WORLD SERVICE SERVICE MONDIAL
BULOVA
SERVICIO MUNDIAL WELTDIENST SERVIZIO MONDIALE

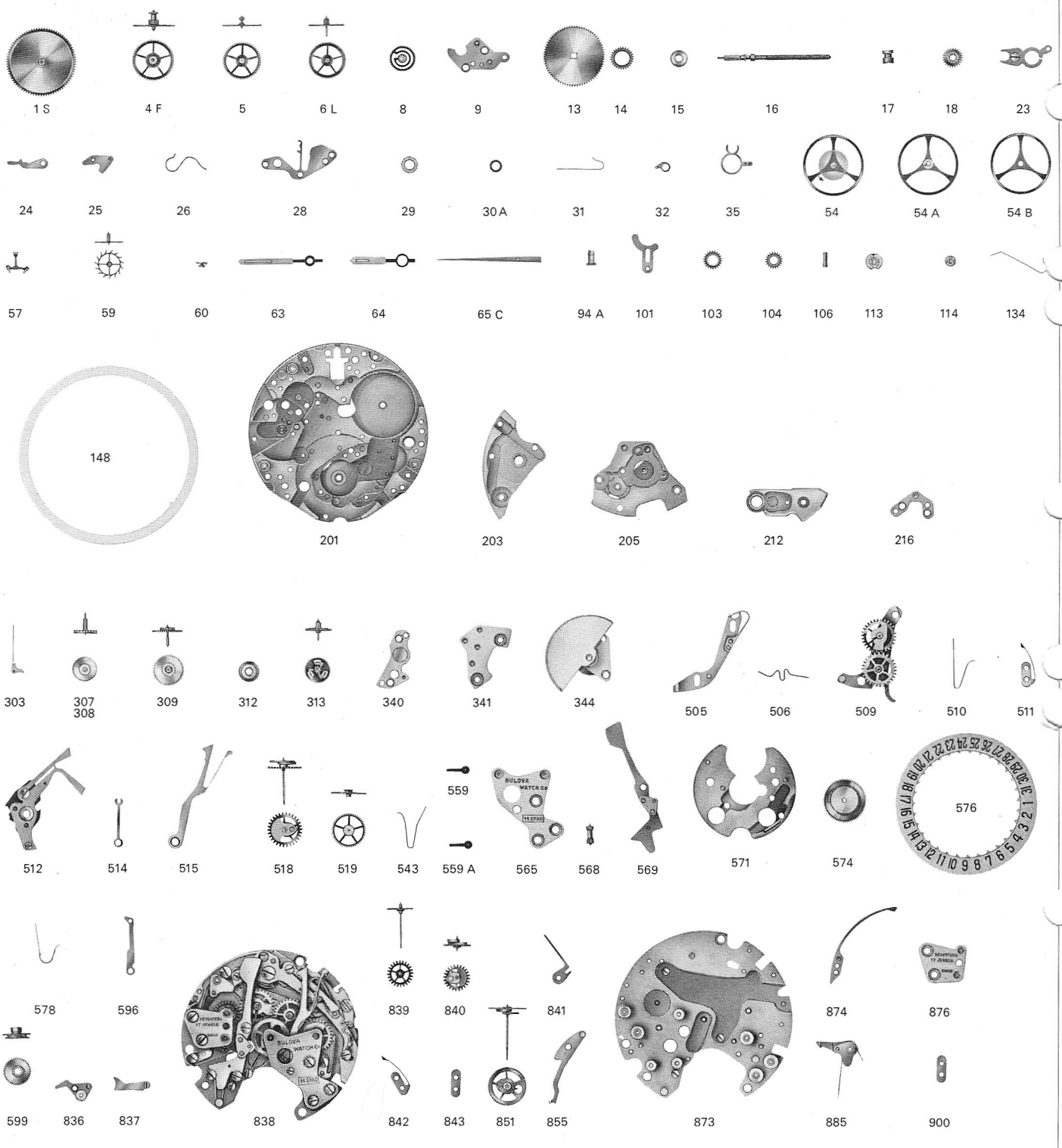
BULOVA

Service Manual Automatic Chronograph

Table of contents

Illustration of parts for calibre 14 EFAD

1:1



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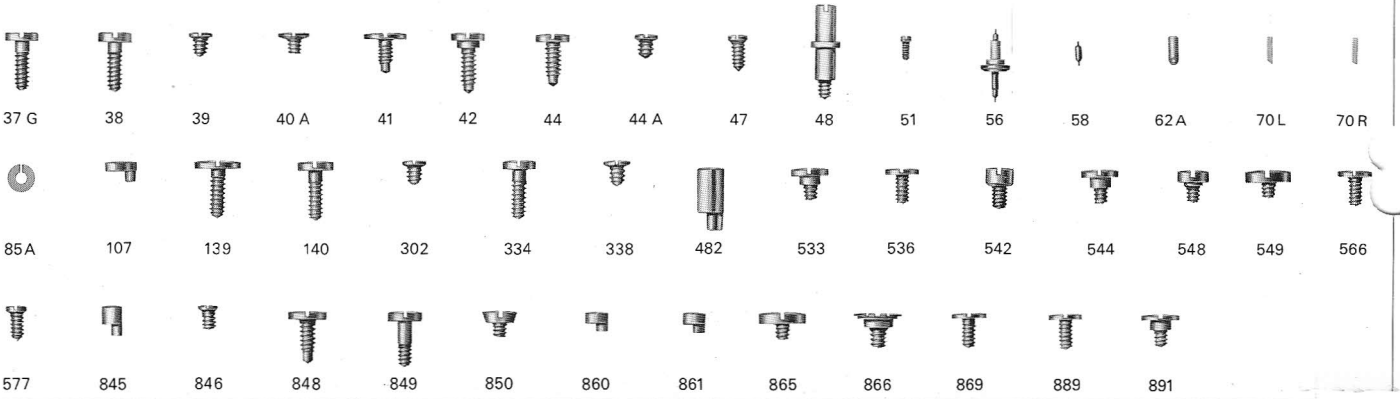


List of parts for calibre 14 EFAD

1S	Barrel complete
2	Barrel arbor
4F	Large driving wheel with cannon pinion
5	Third wheel
6L	Fourth wheel
8	Minute wheel
9	Minute work cock
13	Ratchet wheel
14	Crown wheel
15	Crown wheel core
16	Winding stem
17	Clutch wheel
18	Winding pinion
23	Stud-holder
24	Yoke (clutch lever)
25	Setting lever (detent)
26	Yoke spring (set spring)
28	Setting lever spring (set bridge)
29	Double setting wheel
30A	Additional setting wheel
31	Click spring
32	Click
35	Regulator
37G	Train wheel bridge screw
38	Balance cock screw
39	Pallet cock screw
40A	Crown wheel core screw
41	Ratchet wheel screw
42	Click screw
44	Screw for setting lever spring
44A	Screw for minute work cock
45C	Casing clamp screw
47	Dial screw
48	Setting lever screw
51	Hairspring stud screw
54	Balance complete
56	Balance staff
57	Pallet fork
58	Pallet staff
59	Escape wheel
60	Roller
62A	Round stud for flat hairspring
63	Minute hand
64	Hour hand
65C	Sweep second hand (chronograph)
70L	Exit pallet jewel
70R	Entry pallet jewel
85A	Collet for flat hairspring
94A	Cannon pinion without clam notch
101	Hour wheel guard
103	Intermediate ratchet wheel
104	Intermediate crown wheel
106	Center pipe
107	Eccentric for stud-holder
113	Shock-protecting device, upper
114	Shock-protecting device, lower
134	Setting wheel spring
139	Intermediate ratchet wheel screw
140	Screw for intermediate crown wheel
148	Dial rest
191	Casing clamp
201	Plate
203	Barrel bridge
205	Train wheel bridge
212	Balance cock
216	Pallet cock
302	Screw for oscillating weight bridge
303	Stop click
307	Winding-up wheel
308	Reduction gear
309	Driving gear for ratchet wheel
312	Wig-wag pinion
313	Coupling wheel
334	Screw for upper automatic bridge
338	Screw for lower automatic bridge
340	Lower bridge for automatic device
341	Upper bridge for automatic device
344	Oscillating weight with axle and bridge
482	Banking eccentric for coupling clutch of oscillating pinion
505	Operating lever (2 functions)
506	Operating and fly-back lever spring
509	Sliding gear
510	Sliding gear spring (2 functions)
511	Minute and hour recording jumper
512	Hammer (2 functions)
514	Friction spring for chronograph runner
515	Blocking lever (2 functions)
518	Minute-recording runner
519	Driving wheel
533	Operating lever screw
536	Minute-recording jumper screw
542	Blocking lever screw
543	Coupling clutch spring for oscillating pinion
544	Coupling clutch screw
548	Friction spring screw
549	Hammer screw
559	Minute recording hand
559A	Hour recording hand
565	Chronograph bridge
566	Chronograph bridge screw
568	Oscillating pinion
569	Coupling clutch for oscillating pinion
571	Date indicator guard
574	Date indicator driving wheel
576	Date indicator
577	Screw for date indicator guard
578	Date jumper spring
596	Date jumper
599	Double-toothing hour wheel
836	Sliding gear bridge
837	Reverser (2 functions)
838	Mounted chronograph plate
839	Hour-recording wheel
840	Connecting wheel for hour-recorder with heart
841	Connecting plate
842	Hour-recording jumper
843	Rest for hour-recording jumper (thick)
845	Uncoupling eccentric for coupling clutch
846	Screw for sliding gear bridge
848	Screw for plate of chronograph mechanism
849	Hour-recording jumper screw
850	Regulating screw for hammer
851	Chronograph runner
855	Fly-back lever (zero action)
860	Eccentric for pivoting of sliding gear
861	Finger-depth eccentric
865	Sliding gear screw
866	Fly-back lever screw
869	Screw for hammer cam jumper
873	Plate for chronograph mechanism (unassembled)
874	Hammer cam jumper
876	Hour recorder bridge
885	Hour hammer assembly
889	Screw for hour recorder bridge
891	Hour hammer screw
900	Rest for minute-recording jumper (thin)

Liste des fournitures calibre 14 EFAD

1S Barillet complet
2 Arbre de barillet
4F Grande moyenne avec chaussée
5 Roue moyenne
6L Roue de seconde
8 Roue de minuterie
9 Pont du rouage de minuterie
13 Rochet
14 Roue de couronne
15 Noyau de roue de couronne
16 Tige de remontoir
17 Pignon coulant
18 Pignon de remontoir
23 Porte-piton
24 Bascule
25 Tirette
26 Ressort de bascule
28 Ressort de tirette
29 Renvoi double
30A Renvoi intermédiaire
31 Ressort de cliquet
32 Cliquet
35 Raquette
37G Vis de pont de rouage
38 Vis de coq
39 Vis de pont d'ancre
40A Vis de noyau de roue de couronne
41 Vis de rochet
42 Vis de cliquet
44 Vis de ressort de tirette
44A Vis de pont de rouage de minuterie
45C Vis de bride de fixation
47 Vis de cadran
48 Vis de tirette
51 Vis de piton
54 Balancier avec spiral
56 Axe de balancier
57 Ancre
58 Tige d'ancre
59 Roue d'ancre
60 Plateau
62A Piton rond pour spiral plat
63 Aiguille de minute
64 Aiguille d'heure
65C Aiguille de seconde au centre (chronographe)
70L Palette de sortie
70R Palette d'entrée
85A Virole pour spiral plat
94A Chaussée non lanternée
101 Plaque de maintien de roue des heures
103 Rochet intermédiaire
104 Roue de couronne intermédiaire
106 Tube de centre
107 Excentrique de porte-piton
113 Dispositif amortisseur, dessus
114 Dispositif amortisseur, dessous
134 Ressort de rochet intermédiaire
139 Vis de rochet intermédiaire
140 Vis de roue de couronne intermédiaire
148 Support de cadran
191 Bride de fixation
201 Platine
203 Pont de barillet
205 Pont de rouage
212 Coq
216 Pont d'ancre
302 Vis de pont de masse oscillante
303 Cliquet d'arrêt
307 Roue d'armage
308 Mobile de réduction
309 Mobile entraîneur de rochet
312 Pignon baladeur
313 Roue d'embrayage
334 Vis de pont supérieur du dispositif automatique
338 Vis de pont inférieur du dispositif automatique
340 Pont inférieur du dispositif automatique
341 Pont supérieur du dispositif automatique
344 Masse oscillante avec axe et pont
482 Excentrique-appui d'embrayage pour pignon oscillant
505 Commande, 2 fonctions
506 Ressort de commande et bascule de remise à zéro
509 Baladeur
510 Ressort de baladeur, 2 fonctions
511 Sautoir du compteur de minutes
512 Marteau, 2 fonctions
514 Ressort friction du mobile de chronographe
515 Bloqueur, 2 fonctions
518 Mobile du compteur de minutes
519 Roue entraîneuse
533 Vis de commande
536 Vis du sautoir du compteur de minutes
542 Vis du bloqueur
543 Ressort d'embrayage pour pignon oscillant
544 Vis d'embrayage
548 Vis du ressort de friction du mobile de chronographe
549 Vis du marteau
559 Aiguille de compteur de minutes
559A Aiguille de compteur d'heures
565 Pont de chronographe
566 Vis du pont de chronographe
568 Pignon oscillant
569 Embrayage pour pignon oscillant
571 Plaque de maintien de l'indicateur de quantième
574 Roue entraîneuse de quantième montée
576 Indicateur de quantième
577 Vis plaque de maintien
578 Ressort du sautoir de quantième
596 Sautoir de quantième
599 Roue des heures, double denture
836 Pont de baladeur
837 Inverseur monté, 2 fonctions
838 Planche de mécanisme de chronographe montée
839 Roue du compteur d'heures
840 Renvoi du compteur d'heures avec cœur
841 Bielle
842 Sautoir du compteur d'heures
843 Support de sautoir du compteur d'heures (épais)
845 Excentrique de désaccouplement d'embrayage
846 Vis du pont de baladeur
848 Vis de planche de chronographe
849 Vis du sautoir compteur d'heures
850 Vis de réglage du marteau
851 Mobile de chronographe
855 Bascule de remise à zéro
860 Excentrique de pivotement du baladeur
861 Excentrique de pénétration du doigt
865 Vis du baladeur
866 Vis de bascule de remise à zéro
869 Vis du sautoir de came de marteau
873 Planche du mécanisme de chronographe non montée
874 Sautoir de came de marteau
876 Pont du compteur d'heures
885 Marteau d'heures
889 Vis du pont de compteur d'heures
891 Vis de marteau d'heures
900 Support de sautoir du compteur de minutes (mince)

Lista de fornituras para el calibre 14 EFAD

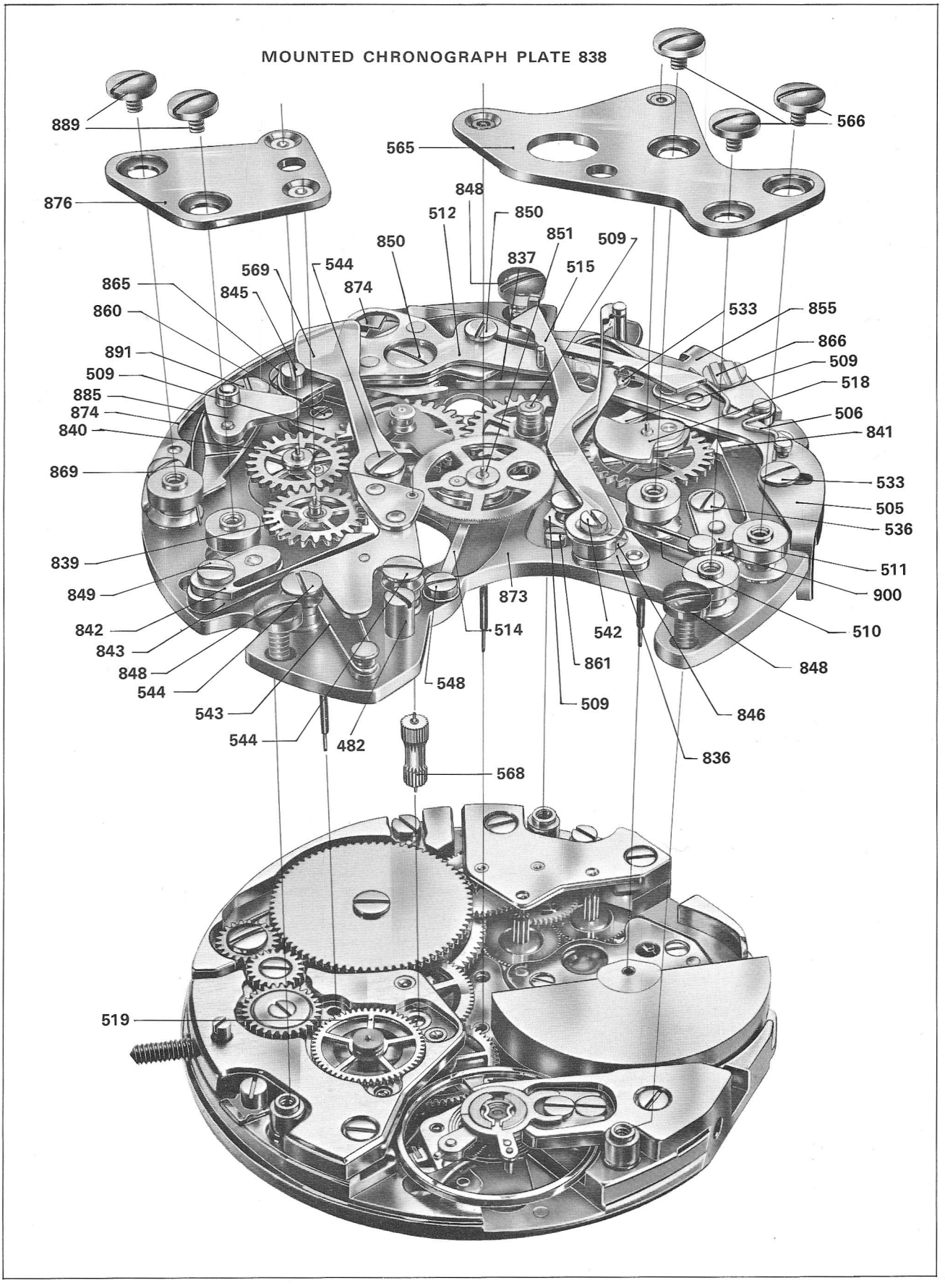
1S Cubo completo
2 Arbol de cubo
4F Rueda grande de arrastre con cañón de minutos
5 Rueda primera
6L Rueda de segundos
8 Rueda de minutería
9 Puente del rodaje de minutería
13 Rochete
14 Rueda de corona
15 Sombrerete de rueda de corona
16 Tija de remontuar
17 Piñón corredizo
18 Piñón de remontuar
23 Portapitón
24 Báscula
25 Tirete
26 Muelle de báscula
28 Muelle de tirete
29 Rueda de transmisión doble
30A Rueda de transmisión intermedia
31 Muelle de trinquete
32 Trinquete
35 Raqueta
37G Tornillo de puente de rodaje
38 Tornillo de puente de volante
39 Tornillo de puente de áncora
40A Tornillo de sombrerete de rueda de corona
41 Tornillo de rochete
42 Tornillo de trinquete
44 Tornillo de muelle de tirete
44A Tornillo de puente del rodaje de minutería
45C Tornillo de brida de fijación
47 Tornillo de esfera
48 Tornillo de tirete
51 Tornillo de pitón
54 Volante con espiral
56 Eje de volante
57 Áncora
58 Tija de áncora
59 Rueda de áncora
60 Platillo
62A Pitón redondo para espiral plano
63 Minutero
64 Horario
65C Segundero central (cronógrafo)
70L Paleta de áncora, salida
70R Paleta de áncora, entrada
85A Virola para espiral plano
94A Cañón de minutos sin muesca de apretar
101 Placa de sujeción de rueda de horas
103 Rochete intermedio
104 Rueda de corona intermedia
106 Tubito de centro
107 Excéntrica de portapitón
113 Dispositivo amortiguador, encima
114 Dispositivo amortiguador, debajo
134 Muelle de rochete intermedio
139 Tornillo de rochete intermedio
140 Tornillo de rueda de corona intermedia
148 Soporte de la esfera
191 Brida de fijación
201 Platina
203 Puente de cubo
205 Puente de rodaje
212 Puente de volante
216 Puente de áncora
302 Tornillo de puente de masa oscilante
303 Trinquete de tope
307 Rueda de tensión
308 Móvil de reducción
309 Móvil de arrastre de rochete
312 Piñón corredera
313 Rueda de embrague
334 Tornillo de puente superior del dispositivo automático
338 Tornillo del puente inferior del dispositivo automático
340 Puente inferior del dispositivo automático
341 Puente superior del dispositivo automático
344 Masa oscilante con eje y puente
482 Excéntrica-apoyo de embrague para piñón oscilante
505 Mando, 2 funciones
506 Muelle de mando y de báscula de vuelta a poner a cero
509 Corredera
510 Muelle de la corredera, 2 funciones
511 Muelle flexible del contador de minutos y de horas
512 Martillo, 2 funciones
514 Muelle-fricción del móvil de cronógrafo
515 Bloqueador, 2 funciones
518 Móvil del contador de minutos
519 Rueda de arrastre
533 Tornillo de mando
536 Tornillo de muelle flexible del contador de minutos
542 Tornillo de bloqueador
543 Muelle de embrague para piñón oscilante
544 Tornillo de embrague
548 Tornillo de muelle-fricción del móvil de cronógrafo
549 Tornillo regulador del martillo
559 Aguja de contador (minutos)
559A Aguja de contador (horas)
565 Puente de cronógrafo
566 Tornillo de puente de cronógrafo
568 Piñón oscilante
569 Embrague para piñón oscilante
571 Placa de sujeción del indicador de fecha
574 Rueda de arrastre de fecha
576 Indicador de fecha
577 Tornillo de placa de sujeción
578 Resorte del muelle flexible de fecha
596 Muelle flexible de fecha
599 Rueda de las horas, doble endentadura
836 Puente de la corredera
837 Inversor, 2 funciones
838 Mecanismo ajustado de cronógrafo
839 Rueda del contador de horas
840 Rueda de transmisión del contador de horas con corazón
841 Biela
842 Muelle flexible del contador de horas
843 Soporte de muelle flexible del contador de horas (espeso)
845 Excéntrica de desacoplamiento
846 Tornillo de puente de la corredera
848 Tornillo de mecanismo de cronógrafo
849 Tornillo de muelle flexible del contador de horas
850 Tornillo regulador del martillo
851 Móvil de cronógrafo
855 Báscula de vuelta a poner a cero
860 Excéntrica de rotación de la corredera
861 Excéntrica de penetración del dedo
865 Tornillo de corredera
866 Tornillo de báscula de vuelta a poner a cero
869 Tornillo de muelle flexible de leva de martillo
873 Placa del mecanismo de cronógrafo non ajustada
874 Muelle flexible de leva de martillo
876 Puente del contador de horas
885 Martillo de horas
889 Tornillo de puente del contador de horas
891 Tornillo de martillo de horas
900 Soporte de muelle flexible del contador de minutos (delgado)

Liste der Ersatzteile für Kaliber 14 EFAD

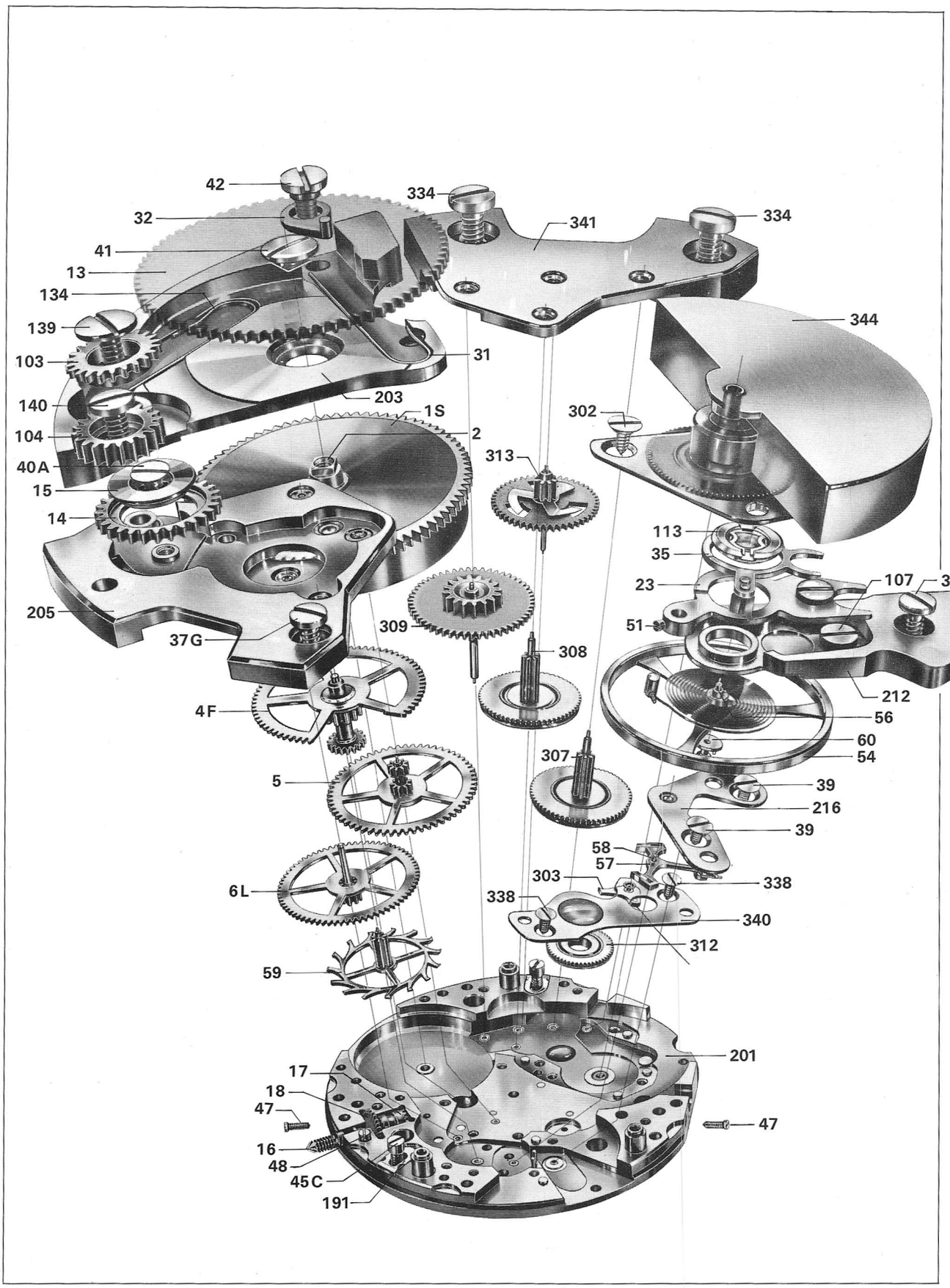
1S Federhaus vollständig
2 Federwelle
4F Grossbodenrad mit Minutenrohr
5 Kleinbodenrad
6L Sekundenrad
8 Wechselrad
9 Wechselradbrücke
13 Sperrad
14 Kronrad
15 Kronradkern
16 Aufzugwelle
17 Schiebetrieb
18 Aufzugtrieb
23 Spiralklötzchen-Träger
24 Wippe
25 Stellhebel
26 Wippenfeder
28 Stellhebelfeder
29 Zeigerstellrad doppelt
30A Zusatz-Zeigerstellrad
31 Sperrkegelfeder
32 Sperrkegel
35 Rücker
37G Räderwerkbrücken-Schraube
38 Unruhkloben-Schraube
39 Ankerkloben-Schraube
40A Kronradkern-Schraube
41 Sperrad-Schraube
42 Sperrkegel-Schraube
44 Stellhebelfeder-Schraube
44A Wechselradbrücken-Schraube
45C Werkbefestigungsbügel-Schraube
47 Zifferblatt-Schraube
48 Stellhebel-Schraube
51 Spiralklötzchen-Schraube
54 Unruh mit Flachspirale
56 Unruhwelle
57 Anker
58 Ankerwelle
59 Ankerrad
60 Hebelscheibe
62A Rundes Spiralklötzchen für Flachspirale
63 Minutenzeiger
64 Stundenzeiger
65C Zentrumsekundenzeiger (Chronograph)
70L Ausgangs-Hebungsstein
70R Eingangs-Hebungsstein
85A Spiralrolle für Flachspirale
94A Minutenrohr, glatt
101 Stundenrad-Halter
103 Zwischensperrad
104 Zwischenkronrad
106 Zentrumlagerrohr
107 Exzenter für Spiralklötzchenträger
113 Stoss-Sicherung, oben
114 Stoss-Sicherung, unten
134 Zwischensperrad-Feder
139 Zwischensperrad-Schraube
140 Zwischenkronrad-Schraube
148 Zifferblatt-Stütze
191 Werkbefestigungsbügel
201 Werkplatte
203 Federhausbrücke
205 Räderwerkbrücke
212 Unruhkloben
216 Ankerkloben
302 Schraube für Schwingmassen-Brücke
303 Sperrklinke
307 Spannrad
308 Reduktionsrad
309 Antriebsorgan für Sperrad
312 Umstelltrieb
313 Kupplungsrad
334 Schraube für obere Automatenbrücke
338 Schraube für untere Automatenbrücke
340 Untere Brücke für Automatvorrichtung
341 Obere Brücke für Automatvorrichtung
344 Schwingmasse mit Welle und Brücke
482 Exzenter für Schwingtrieb-Kupplungs-Anschlag
505 Schalthebel, 2 Funktionen
506 Schalthebel und Nullstellerfeder
509 Sternradwippe
510 Sternradwippenfeder, 2 Funktionen
511 Minutenzählrad- und Stundenzählrad-Sperre
512 Herzhebel, 2 Funktionen
514 Friktionsfeder für Chrono-Zentrumrad
515 Blockierhebel, 2 Funktionen
518 Minutenzählrad
519 Mitnehmerrad
533 Schalthebel-Schraube
536 Schraube für Minutenzählrad-Sperre
542 Blockierhebel-Schraube
543 Kupplungsfeder für Schwingtrieb
544 Kupplungs-Schraube
548 Friktionsfeder-Schraube
549 Herzhebel-Schraube
559 Zählerzeiger (Minuten)
559A Zählerzeiger (Stunden)
565 Chrono-Brücke
566 Chrono-Brücken-Schraube
568 Schwingtrieb
569 Kupplung für Schwingtrieb
571 Halteplatte für Datumanzeiger
574 Datumanzeiger Mitnehmerrad
576 Datumanzeiger
577 Schraube für Datum-Halteplatte
578 Feder für Datumsperre
596 Datumsperre
599 Stundenrad mit Doppelzahnung
836 Sternradwippen-Kloben
837 Wechsler, 2 Funktionen
838 Chrono-Mechanismus montiert
839 Stundenzählrad
840 Verbindungsrad für Stundenzähler mit Herz
841 Treibstange
842 Stundenzählrad-Sperre
843 Stütze für Stundenzählrad-Sperre (dick)
845 Exzenter für Kupplungs-Ausschaltung
846 Schraube für Sternradwippen-Kloben
848 Schraube für Chronomechanismus-Platte
849 Schraube für Stundenzählrad-Sperre
850 Herzhebel-Schraube
851 Chrono-Zentrumrad
855 Nullsteller
860 Exzenter für Sternradwippen-Schwenkung
861 Exzenter für Fingereingriff
865 Sternradwippen-Schraube
866 Nullsteller-Schraube
869 Schraube für Herzhebelbegrenzer-Sperre
873 Platte für Chronomechanismus nicht montiert
874 Sperre für Herzhebelbegrenzer
876 Stundenzähler-Brücke
885 Stundenherzhebel
889 Stundenzählerbrücken-Schraube
891 Stundenherzhebel-Schraube
900 Stütze für Minutenzählrad-Sperre (dünn)

Lista delle forniture calibre 14 EFAD

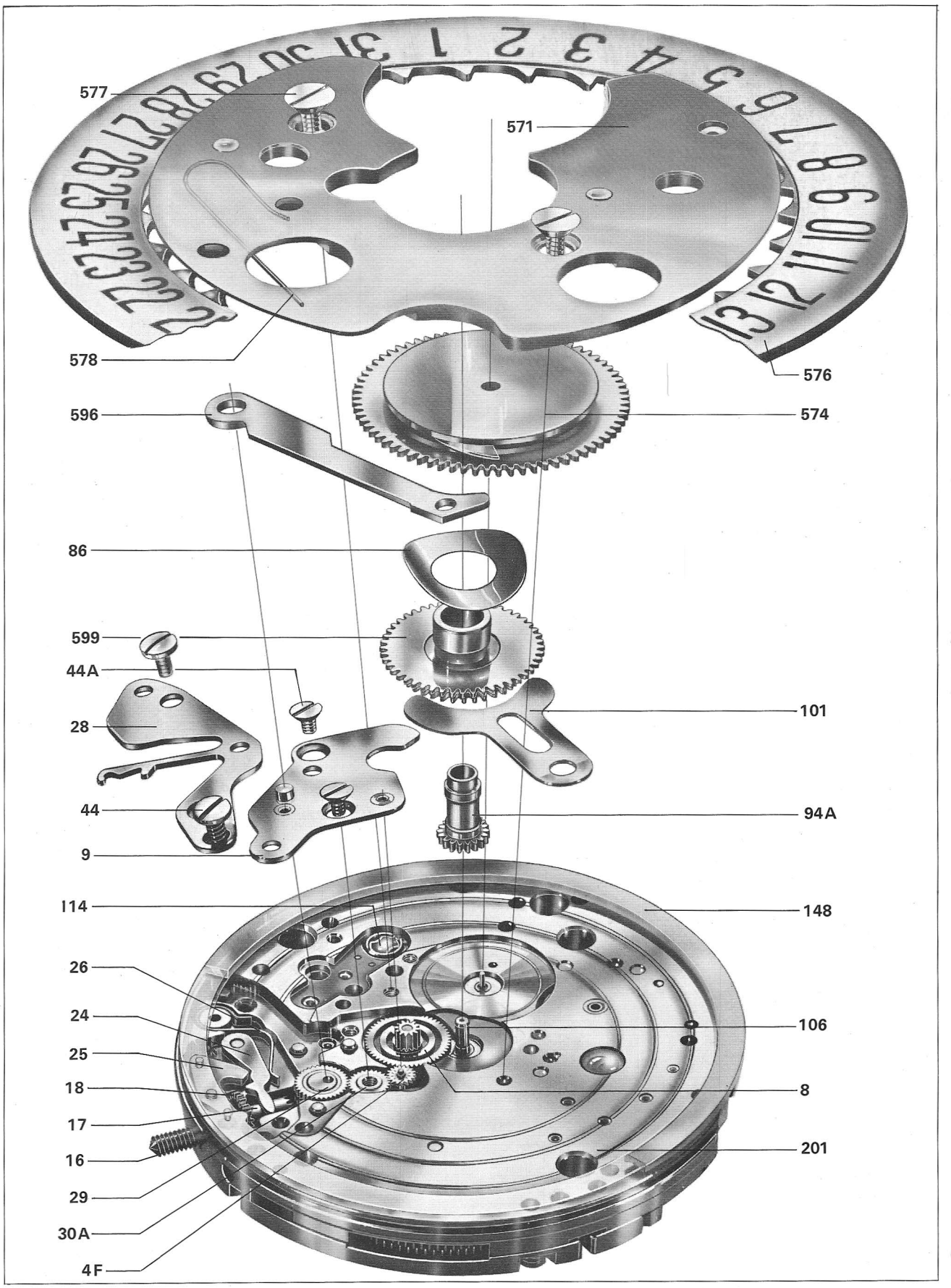
1S Bariletto completo
2 Albero del bariletto
4F Grande mediana con rocchetto dei minuti
5 Ruota mediana
6L Ruota dei secondi
8 Ruota della minuteria
9 Ponte del ruotismo di minuteria
13 Rocchetto
14 Rocchetto a corona
15 Nocciolo del rocchetto a corona
16 Albero di carica
17 Rocchetto scorrevole
18 Rocchetto di carica
23 Portapitone
24 Bascula
25 Levetta di messa all'ora
26 Molla della bascula
28 Molla della levetta di messa all'ora
29 Rinvio
30A Rinvio intermedio
31 Molla del cricco
32 Cricco
35 Racchetta
37G Vite del ponte del ruotismo
38 Vite per il ponte del bilanciere
39 Vite del ponte d'ancora
40A Vite per il nocciolo del rocchetto a corona
41 Vite per il rocchetto
42 Vite per il cricco
44 Vite per la molla della levetta di messa all'ora
44A Vite di ponte del ruotismo di minuteria
45C Vite per la brida di fissaggio
47 Vite per il quadrante
48 Vite per la levetta di messa all'ora
51 Vite per il pitone
54 Bilanciere con spirale
56 Albero del bilanciere
57 Ancora
58 Albero d'ancora
59 Ruota d'ancora
60 Disco
62A Pitone rondo per spirale piana
63 Sfera dei minuti
64 Sfera delle ore
65C Sfera dei secondi al centro (cronografo)
70L Paletta d'uscita
70R Paletta d'entrata
85A Virola per spirale piana
94A Rocchetto dei minuti senza tacca di frizione
101 Placca di guardia della ruota delle ore
103 Rocchetto intermedio
104 Rocchetto a corona intermedio
106 Tubo di centro
107 Eccentrico del portapitone
113 Dispositivo ammortizzatore, sopra
114 Dispositivo ammortizzatore, sotto
134 Molla del rocchetto intermedio
139 Vite per il rocchetto intermedio
140 Vite per il rocchetto a corona intermedio
148 Supporto del quadrante
191 Brida di fissaggio
201 Piastra
203 Ponte del bariletto
205 Ponte del ruotismo
212 Ponte del bilanciere
216 Ponte d'ancora
302 Vite per il ponte della massa oscillante
303 Cricco d'arresto
307 Ruota di carica
308 Mobile riduttore
309 Mobile conduttore del rocchetto
312 Pignone ballerino
313 Ruota d'innesto
334 Vite del ponte superiore del dispositivo automatico
338 Vite del ponte inferiore del dispositivo automatico
340 Ponte inferiore del dispositivo automatico
341 Ponte superiore del dispositivo automatico
344 Massa oscillante, con asse e ponte
482 Eccentrico-appoggio d'innesto per pignone oscillante
505 Comando, 2 funzioni
506 Molla di comando e della bascula di rimessa a zero
509 Ballerino
510 Molla del ballerino, 2 funzioni
511 Scatto del contatore dei minuti
512 Martello, 2 funzioni
514 Molla a frizione del mobile del cronografo
515 Leva di blocco, 2 funzioni
518 Mobile del contatore dei minuti
519 Ruota conduttrice
533 Vite per comando
536 Vite per scatto del contatore dei minuti
542 Vite per leva di blocco
543 Molla d'innesto per pignone oscillante
544 Vite per innesto
548 Vite per molla a frizione del mobile del contatore dei minuti
549 Vite per martello
559 Sfera del contatore (minuti)
559A Sfera del contatore (ore)
565 Ponte del cronografo
566 Vite per il ponte del cronografo
568 Pignone oscillante
569 Innesto per pignone oscillante
571 Placca di guardia dell'indicatore di data
574 Ruota conduttrice dell'indicatore di data
576 Indicatore della data
577 Vite per la placca di guardia
578 Molla dello scattadata
596 Scattadata
599 Ruota delle ore a doppia dentatura
836 Ponte del ballerino
837 Invertitore, 2 funzioni
838 Meccanismo montato del cronografo
839 Ruota del contatore di ore
840 Rinvio del contatore di ore
841 Biella
842 Scatto del contatore di ore
843 Supporto dello scatto del contatore di ore
845 Eccentrico di disaccoppiamento dell'innesto
846 Vite per ponte del ballerino
848 Vite per meccanismo del cronografo
849 Vite per scatto del contatore di ore
850 Vite per regolatore del martello
851 Mobile del cronografo
855 Bascula di rimessa a zero
860 Eccentrico di rotazione del ballerino
861 Eccentrico di penetrazione del dito
865 Vite per il ballerino
866 Vite per bascula di rimessa a zero
869 Vite per scatto della palmola del martello
873 Tavola del meccanismo del cronografo
874 Scatto della palmola del martello
876 Ponte del contatore di ore
885 Martello delle ore
889 Vite per ponte del contatore di ore
891 Vite per martello delle ore
900 Supporto dello scatto del contatore dei minuti



VIEW OF THE BASIC MOVEMENT AND THE CHRONOGRAPH PLATE



EXPLODED VIEW OF THE MOVEMENT ON THE BRIDGE SIDE



EXPLODED VIEW OF THE MOVEMENT ON THE DIAL SIDE

Technical characteristics and description

1. TECHNICAL CHARACTERISTICS

Chronograph with self-winding mechanism, and day of the month indication, 17 jewel lever movement. The casing diameter is 31.00 mm (13¾‴), overall height 7.70 mm. It comprises two essential elements which are totally independent:

- the basic movement comprising the self-winding and calendar mechanism;
- the chronograph plate carrying the whole of the chronograph mechanism including the hour recorder.

1.1 The basic movement

Overall height 4.60 mm. 21,600 vibrations per hour. Glucydur plain balance with self-compensating balance spring. Incabloc shock absorbers. Unbreakable mainspring.

1.2 The chronograph plate

Overall height 3.10 mm, total diameter 30.80 mm. Mechanism with semi-instantaneous minute and hour recorders with two button control. Starting and stopping of the sweep hand by the push-piece at 2 o'clock, return to zero by the push-piece at 4 o'clock.

2. DESCRIPTION

Three pillars on the basic movement assure, with the aid of three screws, the orientation and attachment of the chronograph plate which is superposed on it. An opening made in this latter allows access to the regulating elements.

2.1 The chronograph plate

The chronograph mechanism including the second, minute and hour recorders, has the special feature of being entirely mounted on the chronograph plate; securing of this latter is effected by three blue headed screws which are easily recognized. The mechanism is of the cam type i.e. without pillar wheel. This controlling cam with alternate motion, carrying out in addition the function of return to zero hammer for the minute recorder and centre seconds hands, controls the functions of the coupling clutch, the hour recorder hammer and blocking lever. As fig.1 shows, the whole of the unit is located with the exception of the oscillating pinion and its driving wheel, on one side of the chronograph plate.

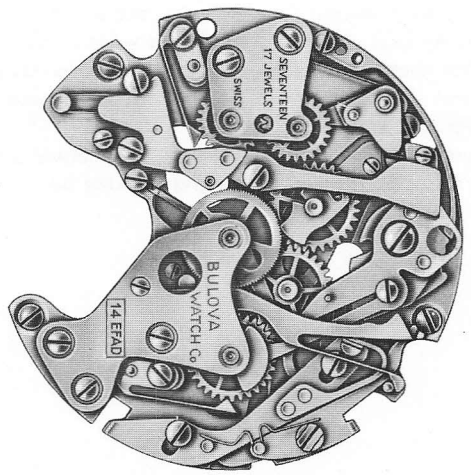


Fig. 1

Fig. 2

The two recorders are arranged in series, that is to say the minute recorder drives the hour recorder directly, giving enforced synchronisation of the motions of the two hands. Access to the mechanism is easy, even when the movement is cased up.

2.2 The basic movement seen from the bridge side

The oscillating weight, incorporated within the movement, permits simple and clear arrangement of all the components, which are each easily accessible, as shown in fig. 2. The self-winding unit is entirely contained within the thickness of the movement. Oscillating weight mounted on its arbor of heavy non-magnetic alloy. Reversing arrangement with roller-bearings, eliminating wear.
Engagement and dis-engagement of the manual and self-winding trains is automatic. Only the working train is in gear. Consequently wear is diminished and performance increased. Wig-wag pinion maintained between ruby thrust plates. For ease of inspection and cleaning, the barrel is accommodated under one independent bridge.
The patented Isochron index has a moveable stud holder allowing fine adjustment of daily rate, and ensuring the position and stability of the regulating elements against all accidental displacement.

2.3 The basic movement seen from the dial side

The date indicator mechanism is a unit with window-display. Setting the date is rapid, by backward and forward motion of the winding crown.
A backlash-free gear train incorporating a minute wheel, ensures the transmission of motion from the centre wheel (which is offset) to the hands.

Functioning and maintenance

The following information relates only to the characteristics of the 14 EFAD caliber. Operations which are normally carried out on other chronographs are not mentioned.

3. ADJUSTING THE DAILY RATE AND SETTING IN BEAT, CHECKING THE BALANCE AMPLITUDE

With no preliminary taking down, it is possible to effect corrections to the daily rate and beat of the escapement. These two operations can be carried out by placing the watch directly on the microphone of a watch timing machine.

– Daily rate
With the aid of a screwdriver the rate is adjusted by turning the eccentric nearest to the Incabloc mounted in the moveable stud holder 23.

– Beat
By operating the eccentric 107 pivoted in the cock, out of beat may be corrected without disturbing adjustment of the balance.

– Amplitude
For checking on electronic equipment, the theoretical lifting angle of the escapement is equal to 50°.

4. DISASSEMBLING

4.1 Uncasing the movement

To obtain access to the setting lever screw 48, an opening is made in the chronograph plate 873. This hole is located near the end of the hour recorder jumper 842.

4.2 Taking off the dial

Having removed the hands, including those of the minute and hour recorders, unscrew the two dial screws 47 positioned in the side of the dial plate. The dial may then be withdrawn without difficulty. Take care not to lose the friction washer (foil washer) 86 located on the double toothed hour wheel 599.

4.3 Taking off the chronograph plate

In the case of simple cleaning, free the chronograph plate 838 by taking out the three chronograph plate screws 848 with blue heads, having previously taken off the three chronograph hands.

Handle with care the oscillating pinion which is independent of the mechanism, and avoid taking hold of it by its fine teeth. The driving wheel 519 may be left in position on the basic movement. Clean the plate as a whole without any taking down, by plunging it into the bath of a cleaning machine, provided that this is equipped with an ultrasonic agitator. Avoid using a machine employing a mechanical action combined with heating, such as a basket with a rotary, or backward and forward motion. This is to avoid the risk of damaging some of the chronograph components.

4.4 Disassembling the chronograph mechanism

If the replacement of a component is inevitable, avoid altering the position of the reversing device 837 by disturbing the key at its extremity. This key orientates the reversing device in its function with the hammer 512 via the small flat plane, under tension from the circular spring riveted on the operating lever 505. Furthermore, it is essential never to alter the adjustment of the eccentrics of the sliding gear and the clutch (860-845-861-482). These various parts are easily distinguishable by their pink colour.
It is recommended not to turn the adjusting screw 549 of the minute hammer 512 (pink gilt).

Important note: After-sales service offers standard exchange of the chronograph plate 838. The mechanism and functions are delivered completely adjusted, and it suffices to place the new unit on the movement, taking care to carry out the checks described (see chapter 5.4).

4.5 Disassembling the basic movement

4.5.1 Letting the mainspring run down

As shown in fig. 3, the upper bridge of the self-winding unit 341 must be withdrawn with the two wheels 309 and 313. Then draw back the click 32 and let the spring run down, allowing the crown to turn slowly backwards.

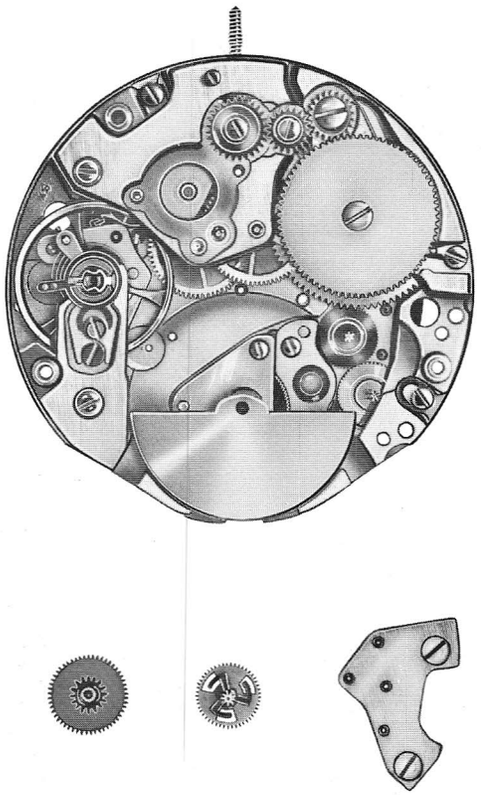


Fig. 3

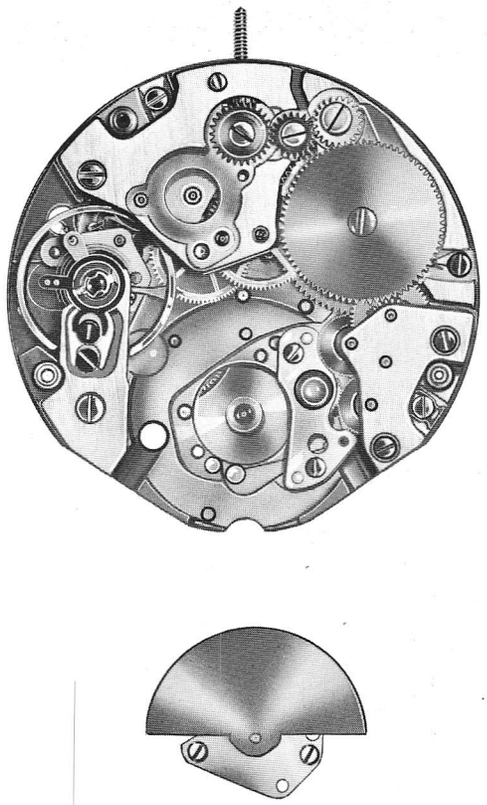


Fig. 4

4.5.2 Taking off the oscillating weight

Withdraw the bridge 301 from the plate with the oscillating weight 344, by taking out the two screws 302 (fig. 4). The two components are held together by the friction fitting of the oscillating weight on its axle. They must not be separated (part 344). During overhaul the assembly may be put in the cleaning machine without taking apart. After careful drying, the upper bearing needs to be lubricated with Synta-Visco-Lube oil.

4.5.3 Taking off the train bridge

Having removed the bridge, take the precaution of withdrawing the driving wheel 519 which is solid with the fourth wheel 6L. To facilitate this operation, the wheel is mounted on a tube, which has a groove into which the jaws of an appropriate tool may be inserted. Such a tool, specially designed for this work, may be obtained through our after-sales service (Bergeon Tool No. 30638/3).

5. ASSEMBLY, LUBRICATION, AND CHECKING THE FUNCTIONS

5.1 Choice of lubricants

The various oils and greases mentioned in this manual are given by way of indication. They may be replaced by other lubricants having equivalent properties.

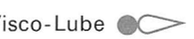
5.1.1. List of lubricants employed, with corresponding symbols

Basic movement: see figs. 10 and 11.
Chronograph: see fig. 16.

Synt-a-Lube 9010

Cuypers No. 3 

Synta-Visco-Lube 

PML WF NYE 

5.2 The basic movement

5.2.1 The barrel

Fig. 5 shows with what facility the barrel 1S can be taken out from the movement. The development of the mainspring

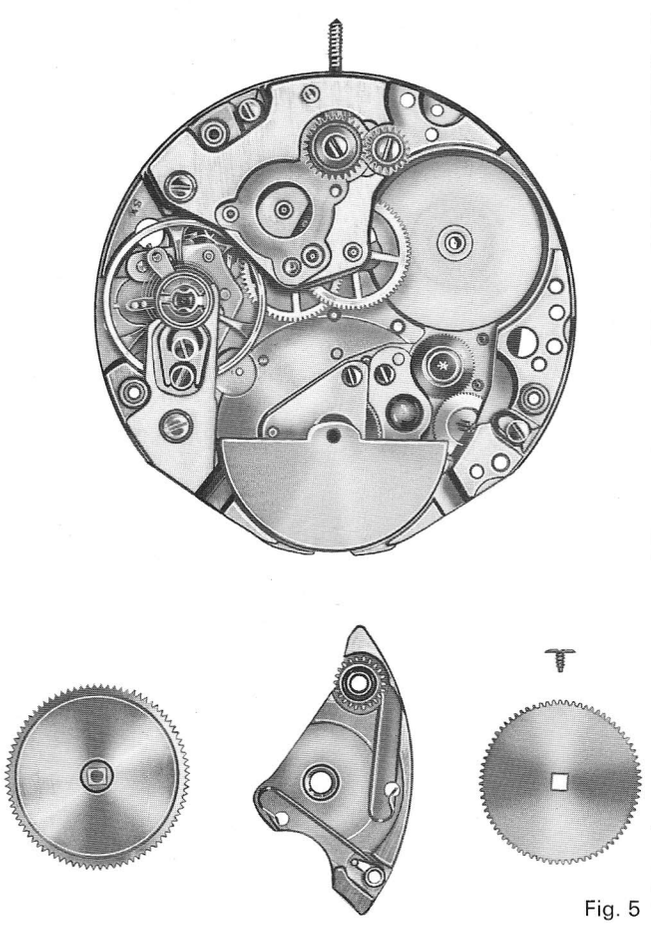


Fig. 5

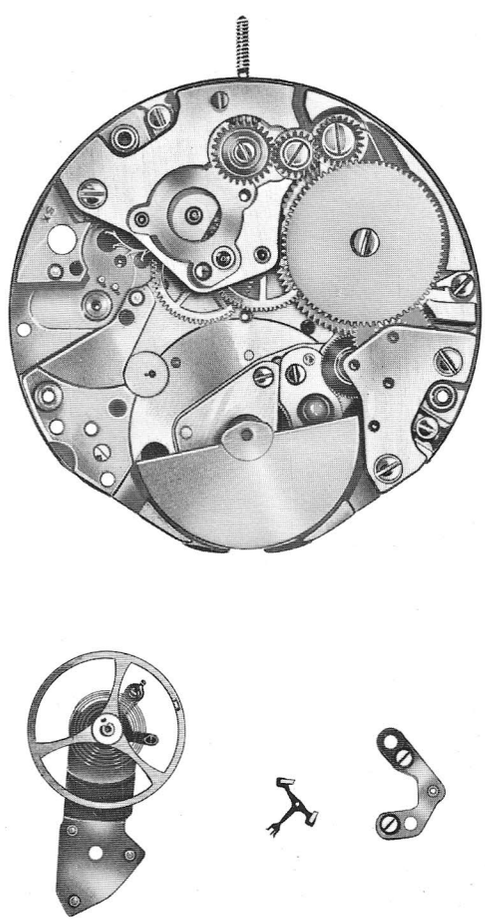


Fig. 6

should be equal to 7.5 turns minimum in new condition. Eight turns are necessary to cause the slipping of the brake spring. The slipping couple must lie between 980 and 1240 grmm. This couple, and that of the spring proper, is factory checked using modern measuring instruments. In the case of difficulty with the mainspring, the complete barrel must be replaced (No. 1S).
This latter must be cleaned externally only. It must not be dipped in a solvent.
The pivots of the barrel arbor 2 within the barrel, the plate, and the bridge must be greased with the lubricant PML WF NYE.

5.2.2 The balance and escapement

As shown in fig. 6 it is unnecessary to disturb any other portion of the movement in order to remove the balance 54 and pallets 57. Lubricate this latter with Synta-Visco-Lube oil by placing a drop of oil three times on the impulse plane of the exit pallet. Turn the escape wheel a few teeth after each drop of oil. The escapement has been treated with "Stop-Oil", so avoid repeated use of an ammonia based bath.
The balance is oiled with Synt-a-Lube 9010.
The pallet pivots 57 must not receive any lubricant.

5.2.3 The oscillating weight

When any of the components comprising the oscillating weight is defective, replace the whole assembly. If after replacement, the oscillating weight touches the plate, correct it in the following way, see fig. 7:

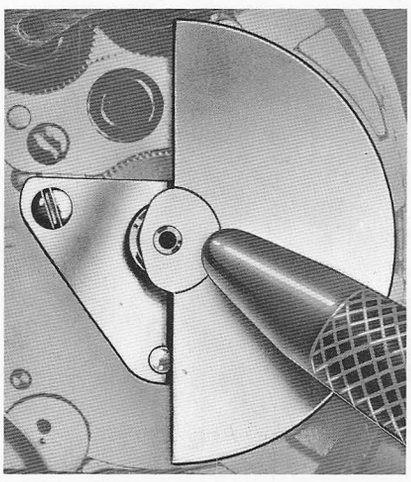


Fig. 7

- Put the oscillating weight in position on the plate and secure it with the two screws 302.
- Press on the oscillating weight near the support at the arbor, and simultaneously lift it at the periphery at the point where it needs to be corrected. In this manner the force necessary to correct it is not exerted on the arbor.
  For cleaning and lubrication, see fig. 11 and under paragraph 4.5.2.

5.2.4 The off-set centre wheel and the hand-setting train

The large driving wheel 4F is not positioned at the centre of the movement. To provide transmission of motion to the hands, it possesses a cannon pinion with snap which, via the minute wheel 8, drives a second cannon pinion 94A, freely pivoted on a pipe 106 at the centre of the plate and which carries the minute hand. The flexible arm of the minute wheel prevents back-lash in the gear mesh, and thus permits the hands to be driven with minimum shake, see fig. 8.

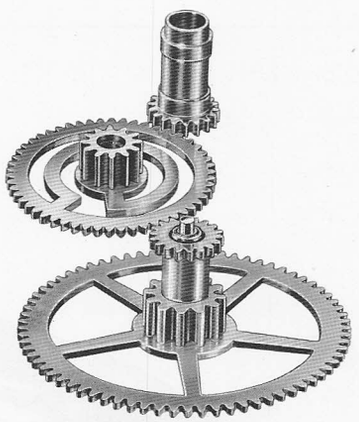


Fig. 8

It is necessary to take the following precautions with the large wheel 4F and its cannon pinion:

- When cleaning, always separate the cannon pinion from its wheel.
- For oiling, place a drop of Cuypers No. 3 oil on the large driving wheel arbor, before fitting the cannon pinion, see fig. 9. The pivots are treated with the same oil.

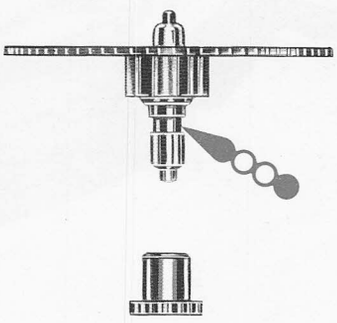


Fig. 9

5.2.5 Assembly and lubrication

It is preferable to commence assembly on the dial side by positioning the minute wheel 8, the additional setting wheel 30A and the double setting wheel 29. First grease the studs with PML WF NYE (that of the double setting wheel 29 must receive very little lubrication) and then secure the minute wheel cock 9. On the bridge side, locate the wheel train and its bridge, positioning also the intermediate crown wheel 104. Continue with the barrel and its bridge. Before fixing this latter, position the intermediate ratchet wheel and the click 32. Then assemble the self-winding unit and its gear train.

The wheel train and the self-winding train are lubricated with Synta-Visco-Lube, also the wig-wag pinion 312 and the beak of the subsidiary click. However, the pivots of this latter must not receive any lubricant. The rubbing surface of the spring on the clutch wheel must be treated with PML WF NYE.
Similarly lubricate the manual winding train with PML WF NYE.
To lubricate the basic movement, also refer to figs. 10 and 11 as well as chapter 5.1.

5.2.6 Checking the self-winding mechanism

The mainspring being wound about 6 turns, hold the movement vertically and rotate it around the axis of the hands as indicated in fig. 12. The oscillating weight used to wind the mainspring must remain at its lowest point, and not be influenced by the motion imparted to the watch. In the event of faulty functioning, check the freedom of the train, and check the transmission of force from the oscillating weight 344 to the ratchet wheel 13 by rotating the latter in both directions.

Fig. 10

Synt-a-Lube 9010

Synta-Visco-Lube

Cuypers No. 3

PML WF NYE

DO NOT TAKE APART

Synt-a-Lube 9010

Synta-Visco-Lube

Cuypers No. 3

PML WF NYE

Fig. 11

LUBRICATION OF BASIC MOVEMENT

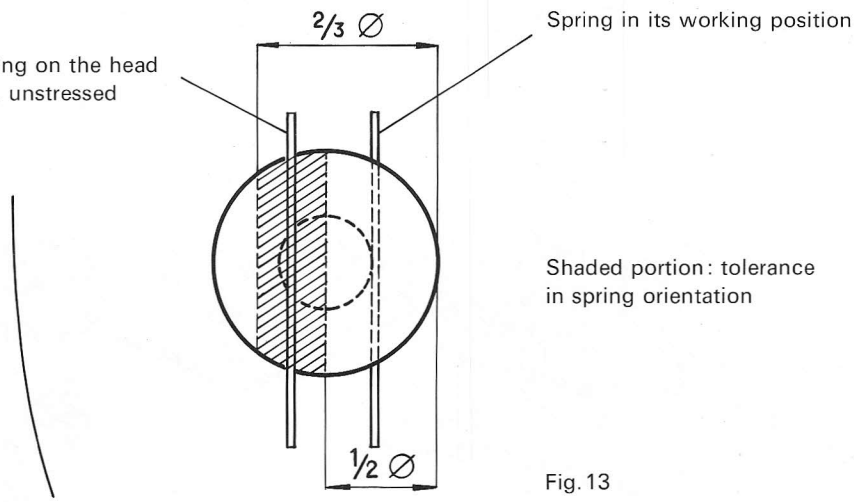


Fig. 13

Fig. 12

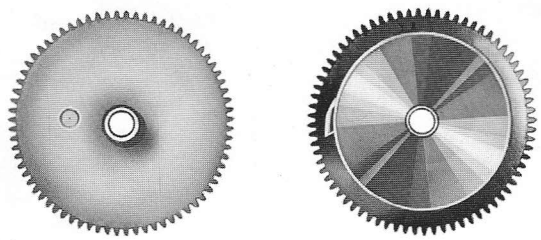


Fig. 14

Check functioning of the coupling wheel 313, the freedom of the wig-wag pinion 312, the tension and position of the stop click spring 303.

To carry out this last check proceed in the following manner:

- Position of the spring in elevation
  The spring must be centred in the groove of the stud.

- Orientation of the spring in plan
  Engage and maintain the stop click 303 in the tooth of the winding wheel 307.
  Bring the spring on to the head of the stud so that it lies without lateral constraint.
  Its position must conform to that shown in fig. 13.

5.3 The calendar mechanism

5.3.1 Functioning

The calendar components are retained on the plate by a cover plate. One may thus take off the dial and study the functioning without difficulty. The date indicator driving wheel 574 (fig. 14) comprises several components which must never be separated. Mounted on this wheel the calendar finger makes six turns per day. Furthermore, it is displaced radially under the influence of an eccentric and comes opposite a tooth of the date indicator once per day. As a result of its high peripheral speed, the time of date change has been reduced to about 15 minutes. Furthermore the finger has been mounted in such a way that it corrects the date in one direction only, in the other it jumps over the date indicator tooth without displacing it. This feature allows the date to be

reset without difficulty by moving the hands backwards and forwards between 22.30 and 24.00 hours.

5.3.2 Lubrication

Only the pivoting-point of the date indicator driving wheel 574 must be lubricated with Synta-Visco-Lube (see fig. 10).

5.3.3 Assembly and adjustment

Replace the date indicator driving wheel 574, the date indicator 576, the date jumper 596, and its spring 578, the hour wheel guard 101 and secure the date indicator guard 571 with the aid of two screws 577.

This last operation completes the assembly and adjustment of the calendar mechanism.

5.3.4 Checking and correcting

Check whether the motion and driving of the date indicator is normal, by causing it to be moved several teeth.

To correct the following faults:

- Insufficient travel of the calendar finger
  Ensure perfect freedom of the date indicator 576.
  Adjust the tension of the date jumper spring 578 to ensure a clean jump of the date indicator.
  Replace the date indicator driving wheel 574 if the finger is not free in its emplacement.
  Check that the penetration of the finger in the teeth of the date indicator is adequate, if this is not so, check the stud of the date indicator driving wheel 574 which possibly may have been bent, as well as the teeth of the indicator.

- Repeated jumps of the date indicator
  Adjust the tension of the spring 578 to ensure that the date jumper 596 presses sufficiently in the teeth of the date indicator 576.

5.4 The chronograph mechanism

5.4.1 Assembly, lubrication and adjustment of the functions

Before proceeding with the assembly of the chronograph plate on the movement, make sure that the lubrication and checking of the basic movement have been carried out.
Secure the driving wheel 519 on the upper pivot of the fourth wheel 6L. These two wheels must be solid one with the other by a pressed fit.
Now place the oscillating pinion 568 in its housing, after having lubricated the lower jewel in the movement.
If the chronograph plate 838 has not been dismantled or if it is a unit obtained as a standard replacement, it is sufficient to place it on the three pillars, secure it by the three screws with blue heads 848, and proceed with lubrication.
See fig. 16.
If the unit has been taken apart, it is recommended to proceed with the re-assembly of its components directly on the movement, after ensuring a tight fit of the driving wheel 519 and lubricating the oscillating pinion 568, according to the method which follows:

- Fit the chronograph plate 873 on the three pillars and secure it with the three blue-headed screws 848.
- Replace the coupling clutch screws 544.
- Secure the friction spring 514 using screw 548.
- Replace the sliding gear bridge 8105 and secure it with the screw 846.
- Replace the sliding gear 509 and the sliding gear screw 865.
- Replace the sliding gear spring 510.
- Replace the connecting plate 841.
- Secure the operating and fly back lever 855 with the screw 866 – **take care: left hand thread.**
- Replace the operating lever 505 and its two screws 533.
- Replace the fly back lever spring 506.
- Oil the friction spring (a drop on one arm of the fork).

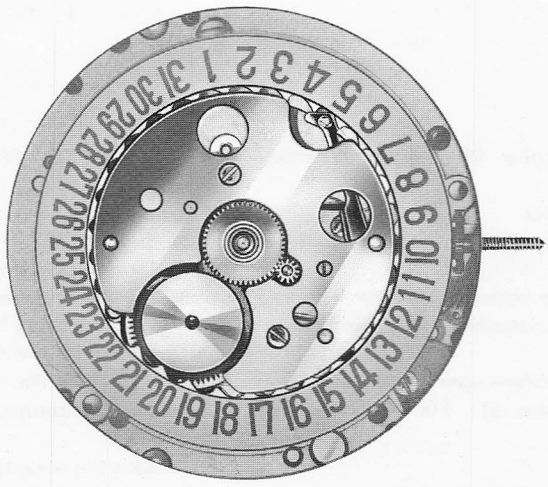
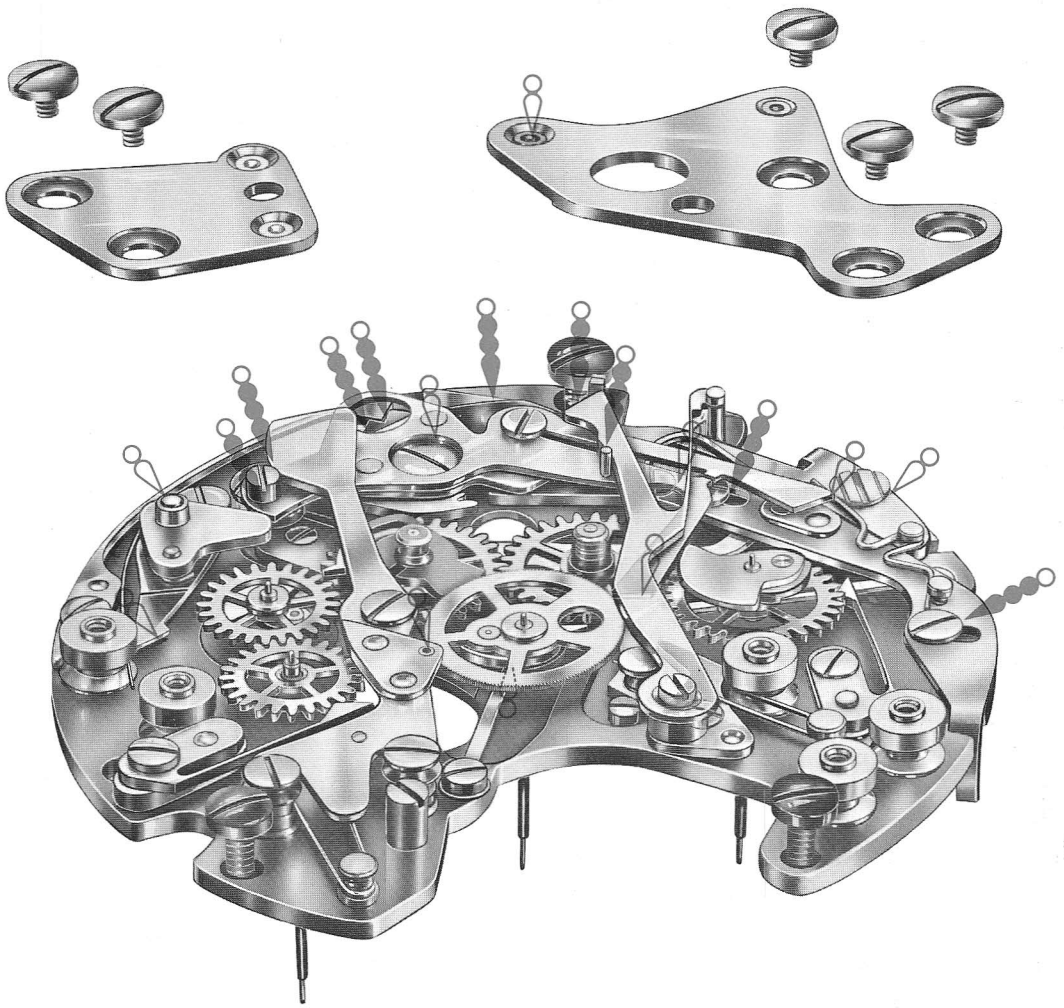


Fig. 15

Fig. 16



Synt-a-Lube

PML WF NYE

- Replace the chronograph runner 851 and the minute recorder runner 518.
- Position the hour recorder finger.
- Replace the chronograph bridge 565 and its three screws 566.
- Adjust mesh between minute-recording runner 518 and sliding gear 509 (deeper penetration is achieved with eccentric 860).
- Position the minute recorder jumper spring rest (thin) 900 and the minute recorder jumper 511. Fix them together with the screw 536 (short).
- Replace the reverser 837.
- Oil the joint of the reverser 837 and the bearing of the fly back lever 855.
- Grease the operating lever 505 beneath each of its screws 533.
- Secure the hammer 512 using the screw 549.
- Adjust the height of the hammer 512 relative to the heart cams and the clearance under the screw 549.
- Oil the bearing of the hammer 512.
- Replace the hammer cam jumper 874 and its screw 869.
- Grease the hammer 512 at the following rubbing points:
  1. with the hammer cam jumper 874.
  2. with the hour hammer 885.
  3. with the flyback lever 855.
- Replace the connecting wheel for hour recorder with heart cam 840.
- Replace the hour recorder 839.
- Fit the hour hammer 885 with spring incorporated.
- Replace the hour recorder bridge 876 and its two screws 889.

- Replace the hour recorder jumper rest (thick) 843, flat side up, and the hour recorder jumper 842. Secure them with the screw 849 (long).
- Replace the safety screw of the hour hammer 891.
- Oil the hour hammer pivot.
- Check the vertical clearance of the hour recorder wheel 839 and of the minute recording runner 518 (clearance 0.03 mm).
- Adjust the position of the reverser 837 if necessary.
- Check the freedom of the hammer 512, the operating lever 505 and the flyback lever 855.
- Check the height of the hammer 512 on the heart cams (the arm of the hammer 512 must be in the centre of the hearts).
- Adjust, if necessary, the mesh of the minute recorder 518/ sliding gear 509 for deep penetration, by means of the sliding gear eccentric pivot screw, 860, fig.17.
- Check the freedom of the minute recorder wheels.
- Adjust the tension of the minute recorder jumper 511 (weak).
- Adjust if necessary:
  the depth and travel of the chronograph runner finger 851, see fig.17 (eccentric 861);
  the hammer 512, fig.18 (screw 850);
  the position of the chronograph wheel finger 851 for the jump of the hand, see fig.17;
  the depth and travel of the hour recorder finger mounted on one of the wheels carried by the sliding gear 509, see fig.17.
- Adjust the pressure of the hour recorder jumper 842 (weak).
- Adjust, if necessary, the hour hammer 885.
- Oil the surface of the hour hammer 885.
- Replace the oscillating pinion 568 (check the fine teeth).
- Replace the coupling clutch spring 543.
- Replace the coupling clutch unit 569 with the aid of the screw 544.
- Check the penetration of the oscillating pinion 568 teeth with the chronograph wheel 851, see fig.19 (eccentric 482).

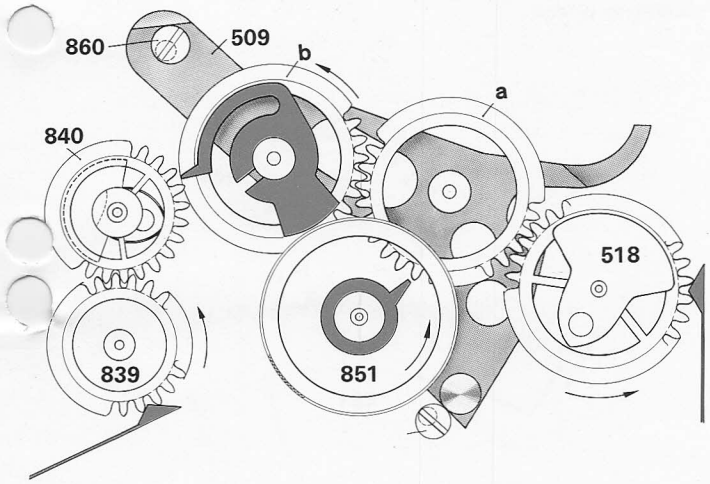


Fig. 17

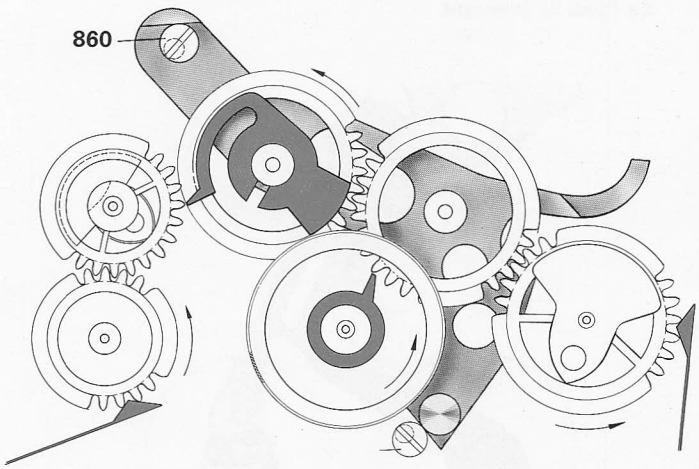


Fig. 17a

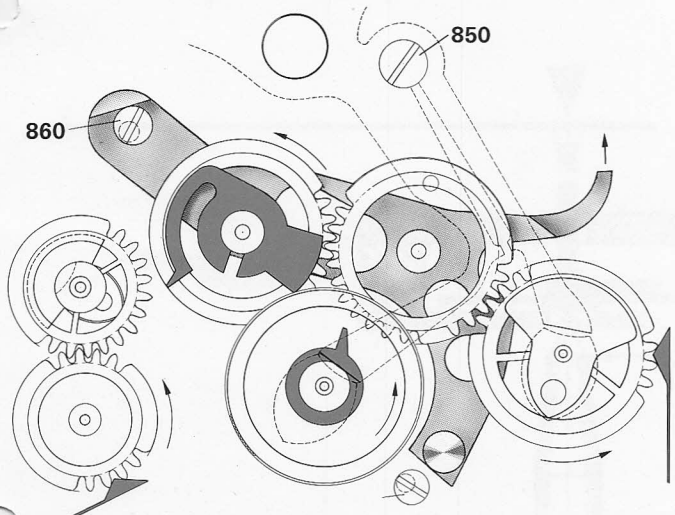


Fig. 17b

Fig. 17 Position of the fingers 5 seconds before the minute and hour recorders jump forward.

Fig. 17a Position of the fingers at the starting position of the chronograph from zero.

Fig. 17b Position of the sliding gear during return to zero.

- Check the jumps of the minute and hour recorders (synchronisation is achieved by the rotation of the hour finger on the wheel "b" of the sliding gear 509, see fig. 17).
- Position the blocking lever 515 and its screw 542.
- Adjust the tension of the blocking lever 515 on the chronograph wheel 851 in the stopped position of the chronograph.
- Grease the blocking lever 515 at the rubbing points:
  1. with the hammer pin 512;
  2. with the beak of the flyback lever 855.
- Grease the coupling clutch 569 at friction point with uncoupling eccentric 845.

For lubrication employ Synt-a-Lube No. 9010 oil and PML WF NYE, see also fig. 16 and consult chapter 5.5.
In addition, after replacing the hands, do not forget to lubricate the points mentioned under 5.5.3.

5.5 Fitting the hands

5.5.1 Orientation of the hands in relation to calendar

After replacing the dial, turn the winding stem until the date "jumps". The hour hand and that of the minute must then be fitted at midnight.

5.5.2 Replacing the chronograph hands

First of all pass the extremity of the blocking lever spring 515 over its stop pin so that the chronograph wheel 851 is free. Press on the flyback lever 855 to put the heart cams to zero. Turn over the movement and place the three hands on their respective pivots, orientating them so that their tips coincide with the 60-second, 30-minute and 12-hour divisions respectively.
Push them on gently and press once more on the flyback lever 855 to check whether they are perfectly centred.
Press them hard one after the other to obtain a tight fit, taking care to support the corresponding pivot or jewel on an appropriate stake, see fig. 20. Actuate the flyback lever 855 to check the accuracy of orientation, and then replace the brake spring 515.

5.5.3 Final lubrication after fitting the hands

After replacing the dial and hands, do not forget to oil the hammer faces of the hour, minute, and chronograph runners, as well as the upper pivot of the latter and that of the oscillating pinion.

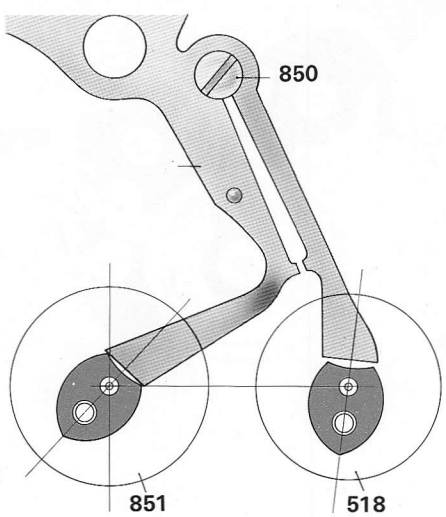


Fig. 18

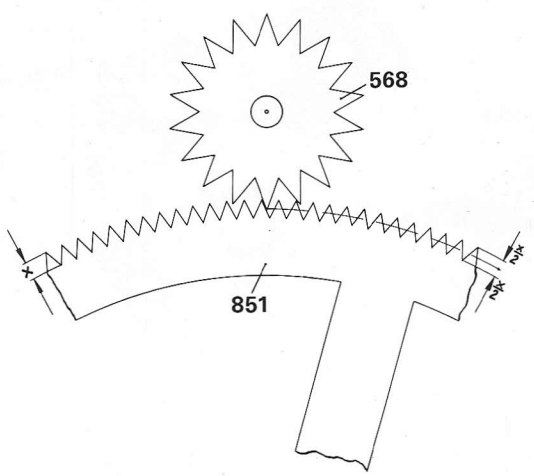


Fig. 19

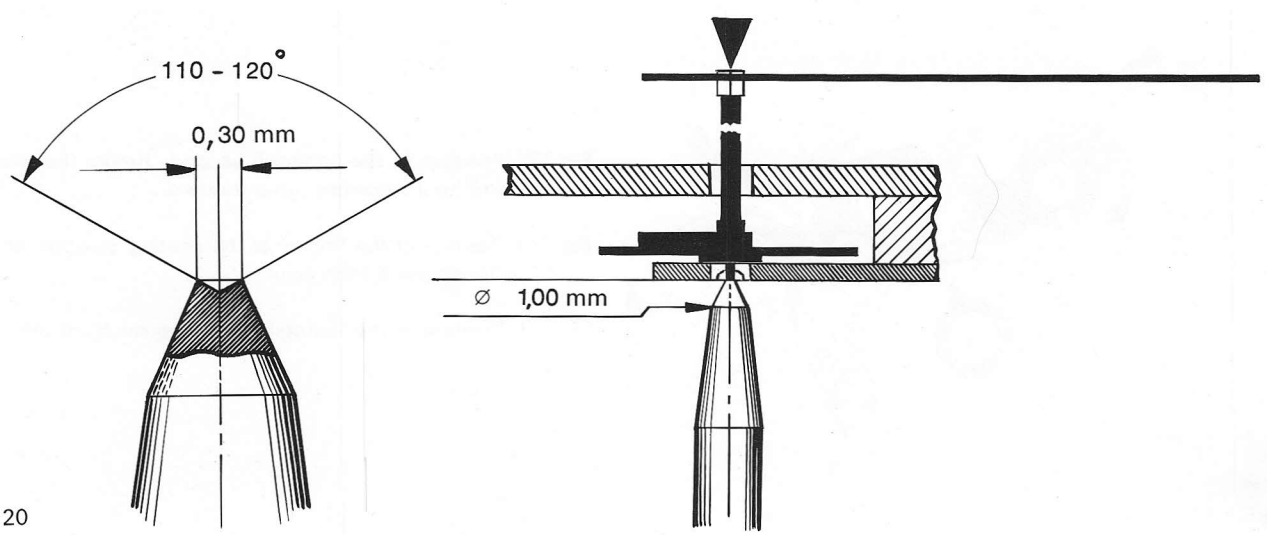


Fig. 20

Diagnostic chart

Note: The sections concerning the chronograph mechanism are printed in **heavy type.**		
The watch works, but		
– it gains excessively.	Wind the watch completely by giving the winding-button 25 turns and check the amplitude of the balance 54.	
	– Amplitude normal.	– Check the condition of the balance spring: coils stuck together, spring seized or stuck between the index pin and boot, poor beating between the pin and boot.
		– Check the clearance between the stud and the arms of the balance 54 in the "dial up" position.
		– Adjust the daily rate, see ch. 3. If necessary, replace the regulated balance 54.
	– Knocking (Banking).	Replace the complete barrel 1S.
	To detect this, cause the brake spring to slip by turning the winding-button very slowly with the watch in the "dial up" position.	
– it loses excessively.	Wind the watch completely by giving the winding-button 25 turns and check the amplitude of the balance 54.	
	– Amplitude normal.	– Reduce the beating of the balance spring between the index pin and boot.
		– Adjust the daily rate, see ch. 3. If necessary, replace the regulated balance 54.
		– Check the free action of the oscillating weight 344 and the functions of the automatic winding-mechanism, v. § 5.2.6.
	– Amplitude insufficient (bad rate, may also cause an excessive gain).	– Make sure that the movement is clean and that the oils are in good condition, and overhaul if necessary.

		– Check the power reserve with the chronograph mechanism out of action. If it is under 40 hours, replace the complete barrel 1S.
– it stops from time to time,		
– **only when the chronograph mechanism is working.**	**Carefully shift the clutch lever 569 so as to disengage the oscillating pinion 568 from the chronograph runner 851.**	
	– **The balance 54 starts to oscillate again.**	– **Make sure that the teeth of the chronograph runner 851 and the oscillating pinion 568 are clean and in good condition. Check concentricity. Replace the parts if necessary.**
		– **Check the depth of the gearing between the chronograph runner 851 and the oscillating pinion 568. The depth is regulated by means of the clutch banking-eccentric 482, v. fig. 19.**
		– **Check the height of the levers and hammers in relation to all the wheels and pinions belonging to the chronograph mechanism.**
		– **Also refer to the sections concerning stoppages due to the chronograph mechanism.**
	– The balance 54 remains motionless.	– See the following section, "when the chronograph mechanism is out of action".
– when the chronograph mechanism is out of action.	– Wind the watch completely by giving the winding-button 25 turns and check the power reserve.	
	– Power reserve over 40 hours.	– **Check the concentricity and teeth of the driving-wheel 519 and the oscillating pinion 568.**
		– Check the free action and the endshake of the oscillating weight 344 and the functions of the automatic winding-mechanism, v. § 5.2.6.

	– Power reserve under 40 hours.	– Make sure that the movement is clean and that the oils are in good condition, and overhaul if necessary. – Replace the complete barrel 1S.
– the date indication does not change.		– Check the free action, the condition and the functions of the components of the date-indicator mechanism, including the hour wheel 599, v. ch. 5.3. – Make sure that the date-indicator guard 571 is screwed on tightly. – Check the free action of the date-indicator 576 under the dial.
– the date numeral does not appear in the centre of its window.		– Check as indicated above. – Check the centring of the dial.
– the date-indicator jumps one or two days too many.	This fault may occur under the effect of a violent shock.	See § 5.3.4.
– it can no longer be normally wound by hand.	– Take out the winding-stem and check its condition and that of the winding-crown. Exchange if necessary. – Lubricate the stem pipe with oil containing silicon.	Refit the winding stem; if the function is not in order: – Check the condition, free action and operation of the components of the manual winding system, as well as the set-hands mechanism. – Check the function of the coupling-wheel 313 of the automatic winding-mechanism.
– the hand setting mechanism does not work.	Proceed as above.	Refit the winding stem and, if necessary: – Check the functions of the set-hands mechanism and its gearing.

– the hour and minute hands stop near midnight and the date indication does not change, while the chronograph hand and the recorder hands work normally.	Faulty friction of the indented cannon pinion on the large driving wheel 4F	Replace the large driving wheel 4F and its indented cannon pinion, v. § 5.2.4.
– the chronograph and minute-recorder hands jump when starting from zero.	– Incorrect position of the finger of the chronograph runner 851.	Correct the position according to fig. 17a.
	– Magnetization of the hammer 512 or the heart-pieces of the chronograph runner 851 and the minute-recorder wheel 518.	Demagnetize these parts with a suitable appliance.
	– The heart-piece of the chronograph runner 851 or of the minute-recorder wheel 518 has come loose.	Replace the chronograph runner 851 or the minute-recorder wheel 518 if necessary.
	– Bore of the lower bearing of the chronograph runner 851 too large.	Replace the centre pipe 106 in the bottom plate.
– the chronograph hand does not move correctly, but jerks or wobbles.	Insufficient tension of the friction spring 514.	Remove the spring and load it by bending it at its base.
– the chronograph hand moves when the mechanism is out of action.	Incorrect adjustment of the blocking-lever 515.	– Make sure that the blocking-lever 515 rests against the chronograph runner 851 before the oscillating pinion 568 is entirely disengaged.
		– Make sure that the tangential pressure of the blocking-lever is sufficient to stop the chronograph runner 851 from turning.
– the minute- and hour-recorder hands do not jump at the same time.	The 14 EFAD caliber has a minute-recorder jumper 511 and an hour-recorder jumper 842. At half-hourly intervals, they should cause the two recorder hands to jump simultaneously.	– To ensure simultaneous jumping, regulate the position of the hour finger of wheel (b) of the sliding gear 509 by turning it, v. fig. 17.
		– Check the working of the jumpers as above.
– the minute- and hour-recorder hands jump inopportunely whether the chronograph mechanism is in or out of action.	This fault may occur under the effect of a violent shock.	– Tension the jumpers 511 and 842 so that they hold their respective wheels correctly, preventing them from moving accidentally.

		– Make sure that the tension of the jumpers is not too great by turning the chronograph wheel 851 with a fine tool (such as a pivoting-reamer, dia. 0.12 mm). The resistance of the gear train to the forward movement should be normal, so as to avoid stoppages when the fingers are passing.
– When returned to zero, the chronograph hands do not fly back to the zero marks on the dial.	– A tooth of the wheel of the sliding gear 509 comes against the tip of the finger of the chronograph wheel 851.	Shift the finger in the direction of rotation of the chronograph runner 851, v. fig. 17a.
	– The pean of the hammer 512 (inclined surface of the hammer which pushes the heart back to zero) does not rest on the shoulders of the heart-piece of the chronograph wheel 851.	Move aside the minute-counter arm of the hammer 512 by turning clockwise the screw 850 at the intersection of the two arms. Make sure that there is slight play on the heart-piece of the minute-recording wheel 518, v. fig. 18.
	– The hand has come loose on its pipe.	Change the hand.
	– There is excessive play between the heart-piece of the minute-recorder wheel 518 and the pean of the hammer 512.	Turn the screw 850 counterclockwise to bring the play back to normal. It should allow the jumper 511 to hold the minute-recorder recording wheel 518 in position, v. fig. 17 and 18.
	– The hammer 512 rubs against the chronograph wheel 851.	Correct the heights so as to leave sufficient clearance between the two parts.
– When returned to zero, the hour- or minute-recorder hand does not fly back correctly to the zero mark.	– The tension of the hour- or minute-hammer spring is insufficient.	Tension the spring and check its action.
	– The direction of the hour-recorder hand in relation to the heart-piece of the connecting-wheel 840 of the hour-recorder is not correct.	Turn the heart-piece into its correct position by acting on its counterpoise.
The watch is stopped and the chronograph mechanism is out of action and set to zero.	– Note the position of the hour and minute hands.	Make sure that they do not catch and that the hour hand does not touch the dial.
	– Push the winding-crown right in.	If the watch starts working again, wind it completely and check the power reserve (at least 40 hours), to make sure that it is the only cause of the stoppage.

	– Take the movement out of the case.	Check the endshake of the hour and minute hands and the centring of the dial in relation to the hour-hand pipe.
– when the date-indicator is operating.	Change the date indication by means of the set-hands system and check the remaining power reserve:	
	– If it is under 10 hours:	– Make sure that the movement is clean and that the oils are in good condition. Overhaul if necessary.
		– Check the free action of the oscillating weight 344 and its endshake, as well as the functions of the automatic winding-mechanism, v. § 5.2.6.
	– If it is over 10 hours:	– Check the free action of the date-indicator 576 under the dial.
		– Check the endshake, condition and functions of the components of the date-indicator mechanism, v. ch. 5.3.
– at 10.10 a.m. or 1.40 p.m.	The finger of the date-indicator driving-wheel 574 is touching the hour wheel 599.	– Make sure that the upper hour wheel is true in the horizontal plane.
		– Make sure that the post of the date-indicator driving-wheel 574 is perpendicular to the bottom plate.
– at some other time.	Wind the mainspring by giving the winding-crown 3 turns.	
	– The balance 54 starts to oscillate again.	– Make sure that the movement is clean and that the oils are in good condition. Overhaul if necessary.
		– Check the power reserve. If it is under 40 hours with the chronograph mechanism out of action, change the complete barrel 1S.
		– Check the free action and the endshake of the oscillating weight 344 and the working of the automatic winding-mechanism, v. § 5.2.6.

	– **If the balance 54 remains motionless, take out the oscillating pinion 568.**	
	– **The balance 54 starts to oscillate again.**	– **Check the endshake, the free action and the condition of the oscillating pinion 568 (take care not to damage its fine teeth).**
		– **Check the concentricity and the teeth of the driving-wheel 519.**
	– The balance 54 remains motionless.	
	Remove the chronograph plate.	Check and overhaul the basic movement:
		– The teeth of the barrel 1S do not press on the pinion of the centre wheel 4F. Barrel defective.
		– No moment of force on the escape wheel 59: Going train blocked; check the endshake of the wheels and make sure that their teeth and pivots are clean and in good condition. Set-hands mechanism and motion work blocked; check the endshake and the condition of the parts. Date-indicator mechanism blocked; check the functions, v. ch. 5.3.
		– The escape wheel 59 presses on the pallet stones: Lever 57 blocked; check its pivots and endshake. Overbanking of the lever 57; remove the balance and refit it, making sure that the impulse pin 60 enters the notch of the lever 57 correctly.
		– The balance 54 is not held correctly in its bearings; check the balance staff 56 and the two shock-absorbers 113 and 114.

The watch is stopped with the chronograph mechanism in action.	– Note the position of the chronograph and counter hands.	Make sure that the chronograph hand does not touch the glass and that the recorder hands do not touch the dial.
	– Note the position of the hour and minute hands.	See the section concerning "the watch stopped with the chronograph mechanism out of action".
– on the passage of the counter hands, the chronograph hand stopping between the 55th and the 2nd division of the scale of seconds.	– Minute or hour recording jumper over-stressed.	Correct the loading of the jumper.
	– The finger of wheel (b) of the sliding gear 509 catches when it engages with the hour-recorder connecting-wheel 840.	By deforming its bendable arm, correct the position of the finger and its depth of engagement with the connecting-wheel 840, making sure there is sufficient clearance between the finger and the tooth of wheel (a) which precedes the one it should normally touch.
– at some other time.	– Carefully move aside the clutch lever 569, so as to disengage the oscillating pinion 568 from the chronograph runner 851.	
	– The balance 54 starts to oscillate again.	– Make sure that the teeth of the chronograph runner 851 and of the oscillating pinion 568 are clean and in good condition. Check concentricity. – Check the depth of gearing between the chronograph runner 851 and the oscillating pinion 568, v. fig. 19. – Check the height of the levers and hammers in relation to all the wheels and pinions belonging to the chronograph mechanism. – Make sure that the pipes of the chronograph and counter hands do not limit the endshake of the wheels or touch the dial, the cannon pinion 94A or the centre pipe 106. – With a fine tool (such as a pivoting-reamer, dia. 0.12 mm), check:

		The free action and the endshake of the chronograph runner 851 by gently pressing its rim. The wheel should at once resume its position when the pressure ceases. **The friction of the chronograph runner 851. If it is too great, slacken the spring 514 without altering its shape.** **The free action of the chronograph gear train.** **The tension of the jumpers 511 and 842, which should not offer too much resistance to the passing of the finger.**
	– the balance 54 remains motionless	See the section "The watch is stopped, and the chronograph mechanism is out of action".

Special servicing instructions

Movement-holders

Two holders are required for servicing this movement:

No. has four push-pieces which make it possible to check the chronograph functions of an uncased movement with either the dial side or the chronograph mechanism uppermost.
See fig. 21.

No. is required when fitting the hands. It has three adjustable support screws on which the bearings rest when hands are pushed home. There are also two push-pieces for checking the flyback action.
See fig. 22.

Fig. 21

Fig. 22

Mounted Chronograph Plate (838)

The mounted chronograph plate (838) can be supplied separately for standard exchange. The mechanism and functions are delivered fully adjusted. The unit may also be returned to Bulova for repair.

Push-pieces

To remove the push-pieces, unscrew them from inside the case.

Checking water-resistance

After every repair it is essential to check water-resistant models either at a pressure of 2.5 atm. *or by vacuum-testing.*

Spare Parts Orders

When ordering movement parts, please be sure to indicate the caliber number. When ordering case parts, please indicate the reference number of case (i.e. framed number inside case back).

BULOVA WATCH CO.,
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