




CONTROLE OFFICIEL SUISSE DES CHRONOMETRES

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| BUREAUX OFFICIELS DE CONTROLE (BO) de Bienne, Le Locle, Saint-Imier | Edition : | 1 |
| | Edited by : | PSO |
| Homologation Report FIS (TIMING-BOOKLET v2.50 October 2013) | Date : | 31.03.2014 |
| | Page : | 1 of 5 |

Homologation Report of timing device Digitech ChronoPrinter Master 3

based on FIS TIMING-BOOKLET (version 2.50 October 2013)

| | | |
|--------------------------|---|--|
| Report Number | HOM-DIGCPM3_2014001 | |
| Requested by | Fédération Internationale de Ski (FIS) Mr Francesco Cattaneo Blochstrasse 2 CH-3653 Oberhofen/Thunersee | |
| Description of equipment | Multi sports timing device, internal printer with battery | |
| Type | Chronoprinter MASTER 3 | |
| Manufacturer | DIGITECH | |
| Serial Number | 01011C4/0112 | |
| Production Year | 2014 | |
| Date(s) of measures | 25.03.2014 – 28.03.2014 | |
| Date of report | 31.03.2014 | |
| Location(s) of measures | Bureau Officiel de Saint-Imier | |
| Rules | FIS 2.50, October 2013 | |
| Results | Passed | |
| Signatures | Tests and report by Pascal Soltermann  | Controlled by Andreas Wyss CONTROLE OFFICIEL SUISSE DES CHRONOMETRES COSC Léopold Robert 65 2301 La Chaux-de-Fonds |
| Comments | The reference triggering is within +/- 1µs GPS time-scale absolute time, uncertainty and propagation delays are included. DUT Time-of-Day is synchronized electronically in Manual mode with 60S reference pulse. DUT GPS synchronization was inactive during the tests. | |
| Content: | Appendices: | |
| Report: 5 pages | Appendix A: Test 8.2, Data and Statistics | |
| Appendices: 4 pages | Appendix B: Test 5.1, 7.2, Data and Statistics | |



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Homologation Report FIS (TIMING-BOOKLET v2.50 October 2013)

Equipment Description



| | |
|-----------------------|---|
| Dimensions | : 360 x 270 x 100 mm |
| Weight | : 3000 gr. |
| Operating Temperature | : -10°C to +60°C |
| Relative Humidity | : 10 to 90% without condensation |
| Power Supply | : built-in NiMH battery, external AC adapter, 19VDC |
| Number of inputs | : 4, Start, Intermediate I, Intermediate II, Finish |
| Min. Pulse Duration | : 2ms |
| Serial Interface | : 3x RS232C asynchronous, 1x USB |
| Local Network | : Ethernet Port and proprietary expansion ports |
| Calibration Accuracy | : +/- 0.03 PPM |
| Temperature stability | : +/- 1 PPM from -20°C to +70°C |
| Ageing | : +/- 3 PPM per year |
| Firmware version | : 14-02c-beta8 |

Abbreviations:

Ref. = Reference

P = PASS

F = FAIL

N/A = not applicable

N/C = not conducted (not measured or not checked)

DUT = Device under Test

GPS = Global Positioning System



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| Ref. | Description | Comments | Result |
|----------|---|--|--------|
| 1 | Timer | | |
| 1.1 | The timing device must have an internal or external printer | Internal printer | P |
| 1.2 | Printing through a computer is not allowed | Internal printer | P |
| 1.3 | The timer must be able to operate in Time-of-Day | | P |
| 1.4 | The output of the time must always have the same precision (e.g. printer, display and interface) | | P |
| 2 | Printer | | |
| 2.1 | The printer must print at least in a chronological order the time of day | | P |
| 2.2 | For each printed time of day there must be an indication of the timing channel | S, I, II, F # Symbol if Manual sensing | P |
| 2.3 | If it is possible to do manipulation or correction of time in the timer, the printer must mark such a corrected time | Corrected times are printed in bold text with surrounding brackets | P |
| 3 | Interface | | |
| 3.1 | The timing device needs an interface (e.g. RS232, RS422, USB) to connect a PC and transfer the data for data processing (result service) online | RS232, USB, Ethernet | P |
| 4 | Power Supply | | |
| 4.1a | The timing system must work without power supply on internal batteries for 4 hours at +10°C and two impulses per minute with printout | Valid from 2012-05-01 | P |
| 4.1b | The timing system must work without power supply on internal batteries for 4 hours at +23°C and one impulse per minute with printout | Valid until 2012-04-30 | N/A |
| 4.1c | The timing system must work without power supply on internal batteries for 2 hours at -10°C and one impulse per minute with printout | Valid until 2012-04-30 | N/A |
| 5 | Operation Temperature | | |
| 5.1 | The timing device and printer must work at ambient temperature from -10°C to +40°C | Tested with 7.2 | P |
| 6 | Measuring range | | |
| 6.1 | Time of day mode must be possible in hours, minutes, seconds and 1/1000, or better | 1/10000 mode is available Can be truncated or rounded in 1/1000, 1/100, 1/10 or to the second | P |



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| Ref. | Description | Comments | Result |
|-----------|--|---|--------|
| 7 | Timer precision | | |
| 7.1a | Must measure up to 1/1000 second in time of day mode | Valid until 2012-04-30 | N/A |
| 7.1b | Must measure up to 1/10000 second in time of day mode | Valid from 2012-05-01 | P |
| 7.2 | Timer accuracy must be below +/-10 PPM at a device temperature from -10°C to +60°C | Test Results Appendix B Time Drift after 4h @+60°C: -0.229 PPM (-3.3ms) Time Drift after 4h @-10°C: -0.063 PPM (-0.9ms) | P |
| 8 | Quartz | | |
| 8.1 | Ageing of the quartz must be below +/-3 PPM per year | Not tested, given at +/- 3 PPM per year (manufacturer specifications) | P |
| 8.2 | With adjusted quartz frequency the time drift must be below +/-0.5 PPM at 23°C | Test Results Appendix A Measured Time Drift after 24h: 0.02 PPM (+1.7ms) | P |
| 9 | Impulse Triggering | | |
| 9.1 | The delay of impulses is not allowed to be higher than 1/1000 second for the same channel (the channel is triggered from a reference impulse device in minute intervals) | Stopwatch mode, 1/10000 resolution, truncated, within the same 1/10000 second. | P |
| 9.2 | If two channels are triggered at the same time their times must be within 1/1000 second | Same conditions as 9.1, all channels are within the same 1/10000 second. | P |
| 9.3 | The delay of impulses must be constant; the range must be less than 1/10000 second | Same conditions as 9.1, all channels are within the same 1/10000 second. | P |
| 10 | Timing Channels | | |
| 10.1 | The timing device needs a minimum of two independent channels, one for start and one for finish | 4 Channels available: Start, Intermediate I, Intermediate II and Finish | P |
| 11 | Synchronization | | |
| 1.1 | Synchronization between main and backup timer must be possible | | P |



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| Ref. | Description | Comments | Result |
|-----------|--|---|----------|
| 12 | Electromagnetic | | |
| 12.1 | The timing device must meet the standards of IEC (International Electronic Commission) | <i>Safety:</i> <i>EN60950:2006</i> | P |
| 12.2 | The timing device must function satisfactorily in its electromagnetic environment without introducing intolerable electromagnetic disturbances to anything in that environment | <i>EMC:</i> <i>EN55022:2006 Class B</i> <i>EN61000-6-1:2007</i> <i>EN61000-4-3: 3V/m</i> <i>ENV50204: 10V/m</i> <i>EN61000-4-2: - 4kV CD – 8kV AD</i> <i>EN61000-4-4: - 1kV AC – 0.5kV I/O</i> <i>EN61000-4-5: - 2kV C.mode</i> <i>- 1kV D.mode</i> <i>EN61000-4-6: - 3Vemf C.mode</i> | P |
| 13 | Truncation | | |
| 13.1 | The truncation to 1/100 of seconds must be made after the calculation of the run time. The digits of the run time after the 1/100 are thrown away (See booklet for details) | | P |

Timer Homologation, Test Reference 8.2, Appendix A

Date / Tester : 25.03.2014 PSO
 Homologation # : DIGPCM2014001
 Test : 8.2, Time drift must be below +/-0.5 PPM @ 23°C
 Result : **PASS**
 Drift after 24h [s] : 0.001700
 Drift after 24h [PPM] : **0.020**
 Setup : Timer is triggered from 10MIN Reference Pulse on Finish input
 Test duration is 24h, 1 impulse every 10 minutes with printout
 Temperature : **23°C (+/- 0.5°C)**
 Triggering rate [minutes] 10
 Synchronization Time : 09:17:00.0000
 Comments : RS232 Auto TX is used for logging with a PC and compared against the printout results, if discrepancy is detected, the paper value is used and discrepancy is noted.

| DATA | | | |
|-------------------------|--------------|---------------------|---------------------|
| <i>DUT PC RAW TRACE</i> | <i>Index</i> | <i>DUT Printout</i> | <i>Drift in [s]</i> |
| 0920000000 | 0 | 09:20:00.0000 | |
| 0930000000 | 1 | 09:30:00.0000 | 0.000000 |
| 0940000000 | 2 | 09:40:00.0000 | 0.000000 |
| 0950000000 | 3 | 09:50:00.0000 | 0.000000 |
| 1000000001 | 4 | 10:00:00.0001 | 0.000100 |
| 1010000001 | 5 | 10:10:00.0001 | 0.000100 |
| 1020000001 | 6 | 10:20:00.0001 | 0.000100 |
| 1030000001 | 7 | 10:30:00.0001 | 0.000100 |
| 1040000001 | 8 | 10:40:00.0001 | 0.000100 |
| 1050000001 | 9 | 10:50:00.0001 | 0.000100 |
| 1100000001 | 10 | 11:00:00.0001 | 0.000100 |
| 1110000001 | 11 | 11:10:00.0001 | 0.000100 |
| 1120000001 | 12 | 11:20:00.0001 | 0.000100 |
| 1130000002 | 13 | 11:30:00.0002 | 0.000200 |
| 1140000002 | 14 | 11:40:00.0002 | 0.000200 |
| 1150000002 | 15 | 11:50:00.0002 | 0.000200 |
| 1200000002 | 16 | 12:00:00.0002 | 0.000200 |
| 1210000002 | 17 | 12:10:00.0002 | 0.000200 |
| 1220000002 | 18 | 12:20:00.0002 | 0.000200 |
| 1230000002 | 19 | 12:30:00.0002 | 0.000200 |
| 1240000002 | 20 | 12:40:00.0002 | 0.000200 |
| 1250000003 | 21 | 12:50:00.0003 | 0.000300 |
| 1300000003 | 22 | 13:00:00.0003 | 0.000300 |
| 1310000003 | 23 | 13:10:00.0003 | 0.000300 |
| 1320000003 | 24 | 13:20:00.0003 | 0.000300 |
| 1330000003 | 25 | 13:30:00.0003 | 0.000300 |
| 1340000003 | 26 | 13:40:00.0003 | 0.000300 |
| 1350000003 | 27 | 13:50:00.0003 | 0.000300 |
| 1400000003 | 28 | 14:00:00.0003 | 0.000300 |
| 1410000003 | 29 | 14:10:00.0003 | 0.000300 |
| 1420000004 | 30 | 14:20:00.0004 | 0.000400 |
| 1430000004 | 31 | 14:30:00.0004 | 0.000400 |
| 1440000004 | 32 | 14:40:00.0004 | 0.000400 |
| 1450000004 | 33 | 14:50:00.0004 | 0.000400 |
| 1500000004 | 34 | 15:00:00.0004 | 0.000400 |
| 1510000004 | 35 | 15:10:00.0004 | 0.000400 |
| 1520000004 | 36 | 15:20:00.0004 | 0.000400 |
| 1530000004 | 37 | 15:30:00.0004 | 0.000400 |
| 1540000005 | 38 | 15:40:00.0005 | 0.000500 |
| 1550000005 | 39 | 15:50:00.0005 | 0.000500 |
| 1600000005 | 40 | 16:00:00.0005 | 0.000500 |

| | | | |
|------------|-----|---------------|----------|
| 0050000011 | 93 | 00:50:00.0011 | 0.001100 |
| 0100000011 | 94 | 01:00:00.0011 | 0.001100 |
| 0110000012 | 95 | 01:10:00.0012 | 0.001200 |
| 0120000012 | 96 | 01:20:00.0012 | 0.001200 |
| 0130000012 | 97 | 01:30:00.0012 | 0.001200 |
| 0140000012 | 98 | 01:40:00.0012 | 0.001200 |
| 0150000012 | 99 | 01:50:00.0012 | 0.001200 |
| 0200000012 | 100 | 02:00:00.0012 | 0.001200 |
| 0210000012 | 101 | 02:10:00.0012 | 0.001200 |
| 0220000012 | 102 | 02:20:00.0012 | 0.001200 |
| 0230000013 | 103 | 02:30:00.0013 | 0.001300 |
| 0240000013 | 104 | 02:40:00.0013 | 0.001300 |
| 0250000013 | 105 | 02:50:00.0013 | 0.001300 |
| 0300000013 | 106 | 03:00:00.0013 | 0.001300 |
| 0310000013 | 107 | 03:10:00.0013 | 0.001300 |
| 0320000013 | 108 | 03:20:00.0013 | 0.001300 |
| 0330000013 | 109 | 03:30:00.0013 | 0.001300 |
| 0340000013 | 110 | 03:40:00.0013 | 0.001300 |
| 0350000014 | 111 | 03:50:00.0014 | 0.001400 |
| 0400000014 | 112 | 04:00:00.0014 | 0.001400 |
| 0410000014 | 113 | 04:10:00.0014 | 0.001400 |
| 0420000014 | 114 | 04:20:00.0014 | 0.001400 |
| 0430000014 | 115 | 04:30:00.0014 | 0.001400 |
| 0440000014 | 116 | 04:40:00.0014 | 0.001400 |
| 0450000014 | 117 | 04:50:00.0014 | 0.001400 |
| 0500000014 | 118 | 05:00:00.0014 | 0.001400 |
| 0510000015 | 119 | 05:10:00.0015 | 0.001500 |
| 0520000015 | 120 | 05:20:00.0015 | 0.001500 |
| 0530000015 | 121 | 05:30:00.0015 | 0.001500 |
| 0540000015 | 122 | 05:40:00.0015 | 0.001500 |
| 0550000015 | 123 | 05:50:00.0015 | 0.001500 |
| 0600000015 | 124 | 06:00:00.0015 | 0.001500 |
| 0610000015 | 125 | 06:10:00.0015 | 0.001500 |
| 0620000015 | 126 | 06:20:00.0015 | 0.001500 |
| 0630000016 | 127 | 06:30:00.0016 | 0.001600 |
| 0640000016 | 128 | 06:40:00.0016 | 0.001600 |
| 0650000016 | 129 | 06:50:00.0016 | 0.001600 |
| 0700000016 | 130 | 07:00:00.0016 | 0.001600 |
| 0710000016 | 131 | 07:10:00.0016 | 0.001600 |
| 0720000016 | 132 | 07:20:00.0016 | 0.001600 |
| 0730000016 | 133 | 07:30:00.0016 | 0.001600 |
| 0740000016 | 134 | 07:40:00.0016 | 0.001600 |
| 0750000016 | 135 | 07:50:00.0016 | 0.001600 |
| 0800000017 | 136 | 08:00:00.0017 | 0.001700 |
| 0810000017 | 137 | 08:10:00.0017 | 0.001700 |
| 0820000017 | 138 | 08:20:00.0017 | 0.001700 |
| 0830000017 | 139 | 08:30:00.0017 | 0.001700 |
| 0840000017 | 140 | 08:40:00.0017 | 0.001700 |
| 0850000017 | 141 | 08:50:00.0017 | 0.001700 |
| 0900000017 | 142 | 09:00:00.0017 | 0.001700 |
| 0910000017 | 143 | 09:10:00.0017 | 0.001700 |
| 0920000017 | 144 | 09:20:00.0017 | 0.001700 |

Timer Homologation, Test Reference 5.1, 7.2, Appendix B

Date / Tester : 26.03.2014 PSO
 Homologation # : DIGPCM2014001
 Test : 7.2, Timer accuracy must be below +/- 10 PPM from -10°C to +60°C
 Result : **PASS**
 Drift after 4h [s] : -0.003300
 Drift after 4h [PPM] : **-0.229**
 Setup : Timer is triggered from 10MIN Reference Pulse on Finish input
 Test duration is 4h, 1 impulse every 10 minutes with printout
 Temperature : **60°C (+/- 0.5°C)**
 Triggering rate [minutes] 10
 Comments : RS232 Auto TX is used for logging with a PC and compared against the printout results, if discrepancy is detected, the paper value is used and discrepancy is noted.
 Test 5.1 is intrinsically tested with test 7.2 as the unit has proven to be able to work with printout from -10°C up to +60°C

| DATA | | | |
|-------------------------|--------------|---------------------|---------------------|
| <i>DUT PC RAW TRACE</i> | <i>Index</i> | <i>DUT Printout</i> | <i>Drift in [s]</i> |
| 1050000005 | 0 | 10:50:00.0005 | |
| 1100000003 | 1 | 11:00:00.0003 | -0.000200 |
| 1110000002 | 2 | 11:10:00.0002 | -0.000300 |
| 1120000001 | 3 | 11:20:00.0001 | -0.000400 |
| 1129599999 | 4 | 11:29:59.9999 | -0.000600 |
| 1139599998 | 5 | 11:39:59.9998 | -0.000700 |
| 1149599996 | 6 | 11:49:59.9996 | -0.000900 |
| 1159599995 | 7 | 11:59:59.9995 | -0.001000 |
| 1209599994 | 8 | 12:09:59.9994 | -0.001100 |
| 1219599992 | 9 | 12:19:59.9992 | -0.001300 |
| 1229599991 | 10 | 12:29:59.9991 | -0.001400 |
| 1239599989 | 11 | 12:39:59.9989 | -0.001600 |
| 1249599988 | 12 | 12:49:59.9988 | -0.001700 |
| 1259599987 | 13 | 12:59:59.9987 | -0.001800 |
| 1309599985 | 14 | 13:09:59.9985 | -0.002000 |
| 1319599984 | 15 | 13:19:59.9984 | -0.002100 |
| 1329599983 | 16 | 13:29:59.9983 | -0.002200 |
| 1339599981 | 17 | 13:39:59.9981 | -0.002400 |
| 1349599980 | 18 | 13:49:59.9980 | -0.002500 |
| 1359599978 | 19 | 13:59:59.9978 | -0.002700 |
| 1409599977 | 20 | 14:09:59.9977 | -0.002800 |
| 1419599976 | 21 | 14:19:59.9976 | -0.002900 |
| 1429599974 | 22 | 14:29:59.9974 | -0.003100 |
| 1439599973 | 23 | 14:39:59.9973 | -0.003200 |
| 1449599972 | 24 | 14:49:59.9972 | -0.003300 |

Timer Homologation, Test Reference 5.1, 7.2, Appendix B

Date / Tester : 27.03.2014 PSO
 Homologation # : DIGPCM2014001
 Test : 7.2, Timer accuracy must be below +/- 10 PPM from -10°C to +60°C
 Result : **PASS**
 Drift after 4h [s] : -0.000900
 Drift after 4h [PPM] : **-0.063**
 Setup : Timer is triggered from 10MIN Reference Pulse on Finish input
 Test duration is 4h, 1 impulse every 10 minutes with printout
 Temperature : **-10°C (+/- 0.5°C)**
 Triggering rate [minutes] : 10
 Comments : RS232 Auto TX is used for logging with a PC and compared against the printout results, if discrepancy is detected, the paper value is used and discrepancy is noted.
 Test 5.1 is intrinsically tested with test 7.2 as the unit has proven to be able to work with printout from -10°C up to +60°C

| DATA | | | |
|-------------------------|--------------|---------------------|---------------------|
| <i>DUT PC RAW TRACE</i> | <i>Index</i> | <i>DUT Printout</i> | <i>Drift in [s]</i> |
| 0909599979 | 0 | 09:09:59.9979 | |
| 0919599979 | 1 | 09:19:59.9979 | 0.000000 |
| 0929599978 | 2 | 09:29:59.9978 | -0.000100 |
| 0939599978 | 3 | 09:39:59.9978 | -0.000100 |
| 0949599978 | 4 | 09:49:59.9978 | -0.000100 |
| 0959599977 | 5 | 09:59:59.9977 | -0.000200 |
| 1009599977 | 6 | 10:09:59.9977 | -0.000200 |
| 1019599977 | 7 | 10:19:59.9977 | -0.000200 |
| 1029599976 | 8 | 10:29:59.9976 | -0.000300 |
| 1039599976 | 9 | 10:39:59.9976 | -0.000300 |
| 1049599975 | 10 | 10:49:59.9975 | -0.000400 |
| 1059599975 | 11 | 10:59:59.9975 | -0.000400 |
| 1109599975 | 12 | 11:09:59.9975 | -0.000400 |
| 1119599974 | 13 | 11:19:59.9974 | -0.000500 |
| 1129599974 | 14 | 11:29:59.9974 | -0.000500 |
| 1139599974 | 15 | 11:39:59.9974 | -0.000500 |
| 1149599973 | 16 | 11:49:59.9973 | -0.000600 |
| 1159599973 | 17 | 11:59:59.9973 | -0.000600 |
| 1209599972 | 18 | 12:09:59.9972 | -0.000700 |
| 1219599972 | 19 | 12:19:59.9972 | -0.000700 |
| 1229599972 | 20 | 12:29:59.9972 | -0.000700 |
| 1239599971 | 21 | 12:39:59.9971 | -0.000800 |
| 1249599971 | 22 | 12:49:59.9971 | -0.000800 |
| 1259599971 | 23 | 12:59:59.9971 | -0.000800 |
| 1309599970 | 24 | 13:09:59.9970 | -0.000900 |