

ISSUE TIMING BOARD NOISE

Rev. Schematic: R and R; Mod. R0473

An owner in Mod 51873 contacted us in Dallas to have a RFE to replace the timing board in a 2235. If you order a timing board and receive a 930-0011-00 when a 001 was being used, receive 00000 as follows:

00000	00000
-00	-00
00000, 000000 A gate not	
-00	-00
00000, 000000 B gate not	
-00	-00
00000, 000000 Q00	

Main board Timing board.

A 000 001 is being generated now.

Thanks to Don Wall, Boston Service Center for the information

Tom Fox

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Issue 15-07

2213A/2215A/2235/2236
POWER SUPPLY AUDIBLE NOISE

RE: Mod #54681

Implemented in Manufacturing:

2213A	8016090
2215A	8013550
2235	8015626
2236	8014886

The preregulator and DC-DC converter frequencies may be harmonically close enough to produce an audible beat. This anomaly will only occur after changing some major power supply frequency determining part, e.g. T944. Engineering changed R919 to a selectable part, allowing a Technician to alter the preregulator frequency a small, but sufficient amount, thereby, stopping the audible beat.

R919 Nominal value 10Kohm 315-0103-00
Alternate value #1 11Kohm 315-0113-00
Alternate value #2 9.1Kohm 315-0912-00

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Issue 15-1

ISSUE TIMING BOARD NOISE

RE: Mod 50000

The 001 filter for the power input marginally missed the 0000 level. Changing the value of 0001 to a 000-000-00 greatly improves the filter's performance, with no effect on any other parameter. This change was implemented in manufacturing at these serial numbers:

2213A	8016090
2215A	8013550
2235	8015626
2236	8014886

Since the power line filtering performance limits are of value to only those engineers and technicians working in a noisy power environment, this mod should be installed only when a customer complains about bridge and vertical noise problems at specific sites.

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Issue 15-0

ISSUE TIMING BOARD NOISE

RE: Schematic R; Mod 50000

Implemented in:

2213A	8016090
2235	8015626
2236	8014886

The present 0007 can not normally be adjusted to achieve stable "0" triggering at 0.25 divisions of signal. If you encounter a weak "0" trigger, change 0007 to a 000 000, 001-0000-00.

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Issue 15-0

WIZARD WORKSHOP ARTICLES

2220/2230 AUDIBLE NOISE FROM POWER SUPPLY

REF: Mod #60432
Mod #60111
Mod #60530

Over the years there have been power supply audio noise problems associated with 2200 series oscilloscopes. The usual fix has been to replace T948 or R919. During the manufacturing introduction of the 2220/30 this problem has shown up in a large percentage of instruments, necessitating research into the problem. It was discovered that in reality there are several noise sources. They are as follows: T948, T906, and C907. Each component has it's own mode of noise generation. As far as we know these are the only noise sources.

The solutions to these problems are to replace the above items with modified or different parts as follows:

- 1) T948 changed to Tektronix P/N 120-1601-01
- 2) T906 changed to Tektronix P/N 120-1439-01
- 3) C907 changed to Tektronix P/N 285-1177-01

The differences in these parts are as follows:

- 1) T948: the -01 version will have the filament winding bobbin firmly attached to the main body of the transformer. Also, the shield band around the outside of the transformer will be modified to prevent it's possible vibration.
- 2) T906: the -01 version will have the center hole filled with appropriate silicone rubber to damp core vibration.
- 3) C907: will change to a different P/N which is a metallized polypropylene construction in cylindrical form, which has better audio characteristics. Also, this part is better electrically than the original part.

These changes were incorporated in the manufacture of the 2220/30 at the following serial number breaks.

- 1) T948: 2220, B020100
2230, B020100
- 2) T906: 2220, B010149
2230, B011391
- 3) C907: 2220, B010149
2230, B011391

Similar changes in the rest of the 2200 series will follow.

If the circuit board can be flexed and the sound comes and goes, then T948 should be changed. If the sound is constant while flexing the board, then T906 and C907 should be changed.

Building Your Own Precision Sonic Wave Analyzer

Many methods were tried in an attempt to locate the problem components, such as a spectrum analyzer and a D.S.O.

The problem components were discovered by using a precision sonic wave analyzer which can be built to assist in locating the actual noise sources in the instruments. It consists of a two-foot length of 3/8 inch outside diameter clear PVC tubing. This material should be readily available at hardware stores or plumbing supply shops at a very low cost per foot. It is used by holding one end near the ear with one hand, and probing around the power supply circuitry with the other end, thus acting as a stethoscope to locate the noise sources. **CAUTION:** Make sure that the tubing is not conductive. Exercise extreme caution when attempting to do this since line voltage and CRT high voltage supplies are present in this area.

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Issue 16-15

WIZARD WORKSHOP ARTICLES

2213A/2215A/2235/2236 AUDIBLE NOISE
FROM POWER SUPPLY

REF: Mod #61544

S/N: Not available

There have been three "speakers" identified in the 2200 Series which emit high-frequency audible sound from the power supply. Due to the urgency of this change to the field, only two of these components have been changed on this mod. These components and new Tektronix part numbers are as follows:

T906: Tektronix P/N 120-1439-01
C907: Tektronix P/N 285-1177-01

In a very few instruments T948 was found to be the third culprit. Changing this part number will require UL testing and recertification, so some testing and evaluation need to be conducted before the part can be modified.

If an instrument comes into the Service Center with this problem, try changing C907 first. If this does not eliminate the sound, change T906.

FOR TEKTRONIX INTERNAL USE ONLY:

The "Precision Sonic Wave Analyzer" described in the 2220/2230 Audible Noise from Power Supply WIZARD article, Issue 16-15, could be a tool for tracking down the source of sound.

Thanks to Marty Jost of the Dallas Service Center for his SAR and valuable information on this problem.

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Issue 16-16

TEKTRONIX INTERNAL FILE INFORMATION
THIS ISSUE, ISSUE 16-16, HAS A DATE

Ref: Mod #61544

Serial Number:	2213A	2235A
	2220	2230A
	2235	2236A
	2236	2237A

The horizontal process IC (T906) uses two channels for A and B sweep. The gain of these two channels has a slight variance from one batch of ICs to another, causing a difference in gain between A and B sweep, especially noticeable in the magnified sweep range. There is no adjustment for B sweep speed, this may be seen as a linearity problem.

To correct this we are using only one channel to drive for both A and B sweep. Connect the solder from collector of both T906A and T906B. Lift the collector of T906 and solder it to the pad for the collector of T906.

If you change T906A and B sweep linearity is not meeting specifications, or if an instrument comes in with a B linearity complaint, perform this mod.

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Issue 16-16

WIZARD WORKSHOP ARTICLES

Scan by Zenith

2213A/2220/2221/2230/2235/2236/
2245A/2246A: Audible Noise

REF: 120-1349-00
120-1594-00
120-1601-01
120-1685-01
Lot Dates 8821-8838

The core of the transformer used in the 2200 series was cracking due to stresses during the manufacturing process because of a change in the type of ferrite material used in the transformer's core. This cracking occurred in transformers with lot dates of 8821 through 8838 inclusive.

Starting in week 29, instruments were reworked in manufacturing by adding a plastic clip (black in color) to the top of the transformer. On the 2245A and 2246A the part number tag was applied to the top of the transformer clip. The part number will not be visible on the other 2200's which were reworked for a cracked transformer. This method of repair was only used on reworked instruments.

Transformers built and shipped from weeks 29-88 through 38-88 had a possibility of producing audible noise, however the core cracking problem was corrected. After week 38, an improved core assembly method was used which reduced the tendency to produce audible noise.

Instruments received for service with a complaint of audible noise and that have a transformer with a lot date between 8821 and 8838 should have the transformer changed.

The redesigned transformers that were manufactured and shipped after Week 38 do not have a tendency to produce audible noise.

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Issue: 18-19

2213A/2220/2221/2230/2235/2236/
2245A/2246A: Audible Noise
Power Supply Transformer Change

The upper limit for the regulation of the +150 Volt power supply has been changed from -2% to -4%. This change is retroactive for all serial numbered instruments.

A manual change has been submitted.

Thanks to George Malachuk of the Chicago Service Center for informing about this change.

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Issue: 18-19