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STOP WATCHES

This Defence Standard
supersedes Def Stan 66-4
parts 3, 6, 7, 8, 12, 13
and 14 as listed in
Historical Record

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2 July 1973
Def Stan 66-4(Part 8)/2 Stop Watch, 6 second sweep, calibrated in yards,
general service dated 22 June 1973
Def Stan 66-4(Part 12)/1 Stop Watch 1/5 second, dashboard
dated 28 December 1973
Def Stan 66-4(Part 13)/1 Stop Watch 1/100 minute work study (continuous
running) dated 28 December 1973
Def Stan 66-4(Part 14)/1 Stop Watch, 1/5 second (continuous running)
dated 28 December 1973

STOP WATCHES

PREFACE

<p>This Defence Standard supersedes Def Stan 66-4 Parts 3, 6, 7, 8, 12, 13 and 14 as listed in Historical Record</p>
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i This Standard specifies the materials, methods of test, and other requirements for stop watches of various types in general service use within the Ministry of Defence (MOD).

ii This Standard has been prepared in association with DGSW(N) SW177A1B who are the sponsoring authority for watches.

iii This Standard has been agreed by the authorities concerned with its use and shall be incorporated whenever relevant in all future designs, contracts, orders etc and whenever practicable by amendment to those already in existence. If any difficulty arises which prevents application of the Defence Standard, the Directorate of Standardization shall be informed so that a remedy may be sought.

iv Any enquiries regarding this Standard in relation to an invitation to tender or a contract in which it is incorporated are to be addressed to the responsible technical or supervising authority named in the invitation to tender or contract.

v This Standard has been devised for the use of the Crown and of its contractors in the execution of contracts for the Crown. The Crown hereby excludes all liability (other than liability for death or personal injury) whatsoever and howsoever arising (including, but without limitation, negligence on the part of the Crown its servants or agents) for any loss or damage however caused where the Standard is used for any other purpose.

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STOP WATCHES**1 Scope**

This Standard specifies the requirements for stop watches, of various types in general service use within MOD.

2 Related Documents

2.1 The following documents and publications are referred to in this Standard:

ISO 3157	Radio Luminescent Deposits for Time Measuring Instruments
BS 970	Part 1: General Inspection and Testing Procedures and Specific Requirements for Carbon, Carbon Manganese, Alloy and Stainless Steels
BS 1449	Part 2: Specification for Stainless Steel and Heat Resisting Steel Plate, Sheet and Strip
BS 2870	Specification for Rolled Copper and Copper Alloys: Sheet, Strip and Foil
BS 2872	Specification for Copper and Copper Alloy Forging Stock and Forgings

2.2 Reference in this Standard to any related documents means in any invitation to tender or contract the edition and all amendments current at the date of such tender or contract unless a specific edition is indicated.

2.3 Related documents referred to above can be obtained from the address quoted in the following table:

DOCUMENT	SOURCE
British Standard (BS) International Organization for Standardization (ISO)	BSI Sales Department Linford Wood MILTON KEYNES MK14 6LE

3 General Construction

3.1 The general construction for each stop watch listed in table B is given below.

3.2 Watch movement. The movement shall be fitted with a minimum of 7 jewels, and a shock-resisting device on the balance assembly. The calibre number shall be stamped or engraved in such a position that it shall be evident on removal of the case back.

The balance and balance spring, shall be constructed of non-magnetic materials and shall be such that the rating requirements specified in **5.2** are met.

The mainspring shall be made of unbreakable, rustproof, stainless steel alloy and shall be fitted with a robust brace.

3.3 Hands

3.3.1 The hands shall be of blued steel and shall have brass centre bushes.

3.3.2 For item 5, table B, the hands shall be of non-magnetic material. The centre seconds and minute hands shall be of bright metal, matt white finish and luminized as in fig 5 and **E.1.3**.

The hour indicator disc shall be of matt white finish with the numerals 0 to 11 marked boldly in black.

3.4 Case assembly

3.4.1 The case shall be either nickel silver to BS 2870, table 11 - chromium plated or of a two-piece type, the mainframe of brass to BS 218, chromium plated and the back cover of stainless steel to EN 58D of BS 1449. The case shall be to the dimensions shown for each watch, in figures 1 to 7 as appropriate.

3.4.2 For item 5, table B, the mainframe and pushpiece shall be of brass to BS 2872, plated specially for resistance to corrosion and with a matt black finish.

The winding crown, stop start pusher shall be of corrosion-resisting steel to EN 58D of BS 970 Part 1 with a matt black finish.

The mainframe back shall be of corrosion-resisting steel to EN 58D of BS 1449 and a tight snap-on fit.

The mainframe shall be provided with three 2 mm screw threaded fixing holes to enable the securing of the appropriate mounting back plate.

3.5 Glass. The cover 'glass' shall be fully shrunk, unplasticized polymethyl methacrylate, free from defects.

3.6 The materials, parts, manufacture, assembly, workmanship and finish shall be of a quality to be the subject of agreement between the purchaser and the supplier.

4 Detailed Construction

For detailed construction of each watch refer to the relevant annex.

5 Rating and Testing

5.1 General

5.1.1 The indication of the recorder hand shall always be consistent with the position of the sweep hand so that no ambiguity can arise.

5.1.2 On stopping and resetting the watch, both hands shall return exactly to the zero mark.

5.1.3 The error developed by the second/centre or sweep hand during any interval of its first revolution should be no more than as indicated in table A:

5.1.3 (Contd)

Table ASweep Hand Acceptable Error

ITEM NO	TABLE B ITEM NO	ACCEPTABLE ERROR
1	1	0.02 sec
2	2	0.1 sec
3	3 , 5 & 7	0.2 sec
4	4	0.04 sec
5	6	1/300 min

5.1.4 For item 5, table B only. The hour indicator disc shall always be consistent with the position of the minute hand so that no ambiguity can arise.

5.2 Rating. The watch shall be tested at room temperature (10 to 20°C) and shall meet the requirements as stated in the annex for that watch.

5.3 Temperature. The watch shall be tested as required in the annex for that watch.

5.4 Endurance

5.4.1 The watch shall undergo a starting and stopping test consisting of 200 complete cycles of starting, stopping and resetting operations, ie 600 actuations of the operating mechanisms.

5.4.2 After the endurance test, the watch shall again be tested in the manner specified in 5.2 and shall still comply with the requirements given in the annex for the watch concerned. The watch shall also still comply with the requirements of 5.1.

6 Marking

The back of the case shall be engraved as follows:

- (a) the NATO stock number;
- (b) the serial number and year of manufacturer, together with any other information which may be required in the contract;
- (c) for item 4, table B, only. MAX RUN - 1 hour.

NOTE: All engraved markings shall measure 3.0 mm in height.

7 Packaging

Packaging shall be in accordance with the tender or contract requirements.

Table B
Description of Stop Watches within this Standard

ITEM NO	NATO STOCK NUMBER 6645-99-	SERVICE MANAGEMENT CODE			DESCRIPTION									
		NAVY	ARMY	AIR	DIAL					MOVEMENT		CASE	DETAILED CONSTRUCTION	GENERAL ARRANGEMENT
					GRADUATION	RECORDER	HANDS	CONTROL	COLOUR	SIZE	TYPE			
	(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(j)	(k)	(l)	(m)	(n)	(p)
1	916-0180	0552	--	6B	1/100 sec	90 second	1 Sweep 1 Recorder	Push down crown and stem	White with black markings	19 ligne	Non-magnetic balance and balance spring Shock-resistant	Open face pocket type	Annex A	Fig 1
2	910-1002	--	W10	6B	1/10 sec	15 minute	1 Sweep 1 Recorder	Push down crown and stem	White with black numerals and graduation	19 ligne	Shock-resistant	Open face pocket type	Annex B	Fig 2
3	521-3169	0552	W10	6B	1/5 sec and 1/100 min	30 minute	1 Sweep 1 Recorder	Push down crown and stem	White with black numerals and graduations 1/100 minute zone red	19 ligne	Shock-resistant	Open face pocket type	Annex c	Fig 3
4	520-9365	0552	--	6B	100 yds and 1 sec	-	1 Sweep	Push down crown and stem start, stop, and flyback	White seconds zone red Yards zone black	18½ to 19½ ligne	Shock-resistant	Open face pocket type	Annex D	Fig 4
5	520-9604	--	--	6B	1/5 sec	60 minute	1 Sweep (luminized) 1 Recorder (luminized)	Push down crown and side push piece	Black with white luminized numerals and graduations	19 3/4 ligne	Shock-resistant	Open face Dash-board mounted	Annex E	Fig 5

Notes applicable to this table are on page 8.

Continued on page 7

Table B - Concluded

ITEM NO	NATO STOCK NUMBER 6645-99-	SERVICE MANAGEMENT CODE			DESCRIPTION									
		NAVY	ARMY	AIR	DIAL					MOVEMENT		CASE	DETAILED CONSTRUCTION	GENERAL ARRANGEMENT
					GRADUA- TION	RECORDER	HANDS	CONTROL	COLOUR	SIZE	TYPE			
	(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(j)	(k)	(l)	(m)	(n)	(p)
6	960-8411	0552	W10	6B	1/100 min	30 minute	1 Sweep 1 Recorder	Push down crown and side slide	White with black numerals and graduation	19 ligne	Shock- resistant continu- ous running	Open face pocket type	Annex F	Fig 6
7	523-9007	0552	- -	- -	1/5 sec	10 minute	1 Sweep 1 Recorder	Push down crown and side slide	White with black numerals and gaduation	19 ligne	Shock- resistant continu- ous running	Open face pocket type	Annex G	Fig 7

Notes applicable to this table are on page 8.

Notes Applicable to Table B

NOTE 1: When only a Service management code appears in the Navy column, the full Navy number is the last seven digits of the NATO Stock Number (NSN) prefixed by that code, eg 0552/916-0180.

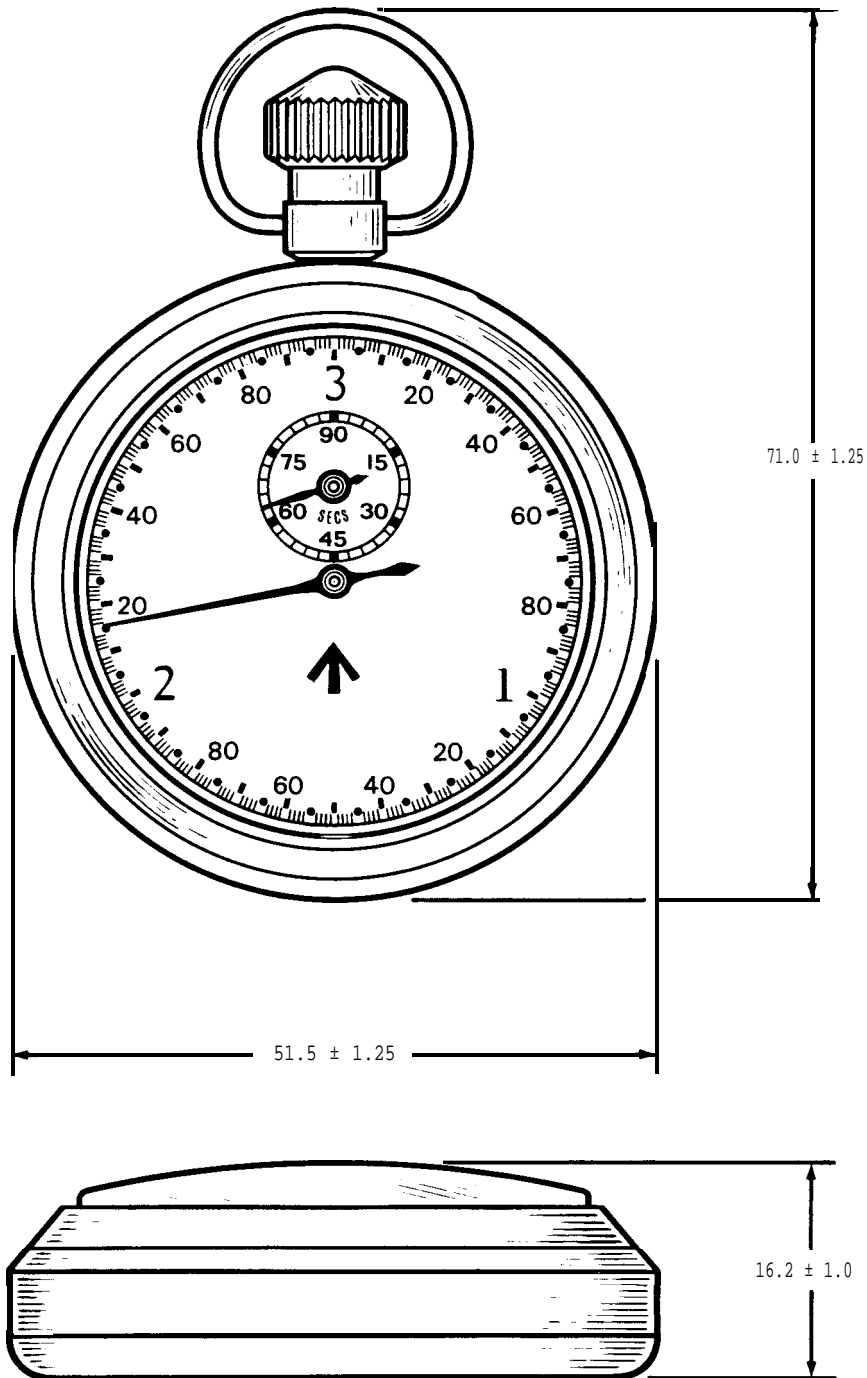
NOTE 2: When only a Service management code appears in the Army column, the full Army number is the NATO Stock Number (NSN) prefixed by that code, eg W10/6645-99-521-3169.

NOTE 3: When only a Service management code appears in the Air Force column, the full Air Force number is the last seven digits of the NATO Stock Number (NSN) prefixed by that code, eg 6B/9101002 (the number is not hyphenated).

NOTE 4: - indicates that the column heading does not apply.

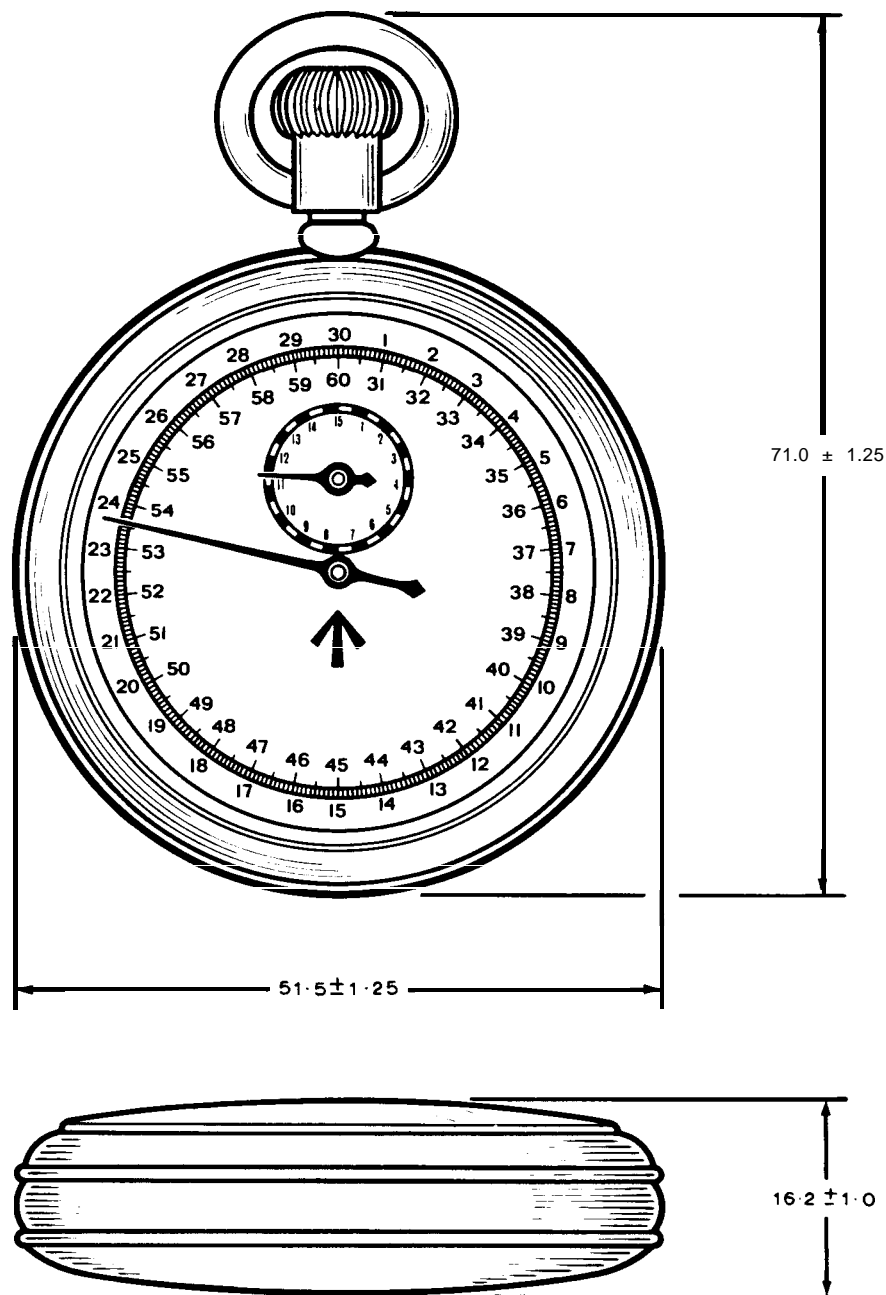
NOTE 5: - - indicates that the Service concerned does not at present use this item.

NOTE 6: When specifying a particular item within a table the page number and item number should be given.



ALL DIMENSIONS ARE IN MILLIMETRES

Fig 1 General Arrangement for Stop Watch
1/100 Second - 3 Second Sweep
(NSN 6645-99-916-0180)

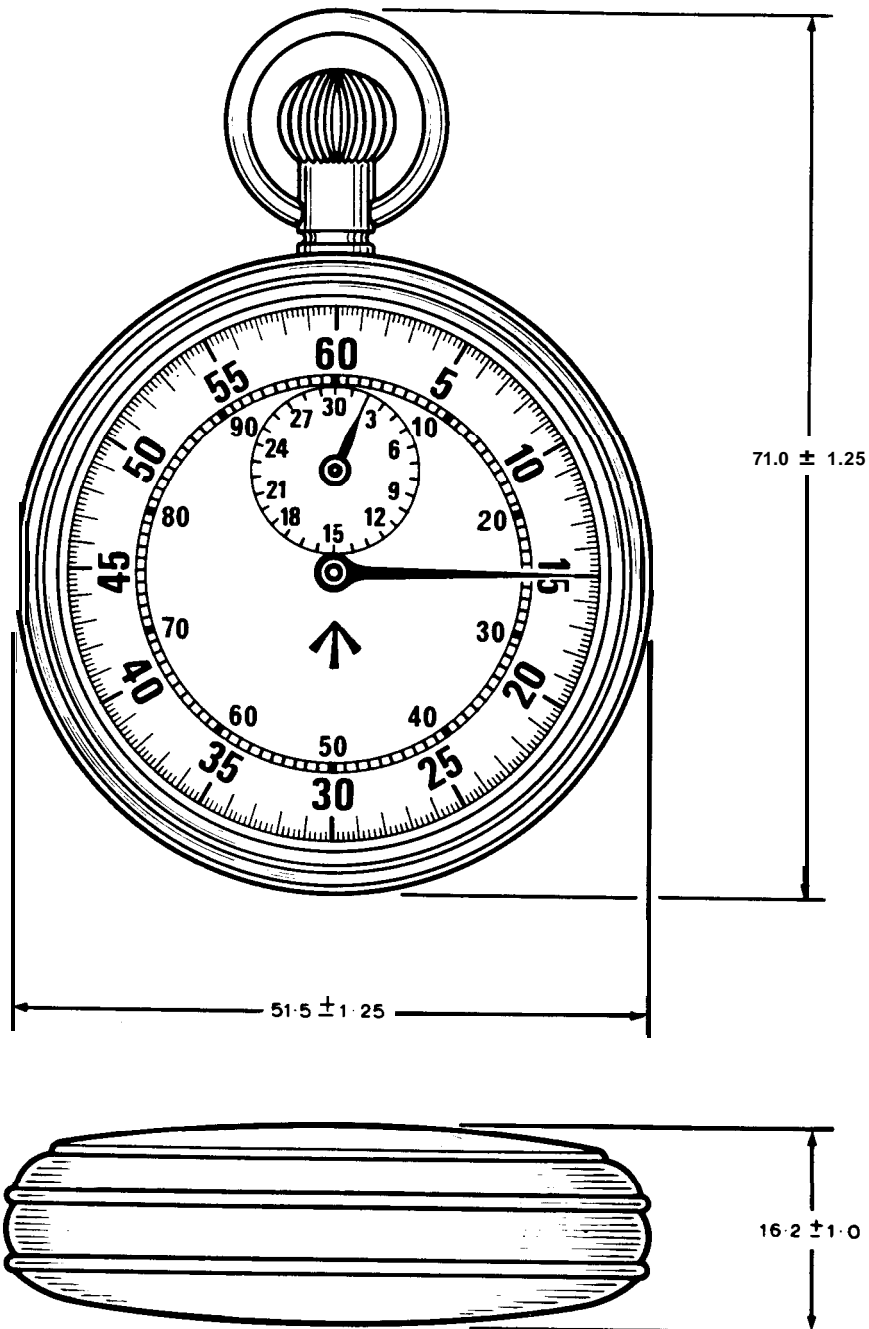


NOTE 1: The figures 31 to 60 and the shaded sectors of the minute recorder circle to be in red.

NOTE 2: The drawing shows a typical stop watch; the shape of the case etc is shown only for the sake of completeness. Any shape which conforms to the dimensions quoted and to the requirements of the Standard will be considered to be satisfactory.

NOTE 3: All dimensions are in millimetres.

Fig 2 General Arrangement for Stop Watch, 1/10 Second
General Service
(NSN 6645-99-910-1002)

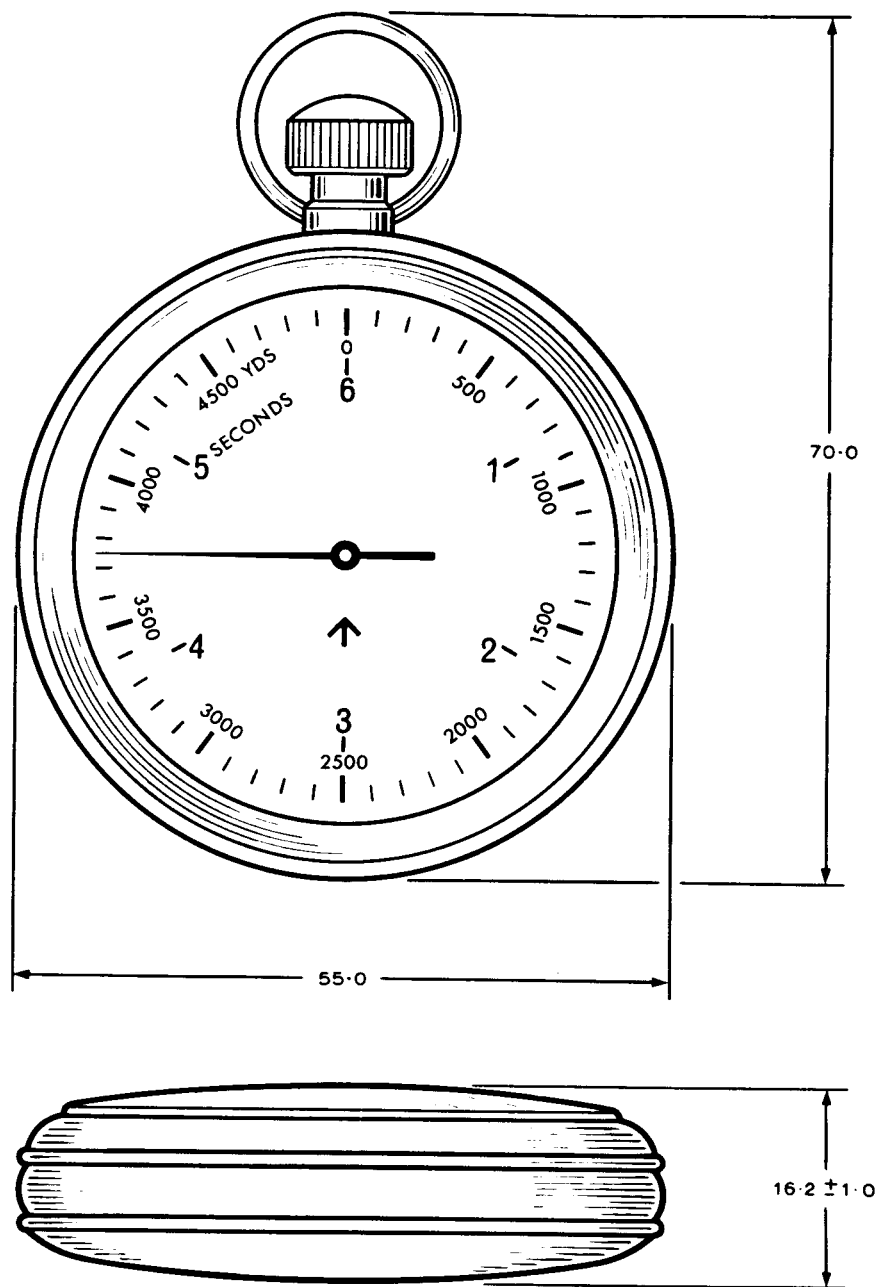


NOTE 1: The 1/100 minute zone including figures 10 to 90 to be in red.

NOTE 2: The drawing shows a typical stop watch; the shape of the case etc is shown only for the sake of completeness. Any shape which conforms to the dimensions quoted and to the requirements of the Standard will be considered to be satisfactory.

NOTE 3: All dimensions are in millimetres.

Fig 3 General Arrangement for Stop Watch
1/5 Second 1/100 Minute
(NSN 6645-99-521-3169)

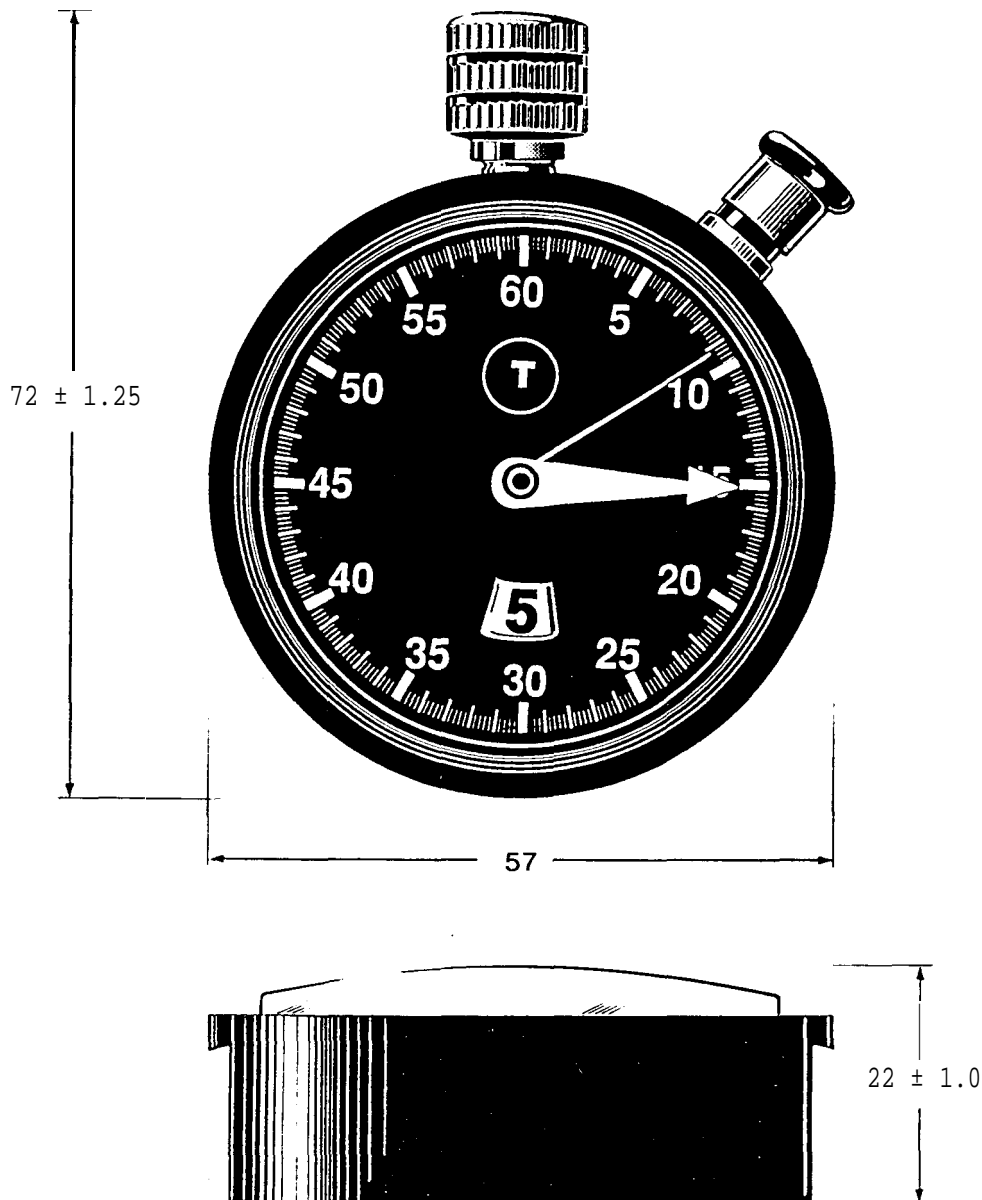


NOTE 1: The figures to 6, denoting seconds, to be in red.

NOTE 2: The drawing shows a typical stop watch; the shape of the case etc is shown only for the sake of completeness. Any form which conforms to the dimensions quoted and to the requirements of the Standard will be considered to be satisfactory.

NOTE 3: All dimensions are in millimetres.

Fig 4 General Arrangement for Stop Watch
6 Second (Calibrated in Yards)
(NSN 6645-99-520-9365)

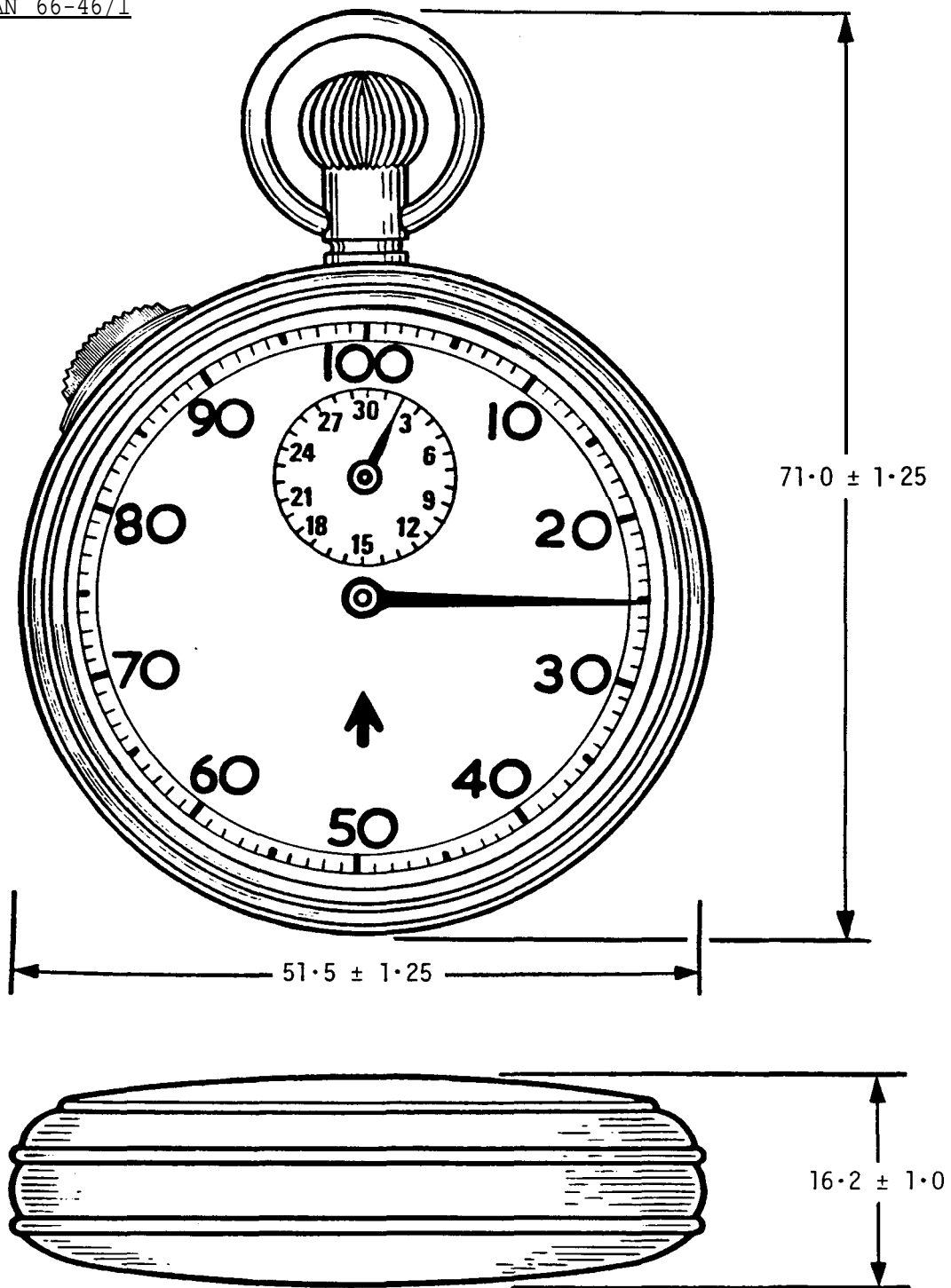


NOTE 1: Numerals 5 to 60 - luminized. Second and minute hand - luminized. Batons - luminized. External Surfaces - matt black.

NOTE 2: The drawing shows a typical stop watch; the shape of the case etc is shown only for the sake of completeness. Any shape which conforms to the dimensions quoted and to the requirements of the Standard will be considered to be satisfactory.

NOTE 3: All dimensions are in millimetres.

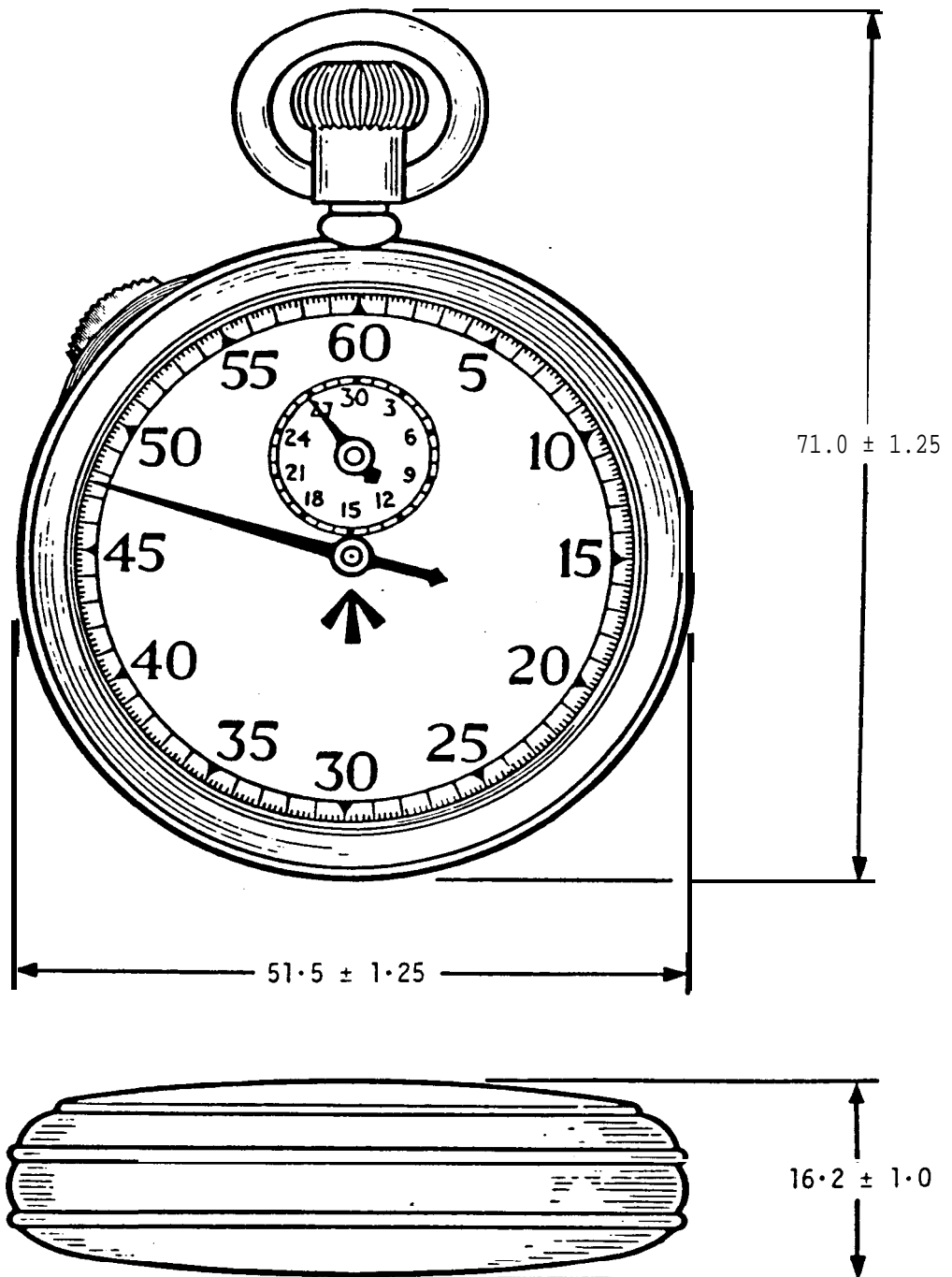
Fig 5 General Arrangement for Stop Watch
1/5 Second, Dashboard
(NSN 6645-99-520-9604)



NOTE 1: The drawing shows a typical stop watch; the shape of the case etc is shown only for the sake of completeness. Any shape which conforms to the dimensions quoted and to the requirements of the Standard will be considered to be satisfactory.

NOTE 3: All dimensions are in millimetres.

Fig 6 General Arrangement for Stop Watch 1/100 Minute,
Work Study (Continuous Running)
(NSN 6645-99-960-8411)



NOTE 1: The drawing shows a typical stop watch; the shape of the case etc is shown only for the sake of completeness. Any shape which conforms to the dimensions quoted and to the requirements of the Standard will be considered to be satisfactory.

NOTE 2: All dimensions are in millimetres.

Fig 7 General Arrangement for Stop Watch
1/5 Second (Continuous Running)
(NSN 6645-99-523-9007)

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Stop Watch 1/100 Second NSN 6645-99-916-0180

A.1 Detailed Construction

The stop watch movement shall operate for a period of 20 minutes and shall be of the keyless lever type, having a centre second hand, a second recorder, and with start, stop and flyback action controlled by the winding crown. The centre second hand shall make one revolution in 3 seconds, and the recorder hand one revolution in 90 seconds.

A.1.1 Watch movement. The watch shall embody a 19 ligne movement and be fitted with a jewelled lever escapement.

A.1.2 Dial. The dial shall be of white stoved enamel with Arabic numerals and graduations marked in accordance with Fig 1. The trade name or trade mark shall be on the dial, if in letters these shall be not more than 1.0 mm in height. All markings shall be in black stoved enamel.

A.2 Testing

A.2.1 Rating. The watch shall be tested for 15 minutes and during any one revolution of the recorder hand the watch shall not have varied by more than:

- (a) 0.2 seconds, in a vertical position with the crown up;
- (b) 0.15 seconds, in a horizontal position with dial up.

A.2.2 Temperature

A.2.2.1 The watch shall be submitted to a temperature of -15°C in the dial up position for 15 minutes during which period it shall not stop. Recommencing the test not less than 24 hours later the watch shall be retested as specified in **A.2.1** to ensure no damage or permanent derangement has been caused.

A.2.2.2 The watch shall be tested at 50°C and shall comply with the requirements specified in **A.2.1**.

Stop Watch 1/10 Second NSN 6645-99-910-1002

B.1 Detailed Construction

The stop watch movement shall consist of an 4-6 hour keyless lever type having a centre second hand, a minute recorder, and with start, stop and flyback action controlled by the winding crown. The centre second hand shall make one revolution in 30 seconds and the recorder hand one revolution in 15 minutes.

B.1.1 Watch movement. The watch shall embody a 19 ligne movement and be fitted with a jewelled lever escapement.

B.1.2 Dial. The dial shall be of white stoved enamel with Arabic numerals and graduations marked in accordance with Fig 2. The trade name or trade mark shall be on the dial, if in letters these shall be not more than 1.0 mm in height. All markings shall be in stoved enamel. The colour shall be in black except where otherwise stated at Fig 2.

B.2 Testing

B.2.1 Rating. The watch shall be tested for 3 hours in each of the following positions:

- (a) in a vertical position with the crown up;
- (b) in a horizontal position with dial up.

The watch shall not vary by more than 1 second in any 30 minutes and shall not accumulate an error exceeding 6 seconds during a test period of 3 hours.

B.2.2 Temperature

B.2.2.1 The watch shall be tested in a vertical position with crown up at a temperature of -20°C for 3 hours. The watch shall not vary by more than 1.5 seconds in any 30 minutes and shall not accumulate an error exceeding 9 seconds in 3 hours.

B.2.2.2 The watch shall be tested in a vertical position with crown up at a temperature of 50°C for 3 hours. The watch shall not vary by more than 1.5 seconds in any 30 minutes and shall not accumulate an error exceeding 9 seconds in 3 hours.

B.2.2.3 The watch shall be tested at temperatures of -20°C and 50°C for compliance with the requirements of 5.1.

B.2.2.4 When the watch has returned to normal room temperature after the tests specified in B.2.2.1, B.2.2.2 and B.2.2.3, the watch shall be tested for 3 hours in a vertical position with crown up and shall not accumulate an error exceeding 6 seconds.

Stop Watch 1/5 Second/ 1/100 Minute NSN 6645-99-521-3169

C.1 Detailed Construction

The stop watch movement shall consist of an 8-12 hour keyless lever type having a centre second hand, a minute recorder, and with start, stop and flyback action controlled by the winding crown. The centre second hand shall make one revolution in 30 seconds and the recorder hand one revolution in 15 minutes.

C.1.1 Watch movement. The watch shall embody a 19 ligne movement and be fitted with a jewelled lever escapement.

C.1.2 Dial. The dial shall be of white stoved enamel with Arabic numerals and graduations marked in accordance with Fig 3. The trade name or trade mark shall be on the dial, if in letters these shall be not more than 1.0 mm in height. All markings shall be in black stoved enamel with the exception of the 1/100 minute zone, including the numerals in that zone, which shall be red.

C.2 Testing

C.2.1 Rating. The watch shall be tested for 6 hours in each of the following positions:

- (a) in a vertical position with the crown up;
- (b) in a horizontal position with dial up.

The watch shall not vary by more than 1 second in any 30 minutes and shall not accumulate an error exceeding 12 seconds during a test period of 6 hours.

C.2.2 Temperature

C.2.2.1 The watch shall be tested in a vertical position with crown up at a temperature of -20°C for 3 hours. The watch shall not vary by more than 1.5 seconds in any 30 minutes and shall not accumulate an error exceeding 9 seconds in 3 hours.

C.2.2.2 The watch shall be tested in a vertical position with crown up at a temperature of 50°C for 3 hours. The watch shall not vary by more than 1.5 seconds in any 30 minutes and shall not accumulate an error exceeding 9 seconds in 3 hours.

C.2.2.3 The watch shall be tested at temperatures of -20°C and 50°C for compliance with the requirements of 5.1.

C.2.2.4 When the watch has returned to normal room temperature after the tests specified in C.2.2.1, C.2.2.2 and C.2.2.3, the watch shall be tested for 3 hours in a vertical position with crown up and shall not accumulate an error exceeding 6 seconds.

Stop Watch, 6 Second Sweep, Calibrated in Yards, General Service
NSN 6645-99-520-9365

D.1 Detailed Construction

The stop watch movement shall operate for a period of 1½ hours after winding and shall be of the keyless lever type. The watch shall have a centre second hand and start, stop and flyback action controlled by the winding crown. The centre second hand shall make one revolution in 6 seconds.

D.1.2 Watch movement. The watch shall embody a 18½-19½ ligne (40.5 to 42.75 mm diameter) movement fitted with a fully jewelled lever escapement.

The mainspring when fully wound shall drive the completed movement a minimum of 1½ hours without rewinding.

D.1.3 Dial. The dial shall be of white stoved enamel with Arabic numerals and graduations marked in accordance with Fig 4. The numerals and graduations denoting distance in yards shall be clearly marked in black. The numerals and graduations denoting seconds shall be clearly marked in red. The dial markings are to indicate as shown in Table C:

Table C

Dial Markings Time/Distance

ITEM NO	TIME IN SECONDS	DISTANCE IN YARDS
1	1	826
2	2	1652
3	3	2478
4	4	3304
5	5	4130
6	6	4956

The trade name or trade mark may appear on the dial, if in letters, these shall not be more than 1.0 mm in height. All manufacturers names or trade marks shall be in black.

D.2 Testing

D.2.1 Rating. The watch shall be tested for one hour in each of the following positions:

- (a) in a vertical position with crown up;
- (b) in a horizontal position with dial up.

D.2.1 (Contd)

The watch shall not vary by more than one second in any 30 minutes and should not accumulate an error exceeding 2 seconds during any 1 hour test period.

D.2.2 Temperature

D.2.2.1 The watch shall be tested in a vertical position with crown up at -15°C for one hour. The watch shall not vary by more than 1.5 seconds in any 30 minutes nor accumulate an error exceeding 3 seconds in one hour.

D.2.2.2 The watch shall be tested in a vertical position with crown up at a temperature of 50°C for one hour. The watch shall not vary by more than 1.5 seconds in any 30 minutes and shall not accumulate an error exceeding 3 seconds in one hour.

D.2.2.3 The watch shall be tested at -15°C and 50°C for compliance with the requirements of **5.1.2**.

D.2.2.4 When the watch has returned to normal room temperature after the tests specified in **D.2.2.1**, **D.2.2.2** and **D.2.2.3**, the watch shall be tested for one hour in a vertical position with crown up and shall not accumulate an error exceeding 2 seconds.

Stop Watch 1.5 Second Dashboard NSN 6645-99-520-9604

E.1 Detailed Construction

The stop watch movement shall consist of an 30 hour keyless lever type having a centre second sweep hand, a minute recorder hand, and an hour indicator disc. The start, stop and restart action shall be controlled by the depression of the winding crown at 60 position of the case. The flyback action shall be controlled by a push piece located mid-way between the 5 and 10 position of the case. Flyback to zero shall only be possible when the hands have been stopped. The sweep centre seconds hand shall make one revolution in one hour and the hour indicator disc shall denote each hour 1 to 12.

E.1.1 Watch movement. The watch shall embody a 19 3/4 ligne (44.8 mm) movement and be fitted with a jewelled lever escapement.

E.1.2 Dial

E.1.2.1 The dial shall be of brass, matt black finish with the markings in bold white in accordance with Fig 5. The arabic numerals and batons shall be marked in white before luminizing.

E.1.2.2 The dial shall be luminized in accordance with Fig 5. Numerals and batons 5 to 60 shall have an adequate thickness of tritium luminous compound securely keyed to the dial. The symbol T, indicating the type of luminous compound used, shall be marked clearly on the dial. The trade name or mark shall appear on the dial above the centre. If in letters, these should not to be more than 2.00 mm in height.

E.1.3 Luminous compound. The materials used shall consist of a tritium-activated luminous compound, natural colour mixed with an unpigmented paint medium and applied upon a white undercoat paint. The brightness of the luminous compound shall be the subject of agreement between the purchaser and supplier. Adhesion of the luminous compound to the dial and hands to conform to ISO 3157.

E.2 Testing

E.2.1 Rating. The watch shall be tested for 24 hours in the vertical crown up position. The watch shall not vary by more than 0.5 second in any 60 minutes and shall not accumulate an error exceeding 12 seconds during the test period of 24 hours.

E.2.2 Temperature

E.2.2.1 The watch shall be tested in a vertical crown up position at a temperature of -30°C for 3 hours. The watch shall not vary by more than 1.5 seconds in any 30 minutes and shall not accumulate an error exceeding 3 seconds in 3 hours.

E.2.2.2 The watch shall be tested in the vertical crown up position at temperature of 70°C for 3 hours. The watch shall not vary by more than 0.5 second in any 30 minutes and shall accumulate an error exceeding 3 seconds in 3 hours.

E.2.2.3 The watch shall be tested at a temperature of -30°C and 70°C for compliance with the requirements of **5.1**.

E.2.2.4 When the watch has returned to normal room temperature after the tests specified in **E.2.2.1**, **E.2.2.2** and **E.2.2.3**, the watch shall be tested for 24 hours in the vertical crown up position and shall not accumulate an error exceeding 12 seconds.

E.2.3 Magnetic field test. The watch shall be tested in accordance with the details specified in clauses **E.2.4** to **E.2.6**, and shall be deemed to have passed the tests and to be suitable for description as 'anti-magnetic' provided that the following requirements are met.

E.2.3.1 The watch shall not stop during any of the exposures as outlined in **E.2.6.2.1** to **E.2.6.2.3**.

E.2.3.2 The residual effect shall not result in a change of daily rate greater than 45 seconds for watches having a casing diameter not greater than 20 mm, or surface area not greater than 314 mm^2 .

E.2.3.3 The residual effect shall not result in a change of daily rate greater than 30 seconds for watches having a casing diameter greater than 20 mm or a surface area greater than 314 mm^2 .

E.2.4 Test conditions

E.2.4.1 Temperature. During the whole of the test period the ambient temperature shall be between 18°C and 25°C and shall not vary by more than 2°C .

E.2.4.2 Straps and bracelets. The watch shall be tested without strap or bracelet unless the latter forms an integral part of the watch case.

E.2.4.3 Winding. The watch shall be fully wound one hour before testing.

E.2.4.4 Testing device. Any testing device which will produce a homogeneous and continuous magnetic field of intensity and directions as specified in Clause **E.2.6** is permitted.

E.2.5 Test procedure. The watch shall be placed on the testing device and exposed to the magnetic field successively and progressively in each of the positions specified in clause **E.2.6.2**. The watch shall then carefully be withdrawn.

E.2.6 Tests

E.2.6.1 Pre-exposure rate. With the watch in the 'dial up' position the daily rate shall be established by measurement over an interval of not less than 2 minutes. The watch shall then be capable of passing the tests outlined in **E.2.6.2** and **E.2.6.3** by satisfying the minimum requirements specified in clause **E.2.3**.

E.2.6.2 Rate during exposures. With the watch in the 'dial up' position, a continuous magnetic field of strength $4800 \pm 400\text{ A/m}$ * (permissible fluctuation $\pm 1\%$) shall be applied and the daily rate measured during each of 3 successive period of 60 seconds, as follows:

*4,800 Ampere/metre = 60 Oersted

E.2.6.2.1 First period exposure. Apply the magnetic field perpendicularly to the plane of the watch in the 'dial up' position.

E.2.6.2.2 Second period exposure. Apply the magnetic field parallel to the plane of the watch in the '6-12' direction.

E.2.6.2.3 Third period exposure. Apply the magnetic field parallel to the plane of the watch in the '3-9' direction.

E.2.6.3 Rate following exposures. Fifteen minutes after the third period exposure (**E.2.6.2.3**) and with the watch in the 'dial up' position, the daily rate shall be established by measurement over an interval of not less than 2 minutes.

E.2.7 Marking. Wrist watches which comply with the requirements above shall be marked with the words 'anti-magnetic'.

Stop Watch 1/100 Minute, Work Study Continuous Running
NSN 6645-99-960-8411

F.1 Detailed Construction

The stop watch movement shall consist of an 8-12 hour keyless lever type having a 1/100th minute sweep hand, a minute recorder, and with start and stop action controlled by a side slide at the 88/100th position on the case. The flyback action shall be controlled by the winding crown. The sweep hand shall make one revolution in one minute and the recorded hand shall make one revolution in 30 minutes.

F.1.1 Watch movement. The watch shall embody a 19 ligne movement and be fitted with a jewelled lever escapement.

F.1.2 Dial. The dial shall be of white stoved enamel with arabic numerals and graduations marked in accordance with fig 6. The trade name or trade mark shall be on the dial, if in letters these shall be not more than 1.0 mm in height. All markings shall be in black stoved enamel.

F.2 Testing

F.2.1 Rating. The watch shall be tested for 6 hours in each of the following positions:

- (a) in a vertical position with the crown up;
- (b) in a horizontal position with dial up.

The watch shall not vary by more than 2/100th of a minute in any 30 minutes and shall not accumulate an error exceeding 24/100ths of a minute during any test period of 6 hours.

F.2.2 Temperature

F.2.2.1 The watch shall be tested in a vertical position with the crown up at a temperature of -20°C for 3 hours. The watch shall not vary by more than 3/100ths of a minute in any 30 minutes and shall not accumulate an error exceeding 18/100ths of a minute in 3 hours.

F.2.2.2 The watch shall be tested in a vertical position with the crown up at a temperature of +50°C for 3 hours. The watch shall not vary by more than 3/100ths of a minute in any 30 minutes and shall not accumulate an error exceeding 18/100ths of a minute in 3 hours.

F.2.2.3 The watch shall be tested at a temperature of -20°C and 50°C for compliance with the requirements of 5.1.

F.2.2.4 When the watch has returned to normal room temperature after the tests specified in **F.2.2.1**, **F.2.2.2** and **F.2.2.3**, the watch shall be tested for 3 hours in a vertical position with the crown up and should not accumulate an error exceeding 12/100ths of a minute.

Stop Watch 1/5 Second (Continuous Running) NSN 6645-99-523-9007

G.1 Detailed Construction

The stop watch movement shall consist of an 8-12 hour keyless lever type having a centre second sweep hand, a minute recorder, and with start and stop action controlled by a side slide at the 50/55 seconds position on the case. The flyback action shall be controlled by the winding crown. The sweep hand shall make one revolution in one minute and the recorded hand shall make one revolution in 30 minutes.

G.1.1 Watch movement. The watch shall embody a 19 ligne movement and be fitted with a jewelled lever escapement.

G.1.2 Dial. The dial shall be of white stoved enamel with arabic numerals and graduations marked in accordance with fig 7. The trade name or trade mark shall be on the dial, if in letters these shall be not more than 1.0 mm in height. All markings shall be in black stoved enamel.

G.2 Testing

G.2.1 Rating. The watch shall be tested for 6 hours in each of the following positions:

- (a) in a vertical position with the crown up;
- (b) in a horizontal position with dial up.

The watch shall not vary by more than 1 second in any 30 minutes and shall not accumulate an error exceeding 12 seconds during any test period of 6 hours.

G.2.2 Temperature

G.2.2.1 The watch shall be tested in a vertical position with the crown up at a temperature of -20°C for 3 hours. The watch shall not vary by more than 1.5 seconds in any 30 minutes and shall not accumulate an error exceeding 9 seconds in 3 hours.

G.2.2.2 The watch shall be tested in a vertical position with the crown up at a temperature of 50°C for 3 hours. The watch shall not vary by more than 1.5 seconds in any 30 minutes and shall not accumulate an error exceeding 9 seconds in 3 hours.

G.2.2.3 The watch shall be tested at a temperature of -20°C and 50°C for compliance with the requirements of 5.1.

G.2.2.4 When the watch has returned to normal room temperature after the tests specified in **G.2.2.1**, **G.2.2.2** and **G.2.2.3**, the watch shall be tested for 3 hours in a vertical position with the crown up and should not accumulate an error exceeding 6 seconds.

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