

Manual Supplement

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This supplement contains information necessary to ensure the accuracy of the above Service Manual. The following items have been added:

SAFETY TEXTS. Important information has to be added to ensure safe use and safe maintenance of the oscilloscope. It is therefore recommended to take careful notice of this information that is presented in this publication under the header SAFETY TEXTS.

CHAPTER 2 - CHARACTERISTICS

The RANDOM SAMPLING specification has been extended. For details refer to EXTENSION TO CHARACTERISTICS.

CHAPTER 4 - PARTS.

For information on part numbers that are not listed (correctly), see EXTENSIONS TO GENERAL PARTS LIST.

CHAPTER 5 – UNIT DESCRIPTIONS

Major changes have been done on the XYZ-amplifier A2 and on the Digitizer A8. All details are presented under XYZ-AMPLIFIER MODIFICATIONS and DIGTIZER MODIFICATIONS

CHAPTER 6 – PERFORMANCE TEST

The tests ‘Crosstalk between channels’ and ‘Requirements for analog mode MAGNIFY’ have been extended. Refer to EXTENSION TO PERFORMANCE TEST.

CHAPTER 7 - CALIBRATION ADJUSTMENT PROCEDURE.

Two extensions have to be added to this chapter. Refer to EXTENSION TO HF SQUARE WAVE ADJUSTMENT.

SERVICE CENTER ADDRESSES.

To locate an Authorized Service Center, visit us on the World Wide Web:

<http://www.fluke.com>

Or call Fluke using any of the phone numbers listed below:

+1-888-993-5853 in U.S.A. and Canada

+31-402-675-200 in Europe

+1-425-446-5500 from other countries

SAFETY TEXTS

To be added on the 'Service Manual' title page in place of the existing 'WARNING' text:



WARNING: This instrument contains high voltages that can be dangerous or fatal. It is therefore that these servicing instructions are for use by qualified personnel only. To reduce the risk of electric shock, do not perform any maintenance other than specified in the Operating Instructions unless you are fully qualified to do so.

To be added on the page 'DECLARATION OF CONFORMITY' in place of the text 'IEC348 (1978)':
EN61010-1 CAT II Pol 2.

To be added directly under '1 - SAFETY INSTRUCTIONS' in place of existing text:

ATTENTION: The instrument is designed for indoor use only. Read these pages carefully before installation and use of the instrument.

To be added under '1.4 - SYMBOLS' in place of existing text:



Danger: High Voltage (red).



Attention: read the safety information in the Users Manual and the Service Manual.



Earth.



Conformité Européenne.



Recycling information.



Static sensitive components (black/yellow).

To be added under '1.5 - IMPAIRED SAFETY PROTECTION' in addition to the existing text:

The use of the instrument in a manner not specified may impair the protection provided by the equipment.
Before use, inspect the instrument and accessories for mechanical damage!

To be added as a new chapter '1.7 - MEASURING EARTH' with the following contents:

The measuring earth socket, the external conductor of the BNC sockets, and the screening of the interface bus connectors are internally connected to the protective earth conductor of the three-core mains cable.

The measuring earth socket, the external conductor of the BNC-sockets, and the screening of the interface bus connectors must not be used to connect a protective conductor.

To be added on page 2-1, item. B in place of the existing text:

B. Safety Characteristics

This instrument is designed for indoor use only. It may occasionally be subjected to temperatures between +5 °C and 10 °C without degradation of its safety. It has been designed and tested for measurements on 150 V rms Category II, Pollution Degree 2 in accordance with the following standards EN61010-1 (1993)(IEC 1010-1), ANSI/ISA S82.01-1994, CAN/CSA-C22.2 No.1010.1-92, UL3111-1. Installation Category II refers to local level, which is applicable for appliances, and portable equipment. The apparatus has been supplied in a safe condition.

The Service Manual contains information and warnings which must be followed by the user to ensure safe operation and to keep the instrument in safe condition.

To be added on page 2-5 and page 2-34 in place of the specification points 'INPUT VOLTAGE LIMITS, high Z position':



In high Z position

Max. input voltage

150 V rms

According to EN61010-1 Cat II Pol 2.

See Note 1, See Note 2

Remark: Specification of 50Ω position is not changed.

Fig. 2.2: the max. input voltage is changed from 400 Vpk-pk to 150 Vrms. For details refer to Figure 1.1 in the Reference Manual, part nr. 4822 872 00798, revision 4/1-Dec-2000.

To be added on page 2-27 under 'LINE VOLTAGE, operation 100 V ... 240 V': Additional Information: CAT II Pol 2.

To be changed on page 2-28 under 'MAX. ALTITUDE, Operating': '4,6 km (15000 ft)' must be changed to: 3 km (10000 ft).

To be changed on page 2-30 and page 2-31:

'IEC 801-3' must be changed to: EN 50081-1 (1992) and EN50082-1 (1992).

'PM9010/091' (page 2-30) must be changed to: PM9010/09x.

'PM9020/091' (page 2-31) must be changed to: PM9020/09x.

Chapter 2.17.3.3 'VDE requirements' has to be removed.

To be added on page 2-32 '2.18 - SAFETY' in place of the existing text:

- | | | |
|---------------------------|---------------------------------------|--|
| • Meets requirements of | EN61010-1, Cat II Pol 2 | Except for power cord, unless shipped with Universal European power plug |
| | UL 3111-1, Cat II Pol 2 | Except for power cord, unless shipped with Universal North American power plug |
| | CSA C22.2 No. 1010.1-92, Cat II Pol 2 | Except for power cord, unless shipped with Universal North American power plug |
| | | Installation Category II refers to local level, which is applicable for appliances, and portable equipment |
| • Approvals (applied for) | CSA C22.2 No.1010.1 | |
| Max. X-radiation | MIL-T-28800D par.3.9.3.4.a | |

Note 1 and Note 2 have to be removed.

To be added in the header of chapter '3.2.1 - Introduction' in addition to the existing text:



WARNING.

Opening the case of the instrument may expose high voltages that can be dangerous or fatal. Always disconnect the power cord and all input signals before opening the case. Bear in mind that repair, servicing and calibration adjustment should only be performed by fully qualified personnel!

To be added in the header of chapter '5.2 - FINAL XYZ AMPLIFIER A2' in addition to existing text:



WARNING.

Opening the case of the instrument may expose high voltages that can be dangerous or fatal. Always disconnect the power cord and all input signals before opening the case. Bear in mind that repair, servicing and calibration adjustment should only be performed by fully qualified personnel!

To be added in the header of chapter '5.6 - POWER SUPPLY A6' in addition to existing text:



WARNING.

Opening the case of the instrument may expose high voltages that can be dangerous or fatal. Always disconnect the power cord and all input signals before opening the case. Bear in mind that repair, servicing and calibration adjustment should only be performed by fully qualified personnel!

To be added in chapter '5.6.1 - WARNING' in place of the existing text:



WARNING.

All measurements in the power supply INPUT CIRCUIT and the CONVERTER CIRCUIT should be done with a measuring instrument with floating input. An example of such an instrument is the the Fluke ScopeMeter Model 196C or 199C. As a reference point for measurements in INPUT CIRCUIT and CONVERTER CIRCUIT you can use measuring point MV1.

To be added in the header of chapter '8 - CORRECTIVE MAINTENANCE PROCEDURES' in addition to existing text:



WARNING.

Opening the case of the instrument may expose high voltages that can be dangerous or fatal. Always disconnect the power cord and all input signals before opening the case. Bear in mind that repair, servicing and calibration adjustment should only be performed by fully qualified personnel!

CLEANING.

Clean the oscilloscope with a damp cloth and a mild soap. Do not use abrasives, solvents or alcohol. These may damage the text on the instrument. To avoid electrical shock or damage to the instrument, never allow water inside the case. Remove all input signals and disconnect the instrument from line power.

To be added in the header of chapter '8.1 - DISMANTLING THE INSTRUMENT' in addition to existing text:



WARNING.

Opening the case of the instrument may expose high voltages that can be dangerous or fatal. Always disconnect the power cord and all input signals before opening the case. Bear in mind that repair, servicing and calibration adjustment should only be performed by fully qualified personnel!

EXTENSION TO CHARACTERISTICS – CHAPTER 2

The RANDOM SAMPLING specification as given in Chapter 2.2.4 Timebase Settings (Digital Mode Only) must be extended as follows:

CHARACTERISTICS	SPECIFICATIONS	ADDITIONAL INFORMATION
RANDOM SAMPLING only for MTB 200 us/div ... 2ns/div PM3390B/PM3394B	200ns/div ... 20ns/div OR 200ns/div ... 0.001x MTB Setting	Whichever is greater Note 2,3
RANDOM SAMPLING only for MTB 200 us/div ... 5ns/div PM3380B/PM3384B/PM3370B	200ns/div ... 50ns/div OR 200ns/div ... 0.001x MTB Setting	Whichever is greater Note 2,3

EXTENSIONS TO GENERAL PARTS LIST – CHAPTER 4

- D8054, D8056 on digitizer A8 (HM628128, used in extended memory version): correct part nr. is 5322 209 52773.
- Zenerdiode BZX84C12 on XYZ-amplifier A2: correct part nr. is 9337 703 70215.
- Transformer T1002 on power supply A6: correct part nr. is 5322 140 10587.
- Connector X1001 on power supply A6: correct part nr is 5322 265 30433.
- Fixing clip for V1019: part nr. is 5322 492 63721.
- Insulation foil for V1019: part nr. is 5322 466 62628.
- Fixing clip for V1016: part nr. is 4822 492 63051.
- Insulation foil for V1016: part nr. is 5322 255 41133.
- Fixing spring for EHT multiplier D1131: part nr. is 5322 401 11111.
- Rear panel screw M3x6: 5322 502 14403
- Screw that fixes mains input: 4822 502 11507.
- Mains input socket + mains filter + mains switch + bowden cable to front: this is one complete assembly with part nr. 5322 219 82813.

XYZ-AMPLIFIER A2 MODIFICATIONS – CHAPTER 5.2

Faultfinding hint for XYZ-amplifier.

In case of insufficient X-deflection and intensity/focusing, first check the diodes V5001, V5002. The diodes are present in the +58 and –58 volt supply lines (diagram ‘Supply Circuits’). In case of a defective diode, the belonging supply line is interrupted and the related amplifier does not function.

Output transistors in Final X- and Y-amplifier.

The type (and envelope) of the output transistors has changed a number of times:

- V2113/2213/3113/3213 have been in succession BFQ232, BFQ231, and BFQ232A. The type BFQ232A is recommended for ALL replacements (part nr. 4822 130 62751).
- V2134/2234/3134/3234 have been in succession BFQ252, BFQ251, and BFQ252A. The type BFQ252A is recommended for ALL replacements (part nr. 4822 130 62932).

Introduction to new .5 PCB layout.

New PCB layouts have been introduced for the 100 MHz and the 200 MHz XYZ-amplifiers. This has been done to integrate a number of manually assembled components into the layout. The 100 MHz and the 200 MHz layouts have both been updated to the .5 version. The change has impact on the Unit layouts and the circuit diagrams in the Service Manual.

Changes for the 100 MHz XYZ-amplifier.

The large component side and the small component side are shown in the Figure 1 and 2. The circuit diagrams and parts lists in the Service Manual are correct. The XYZ-amplifier with .5 layout has been introduced in scopes with serial numbers DM738xxx and onwards. A 12-digit ‘manufacturing’ code ending with .5 is present on the edge of the PCB. The code is readable with the amplifier mounted in the scope’s chassis. The service ordering code 5322 216 04243 of the XYZ-amplifier is not changed.

Changes for the 200 MHz XYZ-amplifier.

The large component side and the small component side are shown in the Figure 3 and 4. Changes in the circuit diagrams and parts lists are described below. The changes are mainly introduced to optimize HF square wave response. Circuit diagrams that have changed considerably are shown in this supplement. The XYZ-amplifier with .5 layout has been introduced in scopes with serial numbers DM698xxx and onwards. A 12-digit ‘manufacturing’ code ending with .5 is present on the edge of the PCB. The code is readable with the amplifier mounted in the scope’s chassis. The service ordering code 5322 216 04244 of the XYZ-amplifier is not changed.

Circuit diagram 1 (Refer to figure on page 5.2-13 in Service Manual):

C1004 is added between the anodes of V1009, 2.2pF, part nr. 5322 122 33063.

C1005 changed from 470 to 10pF, part nr. 5322 122 32448.

C1009 changed from 6.8 to 22pF, part nr. 5322 122 32658.

C1011 changed from 56 to 22pF, part nr. 5322 122 32658.

R1014, R1023 changed from 261 to 121 ohms, part nr. 5322 117 10519.

R1015, R1020 changed from 4.64 to 14.7 k.ohms, part nr. 5322 117 10528.

R1017, R1021 changed from 1.1 to 1 k.ohms, part nr. 4822 051 10102.

R1037, R1038 changed from 261 ohms to 1.47 k.ohms, part nr. 5322 117 10527.

R1029, R1031 changed from 178 to 383 ohms, part nr. 5322 117 10559.

R1041, R1042 changed from 19.6 to 21.5 k.ohms, part nr. 5322 117 10542.

R1046, R1047 changed from 21.5 to 19.6 k.ohms, part nr. 5322 117 10541.

R1073 changed from 100 to 90.9 ohms, part nr. 5322 117 12557.

R1084, R1086 changed from 147 to 100 ohms, part nr. 4822 051 10101.

R1059, R1061 changed from 1 to 10 ohms, part nr. 4822 111 91885.

Circuit diagram 2 (Refer to figure 5 in this publication):

C1110 changed from 1.8 to 3.3pF, part nr. 5322 122 32286.

C1101, C1102 is changed from 3.9 to 3.3 pF, part nr. 5322 122 32286.

C1103, C1104 is changed from 0.68 to 2.2 pF, part nr. 5322 122 33063.

C1117 is added between the junction of R1149/V1128-c and ground, 10nF, part nr. 5322 122 34098.

C1118 is added between the junction of R1148/V1128-c and ground, 10nF, part nr. 5322 122 34098.

R1103 changed from 3.3 to 28.7 ohms, part nr. 5322 111 92015.

R1106, R1107 changed from 316 to 261 ohms, part nr. 4822 051 52611.

R1155 changed from 511 to 261 ohms, part nr. 4822 051 52611.

R1164 changed from 909 ohms to 1.78 k.ohms, part nr. 5322 117 10535.

R1108, R1109 changed from 75 to 28.7 ohms, part nr. 5322 111 92015.

R1186 is added between the junction of R1106/R1108 and the base of V1106, 21.5 ohms, part nr. 5322 111 92014.

R1187 is added between the junction of R1107/R1109 and the base of V1107, 21.5 ohms, part nr. 5322 111 92014.

R1113, R1114 changed from 121 to 28.7 ohms, part nr. 5322 111 92015.

R1123, R1124 is changed from 51.1 to 21.5 ohms, part nr. 5322 117 11734.

R1188 is added between junction V1109-a/R1116 and V1112-b, 21.5 ohms, part nr. 5322 111 92014.

R1189 is added between junction V1108-a/R1117 and V1111-b, 21.5 ohms, part nr. 5322 111 92014.

R1116, R1117 is changed from 287 to 261 ohms, part nr. 5322 117 10527.

R1138, R1139 is changed from 10 to 4.7 ohms, part nr. 4822 051 10478.

R1157, R1170 is changed from 383 to 316 ohms, part nr. 5322 117 10552.

R1148, R1149 is changed from 619 ohms to 1 k.ohms, part nr. 4822 051 10102.

R1104, R1105 is changed from 1 to 28.7 ohms, part nr. 5322 111 92015.

L1103 changed from 270 to 82 nH, part nr. 5322 157 63382.

L1107, L1108 is changed from 27 to 82 nH, part nr. 5322 157 63382.

Circuit diagram 3 (Refer to figure on page 5.2-15 in Service Manual):

R2001 is changed from 16.2 to 12.1 k.ohms, part nr. 5322 117 10522.

Circuit diagram 4 (Refer to Figure 6 in this publication):

R3105 is added between V3104-c and R3103/ZDRIF1, 237 ohms, part nr. 5322 117 10544.

R3205 is added between V3204-c and R3203/ZDRIF1, 237 ohms, part nr. 5322 117 10544.

Circuit diagram 5 (Refer to Figure 7 in this publication):

A zenerdiode BZX84-C11 (part nr. 4822 130 81338) is added in parallel with C4062. The diode has itemnumber V4029 and its cathode is connected to ground)

A series circuit consisting of 2 zenerdiodes BZX84-B47 (part nr. 4822 130 82521) is added. The cathodes of the zeners are connected together (thus in opposite direction). The anode of one zener (V4023) is connected to INTEN-AA; the anode of the other zener (V4021) is connected to ground.

A series circuit consisting of 2 zenerdiodes BZX84-B47 (part nr. 4822 130 82521) is added. The cathodes of the zeners are connected together (thus in opposite direction). The anode of one zener (V4022) is connected to junction C4003/C4004; the anode of the other zener (V4024) is connected to ground.

A series circuit consisting of 3 zenerdiodes BZX84-B47 (part nr. 4822 130 82521) is added. These zeners V4026, V4027, V4028 are connected anode to cathode; they all have the same direction. The anode of V4026 is connected to G1/X2403-3. The cathode of V4028 is connected to K/X2403-2.

DIGITIZER A8 MODIFICATIONS – CHAPTER 5.8

The ADC's N8001 and N8002 of the type OQ0239 are obsolete. Starting with serial number DM 804xxx, the ADC's are replaced by a L-shaped mini-PCB with 2 ADC's of a new type, auxiliary components, and an additional small 5 V fan. The mini-PCB is connected to the small components side of digitizer A8 with 40 pins and has components on both sides: the ADC-A section is on the 'visible' side and ADC-B is on the side that faces A8. The mini-PCB is designed so that its connection pins align with the existing A8 PCB layout. Figure 8 shows the visible side of the mini-PCB. The connection pins align with the former N8002/pin 13 .. 24 (ADC-B input/supply), the former N8001/pin 13 .. 24 (ADC-A input/supply), and the former termination resistors of the ADC outputs D0-A .. D7-A and D0-B .. D7-B. The mini-PCB is used in a limited number of oscilloscopes.

Repair method: in case of a defective mini-PCB, you have to remove it and restore the situation such as indicated on page 5.8-29 and 5.8-30 of the Service Manual. For this proceed as follows:

- Remove the mini-PCB by cutting all interconnection pins and remove the remains of the pins from the digitizer PCB.
- Install N8001, N8002 (OQ0239, PN 5322 209 12509) and install a heatsink (PN 4022 242 13701) on top of each IC. How to mount the heatsink is shown on page 5.8-30.
- Add on the large component side R8555, R8556, R8557, R8558 (42.2 ohm, PN 4822 111 91887).
- Add on the small component side R8004, R8006, R8007, R8008, R8009, R8011, R8012, R8013, R8016, R8017, R8018, R8019, R8021, R8022, R8023, R8024 (1 kilo-ohm, PN 4822 051 10102).
- Add on the large component side C8127, C8129, C8132, C8137 (22 nF, 5322 122 32654).
- Add on the small component side C8124, C8126, C8128, C8131, C8133, C8134, C8136, C8194, (22 nF, 5322 122 32654).

Notes

- All components necessary to restore the old situation are stocked in sufficient quantities.
- Digitizers in the old and new configuration have identical characteristics and are interchangeable. Service part numbers of the complete units therefor have not been changed. Digitizers with the new configuration are also part of the module exchange procedure.
- The fan for the mini-PCB is available as a service part (PN 4022 244 98461).

EXTENSION TO PERFORMANCE TEST – CHAPTER 6

Chapter 6.3.15, Crosstalk between channels:

The Crosstalk check must be done with 6 instead of 8 divisions. Therefore the following has to be changed:

Settings/procedure:

6 - Adjust the generator to a signal amplitude of 6 divisions.

Requirements:

- Verify that the displayed amplitude of the channels with no input signal applied is less than 0.12 divisions (better than 50:1).

Page 6-25: the first line in the table 'Requirements for analog mode MAGNIFY off (*1) includes inaccuracies and must be read as follows:

DEL'D TB setting	MAIN TB setting	Marker pulse	Max. error
500 us	500 us	0.5 ms	1.8 %

The other lines in the table are OK.

EXTENSIONS TO HF SQUARE WAVE ADJUSTMENT – CHAPTER 7

7.15 HF SQUARE WAVE RESPONSE OF FINAL Y AMPLIFIER. The adjustment steps 'pulse t0' and 'pulse t1' are interdependent. Calibration adjustment must be done so that the number in the adjustment menu:

- is low for t0: e.g. between 10 .. 15.

- is high for t1: e.g. between 55 .. 60.

The opposite situation (t0 high, t1 low) gives an almost similar pulse response, but the frequency response is less good.

7.16 HF RESPONSE IN DSO MODE. The procedure in the Service Manual describes the adjustment to be done for each channel at an input sensitivity of 20 mV/div. Additional to this, the adjustment has to be done for each channel in 10 mV/div.