Bulletin	Ampex 350 15 in/s NAB recording equalization
Date	15 Sept 05 (original issue)
Revision	Rev 2 (revised 5 Jan 2012 to fix wiring error in Figure 2 and update photos)
Total pages	4

Problem

The Ampex 350 record/play electronics cannot be adjusted to provide proper record equalization when using modern tape types with 15 ips NAB equalization.

Background

Modern tape formulations have improved high-frequency response; consequently, the 15 ips NAB record equalization as implemented in the Ampex 350 record/play electronics now has too much high-frequency boost on record and cannot be adjusted for flat response.

There is no need to modify the 7.5 ips NAB record circuit as C406 should have enough adjustment range to set the record equalization properly during routine alignment.

Fix

The problem may be fixed by doing the following:

- Disconnecting the high-frequency record resonance circuit (if not previously disconnected)
- Rewiring the record EQ switch
- Installing an extra RC filter to flatten the record EQ response
- Removing extra plates in the record EQ trimmer capacitor (optional)

Required Parts

To perform this modification, you will need the following parts:

- 68K half-watt 5% resistor (preferably carbon film)
- 680 pF/500V 5% dipped silvered-mica capacitor (such as Cornell Dubilier 68PF500VJ)

Procedure

Note that the following procedures assume familiarity with basic electronics repair and knowledge of standard safety protocols. They also require some mechanical dexterity and access to appropriate tools (such as temperature-controlled soldering irons). Do not undertake the following procedures if you are unqualified to do so.

Part 1: Disconnect the record resonance circuit

The Ampex 350 was introduced in 1953. At that time, the predominant magnetic recording tape used in North America was 3M "Scotch" 111; this tape had a high-frequency droop in its record response that could not be corrected with a simple R-C equalizer. Consequently, inductor L401 (20 mH) was used along with capacitors C425 and C426 to form a resonant circuit to compensate for this droop. By the late 1950s however, magnetic recording tape had improved enough so that this circuit was no longer necessary—consequently, Ampex recorders designed after approximately 1960 did not use this circuit.

1 Disconnect ac power from the Ampex 350 power supply and disconnect the power supply cable from the electronics chassis.

2 Remove the bottom cover of the record/play electronics.

3 Locate L401; this is the 20 mH inductor mounted on the inside rear of the front panel between the record level potentiometer and the equalization switch. The location of L401 is obvious as there are no similar components.

4 Cut the green wire connecting one end of the L401 to V404 (6C5/6J5). After cutting the wire, cover the cut end with a short length of heat-shrink tubing and tuck the loose wire into a convenient location.

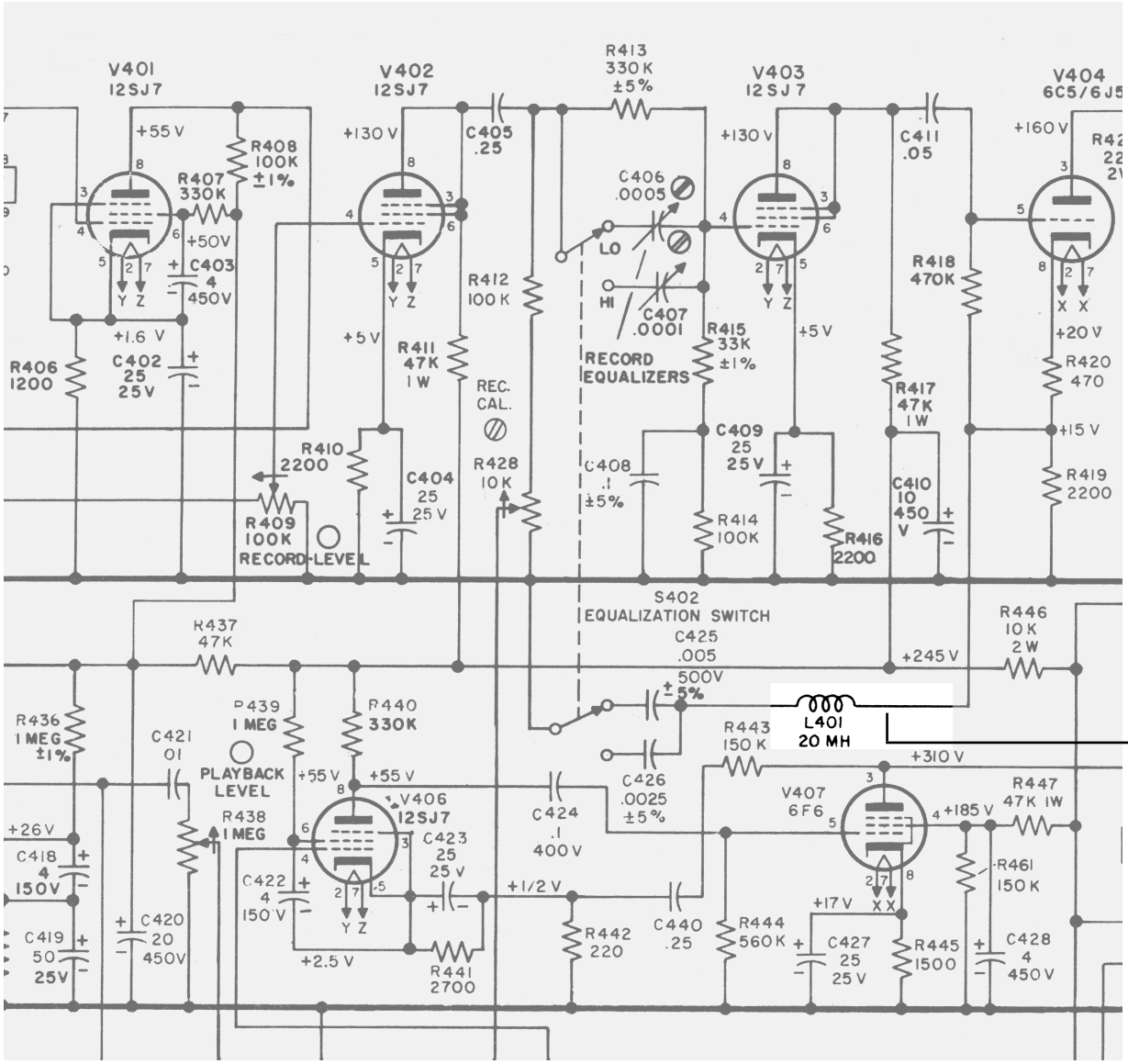


Figure 1. Disconnecting L401

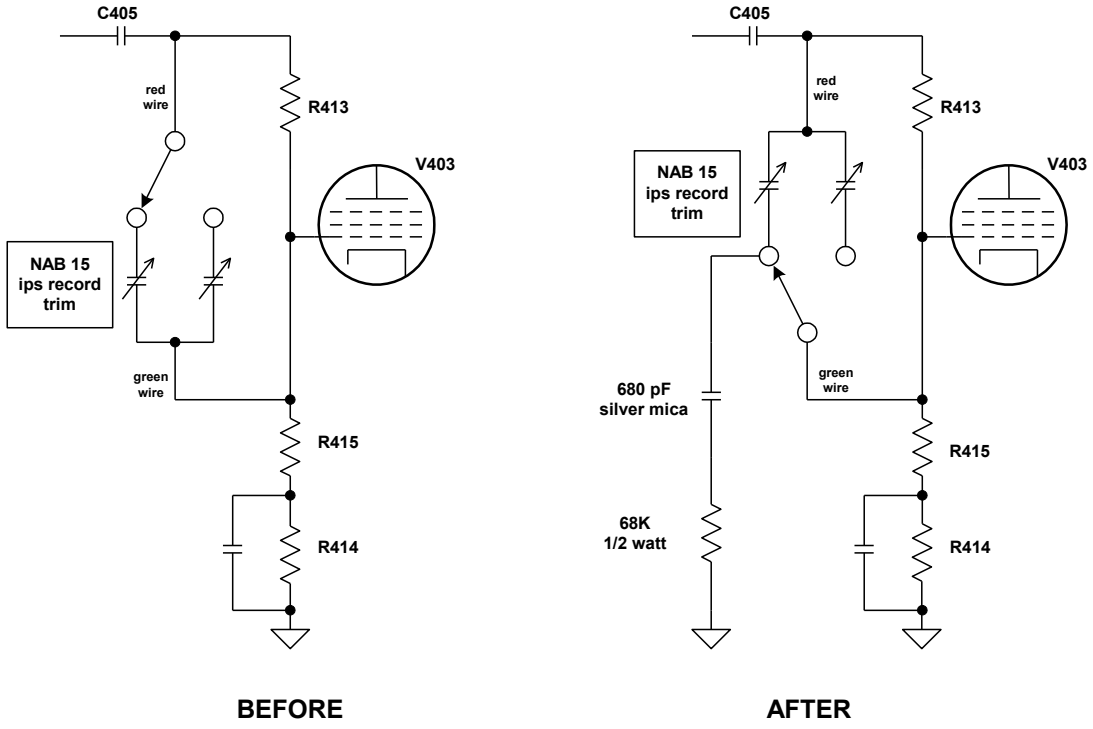


Figure 2. Record EQ switch modification

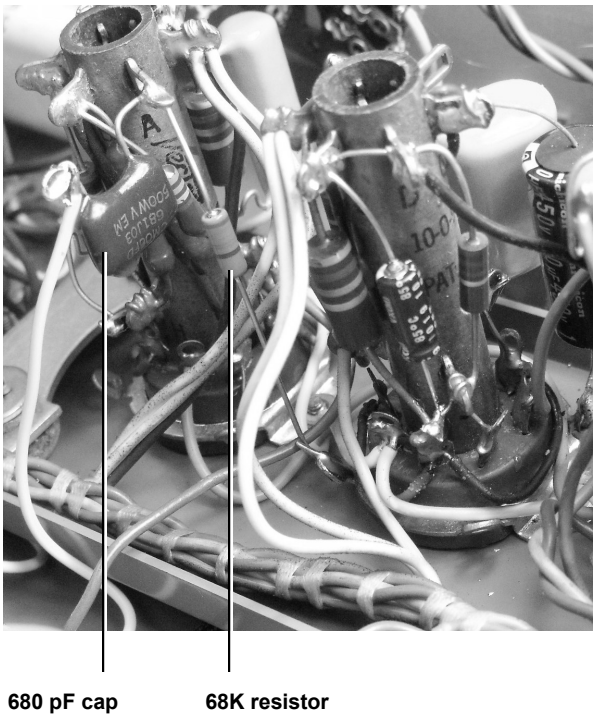
Part 2: Rewire the record switch

1 Locate the green wire where it joins the junction of the two trimmer capacitors (C406 and C407). Carefully unsolder the green wire at this location.

2 Locate the red wire where it joins the wiper terminal of the record equalization switch—this switch has several sections, so be sure to locate the correct wiper terminal. Carefully unsolder the red wire at the location.

3 Move the green wire to the wiper terminal of the record equalization switch. If the wire is not long enough, replace it with a longer length of green insulated wire (18 to 22-gauge stranded insulated wire is fine).

4 Move the red wire to the junction of the two trimmer capacitors.



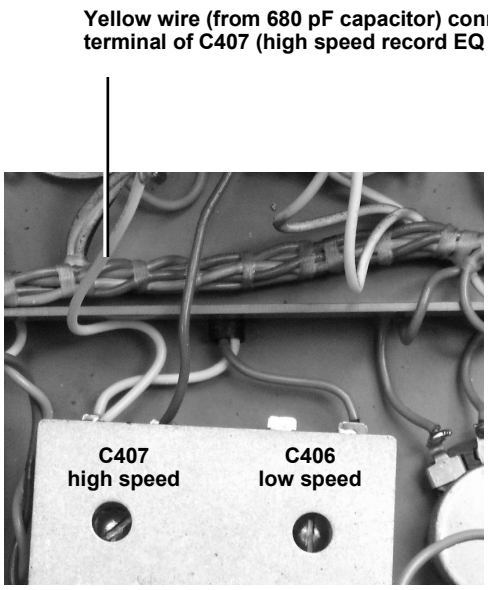


Figure 3. Flattening filter installation

Part 3: Install the filter

This filter (series RC network) is used to flatten the record response.

1 Solder one end of the 68 kilohm resistor to a ground lug on octal socket V402. Solder the other end to the **unused** solder terminal on V403 along with one end of the 680 pF silvered-mica capacitor (see Figure 3).

2 Cut short the other end of the 680 pF silvered-mica capacitor lead to form a small hook. Then attach a small length of wire (preferably yellow to match existing wiring) and solder one end to the hook end of the 680 pF capacitor.

3 Solder the other end of the yellow wire to the *non-common* terminal of the C407 (the high-speed record EQ trimmer)—this is to the left of C406 (the low-speed trimmer) as you look into the underside of the record/play electronics with the rear of the chassis facing you. "Non-common" is the terminal that is *not* connected to the other EQ trimmer.

4 Check playback alignment with a standard calibration tape.

5 Using the tape formulation to be used for recording, adjust the record bias current, then adjust the record equalization for maximum flatness. If there is too much high-frequency boost, remove a set of plates from C407 as outlined in Part 4.

Part 4: Remove plates from C407 (optional)

If you use recording tape with good high-frequency response and a relatively thin oxide coating, you may run out of adjustment range with C407 (high-speed record EQ adjust). For example, this may occur when using Quantegy 632 with NAB 15 ips equalization. The workaround for this is to simply remove one (or more) pairs of plates from C407.

1 Carefully unsolder all leads from the trimmer capacitors.

2 Using a desoldering tool, carefully remove all solder from the capacitor terminals.

3 Carefully remove one or two pairs of plates. Carefully note the position of the mica insulators relative to the metal plates. Then reassemble carefully.

4 Reset the record equalization as described in Part 3.

Acknowledgments

Full-Track Productions would like to thank Jay McKnight, *Magnetic Reference Laboratory* and Kurt Greske,