

### Troubleshooting tips on 2200-series P/S:

This document applies to 2213A, 2215A, 222x, 223x scopes.  
2213/2215 and 224x-series use a similar but slightly different supply. Parts references and numbers may differ.

If the mains fuse is blown then Q9070 is most likely also blown. If you are lucky this is the only fault but it may also take several other components with it as it breaks. Be sure to check at least CR908, Q908, R909, CR920 and CR907. Also make sure the connector to Q9070 is not damaged. Sometimes also U930 will be broken. It may be a little more difficult to determine. You can run the chip, still on the board, with an external power supply and check the pulses on the output. Be sure the mains cable is disconnected. Disconnect Q9070. Connect the external P/S across C925. Momentary raise it to about 25-30 V to initiate the startup circuit. Reduce and leave it at about 14 V. With reference to pin 13 (- of your P/S) you should now have 14 V at pins 8 and 11, 10-14 V at pin 12 and 5 V at pin 14. Still referenced to pin 13 you should have a ramp on pin 5 and pulses on pin 10. If this is the case U930 is OK.

If the mains fuse is not blown and there is no visible life or audible ticking then Q9070 may be open and probably the only fault.

To determine if the inverter and/or secondaries are OK you may also run it with an external power supply. With Q9070 disconnected connect a supply capable of supplying at least 1.5 A at 43 V to TP940 (+) and TP950 (-). If possible set the P/S current limit to 1.5 – 2.0 A. Connect it already set to 43V, i.e. do not turn up voltage gradually since then the over current protection will trigger. If everything is OK the scope should work as normal with a current draw from the P/S of about 1.25 – 1.5 A.

If there is an audible ticking indicating that the scope is continuously starting and shutting down there is secondary problem. The most common fault then is one or more shorted rectifier diode(s) on the secondary windings of the transformer. Also a bad HV Multiplier or a supply shorted in any other way would produce the power supply burst mode.

	221xA/222x/223x	2213/2215	224x	
<b>Q9070</b>	151-1141-00 *			IRF730
<b>Q9070</b>	151-1152-00 *			IRF820
<b>Q9070</b>	151-1245-00			MTP6N55
Q933		151-1152-00 *		IRF820
Q933		151-1245-00		MTP6N55
Q2201			151-1214-00	IRF830
<b>CR908</b>	152-0141-02			1N4152
CR931		152-0061-00		FDH2161
CR2237			152-0141-02	1N4152
<b>Q908</b>	151-0164-00			MPS2907A
Q931		151-0164-00		MPS2907A
Q2202			151-0190-00	2N3904
Q2203			151-0188-00	2N3906
<b>R909</b>	39 Ω			
N/A		N/A		
R2253			100 Ω	
<b>CR920</b>	152-0061-00			FDH2161
CR913		152-0061-00		FDH2161
CR2205			152-0400-00	MB2501 or 1N4936
<b>CR907</b>	152-0808-00			BYD73G
CR933		152-0661-00		MR856
CR2201			152-0906-00	MUR460
<b>U930</b>	156--1627-00			TL594CN
U920		156-1627-00		TL594CN
U2201			156--2395-00	MC34060AP

\* Replaced by 151-1245-00 using parts replacement kit 050-2242-03 for all analog scopes except 2236 below B019719 which used 050-2240-00. 2230 used 050-2239-03

/Håkan H