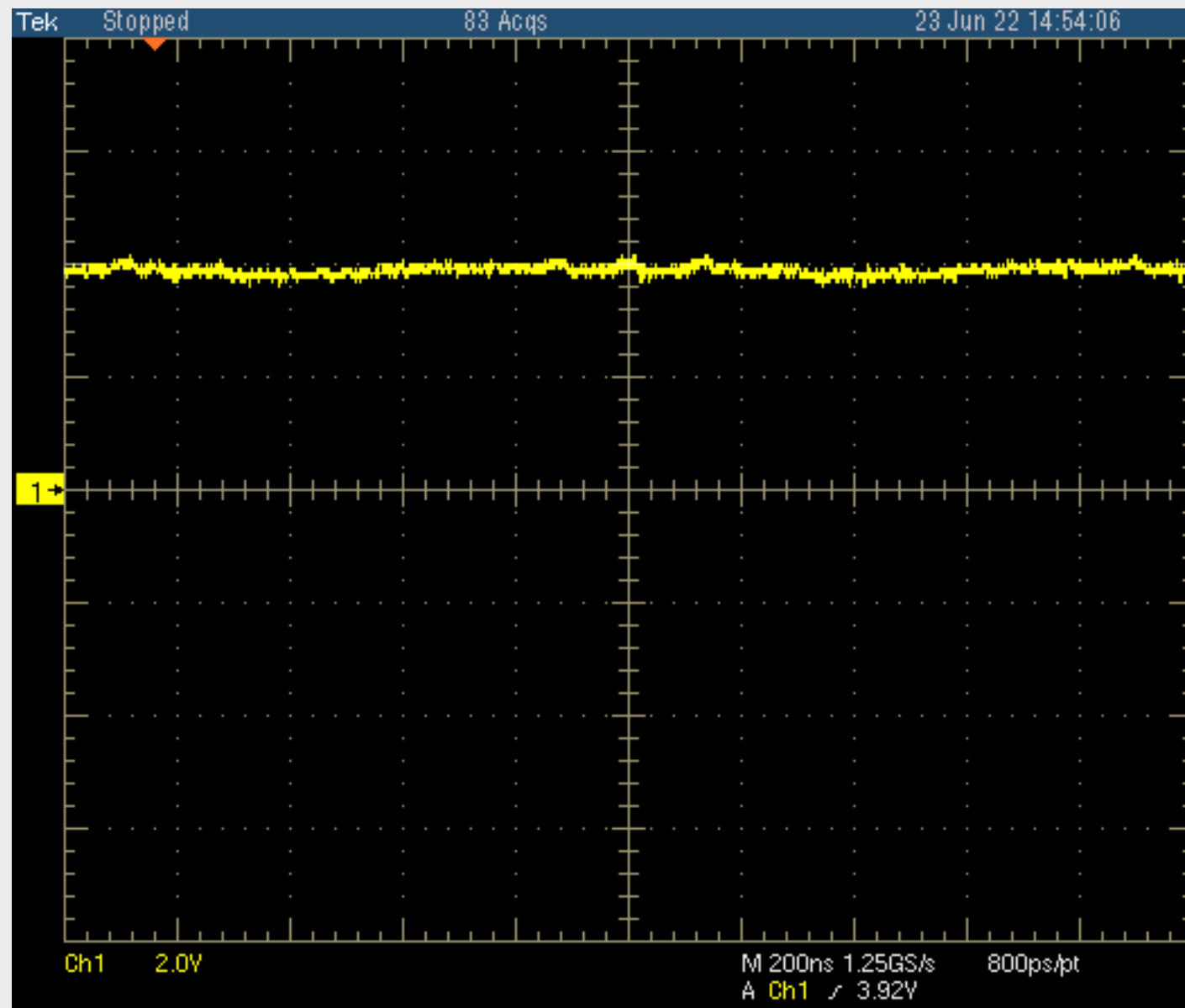


03 Troubleshooting & Repair — Step 7

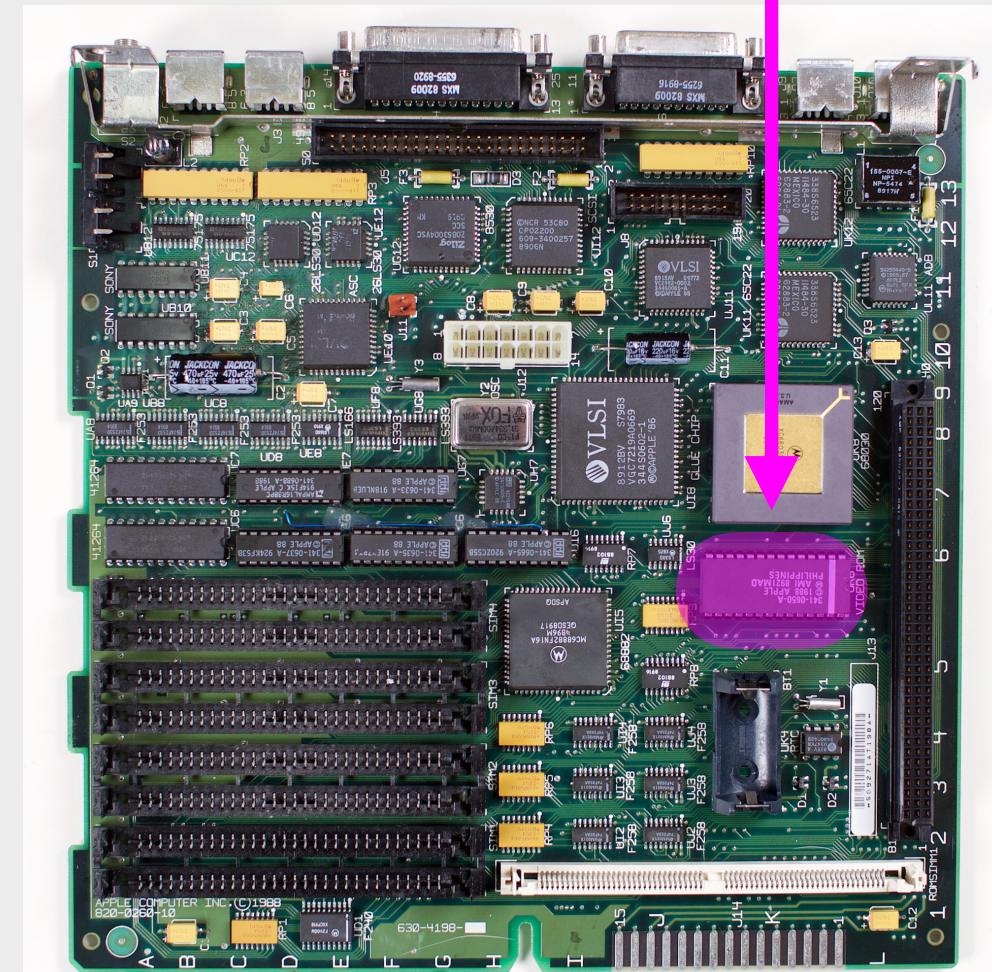
Video ROM (UK6) - Pin 22

A functioning video ROM look like the following when the Mac is idling with a flashing question mark. This page, and those that follow, will show examples of how each signal should look, from pin 1 through pin 28.

Please focus on the image caption below.



Video ROM Pin 22: OE

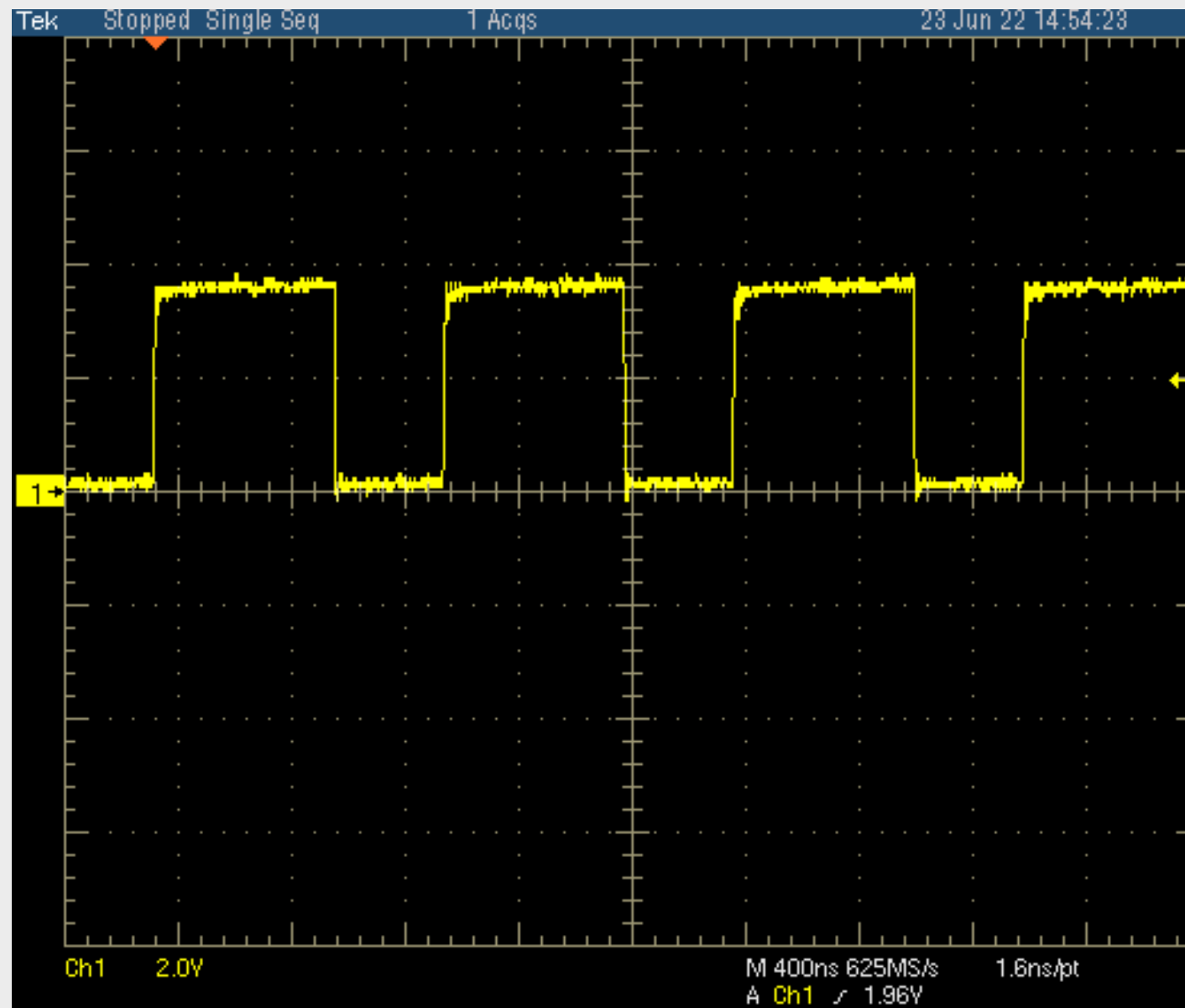


03 Troubleshooting & Repair — Step 7

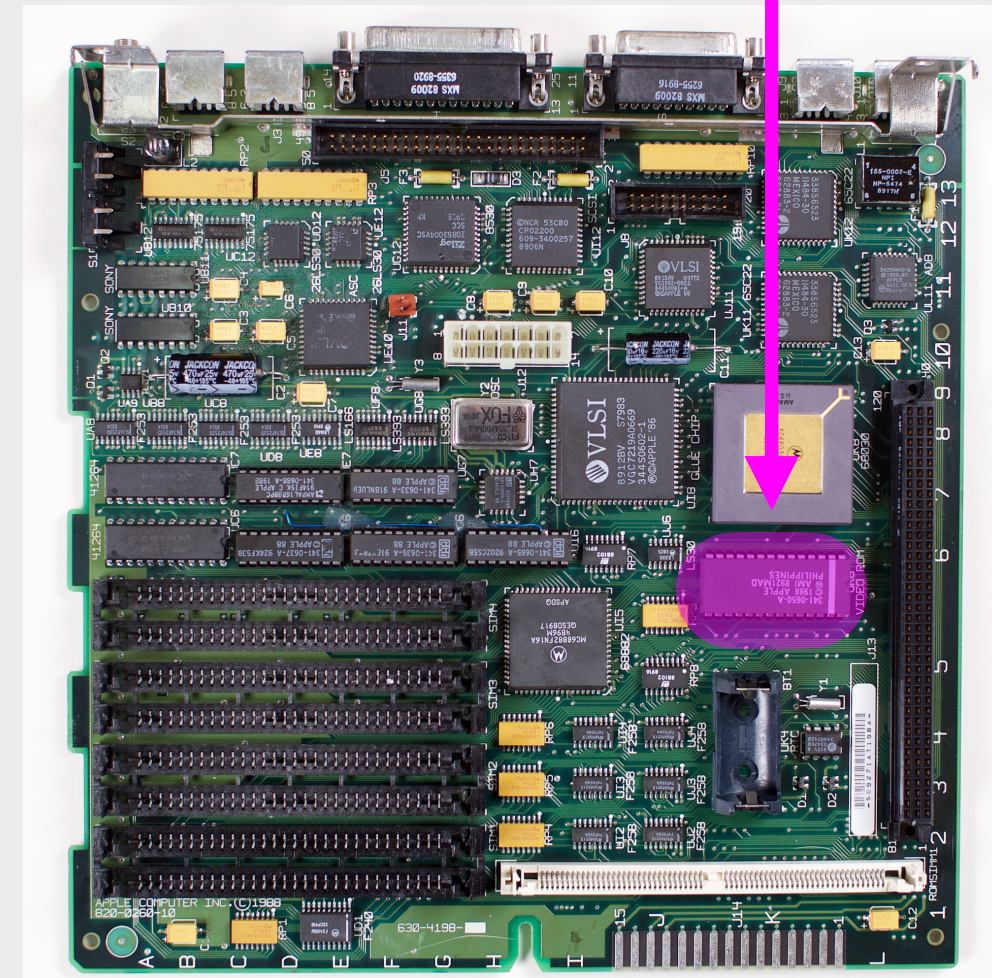
Video ROM (UK6) - Pin 23

A functioning video ROM look like the following when the Mac is idling with a flashing question mark. This page, and those that follow, will show examples of how each signal should look, from pin 1 through pin 28.

Please focus on the image caption below.



Video ROM Pin 23: A(11)

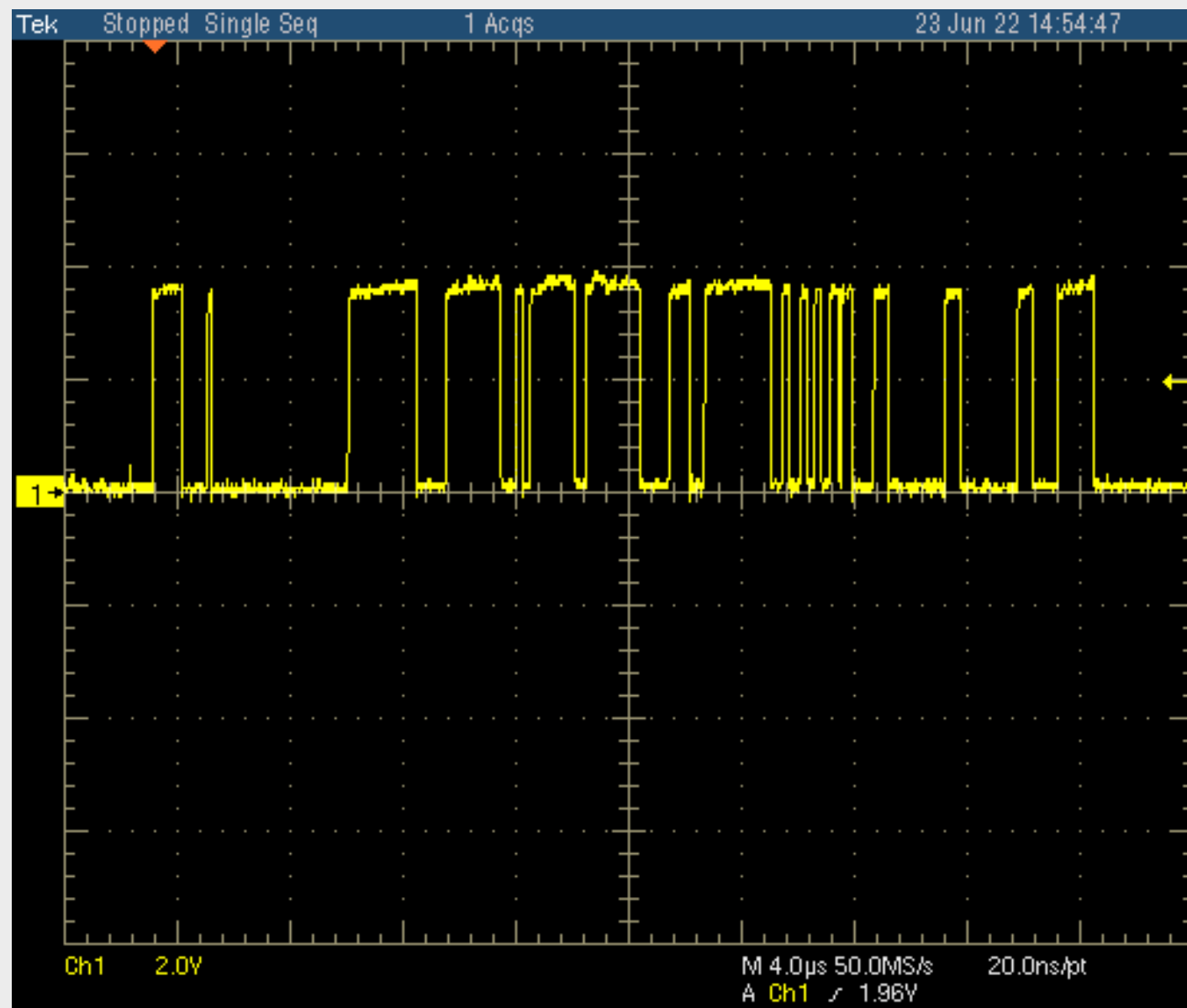


03 Troubleshooting & Repair — Step 7

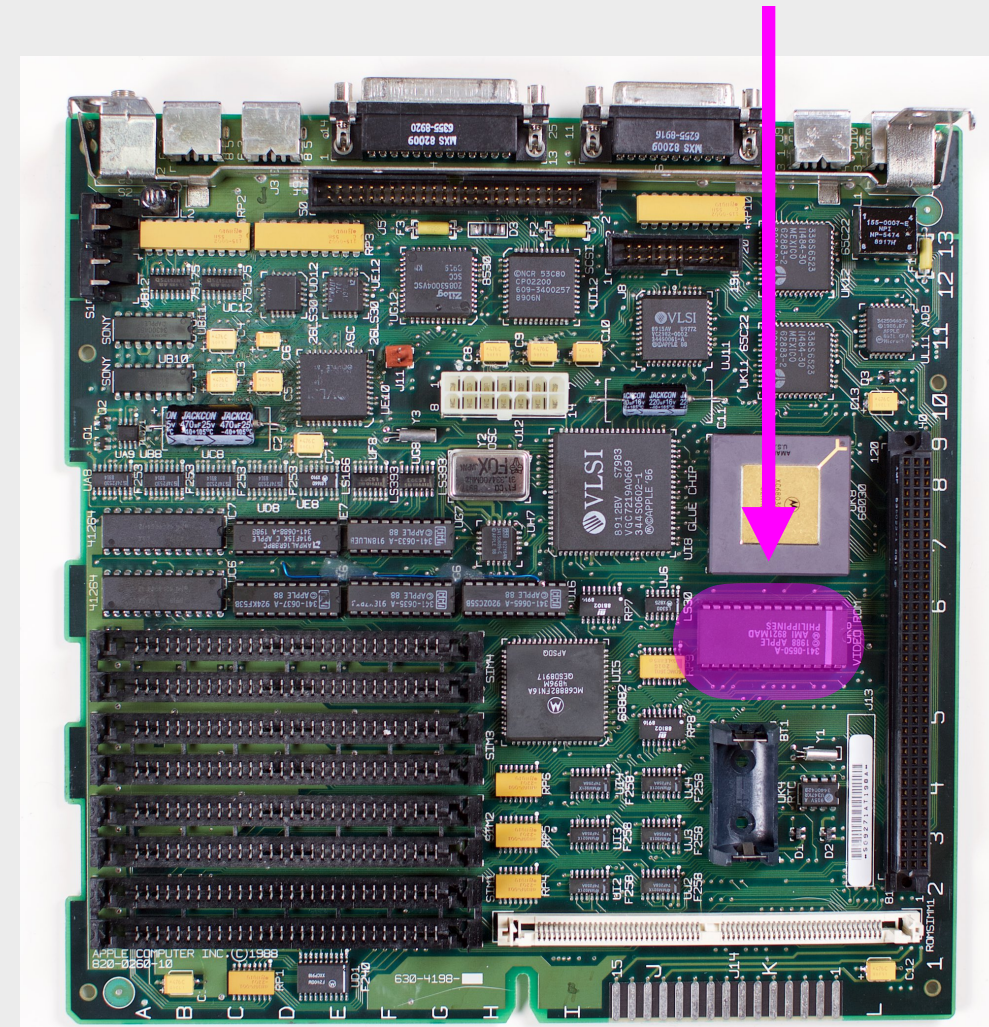
Video ROM (UK6) - Pin 24

A functioning video ROM look like the following when the Mac is idling with a flashing question mark. This page, and those that follow, will show examples of how each signal should look, from pin 1 through pin 28.

Please focus on the image caption below.



Video ROM Pin 24: A(9)

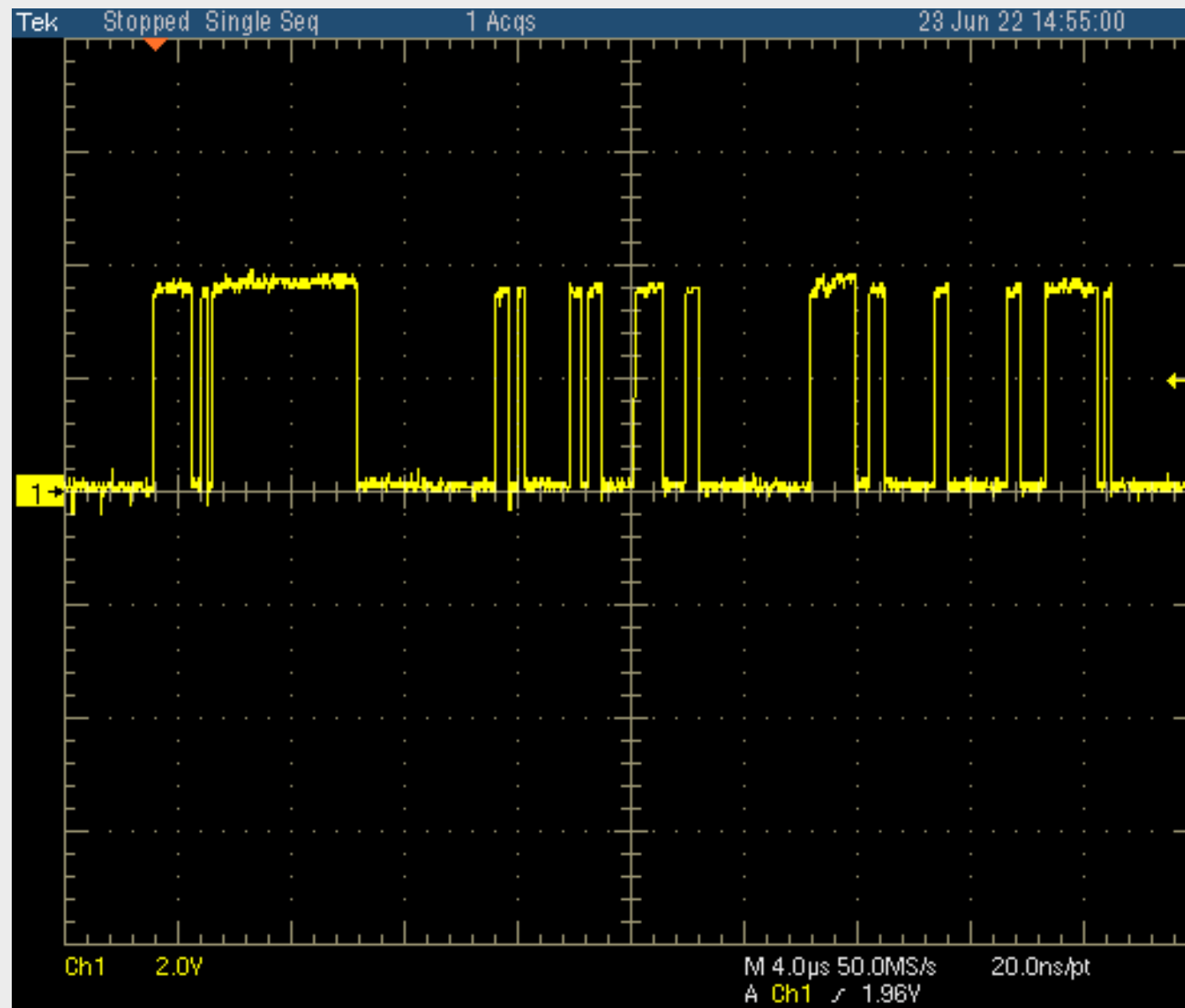


03 Troubleshooting & Repair — Step 7

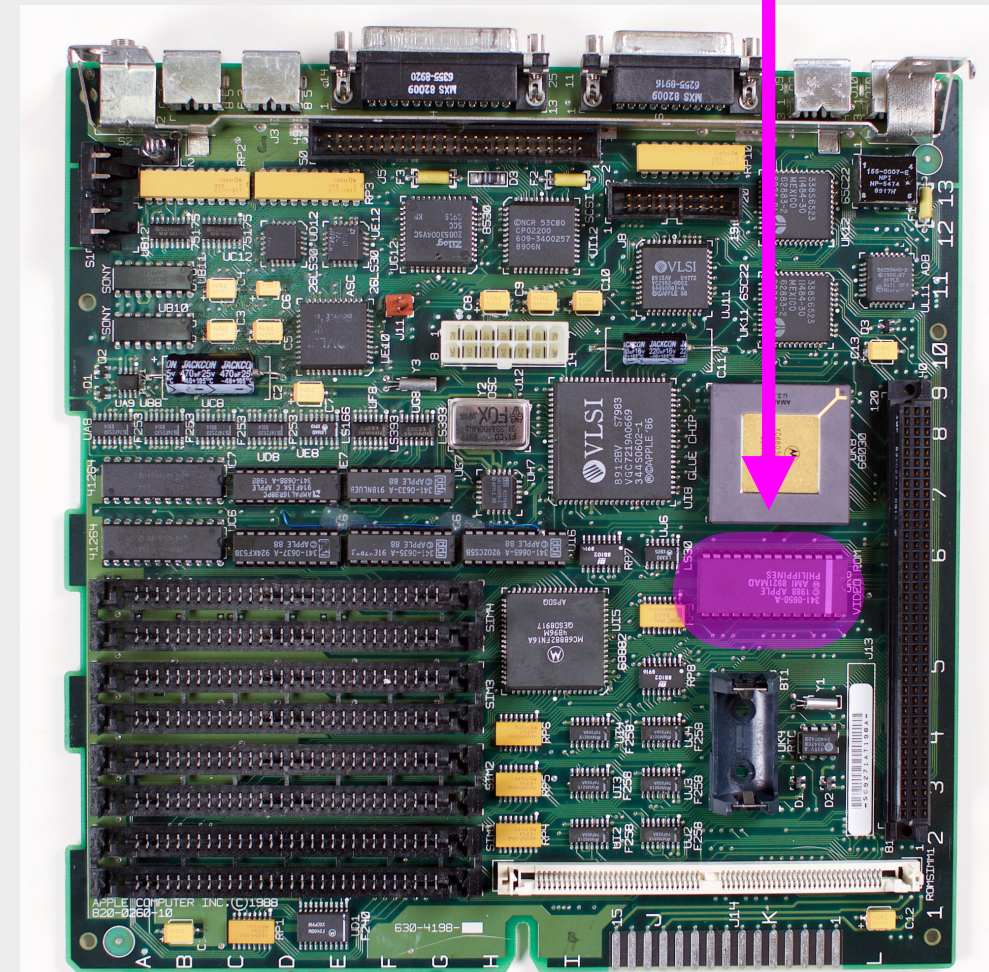
Video ROM (UK6) - Pin 25

A functioning video ROM look like the following when the Mac is idling with a flashing question mark. This page, and those that follow, will show examples of how each signal should look, from pin 1 through pin 28.

Please focus on the image caption below.



Video ROM Pin 25: A(8)

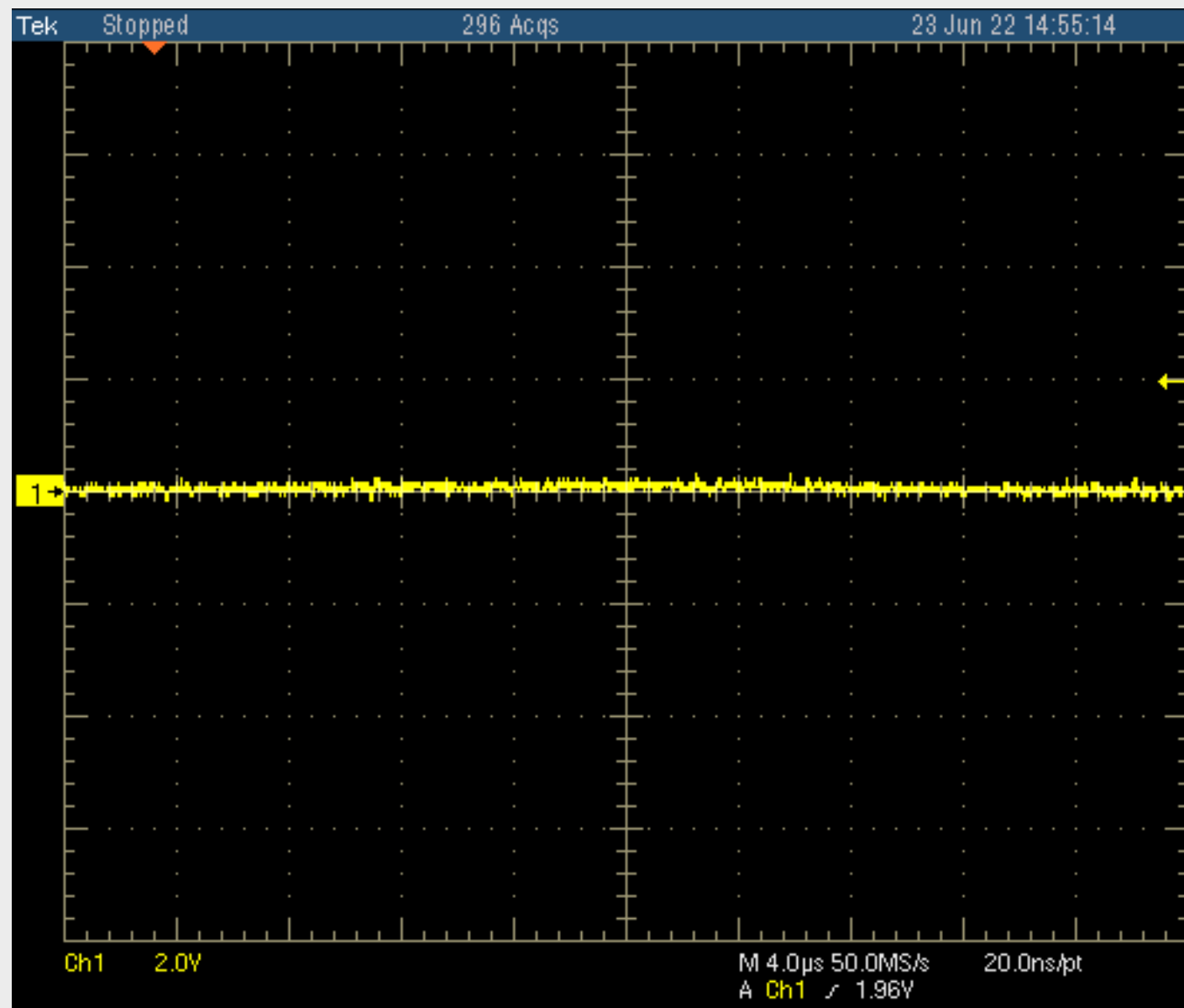


03 Troubleshooting & Repair — Step 7

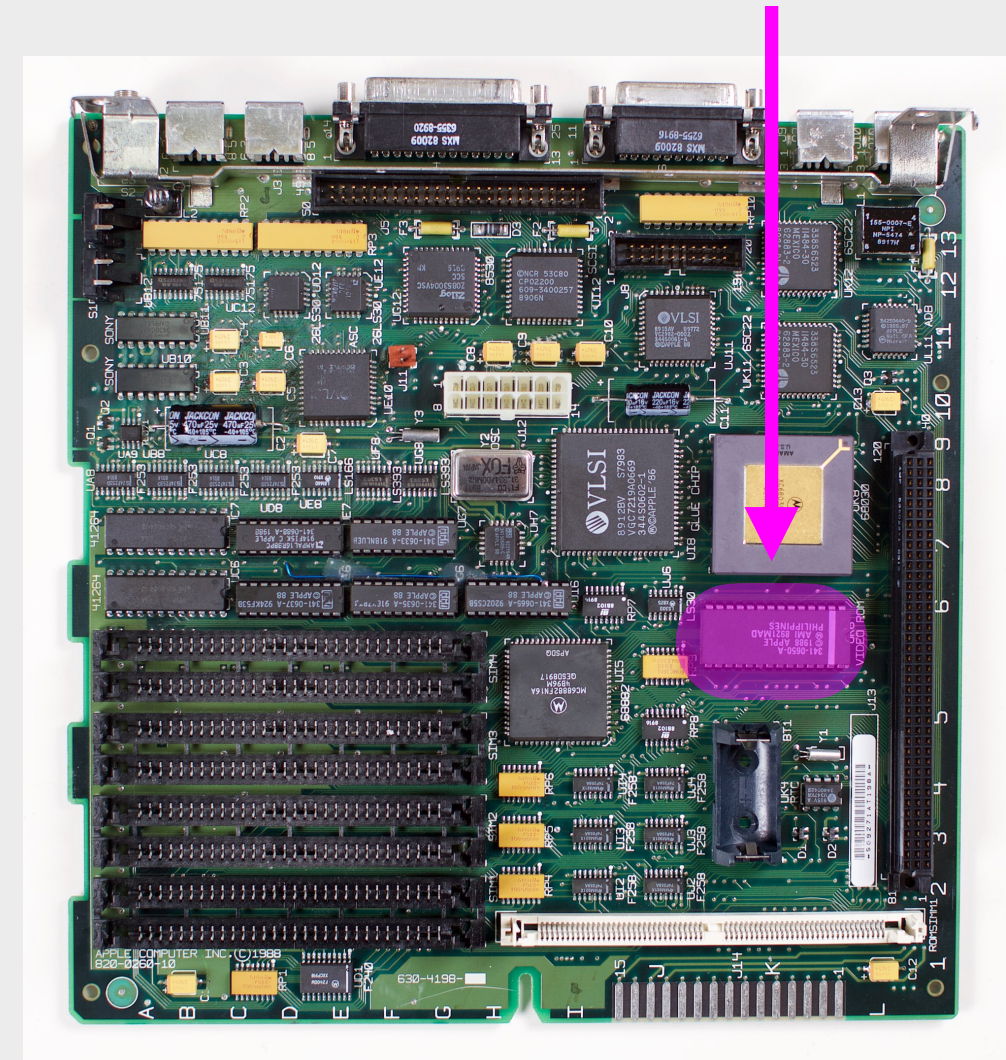
Video ROM (UK6) - Pin 26

A functioning video ROM look like the following when the Mac is idling with a flashing question mark. This page, and those that follow, will show examples of how each signal should look, from pin 1 through pin 28.

Please focus on the image caption below.



Video ROM Pin 26: Ground

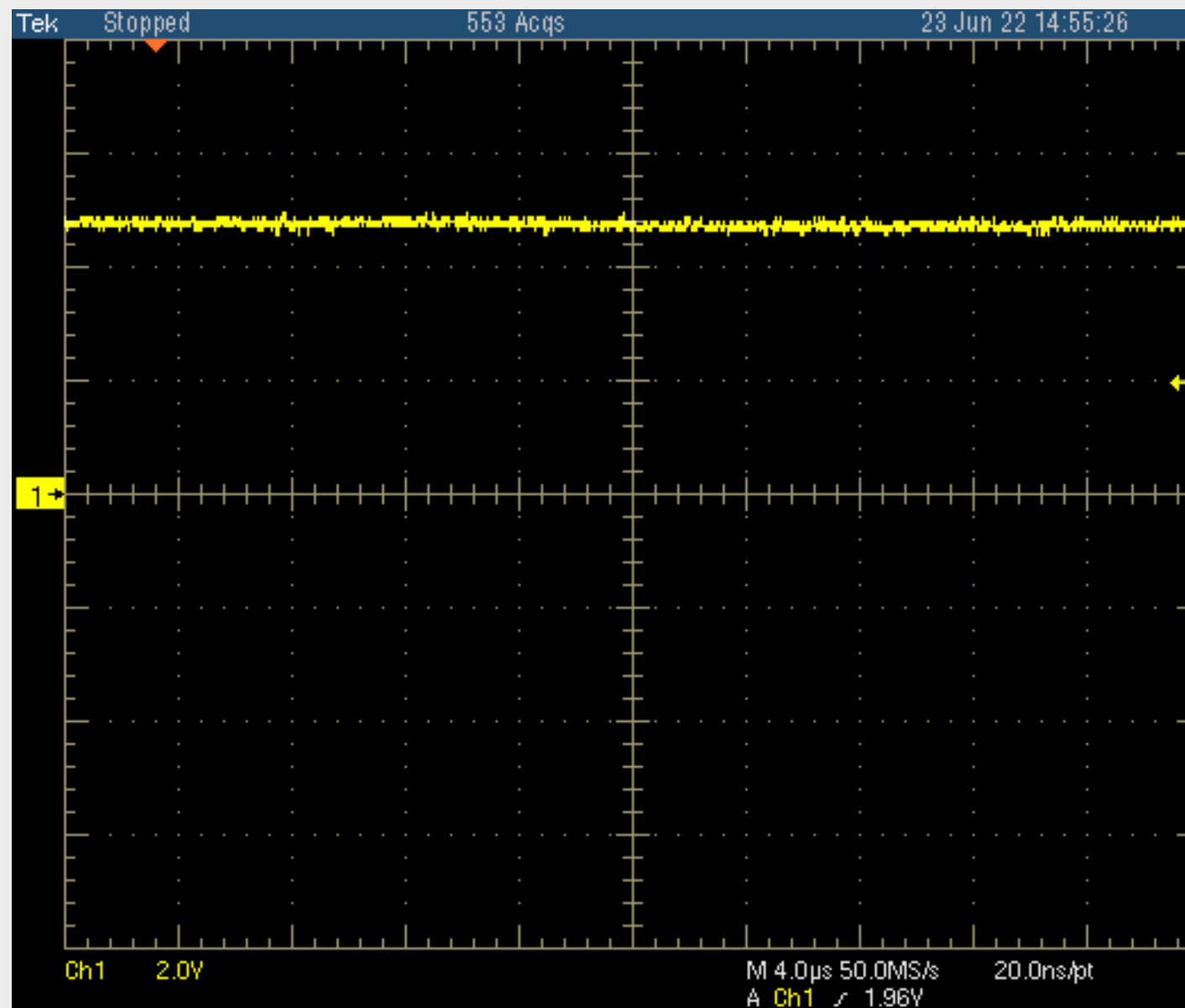


03 Troubleshooting & Repair — Step 7

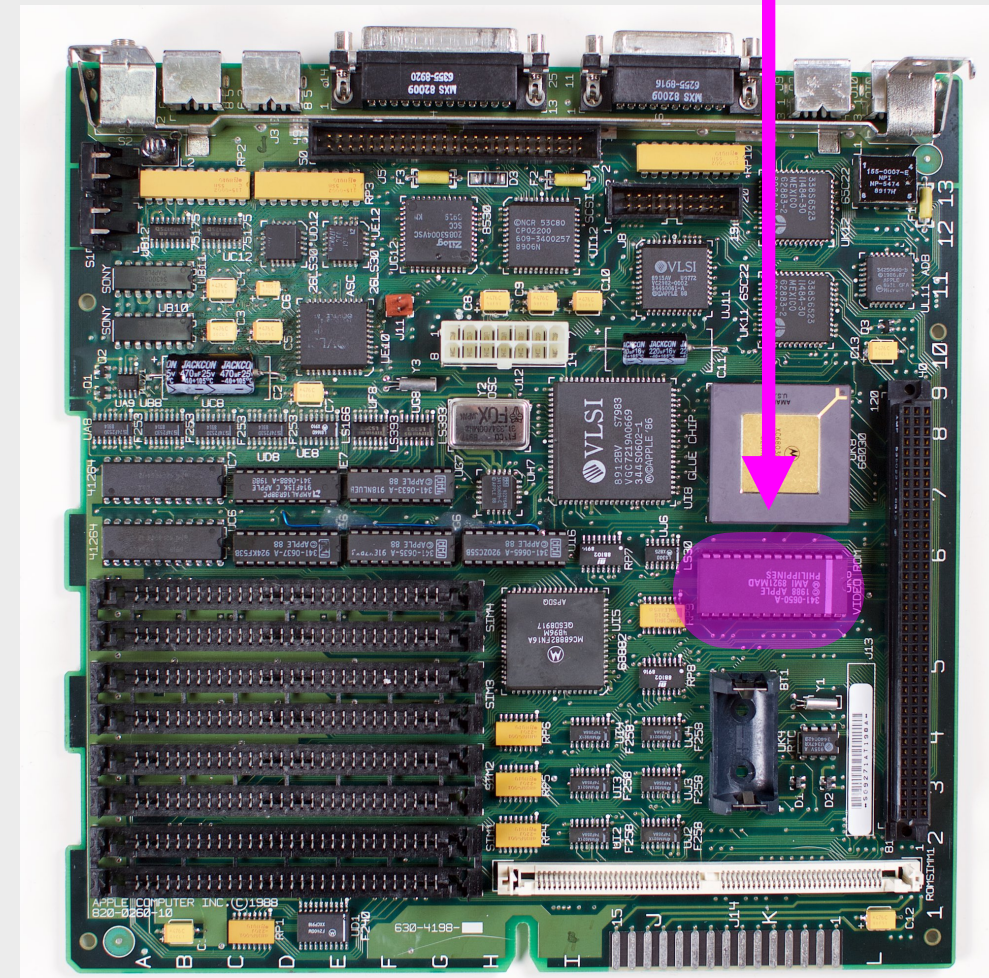
Video ROM (UK6) - Pin 27

A functioning video ROM look like the following when the Mac is idling with a flashing question mark. This page, and those that follow, will show examples of how each signal should look, from pin 1 through pin 28.

Please focus on the image caption below.



Video ROM Pin 27: +5V

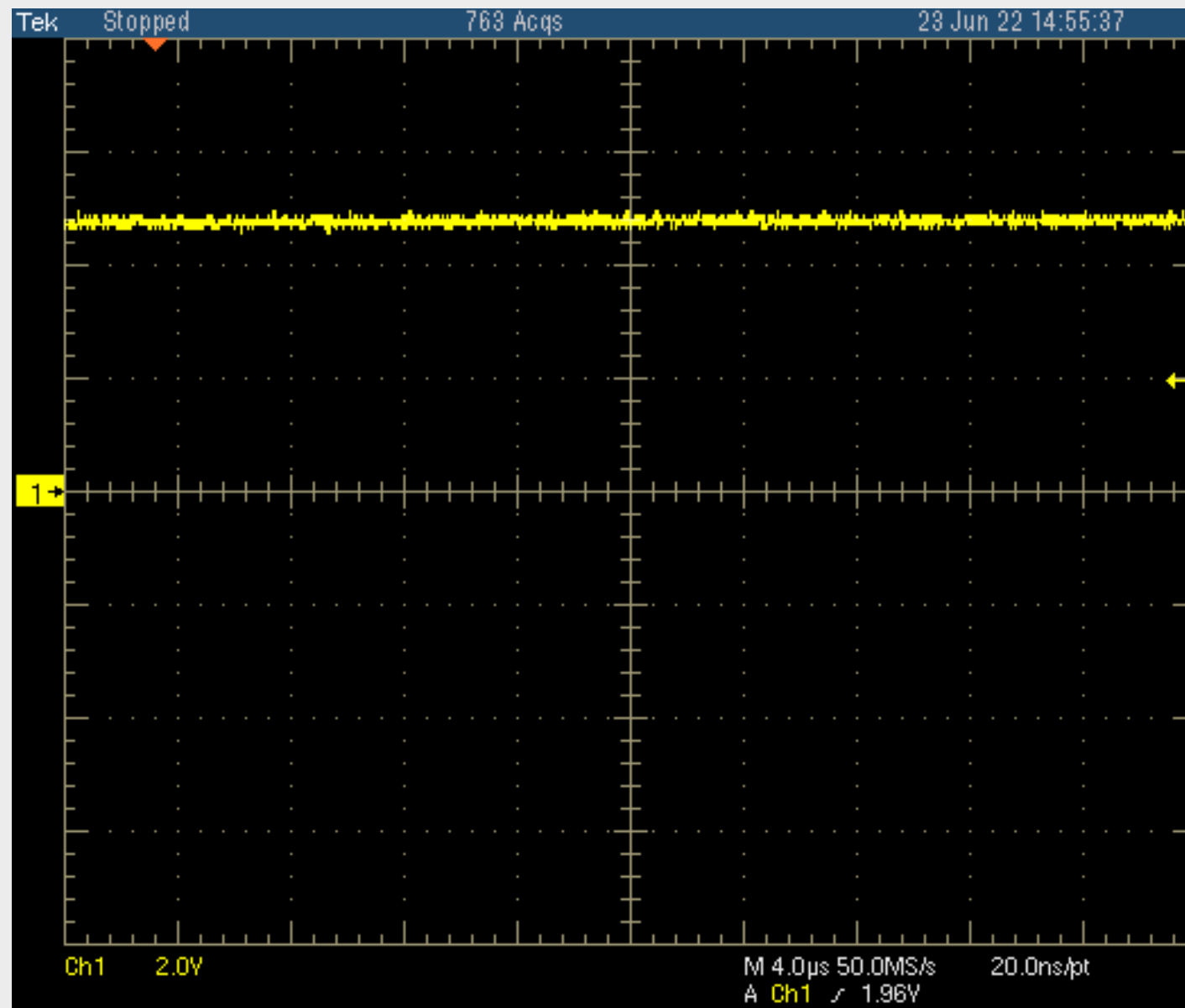


03 Troubleshooting & Repair — Step 7

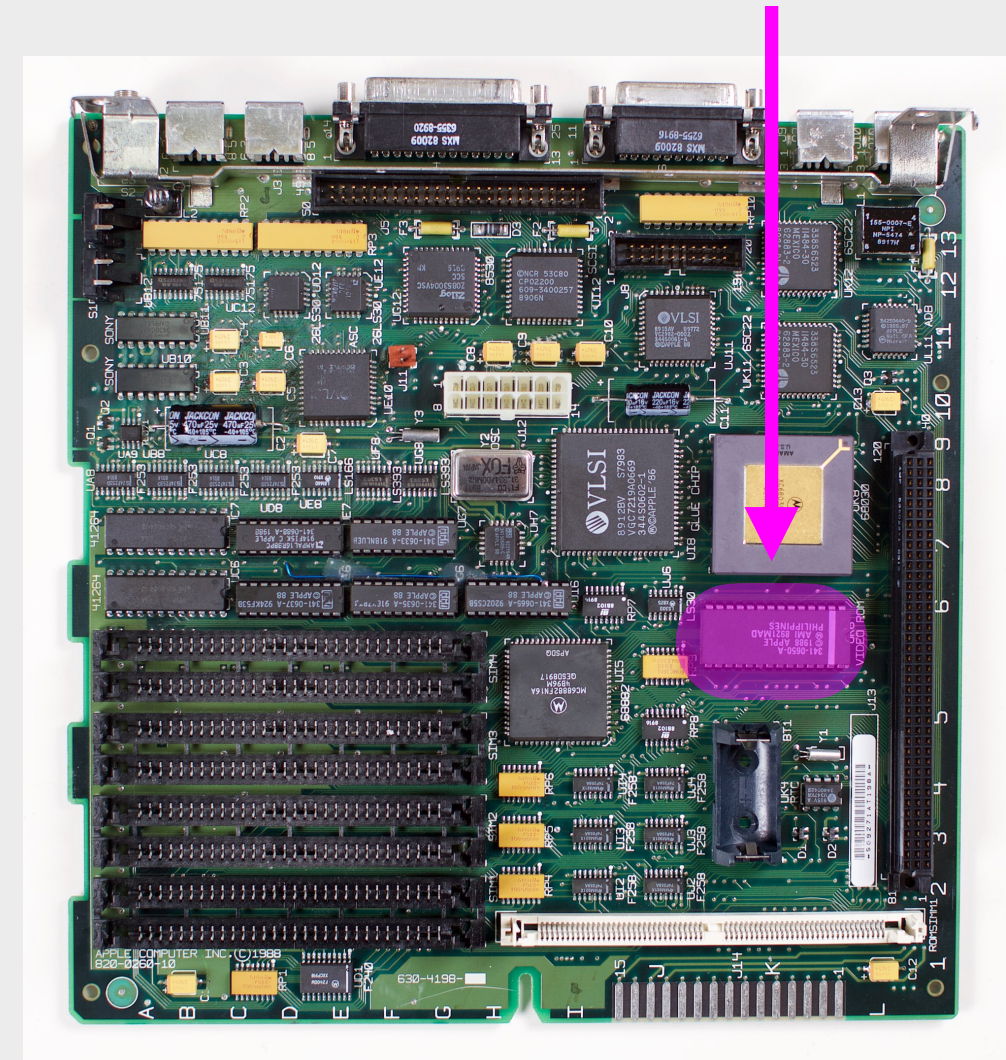
Video ROM (UK6) - Pin 28

A functioning video ROM look like the following when the Mac is idling with a flashing question mark. This page, and those that follow, will show examples of how each signal should look, from pin 1 through pin 28.

Please focus on the image caption below.



Video ROM Pin 28: +5V



Additional Hardware Testing

You'll want to frequently test your Mac SE/30 logic board during your repair process to determine if you have made progress or have inadvertently caused a new issue. The **Resources** section of this guide includes links to Mac SE/30-specific hardware diagnostic tools, recapping guides, software downloads, and other materials that may aid you in repairing your system.

Once your Mac SE/30 is repaired enough to display a Happy Mac and boot up, you'll likely want to test individual components, such as memory, SCSI connectivity, serial ports, etc.

Below are several options that can assist you in testing the hardware of your Mac:

- **Manual System Testing**

Use your Mac SE/30 system and any appropriate cables or peripherals to manually confirm if all I/O ports, hardware, and functions are working.

- **Maxa's Snooper Software Suite**

Snooper is a diagnostic software tool that runs various checks to help confirm your Mac is fully functional. It can test components such as the CPU, PRAM, RAM, Clock, SCSI, serial ports, ADB, FPU, Video RAM, sound, and more. This software will run under System 6 or System 7. Since this is a software tool, it requires that your Mac is in a good enough state to turn on and boot successfully. Snooper 2.0 disk images and documentation can be downloaded from the Macintosh Garden website [here](#).

- **Apple's MacTest Pro Software**

MacTest Pro is a diagnostic software tool created by Apple. Various versions were released over the years that support a variety of Macintosh systems. The "February 1996" disc contains a version for all Macs with 68000 series processors, which supports the Macintosh SE/30. It can be downloaded on this [page](#), be sure to select "MTP68k_Feb96.ZIP", currently listed as download number 3.

- **Apple TechStep**

The TechStep is a hardware diagnostic tool from the 1990's made for Apple technicians. It can be connected to a number of early Mac systems to test and help diagnose hardware issues. However, in most cases the Mac must be mostly functional in order for the TechStep to provide any realistic troubleshooting value. This tool is often sought after and can be hard to find, a modern recreation of the TechStep is also available. You can learn more about the Apple TechStep, read archived documentation, and learn about system compatibility [here](#).

Section 04

Resources

Additional Resources

This page contains additional links to documents, products, videos and other helpful information related to the Mac SE/30. These links are provided below as a courtesy and are not intended to endorse a particular product, person, service, or website.

- [SE/30 Redrawn Schematics](#) - A beautifully redrawn, hi-res copy of Mac SE/30 schematics. This is a must-have for working on any Mac SE/30 that requires in-depth repairs. Also includes helpful address and data line matrix guides. ([PDF](#))
- *The Dead Mac Scrolls* by Larry Pina ([PDF](#)) - This 1992 book covers advanced hardware troubleshooting for early Macs, including the Mac SE/30. Use this guide to help resolve common power, video, and startup issues.
- [Recap-A-Mac](#) website, Mac recapping guides, including SE/30 [sound chip](#) wiring diagram (recapamac.com.au)
- [Mac84.net](#) website, Mac recapping guides, pinouts, and more (<https://mac84.net/web/repair-guides-documents/>)
- [MacDat.net](#) - Another Macintosh recapping reference website, covering many desktop and portable systems.
- Bolle's Macintosh SE/30 PCB recreation project (<https://github.com/TheRealBolle/SE30>)
- Blinken PDS SE/30 by ZigZagJoe ([GitHub](#)) - This PDS interposer card uses LED lights to help visually diagnose issues.
- Mac SE/30 Peeker Diagnostic Kit by Rudy ([GitHub](#), [Buy](#)) - A PDS card with probe points and LEDs to help diagnose issues.
- [Macintosh Garden SE/30 Schematics and Repairs](#) - Additional guides and information, including CRT yoke adjustments.
- [Apple Legacy Software Recovery CD](#) - A bootable CD containing various Mac OS install disk images, utilities, and more.
- [TinkerDifferent.com](#) - A forum for electronics and computer enthusiasts, with a focus on Apple and Macintosh systems.

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Feedback

If you've found this guide helpful please feel visit the [TinkerDifferent thread linked here](#) to provide feedback or share your repair success stories. Thank you for reading this guide!

