Repair and Service Manual

OLYMPIA SG1

Introduction:

In the servicing and repairing of typewriter, the competent mechanic is often faced with problems, the solution of which depends on his knowledge of construction and function of the various makes and models of typewriters.

The purpose of this manual is to make available the most expeditious means of removal and replacement, as well as disassembly of the various assemblies. The more significant adjustments are emphasized and the recognition of malfunctions and their correction is explained.

This manual is arranged in 5 subdivisions, as follows:

Chapter 1: Removal and replacement of the various assemblies and their disassembly. Adjustment instruction.

Chapter 2: Repairs
Chapter 3: Functions
Chapter 4: Special tools
Chapter 5: Photo plates

In Chapter 1 instructions are given only for removal of the various assemblies. Replacement is exactly the same procedure in reverse, unless special directions are given.

Chapter 2 is based on the recognition of the various possible malfunctions, with detailed explanation of their cause and correction.

Chapter 3 contains an explanation of the various functions and the required adjustments for faultless operation.

Chapter 4 contains a listing of special tools and their use. With the aid of these tools a more rapid and workmanlike job can be performed.

Chapter 5 contains photo plates depicting the various numbered parts mentioned in the text. For example:
Part A 17 can be found on plate A under number 17. It is suggested that the plates be folded out so that they lie alongside of the text.

All other part designations refer to the Figures which give a more detailed reproduction, but do not coincide to the part numbers of the plates.

The part numbers of this manual are not to be used when ordering replacement parts. Numbers for ordering parts should only be taken from the Parts Catalog.

This repair and service manual is valid only for the Olympia SG1 models. Additional instruction sheets will be supplied with eventual future modifications of the models.

OLYMPIA WERKE AG

INDEX

Chapter 1 Removal and replacement

1/1 Type bars A33, type bar connecting wires A14, sublevers A17a, key levers A18, tabulator key levers B23

1/2 Key lever key tops, springless key tops, tabulator key tops.

1/3 Segment A35, Universal guide plate C11, Segment carrier C1, Type guide A5, Trip adjustment lever C10, aligning scale bracket A36, card holder A1, aligning scale adjustment

1/4 Ribbon carrier A4, ribbon transport mechanism B32, ribbon transport wheel B43, ribbon transport pawl B42, reverse bracket B36, flat reverse detend spring B5, adjustment of detend spring

1/5 Ribbon color selector wheel A22, ribbon color selector shaft B45 with bellcrank B34 and B46, lift arm B52, adjustment of color selector

1/6 Space bar and attachments B15 to B26, adjustment of space bar.

1/7 Side plates A23, back plates D3

1/8 Adjustment of capital shift, and ring and platen

1/9 Escapement D6. Adjustment of escapement

1/10 Escapement wheel D1, escapement rocker D15, tabulator brake D7, loose escapement dog and rigid dog with flat spring D18b

1/11 Adjustment of spaced typing, tabulator release, tabulator brake D7, escapement trip, shift lock A19b

1/21 Platen, paper pan F25, feed rollers F17, F15, paper table F23a paper guide plate F36, paper bail rod F13, paper bail rollers F17a, paper bail handle F8, paper bail bracket F5.

1/22 Line space lever G5, line space connecting link G4, line space detend roller arm G10, detend roller G7. Line space selector wheel G22, sublever G17, line space pawl G15, eccentric bushing G12, adjustment of line spacing.

1/23 Margin stop rack F38, margin stops F37 and F2, scale and bracket F3

1/24 Carriage release rod F19a, carriage rack F22, tabulator rack E32, tabulator stops E30, spring plate E31

1/25 Inner carriage E38, carriage guides E2 or E39

Chapter 2 Repairs and adjustments

2/1 Type does not print when key lever is depressed.

2/2 Type bar sticks, does not return.

2/3 Carriage does not move when tabulator key is depressed.

2/4 Carriage skips over set tabulator stop.

2/5 Individual tabulator E30 stops do not clear.

2/6 Carriage does not move when space bar is depressed.

2/7 Carriage does not move or stops during typing.

2/8 Alignment is uneven.

2/9 Space between letters is uneven.

2/10 Machine skips.

2/11 Spaced typing does not function.

2/12 Line lock does not function.

2/13 Back spacer does not function or skips two spaces.

2/14 Type bar return lever does not function.

2/15 Ribbon transport does not function.

2/16 Ribbon does not reverse.

2/17 Ribbon color selector does not function.

2/30 Paper can not be inserted, paper does not feed straight.

2/31 Original sheet slides, paper tears.

2/32 Paper is creased, carbon marks on paper.

2/33 Line spacing is uneven.

2/34 Left side margin is uneven.

Chapter 3 Functions

3/1 Space bar

3/2 Capital shift

3/3 Ribbon transport

3/4 Escapement trip

3/5 Escapement

3/6 Carriage glide

3/7 Paper feed

Chapter 4 Special Tools

Chapter 5 Photo Plates

A Key lever and type bar mechanism

B Ribbon mechanism

C Segment carrier with universal bar

D Escapement

E Carriage

F Carriage

G Line space mechanism

Repair and Service Manual

OLYMPIA Typewriter SG1

1/1 Removal and replacement of type bars, connecting links, sub lever and key levers.

1/1a Removal and replacement of type bars, A 33

Remove carriage and top cover; remove segment cover plate by removing binding screws. With the aid of tool WSG 5 (shop fulcrum wire) push type bar fulcrum wire, A 34, as far as type bar which is to be removed. By pulling tool WSG 5 back a fraction, the type bar is freed and can be removed. Both fulcrum wires should be left in the segment until the new type bar is ready to be installed. If all type bars are to be removed, push fulcrum wire out with the aid of tool WSG 5, and remove type bars one by one, numerically from 1-46, including connecting links A 14. The connecting links, A 14, are of different lengths and must be reinserted into the type bar from which each was removed. Replacement of type bars is the same operation, in reverse. When replacing the segment cover, plate, A 3, the aligning scale adjuster, A 39, must be set on space "2", so that the aligning scales, A 37, can be tilted back as far as possible.

1/1b Removal and replacement of type bar connecting links, A 14

The same operation as detailed in Chapter 1/1a.

1/1c Removal and replacement of sublever A17a

Remove carriage and cover. Remove type bars and type bar connecting links as detailed in Chapter 1/1a. Disconnect link A17 on keylever A18 and spring A15 from sublever A17a. Remove stop screws from side plates A23, which hold sublever fulcrum wire A16 in place. Push out sublever fulcrum rod with the aid of a 1/8 in. rod until the sublever to be removed is reached. Pull rod back a fraction and sublever is freed and can be removed. Replacement is same operation in reverse.

1/1d Removal and replacement of key levers A18

Remove carriage, front plate and cover. Remove link A17 from key lever A18 and spring A10 from spring hanger A11. Loosen space bar assembly

as detailed in Chapter 1/6a. Remove stop screws of key lever fulcrum rod A9 from side plate and with the aid of a 1/8 ins. rod, push fulcrum rod until key lever to be removed is reached. Pull back rod a fraction, and key lever can be removed.
Note that when key levers are replaced, there must be a play of .015 in. between key lever and universal bar B31. This play is adjusted with tool WSG 3.

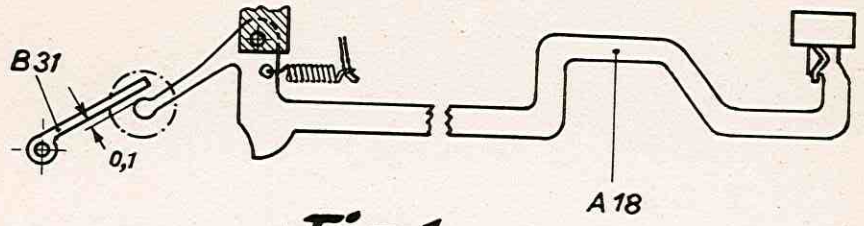


Fig. 1

1/1e Removal and replacement of tabulator key lever B23

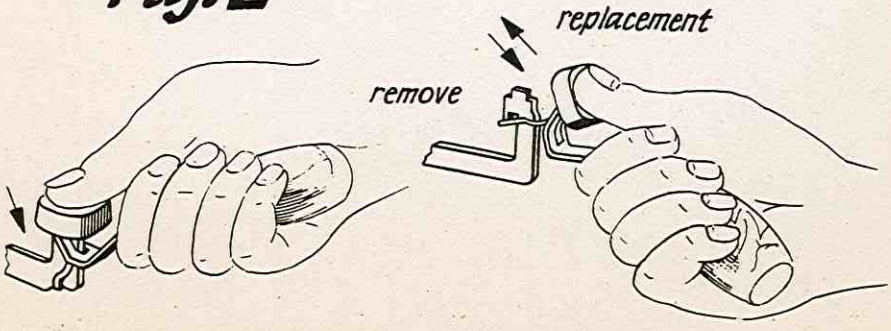
Remove front plate and front cover. Remove binding screws from tabulator lever stop rail B29. Remove retaining spring washers from the studs of part B25, unhook spring B24 and the tabulator key lever can be removed.

1/2 Removal and replacement of key tops

1/2a Removal and replacement of key lever key tops

All spring key tops can easily be removed with tool 7/423/0990. This tool is placed under the key top, which is pressed down with the thumb. Tilt the key top forward and remove. Replacement of key top is same operation in reverse.

Fig. 2



1/2b Removal and replacement of springless key tops

To remove springless key tops use tool RW 26. Place tool under the key lever, with the key lever in the long slot, and the shaft of the key top set on the shoulders of the tool. Drive the key top slowly from the key lever, with the aid of a hammer and a brass punch. To replace, place key lever in short slot and carefully drive key top down with file handle.

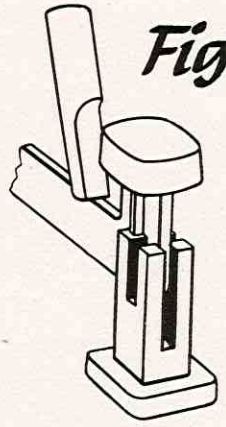


Fig. 3

1/2c Removal and replacement of tabulator key tops

Remove top plate and front plate. With a pair of pliers, hold key lever directly below key top. Place screwdriver between pliers and key top shaft. Twist screw driver and key top will slide off. To replace key top, place block under key lever and carefully tap key top down with file handle.

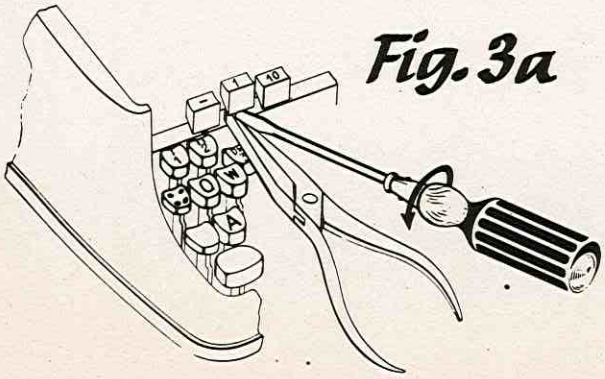


Fig. 3a

1/3 Removal and replacement of segment, segment parts and segment bracket.

1/3a Removal and replacement of segment A35 and universal slide C11

Remove Carriage, top plate and cover plate with aligning scales complete A36. Remove type bars and type bar connecting links as detailed in Chapter 1/1a and 1/1b. Remove segment binding screws, remove cotter pin A8 from ribbon carrier A4 and carefully pull segment from segment dowel pins. When a new segment is to be installed, the segment universal bar and the trip slide must be checked and readjusted if it is necessary.

Adjustments:

1. The type bar should trip 3/16 in. from the platen. The trip push bar C10 can be adjusted by loosening both screws C8.

2. The type bar should make contact with the universal bar C6 when the type bar is 1 1/4 in. from the platen, moving the trip push bar 3/32 in. This adjustment can be made with the adjusting screws C5.

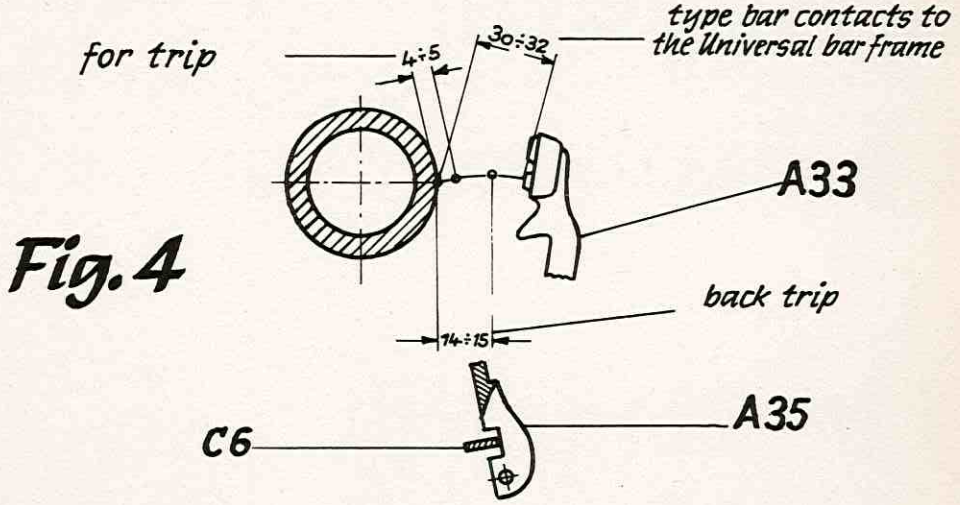


Fig. 4

1/3b Removal and replacement of slide C11 on segment A35

Remove carriage, lock shift key with shift lock A19b, remove screws C2 and ribbon carrier A4, after pulling out cotter pin A8. The slide C11 can now be removed. When installing a new slide, adjustment is made as detailed in Chapter 1/3a. If necessary, both eccentrics C12 must be reset, so that universal bar C6 is guided by them.

1/3c Disassembly of Slide C11

Remove carriage, unhook spring C3, and remove 4 screws at upper part of slide. Now both guide bearing plates C7 can be removed from their dowel pins. When only one of the ball bearing separators C9 is to be replaced, remove only the corresponding bearing plate. Adjustments are made as detailed in Chapter 1/3a.

1/3d Removal and replacement of segment carrier C1

Remove: carriage, front plate, complete machine cover, coverplate with aligning scale A36 complete, segment cover plate A3, and cotter pin A8 from ribbon carrier A4. Remove type bars and type bar connecting links (Chapter 1/1a and 1/1b). Unhook lower ends of springs A31 on segment carrier. Remove segment binding screws and remove segment with slide and ribbon carrier complete. Remove collar screws A19a on both sides, retaining spring washers A8b from connecting link A12, and then remove connecting link. Remove shaft A32 and both retaining spring washers from pins of part B38 on both sides. Mark the direction of the slot of part a (See Fig. 5).
Making this mark is very important, as the segment is not in a vertical position, but is tilted 6 degrees to the rear. Loosen screw b and slide out guide plate c. This operation must be made only on one side, never on both simultaneously, to prevent altering the 6 degree setting of the segment. Remove the segment carrier by twisting it in the direction of the escapement.
Replacement is the same operation in reverse.
Special care must be taken, that shaft A32 is not bound when it is screwed to link A29. Care must be taken that the aforementioned marking is carried out, and that segment moves freely in side bearing with no play.

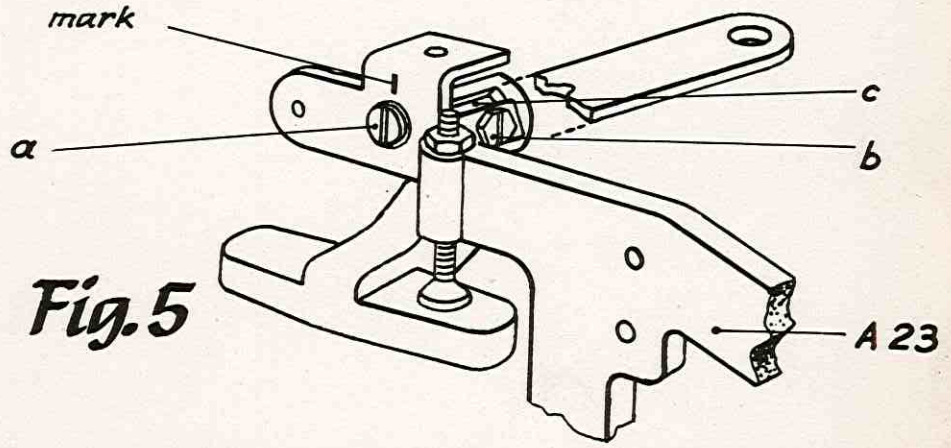


Fig. 5

1/3e Removal and replacement of type guide A5

Remove carriage, top plate and segment cover plate A3. Remove binding screws from type guide and carefully ease type guide from dowel pins. Care must be taken to prevent damage to ribbon carrier A4.
Replacement is same operation in reverse.
To check accuracy of replacement of type guide, type capitals "A" and "P". If these letters are not correctly aligned, the type guide is not

centered and the type bars are forced either to the left or to the right, necessitating an adjustment to the type guide. For adjustment, hold copper punch against lower part of type guide and tap carefully with a hammer.

1/3f Removal and replacement of trip adjuster C10

Remove carriage and unhook spring C3 on one side. Remove both screws C8.
For replacement and adjustment see Chapter 1/3a.

1/3g Removal and replacement of aligning scale A36

Remove carriage, top plate and screws A36a on both sides, freeing the aligning scales. During replacement, care must be taken that the upper edge of the plastic A37 is set at a distance of .008 in. from the platen. Adjustment is made by moving aligning scale bracket A36 forward or back, after loosening screws A36a. Lateral adjustment is made by typing the letters "1" and "i" and moving the aligning scale bracket sideways, so that the vertical lines of the scale are exactly below the letters and that the base of the letters is aligned with the top edge of the scale.

1/3h The card holder is easily removed with an upward pull. Distance between card holder and platen is .038 in.

1/4 Removal and replacement of various parts of ribbon reverse and ribbon transport.

1/4a Removal and replacement of ribbon carrier A4

Remove carriage, top plate, segment cover plate A3 and ribbon. Remove cotter pin A8 on ribbon carrier. Remove segment binding screws and ease out segment A35 about 1/8 of an inch. The ribbon carrier can now be removed.

1/4b Removal and replacement of ribbon mechanism B32

Remove carriage, top plate, machine cover and ribbon. Remove retaining spring washer from pin of part B38 and lift off part B39. Remove retaining spring washer from part B8, disconnect link B10 and remove both binding screws from side plate. Ribbon mechanism can now be removed.

After replacement of new mechanism, ribbon feed pawl B42 and stop pawl B37 must be checked to assure that they are lifted clear of the teeth of the ribbon transport wheel B43. If necessary, reverse retaining spring must be readjusted (See Chapter 1/4f).

1/4c Removal and replacement of ribbon transport wheel B43

Remove top plate and ribbon spools. Remove retaining spring washer underneath part B41, and transport wheel can be pulled out.

1/4d Removal and replacement of ribbon feeding pawl B42

Remove top plate and ribbon spools. Remove retaining spring washer from top of feeding pawl and unhook spring.

1/4e Removal and replacement of ribbon reverse bracket B36

Remove top plate and ribbon. Remove retaining spring washer a from pin b, unhook spring d (See Fig. 6)

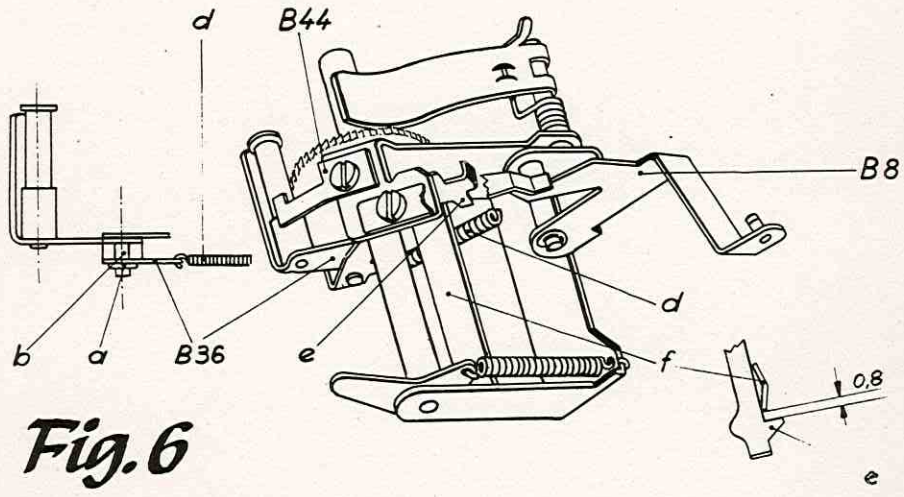


Fig. 6

and reverse bracket can be removed. During replacement of a new bracket, care must be taken that during the reversal, the edge e clears the pawl carrier f with a space of .020 in. Adjust is made by moving plate B44 (Fig. 6).

1/4f Removal and replacement of flat springs B5

Remove top plate and ribbon spools. Remove binding screws and springs can be removed or adjusted. Adjustment must be made, so that when flat spring is engaged in notch 2 of ribbon reverse arm B8, both pawls B42 and B37 are raised .040 in. by cam a from the teeth of the transport wheel B43. Tension is adjusted by bending flat

retaining spring B5. Pressure should be about 11/4 ounces measured at pin c.

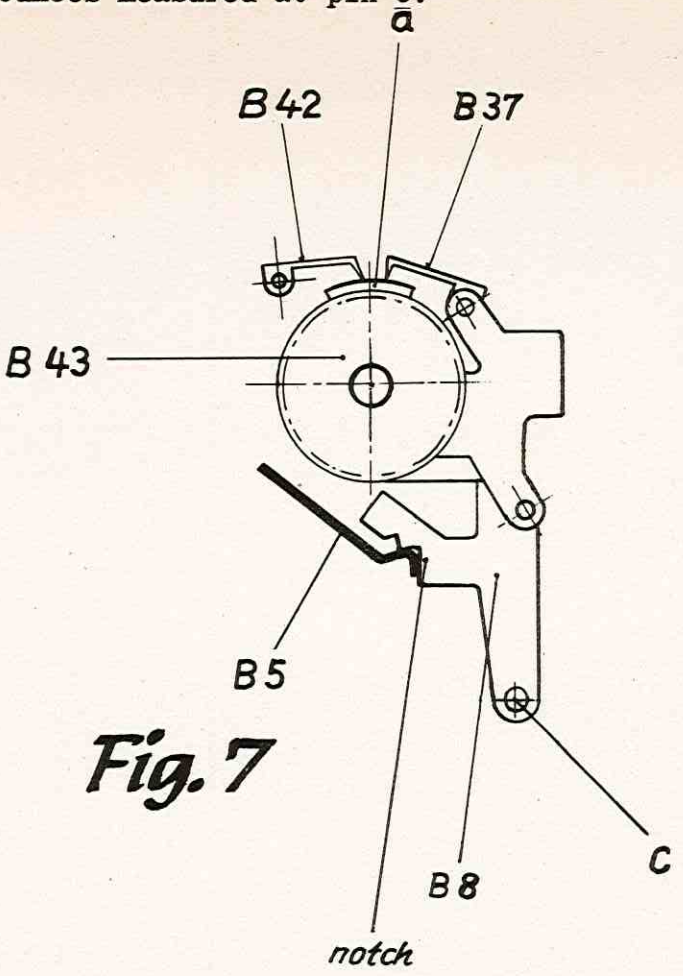


Fig. 7

1/5 Removal and replacement of ribbon color shift parts

1/5a Removal and replacement of ribbon color selector wheel A22

Remove top plate and front plate. Unscrew wheel shaft with wheel from side plate A23.
For adjustment see Chapter 1/5d.

1/5b Removal and replacement of shaft B45, arm B34 and link B46

Remove carriage, remove spring retaining washer from shift arm B34, remove spring retaining washer B55 from shaft B45 and spring retaining washer from pin of part B53, connected to part B46.
Press shaft with arm slightly to the right and remove to the left.
For adjustment see Chapter 1/5d.

1/5c Removal and replacment of lift arm B52

Remove carriage and shift ribbon to RED. Remove both spring retaining washers from part B53 and remove part B53. Remove spring retaining washer from pin B54, cotter pin A8 from ribbon carrier A4, unhook spring from lift arm B52 and remove lift arm.
For adjustment see Chapter 1/5d.

1/5d Adjustment of ribbon color shift

1. Ribbon color selector wheel turned to WHITE. By hand, slowly raise type bar to platen. The pin of part must engage exactly in the cut out of part B52. Adjustment is made by shifting part B30a in connection with part B33 after loosening screw B30.
2. Ribbon color selector wheel turned to BLUE. press shift lock for capital letters. By hand, slowly raise type bar to platen. The upper edge of the ribbon must be raised so that it is even with the upper edge of the type. Screw B51 is used for adjustment. At its highest position, the ribbon is stopped by screw B51. Allowable back lash is .010 in. and is adjusted on connecting link B48.
3. Ribbon color selector wheel turned to RED. Press shift lock for capital letters. By hand, slowly raise type bar to platen. The upper edge of the red section of the ribbon must be even with the upper edge of the type. Allowable back lash is .010 in. Adjustment is made by turning the eccentric plate a on the color selector wheel A22 after loosening screw b.
See Fig. 8

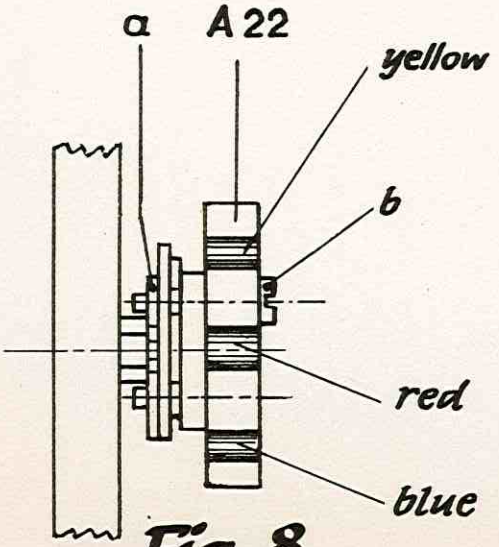


Fig. 8

1/6 Removal and replacement of space bar shafts and adjustment of space bar

1/6a Removal and replacement of space bar shafts B15 to B26

Remove carriage, top plate and machine cover. Disconnect all tabulator key levers B23 from parts B25, and remove parts B26 from parts B25 after removing spring retaining washers. Remove spring retaining washer from the pin of part B15 and remove part B16. Unhook spring B15b, loosen part B13a and remove both fulcrum screws B27a from side plate, which hold shaft of space bar. Place machine on one side and pull out space bar with shaft.
For adjustment see Chapter 1/6b.

1/6b Adjustment of space bar.

Adjustment can only be made when machine cover is in place. The escapement must trip when the space bar has completed 2/3 of its complete motion. Adjustment is made by shifting part B16 after loosening nut B15 a.
In the normal position of the space bar, the small tip of part D13 must be positioned in the slot of part D12a.
For adjustment of space bar in relation to escapement see Chapter 1/9c.

1/7 Removal and replacement of machine side plate

1/7a Removal and replacement of left side plate A23

Remove carriage, top plate, front plate and machine cover. Remove part A36 complete, and unhook spring A31. Remove ribbon spool and binding screws of ribbon mechanism. The ribbon mechanism itself may remain in the machine. Remove color selector wheel A22 by screwing out shaft screw. Remove retaining spring washer from shaft B29a and remove part B30. Remove nut from shaft A32 and unhook spring from carriage lock lever. Remove the 6 binding screws from the side plate and ease side plate from dowel pins.
Note: The ball bearing of the segment guide A30 will fall out.
Parts which remain on the side plate must be transferred to the new side plate.
When replacing a new side plate, special attention must be given to part A29, The ease of operation

and the correct functioning of the segment carrier are dependent on this part, because of the 6 degree tilt of the segment. Ring and platen must also be checked. See Chapter 1/8b.
When installing a new left side plate A23, the flat surface for the carriage guide pins and the support screw for the carriage must be adjusted so that they are level with the ones on the right side plate. For further adjustments see Chapter 1/8a.

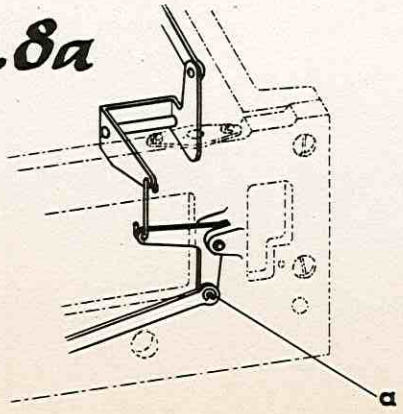
1/7b Removal and replacement of right side plate

The operation for removing right side plate is similar to that detailed in Chapter 1/7a. The only difference is that instead of the color selector wheel A22, the touch control wheel and bell crank lever must be removed.

1/7c Removal and replacement of back plate D3

Remove carriage and machine cover. Unhook springs from carriage lock levers. Remove retaining spring washers from pin E19b and E18b. Unhook spring E20 a and remove part E21a. Disconnect back spacer link by removing retaining spring washer a. Disconnect the links of space bar B16 and tabulator B26 under the tabulator blade lever housing D19 and remove the right side plate as detailed in Chapter 1/7b. Remove the binding screws from the left side plate. Remaining parts on old back plate must be transferred to new back plate.
Replacement of back plate: The new back plate must be installed so that it is exactly vertical. Its height must be adjusted so that the carriage rack precisely engages the pinion gear, i.e., not too deeply and without too much play.
Escapement trip must be checked, see Chapter 1/3a.
If plate D4a was replaced, the proper functioning of the back spacer must be checked, and can be adjusted by shifting plate D4a.

Fig. 8a



1/8 Adjustment of capital shift and ring and platen pressure

1/8a Adjustment of capital shift

The shift for capital letters must be so adjusted, that capital letters and small letters print evenly on upper as well as lower parts of the letters. The same applies to numbers, figures and punctuation marks. Adjustments can be made with adjusting screws A28 at left and right side of segment carrier C1. Care must be taken, that the wide heads of the adjusting screws evenly touch the motion block, regardless of wether left or right shift key is depressed. This is checked by holding a strip of paper between adjusting screw and motion block and depressing shift key. Check the eccentric segment lock A8a. When set correctly, the segment is locked in the basic position for small letters, and can not be pressed down by hand.

1/8b Adjustment of ring and platen pressure

The distance between type and platen must be .007 in. Types like the "0", Comma and Period should be set at a slightly greater distance. Insert a folded sheet of regular writing paper between type and platen and shift color selector wheel to WHITE. Raise type bar by hand and apply pressure directly against segment ring (See Fig. 9).

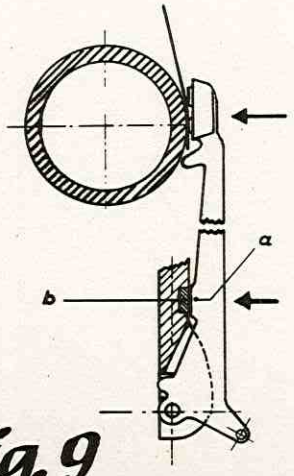


Fig. 9

Attempt to move paper between type and platen. If it is easily removed, the distance is too large. If it is removed by a steady and strong pull, the distance is correct. If it is difficult to remove, the distance must be increased. Adjustment is made by moving carriage rearward or forward by loosening plate a on carriage guide pins E3. Fig. 10

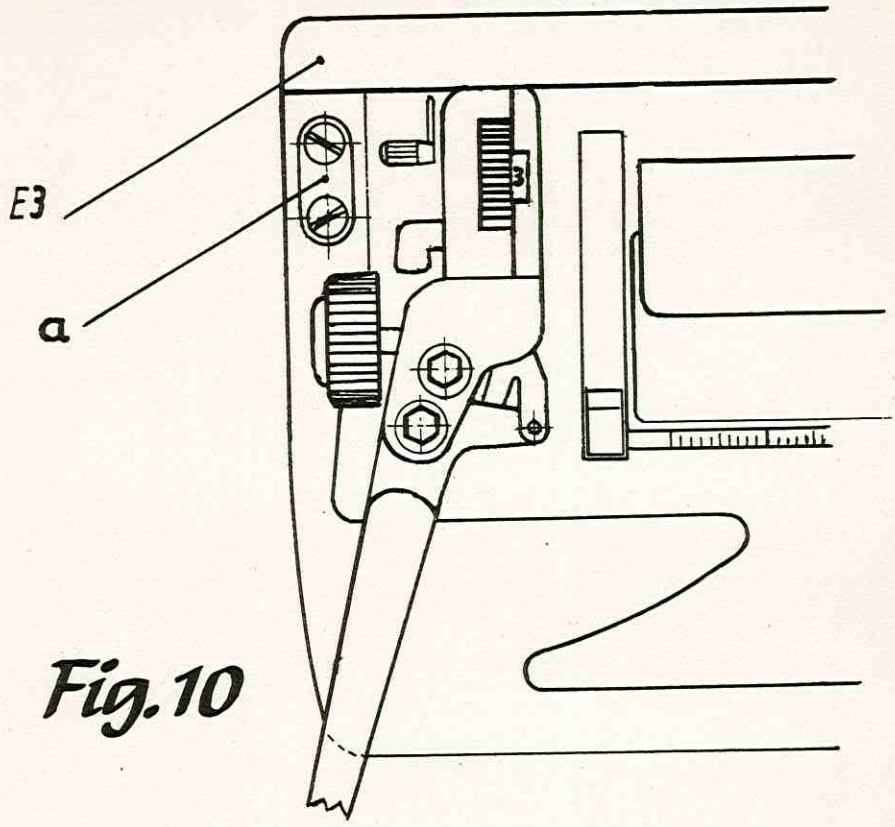


Fig. 10

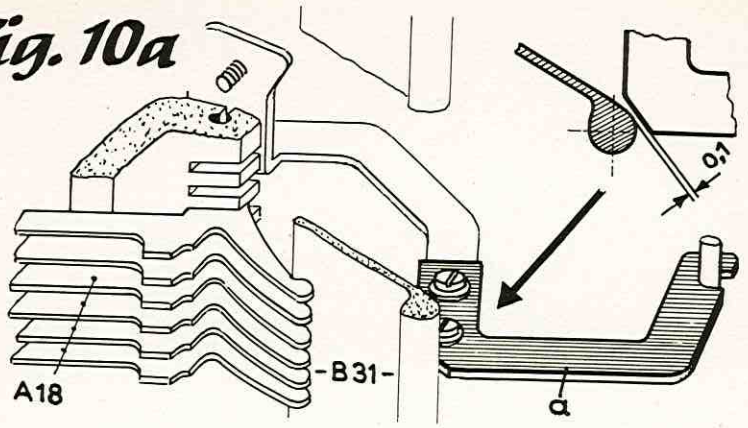
1/9 Removal and replacement of escapement D6, also disassembly and adjustment of escapement.

1/9a Removal and replacement of escapement D6

Remove carriage, top plate and back cover plate. Remove fulcrum screw D3a and unhook spring D5a. Lift back spacer arm and link from escapement housing D6. Remove both binding screws D18a from tabulator blade lever housing D19. Loosen nut D1a (only this nut should be loosened, otherwise the adjustments are altered. Press on the upper edge of the tabulator blade key lever housing, removing it from the back plate in a downward direction.

Remove nut and screw D16a which hold link D16, remove retaining spring washer from pin of part D13 and connecting link of space bar. Lift part D12 until screw D11a can be removed. Unhook springs D7a and D9a. Lock segment by depressing shift lock. Remove both binding screws of support bracket a (Fig. 10a)

Fig. 10a



and pull bracket out in a downward direction. Remove three binding screws on back plate and escapement housing, complete, can be removed in an upward direction.
Replacement Hints:
When replacing the tabulator blade lever housing it is advisable to insert a 1/8 in. steel rod between the springs to lift the blade levers. This facilitates the connection of the tabulator links. Fig. 11.
The spaced typing key must be depressed when replacing the escapement.

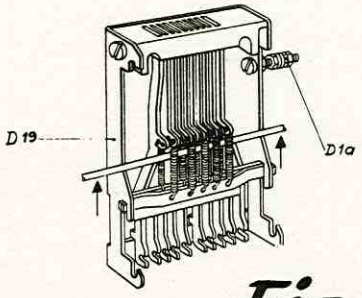


Fig. 11

When replacing the support bracket a, a space of .015 in. between bracket and universal bar B31 must be provided. Fig. 10a.
After replacement of escapement check adjustments as detailed in Chapter 1/9c and 3/5

1/9b Disassembly of escapement D6

After removal of the escapement housing, loosen nut of screw D6a a few turns and press screw partly out, (only this one nut should be loosened). Remove escapement wheel D1. When replacing the escapement wheel, the screw D6a must be so adjusted that the wheel turns easily and without play. Loosen pivot screw D18 (only on left side, in order not to alter original setting). Unhook spring D17 from pivot screw and lift out escapement rocker D15. When replacing rocker, care must be taken that part D9 is connected to D8 and tension spring D17a is inserted between rocker and housing. Loosen nut D6b and push out shaft D5. Press down lever D12 and pull out tabulator brake D7.
After assembly of escapement see Chapter 1/9c and 3/5 for adjustments.

1/9c Adjustment of escapement D6

1. The distance between the loose dog a and the rigid dog B is .10 in. when the loose dog is pressed against the buffer springs c. Adjustment is made with screw d.

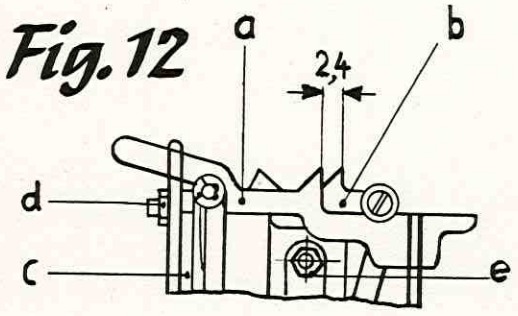


Fig. 12

2. The distance between the loose dog a and the rigid dog b is .08 in. Fig. 13. Adjustment is made with screw E. Fig. 12.

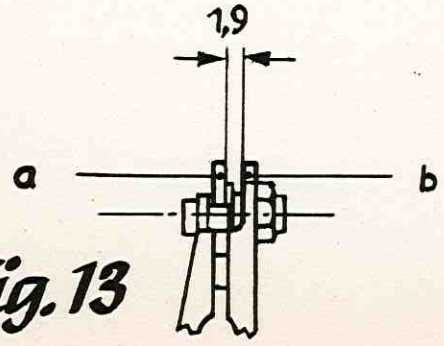


Fig. 13

3. In the basic position of the escapement rocker, the distance between the inner edge of the rigid dog a and the outer edge of the escapement wheel i is .008 in. Adjustment is made with nut g. Fig. 14.

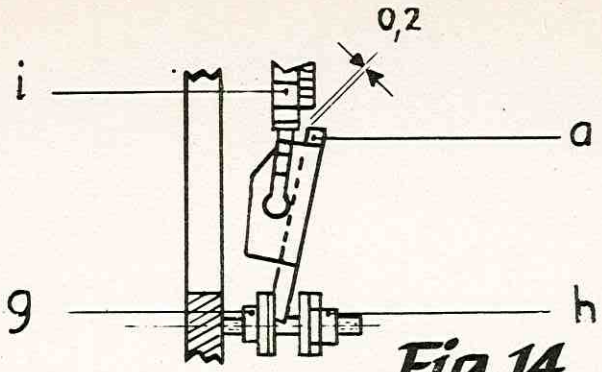


Fig. 14

4. In the depressed escapement position, the outer edge of the rigid dog a projects .004 in over the outer edge of the escapement wheel i. Adjustment is made with nut b Fig. 15.

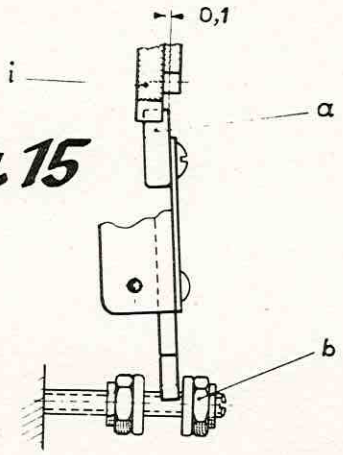


Fig. 15

5. For adjustment of the space bar escapement trip see Chapter 1/6b. For adjustment of space bar for spaced typing see Chapter 1/11a.

6. The tension of the spring D18b on rigid dog should be 17 ounces. Measurement is made on upper edge of rigid dog. See Chapter 10e.

7. Functions see Chapter 3/5

1/10 Removal and replacement of escapement parts

1/10a Removal of escapement wheel with silent carriage return

Remove carriage, loosen nut of screw D6a on escapement housing and lift out escapement whee. If parts of the silent carriage return are to be replaced, the retaining spring washer on

the shaft of the escapement wheel is removed and parts can be removed from the shaft. For proper operation of the silent carriage return, the friction washer D20 must depress the loose dog e sufficiently to enable the escapement wheel to turn freely. Fig. 16. When replacing the escapement wheel, the pivot screw D6a must be so adjusted as to enable the escapement wheel to turn freely without play.

1/10b Removal and replacement of escapement rocker D15

Remove carriage and proceed as detailed in Chapter 1/10a. Loosen pivot screw D18 on left side of escapement housing and unhook spring D17 from pivot screw D18. Remove escapement rocker in an upward direction. When removing the rocker care must be taken that spring D17a is not lost of forgotten during the replacement of the rocker; also that part D9 is connected to part D8. The rocker pivot screw D18 must be so adjusted as to enable the rocker to move freely and without play.

1/10c Removal and replacement of tabulator brake

Remove carriage and escapement wheel as detailed in Chapter 1/10a. Loosen nut D6b and pull screw up. Push shaft D5 out part way, unhook spring D7a and remove pin D11a from slot of lever D12.

Remove tabulator brake in an upward direction.

1/10d Removal and replacement of loose escapement dog.

Proceed as detailed in Chapter 1/10b. Remove retaining spring washer a, pull lever b from shaft c and unhook spring d. Remove loose dog e. Figure 16.

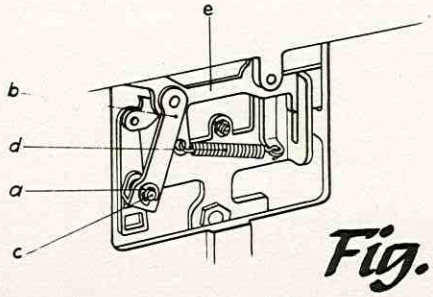


Fig. 16

1/10e Removal and replacement of rigid escapement dog on flat spring D18b

Remove escapement rocker as detailed in Chapter 1/10b. The rigid escapement dog is removed from the flat spring by removing the binding screws. If it is necessary to replace flat spring D18b, remove it from the rocker. Replacement of flat spring D18b is only necessary when it does not

possess the required tension or when its proper function is otherwise impaired. The tension of the flat spring can be measured from the upper point of the rigid dog. The pressure to raise the spring from the adjusting screw e (Fig. 12) should be at least 17 ounces. See adjustment of escapement. Chapter 1/9c.

1/11 Adjustment of spaced typing, tabulator brake, escapement trip and shift lock.

1/11a Adjustment of spaced typing

During normal operation of escapement, the lever D10 lies above the universal bar B31. When the spaced typing lever is depressed, spring D9a pulls lever D10 into the universal bar.

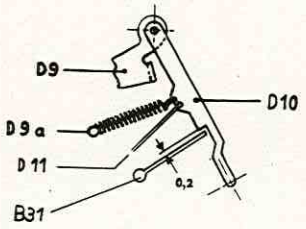


Fig. 17

A subsequent depression of a key lever causes the motion of the universal bar to be transmitted to the levers D10, D9 and D8, permitting the loose escapement dog to travel twice its normal distance. For proper operation it is important that when the spaced typing key lever is depressed, the universal bar B31 lies against the cut out of lever D10. Adjustment is made by bending the connecting wire D11. The loose escapement dog should trip when the type bar is at an angle of 45 degrees to the platen. Adjustment is made with screw D8 which is loosened and shifted in the slot of part D9.
For spaced typing on space bar, the wide surface of D13 must slide in the slot of part D12a. Fig. 18.

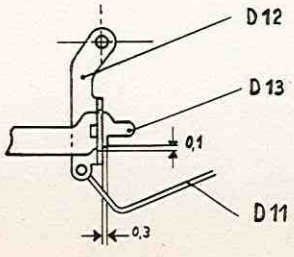


Fig. 18

1/11b Adjustment of tabulator and brake

When a tabulator key is depressed, the parts D12 and D16 are pulled down. The action of the lever D12 must be so adjusted that the pinion of the tabulator brake D7 engages in the pinion gear of the escapement wheel D1. The teeth should mesh to 2/3 of their depth. Adjustment is made with screw D11a. At the same time, lever D16 depresses the loose escapement dog enabling the escapement wheel to turn freely.

1/11c Adjustment of escapement trip action

See Chapter 1/3a

1/11d Adjustment of shift lock

When the shift lock key A19b is depressed, the shift lock pawl A19c hooks securely to plate B27 and remains in this position when pressure on key is released. Small and capital letters must be in perfect alignment and a moderate pressure on left shift key must release shift lock faultlessly.

1/21 Removal and replacement of paper guides and paper feeding parts

---

1/21a Removal and replacement of platen

Unscrew platen knobs F9 & F29,
(both platen knobs have right hand thread).
Pull out the right knob with shaft, move the carriage to the right and remove the platen from the left shaft. Tools WSG12a and WSG12b are useful in loosening the platen knobs.

1/21b Removal and replacement of paper pan F25

Remove platen, (See Chapter 1/21a). Unhook spring F21 from paper pan F25 and lift pan out. When replacing the paper pan, the feed rollers F17 & F15 must be centered in the cut outs of the paper pan and the pan must move freely.

1/21c Removal and replacement of feed rollers F17 & F15

After performing operations detailed in Chapters 1/21a and 1/21b feed rollers can be removed.

1/21d Removal and replacement of paper guide plate F36

Loosen screws of parts F3a, lift guide plate F36 and bail rod, and pull out parts F3a. Return paper guide plate to its normal position and push it to the left until plate disengages from pin. Lift guide plate out to front. When replacing the paper guide plate, a space of .008 in. must remain between paper guide plate and platen. Adjustment is made on parts F3a.

1/21e Removal and replacement of paper table F23a

Raise paper guide plate, remove screw F21a and lift out paper table. It is not necessary to remove platen.

1/21f Removal and replacement of paper bail F5, F13 & F2a

Remove platen, paper table F23a and paper guide plate F36. Unhook spring F34a, left and right, and loosen screws F26a and F9a. The complete paper bail assembly can now be removed in an upward direction.
Replacement:
Bracket F4a must be so placed, that paper guide plate F36 and paper bail rod F13 are parallel to platen. Adjustment is made on brackets F4a.
If paper bail scale and margin stop scale do not correspond, the paper bail rod can be moved by loosening screws on part F8a on bracket F5.

1/21g Removal and replacement of paper bail rod F13

Lift brackets F5 with paper bail rod. Remove screws underneath the brackets F5 and bail rod F13 can be removed.
For replacement see Chapter 1/21f.

1/21h Removal and replacement of bail rollers and bail roll covers F17a

After removing bail roller rod from one side of bracket F5 (Chapter 1/21g) slide off paper bail rollers from rod.

1/21i Removal and replacement of knob F8 on bracket F5 of bail roller rod F13

Lift bail roller rod and remove screw underneath part F8.

1/21j Removal and replacement of bracket F5 of paper bail rod F13

Lift paper bail, unhook spring F34a on pin F34b.

Remove retaining spring washer from bearing pin F34d and push out bearing pin. Remove binding screw from part F8 on bracket F5 and bracket can be removed.

1/22 Removal and replacement of line spacer parts, and variable line space mechanism and adjustment of line spacer.

1/22a Removal and replacement of line space lever G5

Remove nut G4a and screw G3a. Remove retaining spring washer from bolt G4b and remove line space lever G5. When replacing the line space lever, the two washers on shaft screw G3a must be placed underneath part G2.

1/22b Removal and replacement of variable line space mechanism G9 and shaft.

Remove lever F32, F33 and left side carriage end cover F31a. Pull ratchet release lever F31 forward. Unscrew left platen knob G13, including ratchet wheel G6 and shaft F26 from carriage end G1. Loosen screw on spacing ring. Part G10 may have to be pushed down with screwdriver.

1/22c Removal and replacement of link G4 on line space lever

Remove left carriage end cover F31 and variable line space mechanism. See Chapter 1/22b. Remove retaining spring washer G4b from pin of link G4 and unhook link from part G17.

1/22d Disassembly of variable line space mechanism G9

For removal see Chapter 1/22b. Unscrew and remove variable push button G14 and tension spring from shaft F26. Pull off platen knob G13 and remove parts G9 and G6 from shaft, F26. Remove both clutch pawls a from part G9.

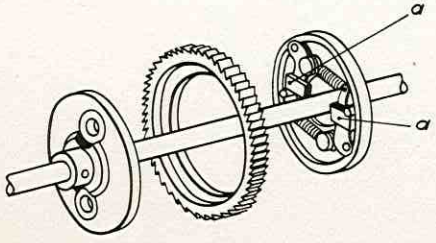


Fig. 19

1/22e Removal and replacement of ratchet detend G10

After performing operation detailed in Chapter 1/22b, remove retaining spring washer G11a from shaft G12. Push down and unhook spring G11 from detend G10 and

1/22f Removal and replacement of roller G7 of detend arm.

Remove left side carriage end cover F31a. Pull ratchet release lever F31 forward and remove retaining spring washer G8a from shaft G8. Ease out shaft G8 and remove roller G7.

1/22g Removal and replacement of line space indicator G22

Remove left side carriage end cover F31a. Remove retaining spring washer G20 from shaft of part G19. Remove screw G21 and line space indicator G22. When removing indicator care must be taken not to loose ball bearing and tension spring inside of indicator.

1/22h Removal and replacement of sublever G17

Remove left side carriage end cover. Remove retaining spring washers G18 and G16b. Ease sublever G17 from shaft and unhook from link G4.

1/22i Removal and replacement of bracket G15 and line space pawl, complete

After performing operations detailed in Chapter 1/22b and 1/22h, remove screw G16 and unhook spring G16a. Remove line space bracket including pressure pin G15 and line space pawl from shaft bushing. When replacing, adjust as directed in Chapter 1/221

1/22k Removal and replacement of eccentric roller G12

Remove left side carriage end cover F31a. Remove nut G14a from shaft pin and ease eccentric roller G12 from pin. When replacing adjust as directed in Chapter 1/221

1/221 Adjustment of line spacing

Set line space indicator on position "1". When operating the line space lever G5

1 the line space pawl must engage between two teeth of the ratchet wheel G6, advancing the wheel two spaces.

2 the line space pawl must be locked by the eccentric roller G12 when spacing action is completed. When releasing line space lever, pawl must be raised free of teeth of the ratchet wheel.

3 the ratchet detend roller lies firmly between two teeth at the completion of the line spacing action and

4 the short arm of the line space lever G5 must

be .008 in. from the eccentric nut of screw G3 at the completion of the spacing action.

Adjustment for 1 - loosen screw G16 and shift parts G19 and G14b.
Adjustment for 2 & 3 - loosen nut G14a and turn eccentric roller G12
Adjustment for 4 - turn eccentric nut and screw G3.

1/23 Removal and replacement of margin stop rack F38, margin stops F37 and carrier for flat spring F1.

1/23a Removal and replacement of margin stop rack F38

Remove paper table F23a (Chapter 1/21e). Remove both screws F3b and ease rack from dowel pins.
Replacement:
Set the left side margin stop against center block E6. Lock margin stop in rack. Now move the margin stop rack to the left or right until the following distance is achieved between center block a and margin stop b. Fig. 20.

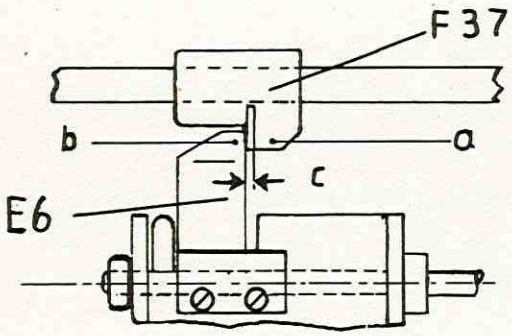


Fig.20

This distance is necessary for back lash.

Pica	-	.100	to	.105	in.
Elite	-	.080	to	.085	in.
Micro	-	.055	to	.060	in.

If the lines of the plastic pointer F1a on the margin stop F37 and the lines on the scale F3 do not correspond, the pointer F1a can be moved by loosening screws a. Fig. 21

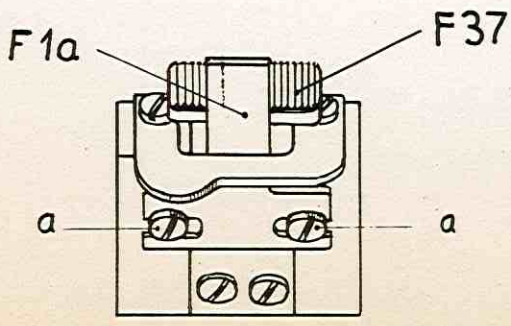


Fig.21

1/23b Removal and replacement of margin stops F37 & F2

Margin stop rack removed as detailed in Chapter 1/23a. Slide margin stops from rack. Reset as detailed in Chapter 1/23a.

1/23c Removal and replacement of carrier F3 for flat spring F1

Remove paper table F23a and margin rack F38 as detailed in Chapters 1/21d and 1/23a. Remove binding screws and remove carrier in an upward direction.

1/24 Removement and replacement of carriage release rod F19a, carriage rack F22 and tabulator rack E32

1/24a Removal and replacement of carriage release rod F19a

Remove tabulator clear lever F33 and carriage release lever F6 from right side carriage end. Remove right side platen knob F9 from shaft F11 and right side carriage end cover. Unhook springs F7a on both sides of carriage release rod F19a. Loosen nut and unscrew pivot screw until carriage release rod is freed.
Replacement:
The carriage release rod must have a little play between pivot screws.

1/24b Removal and replacement of carriage rack F22

Remove binding screws F13a on both sides with offset screwdriver and ease rack from dowel pins.
Replacement:
When a new carriage rack is to be installed the dowel pins of the old one must be removed. The new rack must be attached securely. The screw holes in the rack are large enough to allow adjustment in all directions. The carriage rack must engage the pinion gear with a little play. Disconnect drawband and move carriage to left side, right side and center to check for binding.

1/24c Removal and replacement of tabulator rack E32

Remove tabulator clear lever F33, carriage release lever F6 and F32 , platen knobs and both carriage end covers. Remove parts E34 and E35 from shaft E33. Remove screws E32a on both sides and ease tabulator rack from dowel pins.
Replacement:
The height of the tabulator rack must be so

adjusted, that when tabulator stops are pushed down, they clear the guide plate D19 of the tabulator blade levers. When a tabulator key is depressed, the blade lever should engage the tabulator stop to a depth of .10 in. Lateral adjustment must be made so that tabulator setter and clearer engage the center of the tabulator stop.

1/24d Removal and replacement of tabulator stop E30

Remove parts as detailed in Chapter 1/24c. The tabulator rack E32 need not be removed. Ease out shaft E33 and any tabulator stop can be exchanged individually.

1/24e Removal and replacement of spring plate E31 on tabulator rack E32

Remove tabulator rack as detailed in Chapter 1/24c. Remove plate E33a and spring plate E31 can be removed.

1/25 Removal and replacement of inner carriage E38 and carriage rails E2 and E39

Remove carriage back cover, unhook drawband and hook onto part E29. Loosen screw on spacing ring E24 and remove shaft E25. In order not to alter the adjustment of shaft E25, it is advisable to mark the position of the spacing ring E24 on the shaft E25. Remove screws E28a. and screw E25a and ease bearing plate E28 from its dowel pins. Remove the inner carriage to the right. When replacing the inner carriage, the ball bearing separators are so placed, that the pinion of the separator is in the first hole of the carriage rail. Push inner carriage, with separators, onto carriage rails. Carriage should move easily, but without play, on rails E2 and E39. Adjustment is made with screws E14 after loosening screw E40. When this operation is performed on the long carriage with four ball bearing separators, they must be so placed that they are not visible when the carriage is moved to the extreme left or right. See Chapter 3/6.

1/25b Removal and replacement of carriage rail E2 or E39

Remove carriage back plate and inner carriage as detailed in Chapter 1/25a. Remove two screws E40, left and right, and remove carriage rail. For adjustment and replacement see Chapter 1/25a and 3/6.

2/1 Type does not print when key lever is depressed

Cause 1: Connecting link A17 is disconnected from key lever A18.

Check if pin on key lever A18 is loose or bent; if flat spring on key lever A18 has sufficient tension, or if it is cracked.
See Chapter 1/1d.

Cause 2: Type bar connecting wire A14 broken or disconnected.

If necessary, replace connecting wire. Check if wire is bent correctly and does not bind in type bar or sublever.
See Chapter 1/1a.

Cause 3: Ring and platen not adjusted correctly.

Adjust distance as per Chapter 1/8a.

2/2 Type bar sticks, does not return.

Cause 1: Type bar bent, sticks in type guide.

Cause 2: Type bar connecting wire A14 collides with adjoining wire.

Cause 3: Dirt in slot of segment A35.

Cause 4: Spring A15 on sublever A17 or spring A10 on key lever A18 disconnected.

2/3 Carriage does not move when tabulator key is depressed.

Cause 1: Tabulator connecting link B26 disconnected.

Check if there are retaining spring washers on both pins of Part B25 and if pins are loose. Part B26 must be connected to the release bracket underneath guide plate D19 and secured with retaining spring washers. See Chapter 1/1e.

Cause 2: Loose escapement dog, (Fig. 12, Chapter 1/9c), is not depressed far enough by Part D16.

See that pin, riveted to Part D16, is lying on top of the loose escapement dog and that part D16 presses down sufficiently to release the loose dog from the escapement wheel. With depressed tabulator key, the loose escapement dog should be .015 in. from the escapement wheel. This space is adjusted with screw D16a.

Cause 3: Tabulator brake D7 interferes with escapement wheel D1.

When tabulator key is depressed, the pinion of the tabulator brake D7 should engage the escapement wheel gear to 2/3 its width and 2/3 its depth. Lateral adjustment is made by shifting bearing shaft D5; vertical adjustment on screw D11a.
If the tabulator brake friction is too great, a cork washer may be removed from the brake. Chapter 1/10c.

2/4 Carriage skips over set tabulator stop.

Cause 1: Connecting link B26 disconnected. Chapter 1/1e.

Cause 2: Part E26 must be aligned exactly with tabulator stop.

Cause 3: The motion of part E26 is too short.

Part E26 must push tabulator stop out fully.
Adjustment is made on adjusting screw of part D19c.
Between part E26 and the cleared tabulator stops E30, there must be a space of .02 in. when E26 is released.

2/5 **Individual tabulator stops do not clear.**

Cause 1: Clear lever D19b does not meet tabulator stop E30.

Clear lever D19b must meet tabulator stop at its full width. Tabulator rack may have to be moved. Chapter 1/24c.

When adjusting the tabulator stop rack, it should be checked with individual clearer.

Cause 2: Tabulator stop E30 is not arrested by spring plate E31.
See Chapter 1/24e.

2/6 **Carriage does not move when space bar is depressed.**

Cause 1: Space bar does not trip the escapement, because connecting link B16 is disconnected from pin of part D13. Connecting link must be secured with retaining spring washer.
The escapement should trip when the space bar is depressed 2/3 of the way. Adjustment is made on screw B15a of part B16.

See Chapter 1/6b and 3/1.

2/7 Carriage does not move or stops during typing.

Cause 1: Trip adjuster C10 too far from escapement D15.

Check if projection on type bar A33 reaches and moves universal bar C6 in direction of carriage; also if flat spring D18c on escapement rocker D15 is bent. The space between spring D18c and its binding nut must be .035 in. Check if trip adjuster C10 is in proper position. Adjust trip adjuster C10 and tighten screws C8. Trip adjuster C10 must push escapement rocker D15 completely out of escapement wheel D1.

Cause 2: Universal bar C6 binds.

Check if springs C3 on both sides are connected; also if ball bearings C9 at both sides of universal guide C11 allow the full movement of the universal bar C6 together with trip adjuster C10. One of the bearing separators C9 may be out of position, binding the movement of universal bar C6.

Cause 3: Escapement rocker D15 does not return to original position.

Check if escapement rocker D15 moves easily without play between pivot screws D18; if tension spring D17a is in place; and if part D14a is properly adjusted. See Chapter 1/9c-3.

Cause 4: Carriage rack is not straight and engages too deeply in pinion gear of escapement wheel D1.
Chapter 1/24b.

Cause 5: The ball bearing separators in upper carriage guide E2 on lower carriage guide E39 are jammed or damaged. If necessary replace separators or damaged carriage guides E2 or E39.
Chapter 1/25b.

In addition to the above, check that carriage moves freely and without play.Chapter 3/6.

2/8 Alignment is uneven.

a) Letters are uneven or print unevenly.

If the impression of the letters is too dark, either in the upper or lower part, it can be assumed that the types do not strike the platen at the correct angle. Chapter 1/8a.

Check if eccentric bolts A8a are so adjusted, that segment carrier is limited by capital adjusting screws A28, and segment is locked when in basic position.

b) Capital and small letters are not aligned.

First check whether capital letters or small letters are out of alignment, then adjust segment shift as detailed in Chapter 1/8a.

c) Ring and platen pressure is too great or too light.

Adjust as detailed in Chapter 1/8b.

2/9 Space between letters is uneven.

a) In a word.

Cause 1: Main spring tension too light.

Cause 2: Carriage binds.

Cause 3: Too much friction in silent carriage return.

Cause 4: Uneven touch.

To remedy above causes, check all functions as detailed in Chapter 1/24b and 3/6. If all these adjustments are in order, then it must be assumed, that the uneven touch of the typist, typing at a rate of over 22 strokes per second, is the cause.

b) At the beginning of a word.

If the first two letters type together, after depressing the space bar, the adjustment of the escapement wheel must be checked to assure that it travels its full distance. Or the space bar trip may not release correctly and should be adjusted as detailed in Chapter 1/6b. See also Chapter 3/1.

c) At the beginning of a line.

In this case there is no malfunction of the machine, the typist has struck the first letter before the carriage had returned to the starting position.

2/10 Machine skips.

Cause 1: The escapement is not adjusted properly. Chapter 1/9c.

Cause 2: Insufficient tension of flat spring of rigid escapement dog. Chapter 1/10e.

Cause 3: The typist depresses the key lever A18 with a sluggish touch, holding the key down too long in its lowest position. Being unable to return to its basic position, the type bar A33 bounces back against the universal bar causing a second tripping of the escapement. Since the type bar does not have the momentum to print a second letter, it give the appearance that the machine has skipped.
The typist should be advised to use a short, staccato touch. If typist is dissatisfied, the distance between loose and rigid escapement dog can be reduced, (Chapter 1/9c-2) and tension increased on main spring C 3.

2/11 Spaced typing does not function.

2/11a With spaced typing key depressed, machine does not type spaced.

Cause: Adjustment incorrect. See Chapter 1/11a.

2/11b Without spaced typing key depressed, machine types spaced.

Cause: 1-Adjustment incorrect. See Chapter 1/11a.

2-Error made during removal and replacement of escapement.

During replacement of escapement the spaced typing key was not depressed, Chapter 1/9a, therefore the universal bar B31 transmits its motion to lever D10 at every touch, causing constant spaced typing.

2/11c With spaced typing key depressed, spacing is uneven.

Cause 1: Adjustment incorrect. See Chapter 1/11a.

Cause 2: Rate of typing too great for spaced typing.

Considering that the carriage must move twice its normal distance, the typist must reduce the typing speed to allow the machine to function correctly. Check carriage for free movement and normal tension of main spring. See Chapters 3/1 to 3/5.

2/11d Spaced typing functions when type bar is depressed, but not when space bar is depressed.

Cause: Lever D13 is not engaged in slot of part D12a. Chapter 1/11a, Fig. 18.

2/12 **Line lock does not function.**

Cause: Key lever lock bar does not swing far enough. Check if nose part on right side margin stop F2 pushes center block E6 far enough to swing the key lever block bar B11a. One space before the key lever block bar B11a is placed underneath the lock hooks of key levers A18, the nose part of margin stop F2 must engage the center block E6, Fig. 22, to swing the key lever block bar B11a to a distance of .025 in. between its front edge and the lock hooks of key lever A18. Fig. 23.

Adjustment is made on nose part a on margin stop Fig. 22. If necessary, adjustment can be made on connecting wire E10. Check if spring E19c is connected and part E19 is correctly set underneath shaft E12.

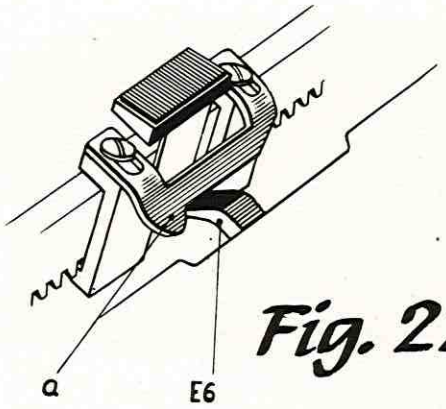


Fig. 22

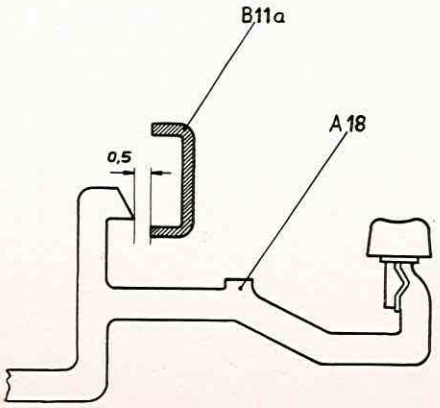


Fig. 23

2/14 Type bar return lever does not function.

Cause 1: The screw bolt which is placed in the long slot of the return key lever is set incorrectly, and does not reach the universal bar, B31.

For returning type bars that are stuck at the platen, it must be noted that the return lever A6 engages the universal bar first, before the screw bolt on the return key lever touches the universal bar B31.

Cause 2: The type bars are not only stuck, but are crossed. In this case they cannot be released by the return key, because they become locked in this position.

2/15 **Ribbon transport does not function.**

Cause 1: Ribbon transport wheel B43 is moved ahead only one tooth.

The transport arm B38 on universal bar B31 must be adjusted so that the transport pawl B42 moves wheel B43 two teeth ahead. An overpull of 1/2 tooth is in order.

Cause 2: Transport wheel B43 does not turn.

Check if tension spring of transport pawl is connected. Also check spring on detend pawl B37.

2/16 Ribbon does not reverse.

Cause 1: Flat detend springs B5 have too much tension. Chapter 1/4f.

Cause 2: Part B7 does not reach the orbit of part B8a, but is stopped by the notches of lever B6.

By shifting detend spring B5, the movement of part B7 is changed bringing it into the orbit of part B8a.

Cause 3: Transport and detend pawls B42 and B37 are simultaneously engaged in both transport wheels, B43.

During the reversing of the ribbon, the transport and detend pawls of one side of the ribbon mechanism must disengage, before the other side engages the teeth of the transport wheel. This is accomplished by cam a, Fig. 7, Chapter 1/4f. The action of cam a is dependent on the connecting links B10, which must be adjusted so that both pawls are lifted out of the teeth of the transport wheels .035 in. Check that cam a fully engages transport and detend pawls on both mechanisms and that detend spring B5 permits the full motion of the connecting links.

2/17 Ribbon color selector does not function.

2/17a Ribbon vibrator is raised when selector wheel is set on WHITE.

Cause: The pin of part B53 does not engage in the corresponding notch of part B52.
See Chapter 1/5d for checking and correction.

2/17b When using a two color ribbon and selector wheel is set on BLUE, underscoring prints RED.

Cause: The adjustment of part B48 is faulty.

See Chapter 1/5d for correction.

2/17c Selector wheel is set on BLUE and upper part of the letters does not print.

Cause: Adjusting screw B51 stops the motion of part B52 too soon.

See Chapter 1/5d for correction.

2/17d Selector wheel is set on RED and underscoring does not print.

Cause: Adjusting screw B49 stops the motion of part B52 too late.

See Chapter 1/5d for correction.

2/30 Paper can not be inserted, paper does not feed straight.

2/30a Paper can not be inserted.

Cause 1: Platen or feed rollers are too smooth, paper slips.

Roughen platen or feed rollers with fine emery cloth, or if necessary, recover platen and/or feedrollers.

Cause 2: Feed rollers do not turn freely on shaft.

Shaft and bushings of feed rollers must occasionally be cleaned with benzine and lightly oiled. Feed rollers must fit freely into the cutouts of the paper pan F25. Rear feed rollers F15 must be correctly placed in bearing arms F18.

Generally speaking, when many copies are to be inserted in the machine, the use of a folded paper jig, combined with use of the paper release lever, will be found to be very helpful. If glued forms are to be inserted constantly, it may be necessary to readjust the pressure of the rear feedrollers. Chapter 3/7.

2/30b Paper does not feed straight.

Cause: The pressure of the feed rollers F15 and F17 is too heavy on one side, or feed rollers are not rolling free on shaft.

Adjust feed roll pressure, or clean shaft. Chapter 3/7

2/31 Original sheet slides, paper tears.

2/31a Original sheet slides over copies.

Cause: The pressure of feed rollers F15 and F17 does not correspond with the pressure recommended in Chapter 3/7.

Check paper pan F25 for burrs, twists or bends.

2/31b Papier tears.

It must first be determined if the paper tears during insertion into carriage or during operation of the line space lever.

Cause 1: Paper pan F25 is burred.

Check if feed rollers have shifted and are not centered in cutouts of paper pan. This may cause the corners of the paper to catch in the cutouts, tearing the paper.

Cause 2: The distance between aligning scale A37 and platen is too great. This may cause paper to be fed against rollers of paper bail F13 instead of under them. Adjust distance between aligning scale and platen to .008 in.

Cause 3: The distance between the upper edge of the aligning scale A37 and the bail rollers F17a of the paper bail F13 is too great, causing paper to be fed against rollers. The paper bail rollers should be as close as possible to the upper edge of the aligning scale, but not hindering the free movement of the carriage. Adjustment is made on bracket F4a.

Cause 4: A corner of the paper is cought in card holder A1.

This may occur when typing on the extreme upper or lower edges of letters or filing cards. It is suggested that card holder 7/9027-50.1, which is specially designed for this purpose, be used.

2/32 Paper is creased, carbon marks on paper.

2/32a Copies and carbon paper are crease.

Cause: Pressure of feed rollers F15 and F17 is too great, (occurring especially when onion skin paper is used). Feed rollers are out of round, or feed roll shafts are bent. It may be necessary to grind or replace feed rollers and/or straighten shafts.
See Chapter 3/7 for correction.

2/32b Carbon paper lines on copies.

Cause 1: Pressure of feed rollers F15 or F17 is too great. See Chapter 3/7.

It is important to take into consideration the number of copies to be typed. If the pressure is reduced too much, the paper may slip when fewer copies are typed on the same machine.

Check if feed rollers are swollen from typing stencils or if rubber of feed rollers is loose on its core.

Cause 2: If after erasing, the paper bail is allowed to slam onto the platen, it will cause carbon marks on the copies.

The typist should be instructed to replace the paper bail gently. If this does not correct the condition, rubber covered bail rollers should be substituted for the metal rollers.

2/33 Line spacing is uneven.

Check adjustment of line space mechanism. Chapter 1/22 L.

Check if line spacer G6, line space pawl G2a or detend roller G7 are worn. Replace as detailed in Chapter 1/22.

2/34 Left side margin is uneven.

Cause 1: Distance between left side margin stop F37 and center block E6 is not correct.

See Chapter 1/23a

Cause 2: The typist has struck the first letter of the new line before the line space lever has been released, and before the carriage has returned to the starting position.

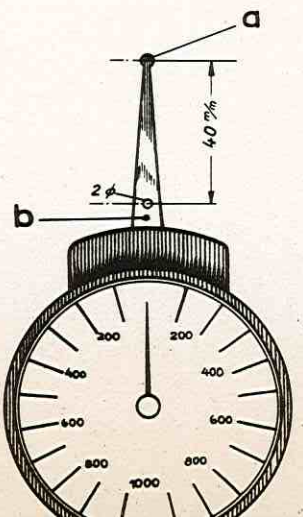
Functional Forces

The following statement summarizes the essential functional forces indispensable for faultless operation which the repairing mechanic is able to check or to adjust.

In order to obtain exact measurements the procedure of measuring the various functions has been explained. These measurements are based on the use of a dial test indicator. It should be noted that in taking measurements the indicator arm b should always be kept vertical to the direction of measurement and that furthermore only the indicator ball a at the end of the indicator arm should have contact to the point of measurement. If also the indicator arm b has contact to the surface of measurement, incorrect values of measurements caused by the reduced momentum of lever would be unevitable. It is also suggested to repeat three times each action of measurement and to use the medium value obtained. Measuring should always be carried out with equal speed of operation, i.e. no acceleration or retardation is to occur during measuring operations, as this too would be of considerable influence to the measured values. Experience has shown that the speed of measurement is slightly slowing down just before the end of the measuring cycle, thus preventing a sudden impact. Therefore the amplitude of dial reading should be kept observed during the complete measuring cycle.

Some measured values ranging above 1000 g exceed the limit of measurement of the normally used dial test indicators up to 1000 g inclusive. However this type of dial test indicators may be adapted accordingly by boring a hole of 2 mm (=o.o7874o in.) dia. into the indicator arm b at a distance of 40 mm (= 37/64 in.) from the center of indicator ball a and by suspending a wire hook therein. Thus the limit of measurement is redoubled. I.e. a dial reading of 100 g then corresponds to an actual value of measurement of 200 g.

If no details regarding tolerance limits are stated in this chapter, a plus or minus limit of 10 percent of the nominal value may be considered normal.



3/1 Space Bar

The force requrired for full depression of space bar (B17) should not exceed 180 g if carriage is in home position. Under a load of 130 g space bar still has to return to rest position from the lowermost point.

3/2 Capital Shift

The force required for applying capital shift should amount to 400 g $\pm$ 50 g. The indicator ball of the dial test indicator is placed to the center of shift key top (A 19d). Reading should be taken before reaching the lowermost position of shift key lever.

In this connection the friction on the segment carrier (C 1) is still important. Friction is still in permissible limits, if segment (C 1) under a load of 300 g and under correct adjustment of shifting force returns to home position thus ensuring interlocking of segment.

3/3 Automatic Ribbon Mechanism

3/3a Ribbon Feed Reverse Actuator

Reversing Force of each automatic ribbon mechanism (B 32) should be appr. 35 g.

Measurement to be taken on the pin of lever (B 8) (see fig. 1).

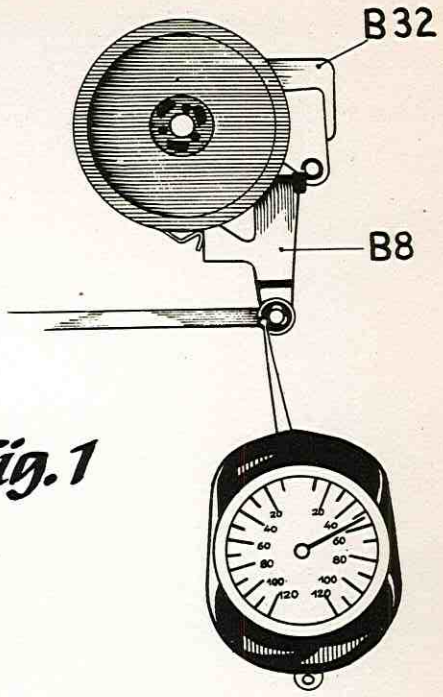


Fig. 1

3/3b Ribbon Feed Limit Links (B 32a) of automatic ribbon mechanism (B 32)

The press-on load of a ribbon feed limit link to the automatic ribbon mechanism should be appr. 40 g. Measurement to be taken by applying the dial test indicator to the lift-off cam of ribbon feed limit link, and dial reading being taken when ribbon feed limit link leaves the ribbon coil (see fig. 2).

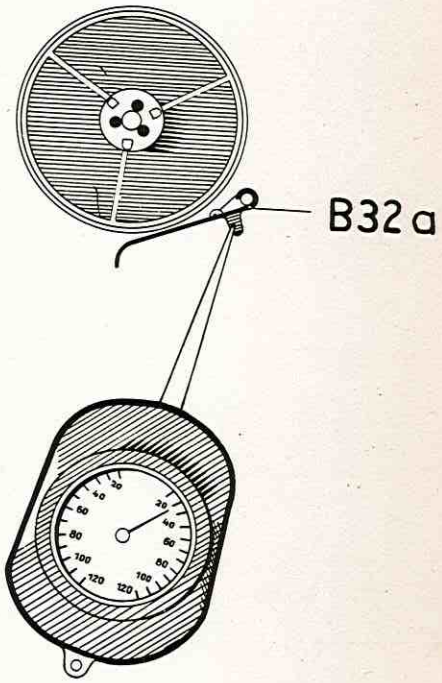


Fig. 2

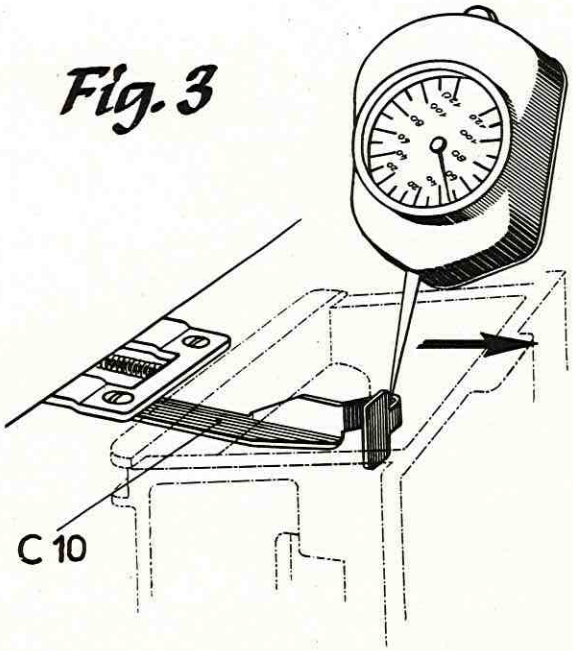
3/4 Escapement Trip

3/4a Universal Bar (C 6)

Spring load of universal bar (C 6) should not exceed 45 g.

Measurement to be taken on trip push bar (C 10) parallel to the sens of motion (see fig. 3). Furthermore it is recommended to press down space bar (B 17) during the cycle of measurement thus enlarging range of motion of trip push bar. For checking purpose even main spring (C 3) may be unhooked, as trip push bar (C 10) must slide unobstructed in direction to escapement (C 6).

Fig. 3



3/5 Excapement

3/5a Resiliency of Rocker (D 15)

After removal of carriage typewriter to be put on frame rear plate. The indicator ball of the dial test indicator to be placed below the arm of rocker (D 15), and dial test indicator lifted in direction to the segment (C 1). Reading of measured value to be taken shortly before reaching stop point of "Coroplast" (D 14a). Measured value should not exceed 90 g.

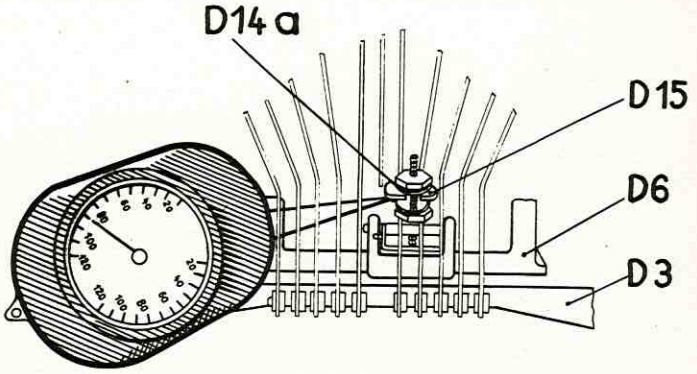


Fig. 4

3/5b Tripping of Loose Dog

The force required for tripping loose dog should not exceed 90 g. Ball of dial test indicator to be placed behind the roller on forcing lever (D 16). Then forcing lever slowly to be pressed downwards by the dial test indicator. Escapement wheel (D 1) to be moved reciprocatingly in direction to forcing lever (D 16), and dial reading to be taken in the very moment when escapement wheel (D 1) is absolutely unobstructed rotatable in either direction.

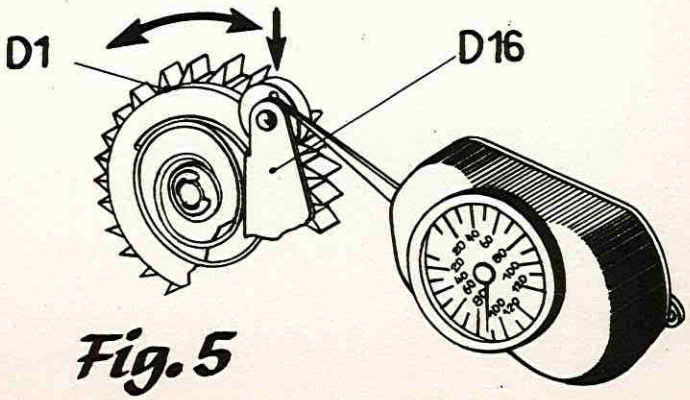


Fig. 5

3/5c **Resiliency of Loose Dog**

Resilient resistance of loose dog in horizontal direction should not exceed 75 g ± 5 g. Prior to measuring action escapement wheel (D 1) is to be removed. The ball of dial test indicator is placed on the center of the tooth face of loose dog (see fig. 6). Mechanism must not be in spaced typing position. The force required to press loose dog (a) to buffer springs (b) should not exceed the value of 75 g ± 5 g.

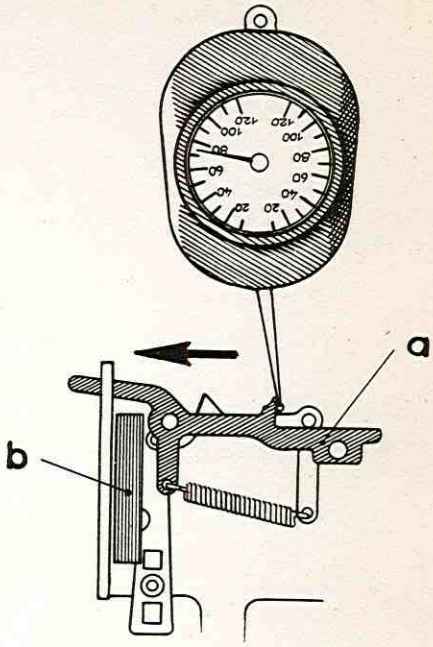


Fig.6

3/5d **Initial Tension of Flat Spring (D 18b) on Rigid Dog**

Flat spring of rigid dog should have a initial tension of 500 g. For testing initial tension place dial test indicator after removal of rocker (D 15) onto crest of rigid dog and press-off spring (D 18b) from rocker. Initial tension is the force required to lift-off spring from the adjustment screw designated as part "e" in fig. 12 to Chapter 1/9c sub para 2.

3/5e Quiet Carriage Return

After removal of carriage right hand of mechanic holds dial test indicator by its ball to the center of tooth face of the escapement wheel (D 1), and the left hand by means of forcing lever (D 16) is pressing downwards loose dog (see fig. 7).

Then escapement wheel (D 1) is being turned in direction to the righthand side of typewriter. Dial test indicator should be moved radially to the escapement wheel. The forces measured during this operation should not exceed 40 g.

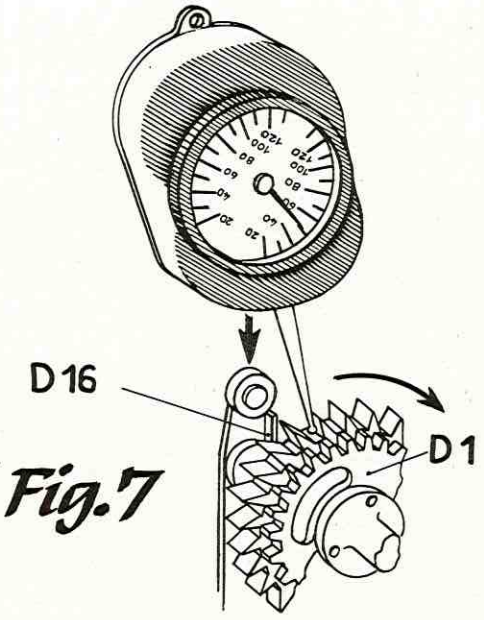


Fig.7

3/6 Carriage Return

3/6a Effective Force of Carriage Return

The effective force of carriage return for any width of carriage should not be less than 600 g.

For measuring same move carriage to the utmost right position until card holder (A 1) has reached the zero mark of the paper holder (F 13). Then move carriage to the left until card holder covers the "70" mark of paper holder (F 13). Secure spaced-typing key in this carriage position, and cause engagement of rigid dog by depression of holding depressed space bar (B 17). Then place ball of dial test indicator onto the inside of the right-hand side end of carriage and move dial test
indicator clockwise until a dial reading of 700 g has been obtained. Release space bar and slowly move dial test indicator which still must show a reading of 700 g backwards to that point at which carriage undertakes the second partial step of the escapement cycle. That value is to be considered as the effective force of carriage return which appears on the dial reading of the test indicator in the very moment in which the carriage performs the last half-cycle of escapement.

In case of not attaining the minimal value of 600 g it is necessary to test the values prescribed in the paras 3/5e and 3/6b to 3/6d inclusive to find out the reason for it. (fig. 8)

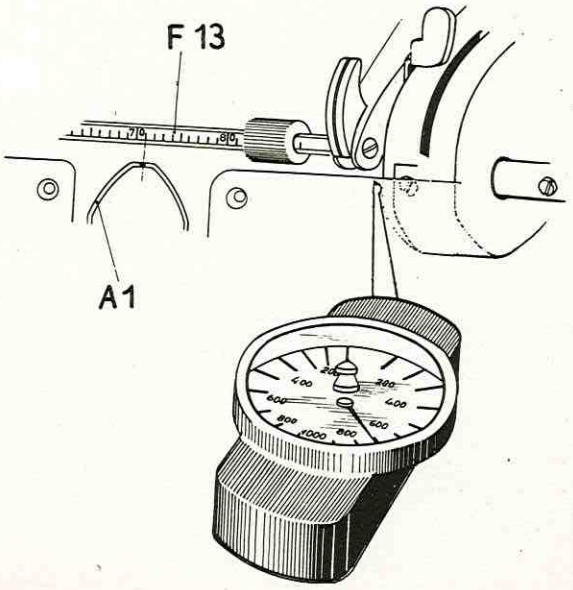


Fig. 8

3/6b Carriage Return

Shift carriage to the left until mark of card holder A 1 covers the "70" mark of the paper holder (F 13). The ball of the indicator arm of the test indicator to be placed against

the inner edge of the right-hand frame member. Move carriage by means of the indicator until the "5" mark of the paper holder (F 13) has been reached. Take dial reading during this operation. Prior to taking dial reading left-hand margin stop (F 37) to be moved to the utmost left-hand position. The normal dial reading values are:

For	a	carriage	of	24	cm(= 9.4488	in.)	width	= 1000 g
"	"	"	"	30	cm(=11.811	in.)	"	= 1000 g
"	"	"	"	33	cm(=12.5984	in.)	"	= 1050 g
"	"	"	"	38	cm(=14.9606	in.)	"	= 1150 g
"	"	"	"	46	cm(=18.1102	in.)	"	= 1150 g
"	"	"	"	62	cm(=24.4094	in.)	"	= 1250 g
"	"	"	"	88	cm(=34.6456	in.)	"	= 1250 g

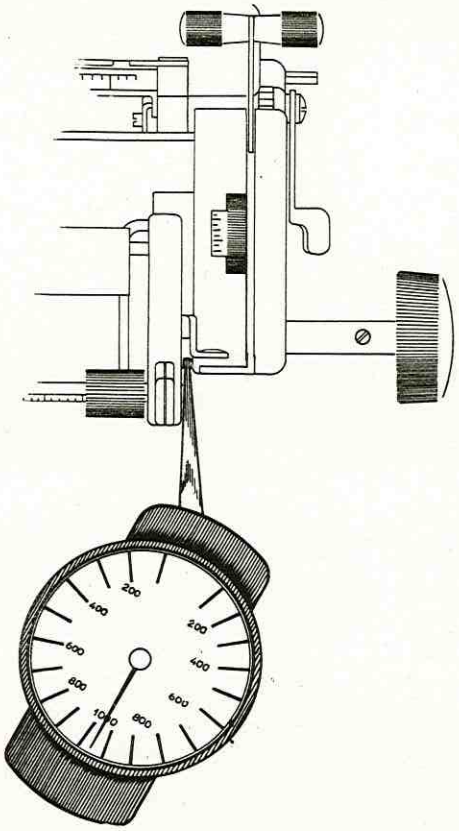


Fig. 9

3/6c Main Spring

Remove carriage from the main frame, move shift-carriage to the left-hand touch, and unhook draw band. The eye of the draw band is placed on the indicator arm of the test indicator behind its ball. Measure spring tension when draw band eye is level to the suspension bolt (E 29) of the carriage bed plate. Please take care that draw band does not slide off from the indicator arm. Measurement should be taken in winding-up sense, i.e. draw band is to be pulled by the dial test indicator to the before mentioned position of measuring. The spring resistance should be 800 g for any width of carriage on this position.

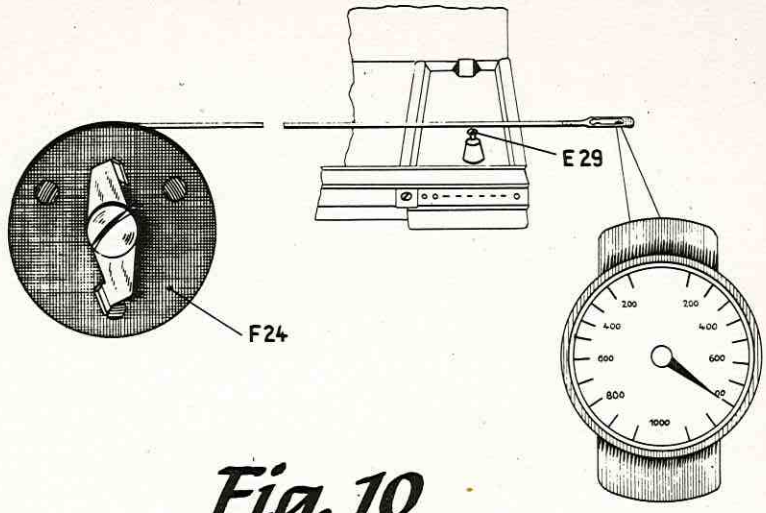


Fig. 10

3/6d **Friction of Carriage**

Remove carriage and place it to the common rest block, unhook draw band and suspend same into knurled head screw (E 29) of carriage support. After unlatching of carriage interlock (a) (see fig. 11) bring indicator arm of dial test indicator into contact to the right-hand side carriage end and move so carriage to the right. Dial test indicator now to bring into contact to the right-hand side carriage end and move carriage to the left. Take the medium value of the dial readings of theses two operations which should not exceed the following values:

For a carriage of				24 cm	(= 9.4488 in.)	width =	60 g
"	"	"	"	30 cm	(= 11.8110 in.)	" =	60 g
"	"	"	"	33 cm	(= 12.5984 in.)	" =	60 g
"	"	"	"	38 cm	(= 14.9606 in.)	" =	60 g
"	"	"	"	46 cm	(= 18.1102 in.)	" =	100 g
"	"	"	"	62 cm	(= 24.4094 in.)	" =	100 g
"	"	"	"	88 cm	(= 34.6456 in.)	" =	100 g

It is stressed that no socalled "tops" should occur in measurements. If these "tops" do occur assume damaged ball guidances of pinions, dirty carriage rails etc. Furthermore it should be noted that shift-carriage on the carriage support only has a minimal play.

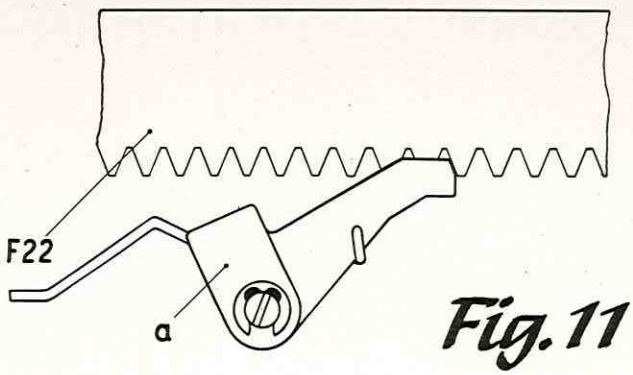


Fig. 11

3/7 Paper Feeding

3/7a Feeding Pressure of Front Paper Feed Levers (F 18)

Feeding pressure of front paper feeding levers amounts to 1200 g ± 80 g. Conditions mentioned in para 3/7b below may result to deviations from normal adjustment referred to herein.

For taking measurements platen and paper pan to be removed before. Furthermore rear feed rollers should be removed. Take individual dial reading of each paper feed lever. For this purpose ball of dial test indicator should be brought into contact to the center of shaft support.

3/7b Feeding Pressure of Rear Paper Feed Levers (F 18)

Independent from any carriage width feeding pressure of any rear paper feed lever should be 450 g ± 50 g. Certain circumstances could necessitate a deviation from this value if feeding of pasted form sets, airmail paper or large numbers of copies require same. It is, however, essential in case of necessary deviations to adjust equal values for any rear paper feed lever.

WSG 3	Tool for adjustment of key lever A18 to universal bar B31.
WSG 12 A	Platen wrench.
WSG 12 B	Platen knob wrench.
WSG 5	Type bar removing fulcrum wire.
7/423/0990	Tool for removal replacement of key tops.
WSG 6	Feed roll pressure regulating wrench.
RW 26	Block for removal and replacement of springless key tops.

Special Tools