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THE TYPEWRITER REPAIR MANUAL

BY HOWARD HUTCHISON

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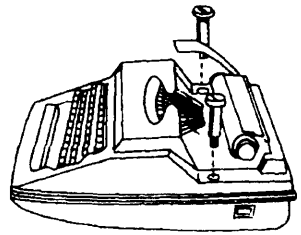

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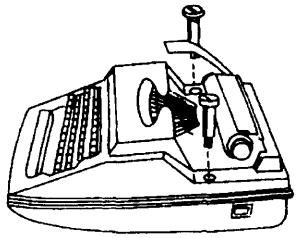
Preface



One of the great mysteries of machine repair, from the layman's viewpoint, has been in the field of typewriters. Probably once or twice in your life you have had problems with a typewriter, taken it to the repair shop, and been informed that there was a "flat fee" for minimum service to the machine, and anything beyond minimum service would be subject to an hourly rate. The unfortunate aspect of this information was that the "flat fee" turned out to be about the equivalent of a day's wages on your factory or secretarial job, and the hourly rate (if you had the nerve to ask) was about two or three times your own hourly rate. Then, when the machine was returned to you (you picked it up, of course, to save additional charges), you looked it over to find that it was now nice and clean looking, and the problem had been solved. But a nagging mystery remained. How much work did the repairman actually do, and how much time did he actually put in doing it? Maybe—just *maybe*—all he did was wipe the machine off on the outside, reach in and rehook a spring, and then make out the ticket for $92.50—which was about twice the resale value of the machine—and then took his coffee break.

On the other hand, the professional repairman could argue that he is not duty-bound to explain exactly what he did, largely on the premise that the average layman wouldn't understand it anyway. And he might also argue—rightly enough—that, like lawyers and other professional people, the customers must ultimately pay for the education and training that allows him to find the spring that needs rehooking.

The above scenario is more true in the field of typewriter repair than in, say, auto repair, in which a lot of do-it-yourselfers

have learned to reline their own brakes, tune up their own engines and even make major overhauls, largely as a matter of survival. Many of these amateur mechanics learn to do competent work, and many more of them go on to become professionals. Why isn't this the case in the field of typewriter repair?

One answer to this question is that, in most cases, if professional help isn't affordable, it turns out to be more practical to relegate a typewriter to the closet than it would be to put the family car on blocks. Individuals with only moderate mechanical knowledge venture forth to fix their cars, and find that it isn't nearly as difficult as their friendly neighborhood garageman told them it would be.

The other answer is that the mechanisms of a typewriter look truly formidable, largely because bookshelves of libraries and bookstores aren't stocked with typewriter repair manuals, as they are with auto repair manuals. Manuals, such as the one you are holding in your hand, are a tremendous help in making these mechanisms look less formidable. And if the manual is written exclusively for laymen—*as this one is*—you'll find that not only do the illustrations do much to clarify the operation, functions, and working sequences of and tolerances between various parts, but also, the text is written so clearly that all those things that professionals know (but are apparently sworn never to divulge) are clearly spelled out. In other words, once you know how, it's infinitely easier to equalize the typing pressure on the typebars of that older IBM typewriter than to change the spark plugs on your VW Super Beetle. It is easier to change a platen, and know when and why it should be changed, than to rotate the tires on your station wagon.

You may argue that this is all very well, but the fact is that the three auto parts stores in your small town all vie with each other for the privilege of selling you spark plugs. Where in the world would you find a new typewriter platen? It has been my own, long-held opinion that a great shortcoming of some do-it-yourself books is that they don't spell out precisely how and where unusual or specialized parts are obtained. Yes, there are sources of typewriter supplies and parts, with apparently enough to go around throughout the United States, but obtaining them requires just a slightly different approach than just walking into your neighborhood store. In this book I will spell out in great detail how to get typewriter supplies and parts.

Then there is the question of obtaining service manuals for specific typewriters. I have been told—more than once and quite

emphatically—that it would be impossible to compile all the technical information on every conceivable typewriter brand/model still in use in the United States between the covers of one book. Of course I had to admit—and a moment's reflection will tell you—that this is true, and that the best that I could possibly do would be to provide illustrations and clearly written textual descriptions of representative typewriter mechanisms and, to translate this into practicality, provide detailed and comprehensive procedures for repairing a few specific brand/models, in both electric and manual machines. In other words, if your goal is to repair/maintain one typewriter, and that particular machine is described in this book, you will have all the information you need. Beyond that, this book should provide you with an excellent grounding in basic mechanisms, as well as a thorough understanding of how and why they do what they do. If your particular machine is not represented herein, you will have already been instructed on how and where to get service manuals and parts catalogs that are so necessary for making an effective repair.

If, on the other hand, your goal is to start a part-time or full-time typewriter repair business, there is enough information in this book to get you on that track. These are not just vague generalities applicable to "business in general," but concrete, specific steps to take—such as making supplier contacts, planning a workshop, buying equipment, etc.—for a typewriter repair business. As a matter of fact, if you can combine business acumen, an attribute you probably can't acquire from a book, with the step-by-step instructions in this book, I don't believe you could fail in such a business.

Typewriter manufacturer/distributors who cooperated or in some way helped in compiling the information for this book were IBM, OLYMPIA USA INC, and *Brother International Corporation*. For example, an IBM representative spent considerable time explaining how to get IBM service manuals and parts Catalogs—as well as restrictions on their republication—and a regional IBM engineer provided me with a wealth of information regarding the IBM Model numbering system, which I am passing along with other IBM information. My *Olympia* contact was pleased with the Olympia chapter. Brother International was extremely cooperative in all ways.

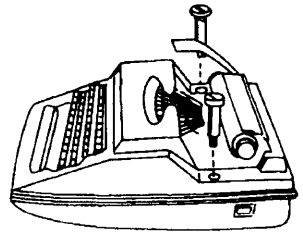
The *Ames Supply Company*, a major supplier of typewriter supplies and parts, was extremely helpful and cooperative in providing information for an entire chapter of this book.

I should say that there are innumerable possibilities for errors to creep into a book containing as much technical data as this one. To avoid this, I have submitted the various chapters to the service departments of the previously mentioned companies. The chapters were read for accuracy by their technicians. They were all pleased with the results and agreed that this should make a useful manual for the layman or beginning professional.

Finally, to possibly belabor a point I tried to make earlier, I would suggest that you read this book not as an encyclopedic volume of technical data but more as a textbook. I truly believe that, when used in this manner, it is the most useful typewriter repair book ever compiled for the layman or beginning professional.

Howard Hutchison

Chapter 1
Definitions and an Overview of Typewriter Controls



When you begin to make a typical home repair (let's say repairing a broken window), your job is made relatively easy. Do-it-yourselfers have been repairing their own windows for so many years that neighborhood hardware and building supply stores, which are oriented to this kind of trade, are willing and eager to furnish all the materials. Your building supply dealer will be easy to talk to, and even if you don't know the difference between single-strength and double-strength glass, he'll be eager to explain the difference and make worthwhile recommendations and suggestions. If you happen to live in a small town, he might even offer to lend you a ladder.

However, when you undertake the repair of your own typewriter, you're pretty much on your own. First of all, living in a small town will be a disadvantage because there may not be a local repairman with whom you can discuss your problem, as you do with your home repair dealer. If there is indeed a local typewriter repairman, or even if the town is burgeoning with them, you'll probably be greeted with some skepticism when you state your intention of repairing your own typewriter. Speaking realistically, I'd even suggest that some sort of professional jealously may enter the picture, since trained, professional repairmen look upon their work as too difficult for a layman to "pick up" in a short time. Therefore, if the success of your repair project depends to any extent upon the cooperation of a professional repairman (such as in the ordering of parts, which will be discussed in more detail in a

subsequent chapter), you'll have to be convincing and persistent—and it won't hurt your cause to be knowledgeable.

Moreoever, the problem will be considerably compounded if it becomes necessary to correspond with out-of-town distributors. This is the situation in which knowledge—together with good communications—is mandatory.

GOOD COMMUNICATIONS

To explain what I mean by good communications, let me relate a story. Two elderly spinsters lived across the street from each other. Every day, day in and day out, they stood on their respective porches and argued back and forth across the street. A newcomer, observing this phenomenon, asked an old-timer in town: "Why can't the ladies ever agree on anything?"

"Because," replied the old-timer, "they're arguing from different *premises*."

The key word of that story is, of course, *premises*, which is ambiguous when taken out of context. If you think that's a little silly, let me tell you a more relevant story. I recently corresponded with a certain typewriter company, requesting a service manual for a particular typewriter model which that company manufactures and distributes. The reply came back, "We no longer manufacture manual typewriters."

To get back to my case for good communications, the point I've tried to make here is that some words are ambiguous when taken out of context. Other words are just inherently ambiguous and can't be used carelessly. When you get into the really technical words and terms of typewriter repair, a lot of confusion will result if you don't use the words correctly. Finally, the professional will have more respect for your capability, and *might* as a result be more cooperative, if you use the correct word or term to describe the part, mechanism or function you're really talking about.

It might be argued that there is no universal agreement as to what certain parts and functions are to be called, but in most cases common usage is a determining factor. In a few cases, especially where inner mechanisms are concerned, terminology may vary slightly from machine brand to brand and, consequently, from service dealer to dealer, depending upon which brands he has spent the most time working with.

SERVICE MANUAL

Alone, the word *manual* is usually taken to mean a book, prepared by the technical department of the typewriter manufacturer. If it is an *operator's manual*, it will only describe a few superficial procedures that the average, non-technical person needs to know about operating the machine. It will have extremely scant, if any, technical or repair information. If you want repair and adjustment information, be sure, therefore, not to ask for an operator's manual but rather for a *service manual*. Since most (but not all) service manuals are compiled for individual models, be sure and specify the brand and model (and any pertinent information that you think might help) of the machine for which you are requesting the service manual.

Apart from being quite specific about what you want in the way of a service manual, it may also be a good idea to state in your initial letter of request that you only intend to use the manual to repair your own machine (in case the dealer maintains franchised repair centers), and that you won't run it through a copier. Most companies are quite sensitive about the unauthorized reproducing of their publications.

MANUAL AND ELECTRIC TYPEWRITERS

A manual typewriter (Fig. 1-1) is one on which the majority of operations are performed manually—that is, without the aid of electrically actuated mechanisms. A true manual typewriter is in fact equipped with no electrical components; however, even the true manual typewriter may have some functions which emulate

Fig. 1-1. This Brother manual portable typewriter will perform essentially the same functions as an electric machine, but with less ease and convenience (courtesy of Brother International Corporation).

power, with the power source being the tension of a spring which is rewound every time the operator performs a certain operation.

On some machines that are electrical-manual hybrids, every operation is performed manually except the return of the carriage to the left-hand margin, which is performed electrically.

An electric typewriter (Fig. 1-2) is one on which the majority of operations are performed by mechanisms which are electrically actuated when the typist touches the appropriate keybutton, control button or lever.

KEYBUTTON OR KEY

The words "keybuttons" and "keys" are almost synonymous (IBM uses the word "keybutton" most extensively, however) to denote the plastic buttons (Fig. 1-3), which are arranged in a standardized format on the keyboard of the typewriter. However, if you use the word "key," some ambiguity may arise, because in common (but erroneous) usage the word "key" is sometimes taken to mean the *typebar head* that strikes the paper (for example, it is often said that the "keys are dirty," when in fact it is the typebar heads that need attention).

TYPEBARS AND TYPEBAR HEADS

First and foremost, typebars and typebar heads are found only on typebar machines—as in contrast to the more advanced

Fig. 1-2. This Brother electric, Model 4512, typewriter takes the work out of typing. Through electrically actuated mechanisms, it maintains even typing pressure on all typebars, regardless of the strength of the finger that pushes the keybutton (courtesy of Brother International Corporation).

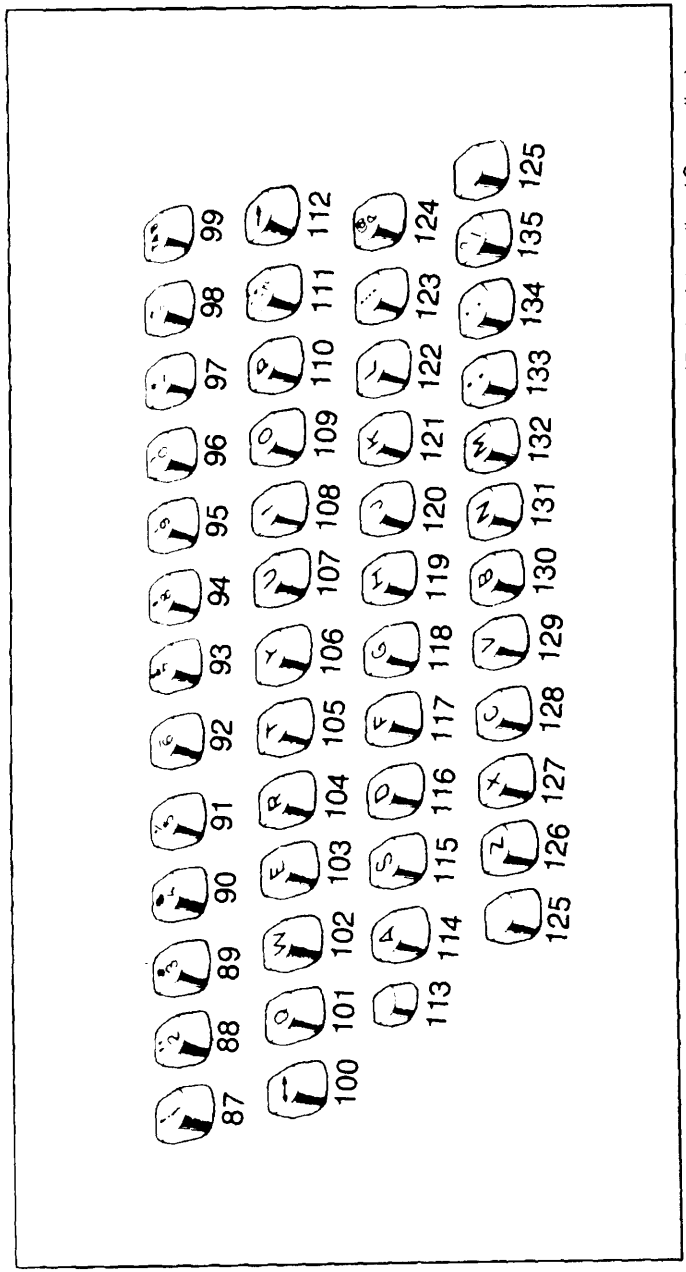


Fig. 1-3. To avoid misunderstanding, you'll be on the safe side to call these items keybuttons (courtesy of Brother International Corporation).

typewriters, which are equipped with spherical elements (these are called *single element* typewriters and will be explained later). However, there are still many typebar machines in use. Typebar machines are still being manufactured. When a keybutton is depressed, the corresponding typebar swings up in an arc, and the typebar head strikes the ribbon/paper. Since the typebar and typebar head make up a solid part, most companies simply call the complete part a *typebar* (Fig. 1-4).

TYPEBAR TYPEWRITER

As I said, there are *typebar* typewriters (Fig. 1-5) and *single element* typewriters. For many years, typebar typewriters dominated the typewriter market. *International Business Machines (IBM)* put the first single element machine on the market in the 1960s and even thereafter, until the mid- and late-1970s. Typebar machines continued to dominate the American market, presumably because IBM held exclusive rights to the patent on the single element mechanism, and wouldn't or couldn't inundate the market with this advanced model (meanwhile, however, IBM itself continued to also manufacture and market typebar machines until, in the late 1970s—I am told by an IBM representative—this company discontinued manufacturing them).

On the typebar machine, the individual typebars—one typebar for every letter, number or character that can be typed on the machine—are arranged in a sort of semi-circle, so that each individual typebar swings up in an arc to make an impression on the paper when the corresponding keybutton is depressed. Sometimes, the complete assembly of typebars, together with the segment in which they pivot, is called a *typebasket*.

The primary advantage of typebar machines is *reliability*, since they have been in production for many years. A disadvantage is that the operator is restricted to one type style and type size per machine, because removing and replacing the typebar assembly is too difficult to do routinely. Another disadvantage, which has nothing to do with maintenance or repair, is that it requires excellent typing skills to avoid occasionally clashing and locking up two or three typebars, when typing speed outruns coordination. This can't happen on a single element typewriter.

SINGLE ELEMENT TYPEWRITER

On the single element typewriter (Fig. 1-6), a spherical piece, with the die-impressed letters, numbers and characters arranged

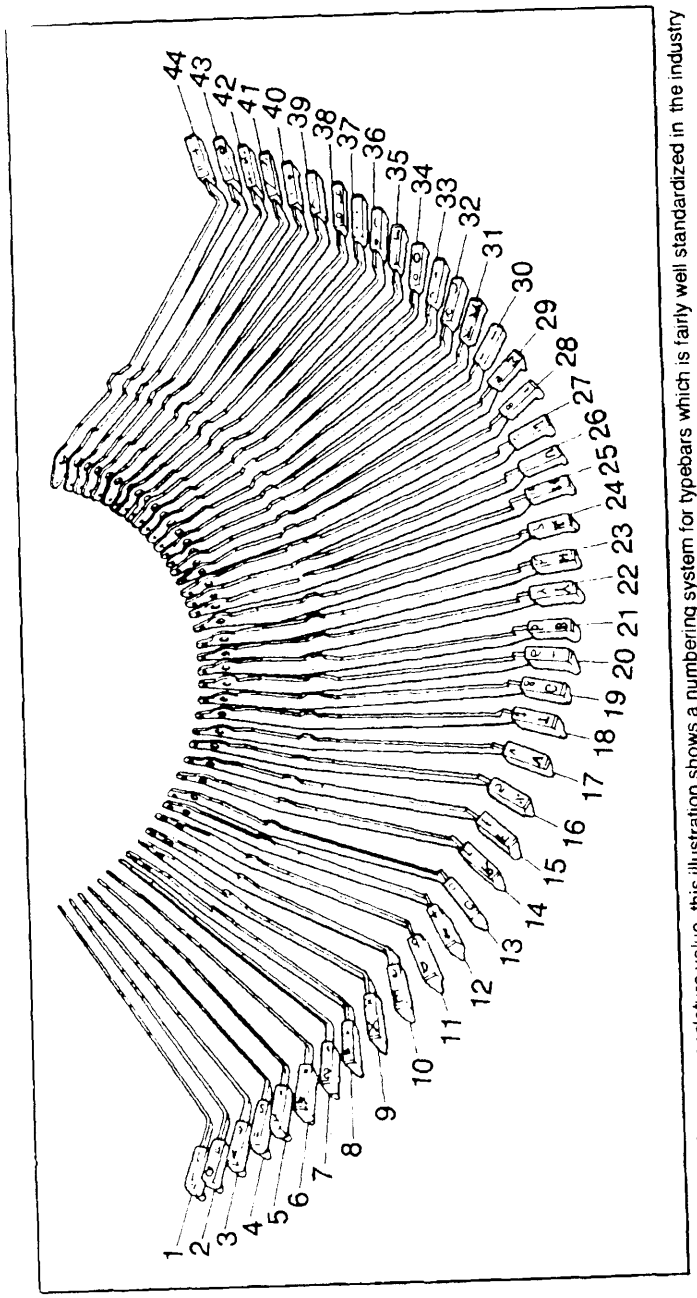


Fig. 1-4. Apart from nomenclature value, this illustration shows a numbering system for typebars which is fairly well standardized in the industry (courtesy of Brother International Corporation).

Fig. 1-5. This old IBM Model A machine is typical of older typebar machines, dating back to the 1950s.

around it, takes the place of the typebars of the older models (Fig. 1-7). The spherical piece is variously called an "element," "type head," or "type font" by the various companies which now manufacture single element typewriters and/or "elements."

Logic would seem to dictate that the term "single element" is a misnomer, since the element can be easily removed and replaced (Fig. 1-8) or, more importantly, replaced by an element containing a different type style or type size. Since the advent of the early single element IBM models of the 1960s, single element machines have become more and more sophisticated and versatile in their functions.

Because the only "old" single element machines in use today are the old IBM models, single element machines are looked upon as too advanced and innovative for do-it-yourself repair jobs and, accordingly, it is next to impossible to get service manuals on them. The exception to this general rule is that IBM sells IBM service manuals (Fig. 1-9) to anyone requesting them, and you would be able to obtain one for your specific single element IBM model.

STANDARD TYPEWRITER

Within some typewriter brands, it is important to indicate whether or not your machine is a *standard* typewriter. In IBMs,

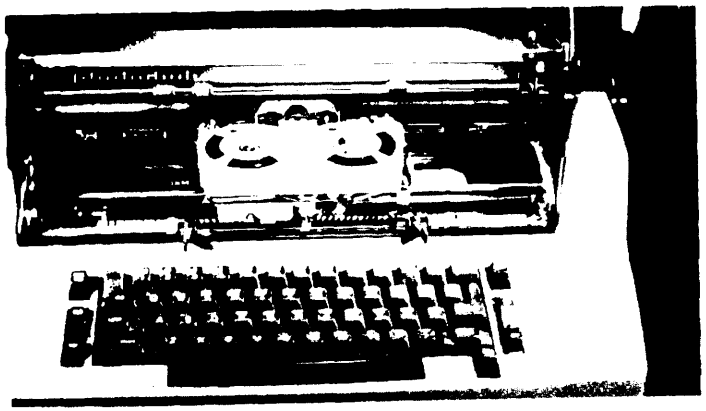


Fig. 1-6. This IBM Selectric II, with the cover swing back for a view of the ribbon cartridge and typing element, is typical of the many single element machines now on the market, which will probably eventually replace typebar machines. Removing and replacing the element with a different one is as easy and fast as turning the machine on.

and other brands as well, a standard typewriter is one on which each character takes up the same amount of space as any other character, with the implied distinction being between this and the

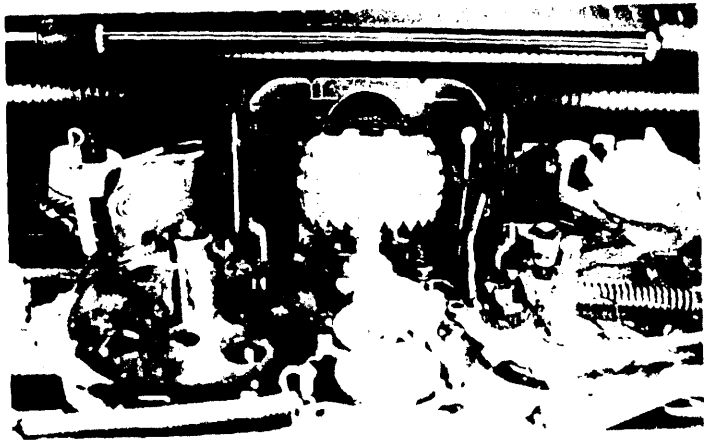


Fig. 1-7. This photo of the same machine as that of Fig. 1-6 has the ribbon cartridge removed for a better view of the element. In the case of IBM, each element is a distinctly different type style/size. Each has its own name and number for identification (interestingly enough—in the case of IBM elements—the number that identifies the element to IBM servicemen is not the one plainly stamped on the plastic top of the element, but the extremely small number stamped into the element itself, next to the plastic top).

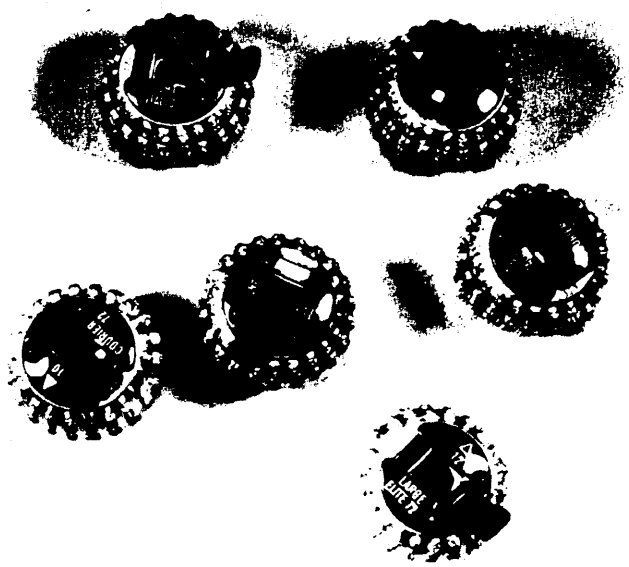


Fig. 1-8. If it were conceivable that a typing format would call for six different type style/sizes, these six elements, at a total cost of around $100, would take the place of six typewriters. One might ask, however, why these machines are called "single element" machines.

machine generally used for specialized purposes, such as typesetting, on which different characters take up different unit widths (the generic term for this latter machine is *proportional spacing* typewriter). Thus, the primary difference, from the repairman's point of view, between standard and proportional spacing typewriters is in the *escapement mechanism*.

Various companies that manufacture the proportional spacing typewriters identify them with their own trade names. For example, while IBM still manufactured typebar machines, its proportional spacer went by the name of *Executive* (Fig. 1-10).

With the advent of single element machines, the terminology has changed somewhat. When making the distinction between standard typewriters and machines for typesetting, it would be well to have some understanding of *pitch*.

PITCH OF A TYPEWRITER

On a standard typewriter, the word *pitch* means the distance between two characters as they are typed on the paper. Tradition-

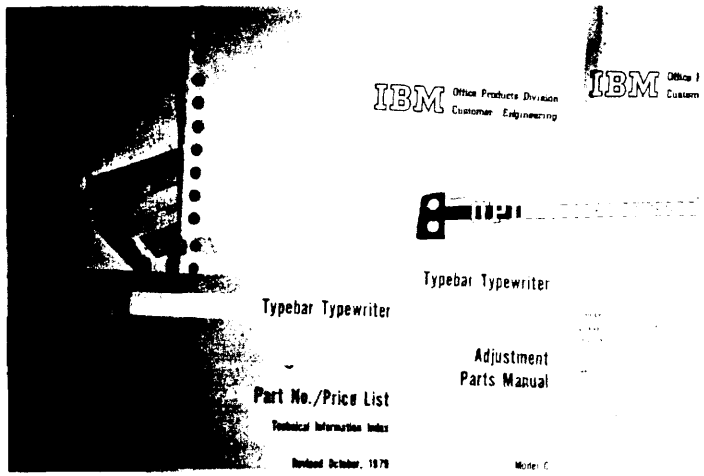


Fig. 1-9. This array of IBM service manuals and parts manuals does not indicate that I have the inside track with IBM, but simply the I had the modest means to purchase them. You can do the same. The simplest way to do it is to begin by calling the toll-free number given in this chapter, where you will be given information on how to contact your regional IBM engineering representative.

Fig. 1-10. If you've recently shopped for used typewriters, you may have seen a few similar to this one in the displays. It is an excellent typewriter, but with several disadvantages for general typing, the most notable being that the various characters take up various amounts of linear space, making back spacing for corrections confusing in the beginning. However, if your typing format calls for an even right-hand margin, on a low budget, this machine will do the job excellently, Providing it has a carbon ribbon and that it is in good condition. Otherwise avoid it.

ally, standard typewriters have been either 10-pitch (10 character/spaces to the inch) or 12-pitch (12 character/spaces to the inch). On the typebar typewriters the pitch is established in the escapement mechanism and is inalterable without changing inner mechanisms. However, on the *more advanced* single element machines, either 10-pitch or 12-pitch can be obtained in the same machine. On yet more advanced single element typewriters, 10-pitch, 12-pitch and a modified form of proportional spacing can be obtained on the same machine.

When pitch is fixed, as on typebar machines and some older single element machines, it is generally assumed that the appropriate type *size* for a 10-pitch machine is *pica* and for a 12-pitch machine, *elite*. However, in the single element machines this is no longer strictly true.

PICA AND ELITE

On the older typebar machines, the word *pica* indicated a 10-pitch machine, with a type that was approximately 12-point in size; and *elite* indicated a 12-pitch machine, with a type that was approximately 10-point in size. (The point system of measuring type is widely used in the printing trade, but in my opinion it has only a tenuous connection to the typewritten copy from standard typewriters.)

PROPORTIONAL SPACING TYPEWRITER

As explained previously, a proportional spacing typewriter is one on which each character is assigned its own unit width (Fig. 1-11), and the carriage is made to move that distance when the corresponding keybutton is depressed. The appeal of such a machine is twofold. Since the characters don't line up under each other like posts in a fence row, the copy has a "printed look." By

```
This is a line of 10-pitch standard

This is a line of 12-pitch standard type
This is a line of proportional spacing type
```

Fig. 1-11. These three lines of type illustrate the differences between the various escapement mechanisms. It may not be immediately obvious to the casual observer that the line of proportional spacing type has any unique characteristics; however, you'll see that certain characters take up less space than others, while on the lines of standard type this is not true.

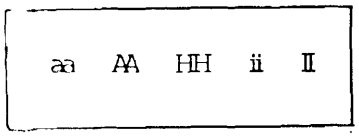


Fig. 1-12. Type any character on a proportional spacing machine. Tap the back space button once. Retype the character, and the result will be something like this.

following a certain procedure in typing, the right-hand margin can be typed even—or *justified*—to give an even more printed look (The right-hand margin can also be justified with a standard typewriter, but the printed look is not quite achieved because of the inherent typed look produced by a standard typewriter).

Unless you have a specific need for a typesetting machine, it is not advisable to buy one of the older model proportional spacers with a view to maintaining it yourself. They are not only complicated to adjust and repair, but relatively complicated to operate as well.

If you have a recently acquired but older machine and don't know whether it is a standard or proportional spacer, make the following test. Type one character (any character). Then tap the back space keybutton and retype the same character. If the second typing does not superimpose (register) exactly on the first typing (Fig. 1-12), it is a proportional spacing machine. Thus, if you think about repairing or adjusting this machine, you should be aware that the mechanism that moves the carriage during typing (called the *escapement*) is relatively complicated. Moreover, be sure to get the appropriate service information for this kind of machine, which may outwardly look like other, standard models.

TYPEWRITER RIBBONS

A typewriter ribbon is essentially the carrier for the medium that creates the impression on the paper when the type head or element strikes it. The two kinds of ribbon in common usage are *fabric ribbons* and *carbon ribbons*.

A fabric ribbon may be either cotton, silk or nylon—with the latter being preferable—impregnated with an ink of the chosen, available color. The ink spreads through the fabric by capillary action. When ink is taken from one small area (as in typing a character), the ink in that area is replenished—until the ink of the total ribbon is depleted through repeated use, or through drying out. Thus, the inking capacity of the ribbon remains about uniform throughout its entire length and width. The entire length of the fabric ribbon is used repeatedly, made possible by a mechanism in the machine that winds and rewinds the ribbon from reel to reel (or

spool to *spool*, if you prefer). This procedure can be repeated over and over until the ribbon is so depleted of ink that it no longer makes a dark impression. As compared to the carbon ribbon, the fabric ribbon has some distinct disadvantages, only slightly offset by some minor advantages.

Loosely speaking, carbon ribbons have somewhat the same characteristics as carbon paper, with a "plain" side and a "coated" side. The coated side contains the carbon that is deposited on the paper when the ribbon is struck by the type head. However, speaking more correctly, I should say that there are currently a variety of ribbons that are called carbon ribbons. Not all of them are constructed the same way; nor do they react quite the same. However, the one feature that various so-called carbon ribbons share in common is that they are one-time ribbons—that is, when the ribbon is used long enough to empty the original reel, the ribbon is used up and must be discarded.

The primary advantage of a carbon ribbon over the fabric ribbon is that it makes a uniformly dark, crisp impression throughout its life, while the impression of the fabric ribbon gets progressively dimmer as the ribbon is used repeatedly. The fact that a carbon ribbon must be disposed of after one use is offset by the fact that it is initially fairly inexpensive. However, typing with a carbon ribbon turns out to be more expensive than with a fabric ribbon. If you run out of ribbon when using a carbon ribbon, you can't type any more until you purchase a new ribbon, while a fabric ribbon can be used beyond its optimum life (and often is). Finally, a carbon ribbon deposits negligible residue on the typebar or element, whereas inked fabric ribbons leave so much residue of ink—which tends to collect dust and lint—that type heads should be cleaned after several hours of typing.

And what, you may ask, does a lengthy discussion of typewriter ribbons have to do with typewriters *per se*? First, ribbons are an extremely important link in the total typing process, with regard to the quality of type produced by a machine. Second, if you don't understand the capabilities of a given ribbon, you may be misled to think the typewriter doesn't work correctly. Here are a few tips.

Helpful Tips

As a general rule, a typewriter is designed to use *either* a fabric ribbon *or* a carbon ribbon, but not both. There are a few exceptions to this rule, however.

If a typewriter is designed to use *only* a fabric ribbon, there is extremely little chance that you can substitute a carbon ribbon. You probably won't be able to find a carbon ribbon of a *width* to match that of the fabric ribbon. Also, you probably won't be able to find a carbon ribbon wound on a reel, or in a cartridge, that would be accepted by the mechanism of your fabric ribbon machine.

Assuming that you could get around these obstacles, you would find that the one-time carbon ribbon would not make a distinct impression. The mechanism that moves the ribbon through the machine is designed to move the inked ribbon only a fraction of the distance occupied by a character. This works all right on fabric ribbons which are inked by capillary action, but not on one-time ribbons, on which the medium of the ribbon is totally depleted when struck by the type head (thus, the slight overlapping of characters on the ribbon will cause indistinct areas in the typed impressions).

There are available certain kinds of so-called "reusable" carbon ribbons (the word "reusable" is a misnomer, however) that purport to ameliorate the problem of one-time use, which will allow an overlapping of characters. However, it is difficult, if at all possible, to find one of these ribbons that can be substituted on a fabric ribbon machine.

As a general rule, your choices in selecting a ribbon for a given machine are limited by the fact that you're almost forced to use whatever ribbon is wound on a reel that will fit your machine. This is even more true in the case of ribbons loaded into cartridges, since the cartridge must fit the machine. However, the tendency is that some choices are available in cartridge ribbons. For example, a few cartridge ribbon machines are designed to take either fabric or carbon ribbons, with cartridges being supplied accordingly.

Most of the advanced single element typewriters use cartridge ribbons. Generally speaking (and *always*, in the case of IBM *Selectric IIs*), the available ribbon is either one that is transported the full width of a character each time the ribbon is struck (i.e., each time the escapement mechanism and ribbon transporting mechanism is activated) or one that allows some overlapping of characters. In IBM terminology, the former ribbon is called *high yield correctable film ribbon* (Fig. 1-13), and the latter is called *Tech III* (Fig. 1-14). The term "high yield" in the case of the former ribbon is misleading because this ribbon actually yields a significantly lower number of characters than the Tech III ribbon. Moreover, the use of the term Tech III is also a poor choice of

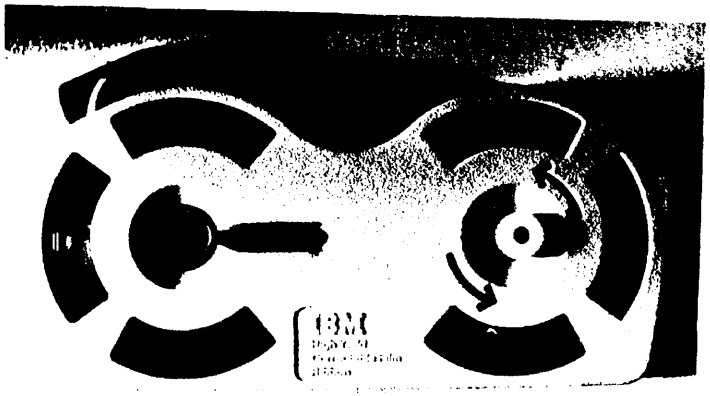


Fig. 1-13. The IBM high yield correctable film ribbon cartridge is specially designed to interact with the ribbon transport of the IBM Selectric II in such a manner that characters do not overlap each other as the element strikes the ribbon. The term "high yield" is sales puff to indicate that this ribbon yields more characters than an earlier IBM correctable film ribbon, primarily because there is more ribbon—not because of any special characteristics of the ribbon.

words because this cartridge is to be used on the Selectric II typewriter. Both, incidentally, are *correctable*, though by different methods.

Suppliers that are not affiliated with IBM, but who supply cartridges for IBM machines, do not use the IBM terminology to describe the ribbons. They designate the ribbon that is comparable to *film* as *pink*—or sometimes *orange* or *red*—core, and the ribbon comparable to the Tech III as *blue core*.

In using either the film or Tech III cartridges, you should understand that the construction of each cartridge determines how it will contact the machine mechanism, and therefore determines the rate at which the ribbon will be transported (Fig. 1-15).

Apart from the kind and quality of the ribbon, the kind of typing paper used affects the quality of the typed impression. With either a fabric or carbon ribbon, a hard-surfaced paper tends to dim the impression and dull its crispness. Moreover, the impression from an inked ribbon tends to smear on a hard-surfaced paper. Some hard-surfaced papers will not accept carbon ribbon impressions at all. Ordinary typing paper is always suitable to be used with either a fabric or carbon ribbon. Other suitable papers are mimeograph bond, duplicator bond and *Xerographic* (the latter, which is plain paper used in Xerox and other plain paper copiers, is less suitable because it is fairly slick; however, it does take an impression). It is

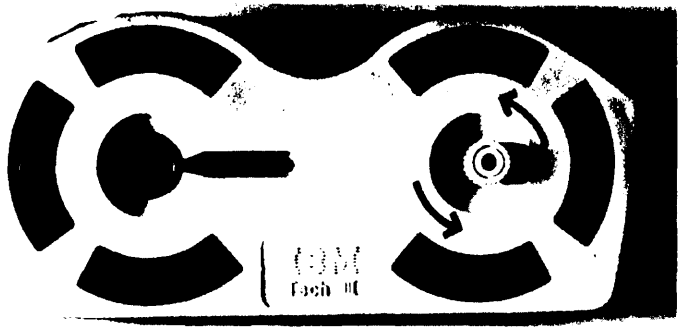


Fig. 1-14. The IBM Tech III ribbon cartridge is designed to interact with the ribbon transporting mechanism of the Selectric II in such a manner that character overlapping is possible. Moreover, this ribbon has certain characteristics which differ from those of the film ribbon. This is an extremely long-lasting cartridge.

important, when choosing a paper to be printed as letterheads, that the paper is compatible (i.e., accepts a dark, crisp impression) with your particular ribbon—especially in the case of the carbon ribbon.

Ribbon Problems

The following are some possible problems arising from ribbons, and their causes:

Problem: The impression is too light (i.e., not dark enough).

Cause #1: The typing pressure is not correct.

Solution: Typing pressure will be discussed later.

Cause #2: Incorrect paper is being used.

Solution: Use the kinds of paper described previously. Sometimes a backup sheet behind the original provides a cushioning effect and makes a darker impression. Avoid hard-surfaced or glossy paper.

Cause #3: In the case of a fabric ribbon, the ribbon is either depleted through use or is shelf-worn.

Solution: Replace the old ribbon with a new one. To avoid the problem of shelf-worn ribbons, buy from dealers who have a rapid turnover of stock.

Cause #4: The multiple-copy control is incorrectly set.

Solution: Most typewriters have multiple copy controls, the purpose of which is to make compensations in the striking pressure of the typing head when several sheets of paper are rolled into the machine. Generally, this is accomplished through a mechanism which backs the platen slightly away from the reach of the typing heads, activated by a lever which is usually calibrated in the letters

A, B, C, D, E, etc., with the highest pressure being represented by A, the next lower pressure by B, etc. Generally, for up to two sheets of paper-plus-carbon, this lever should be set at the maximum pressure (understand, however, that this mechanism does not regulate typing pressure *per se*, but moves the platen away from the typing head, and the more likely result of an incorrect setting of the mutiple-copy control is irregular impressions, rather than consistently light impressions).

Cause #5: In the case of carbon (or ribbons comparable to carbon), the ribbon may be shelf-worn or simply inferior. At the risk of sounding laudatory about "brand names," I would suggest that you always use brand name ribbons that correspond to the brand name of your typewriter (IBM ribbons for IBM machines and the like). This rule does not always hold true, and you may find some "off-brand" ribbons to be superior to brand-name products; however, this has not been my own experience. While some company executives deny that carbon ribbons can become shelf-worn, at least a few repairmen suggest that the shelf life of carbon ribbons is between six months and a year.

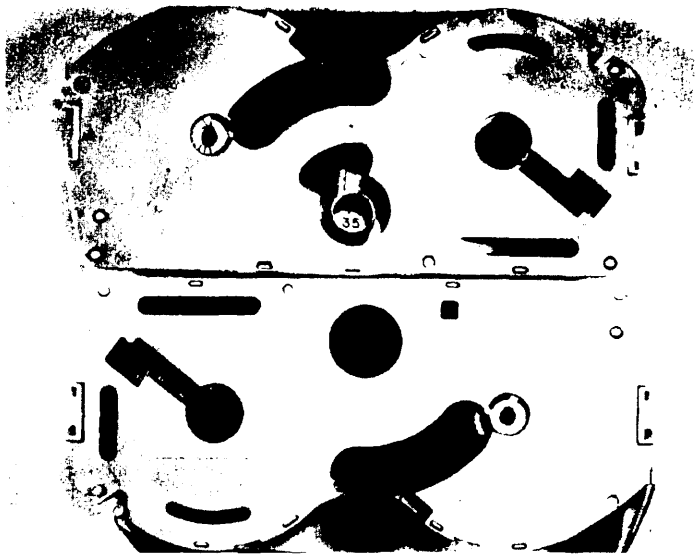


Fig. 1-15. Look at these two cartridges closely and you'll see a significant difference in their construction (note the hollow stud in the upper cartridge, which is the Tech III cartridge). This determines the rate at which the ribbon is transported through the machine.

Problem: Characters are clipped off, on either the bottom or top.

Cause #1: In the case of some single-element machines, this is caused by an incorrect adjustment of the mechanism that lifts the element during typing.

Cause #2: In any case, a too-narrow ribbon will cause the top or the bottom of the characters to be clipped off.

Problem: There are light areas in otherwise dark impressions.

Cause #1: In the case of inked ribbons, this could be caused by dirty type heads or shelf-worn ribbons.

Cause #2: In the case of carbon ribbons, this may be caused by shelf-worn ribbons or more generally by a ribbon transporting mechanism that transports the one-time carbon ribbon an incremental distance that is too short, causing overlapping of characters.

Solutions: Most solutions are self-evident—clean typing heads, etc. In the case of the carbon ribbon, be sure you're not trying to use a one-time carbon ribbon in a mechanism designed for an inked ribbon. In the case of some single element machines (IBM Selectric II, for example) the depression/disengagement of a gear in the ribbon transport mechanism, *only* when the Tech III cartridge is installed, causes the ribbon to be transported slowly. Therefore, if for any reason this gear remains disengaged when the *film* ribbon cartridge is installed, the *film* ribbon will not be transported appropriately to produce a uniformly dark impression.

PLATEN

The *platen* is the long, cylindrical roll, with a hand knob on either end, against which the typing head strikes when it is actuated (Fig. 1-16). The platen serves the dual purpose of providing a striking surface behind the paper; and it works in conjunction with feed rolls to feed the paper through the typewriter. To serve this latter purpose, it is equipped on one end with a *ratchet wheel*, which engages with a push pawl to move the platen a specified distance.

On most older typewriters, the platen is rubber—or perhaps synthetic rubber—which, when new, is resilient to provide a cushioning effect. As the typewriter gets older, and regardless of the amount of use it gets, the rubber of the platen hardens, causing two problems to develop gradually. The type heads cut through the paper (this is particularly problematic when typing on mimeograph

Fig. 1-16. Here the platen has been removed from the old IBM, Model A, and is lying in front of it. This particular platen was resilient when new, but is now hard and should be replaced. That's a minor job.

stencils) and, in extreme cases, the non-resilience of the platen may cause a typebar to break. A hardened platen should be replaced with a new one.

Another problem that can develop gradually is that of the platen surface, which was smooth in the beginning, becoming ridged, with the ridges running around the circumference of the platen as spaces equal to the pitch of the typewriter. This causes an uneven impression. In the early stages of ridging, the effects can be ameliorated by using a backup sheet of paper behind the original sheet. Later, the platen can be resurfaced. Resurfacing requires special equipment, but it is a relatively inexpensive procedure.

On some typewriters, the platens are easily removed, while on others they are removed with more difficulty. Removing platens will be discussed for certain models later in this book.

CARRIAGE

On typebar machines, a *carriage* moves leftward during typing to allow the line of type to progress rightward on the paper. On manuals—and generally speaking, electrics as well—the carriage is pulled along by the tension of a spring, and at the end of the predetermined travel the carriage is pushed rightward to align with the left-hand margin of the paper. On a manual typewriter, the carriage is pushed by hand, whereas on most electrics the carriage is returned under power. In any case, the carriage rides on tracks. The entire carriage assembly includes the platen and paper table and feed rolls (Fig. 1-17).

On single element typewriters, the platen remains stationary. The typing element is transported from left to right during typing.

PAPER TABLE-FEED ROLLS

The *paper table*, which may also be called the *paper pan*, is a curved metal table (or pan), directly underneath the platen. It has a highly polished surface and is fitted with feed rolls (see parts 30-31, Fig. 1-17) which contact the platen in such a manner that when the platen is turned, the paper, which is gripped between the platen and feed rolls, slides over the polished surface of the paper table and is fed through the typewriter. The tension between the platen and the paper table-feed rolls can be eliminated—so the paper can be quickly removed—by a *paper release* mechanism. This mechanism will be described more fully later in this chapter.

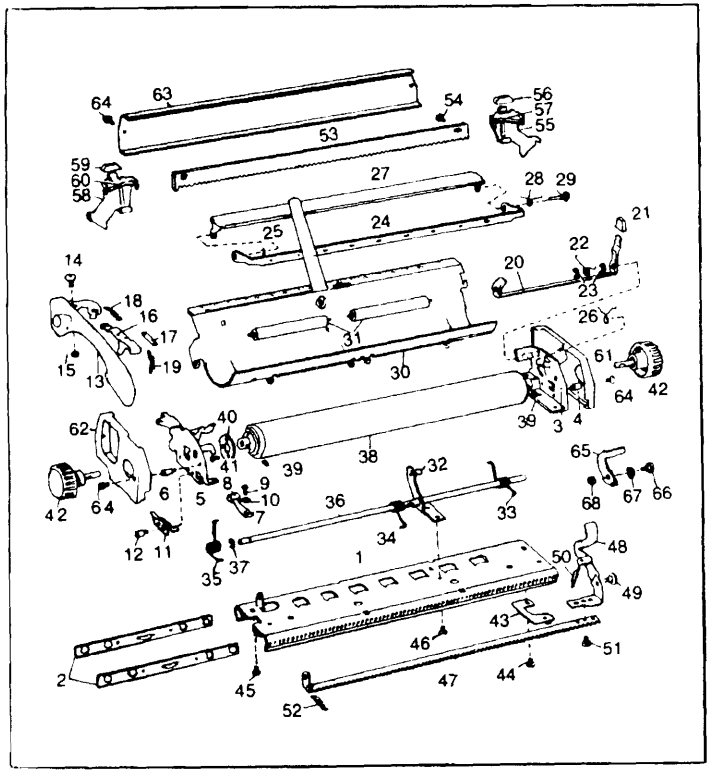


Fig. 1-17. This blow-up shows the carriage parts of certain Brother Models (courtesy of Brother International Corporation).

The *paper bail* is a cylindrical rod, the length of the platen, and is equipped with rolls that swing down against the platen. Its purpose is to hold the paper snug against the platen.

OVERVIEW OF CONTROL BUTTONS AND LEVERS

Typewriter control buttons, levers, knobs, etc., allow the typist to control certain inner mechanisms from an external, convenient position. In some cases these controls are easily identifiable because they are marked; in other cases they are not marked and, in a few cases, reference to an operator's manual is about the only way to identify them. In any case, proper identification of these controls, and the use of the most appropriate terminology to describe them, is important when discussing problems with suppliers and professional repairmen.

Space Bar

Apart from controlling the actions of the typebars through the keybuttons, other operations of the typewriter are controlled through various control buttons and levers. The *space bar* (Fig. 1-18, Item 1) is located directly below the keybutton assembly, in a

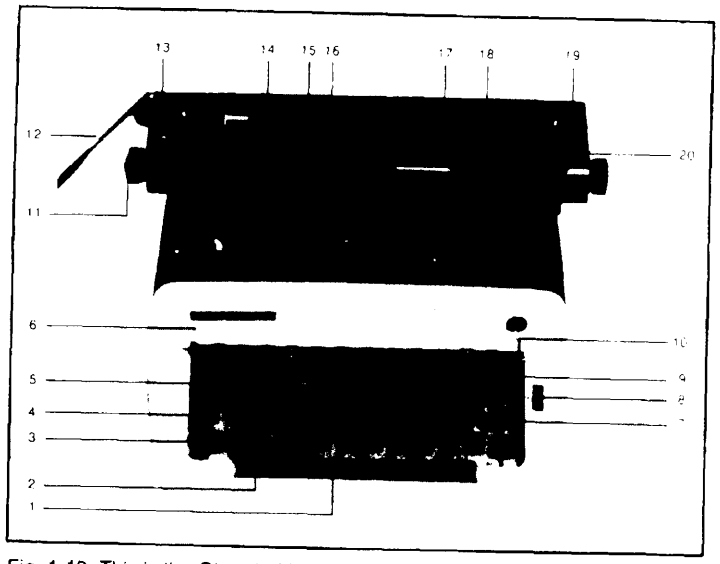


Fig. 1-18. This is the Olympia Model B-12, manual portable typewriter. By the time you read this entire chapter you will understand what all the numbers refer to (courtesy of OLYMPIA USA INC.).

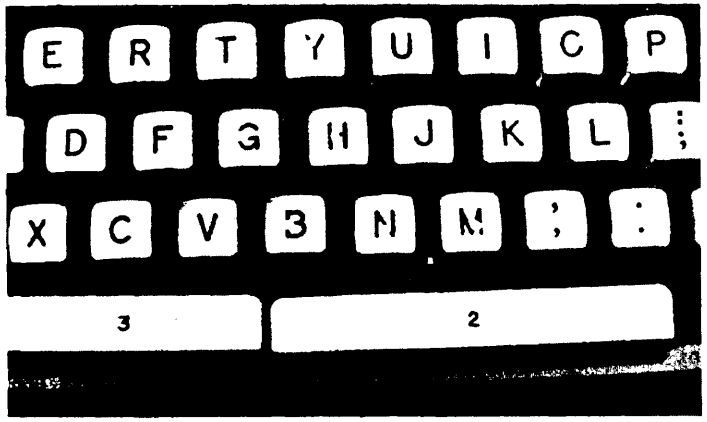


Fig. 1-19. This close-up photo shows the two space bars of the proportional spacing IBM typewriter shown earlier in this chapter. Depressing the space bar marked "3" will move the carriage three units of space; depressing the space bar marked "2" will move the carriage two units of space. This provides a means of varying line lengths to fit certain typing formats.

position where it can be touched by the typist's thumb. Most generally, a light touch on the space bar causes the carriage (or typing element, in the case of single element machines) to be moved one "space," which on standard typewriters is always exactly equal to the movement when a character is typed. On certain machines, a constant pressure on the space bar causes the carriage or element to move and continue moving (i.e., "repeat spacing") until the pressure is released (on the machine of Fig. 1-18, repeat spacing is accomplished by depressing the bar indicated as Item 2). If there are two space bars, their functions will depend upon whether the machine is a standard typewriter or a proportional spacer.

The Second Space Bar On The Standard Typewriter. The second space bar (usually on the left) on a standard typewriter may be either a repeat space bar (as in Fig. 1-18) or half-space bar.

The Second Space Bar On The Proportional Spacing Typewriter. Speaking primarily of the IBM *Executive*, the two space bars, from left to right, will be numbered "3" and "2" (Fig. 1-19). The space bar to use for normal typing is the "2" space bar, which moves the carriage leftward a distance of two units of width. The space to use for other purposes—such as modifying line lengths if desired—is the "3" space bar, which moves the carriage leftward by a distance of three units of width. These two space bars

are used in conjunction with the back space key, which moves the carriage rightward (that is, *back*) by a distance of one unit of width, to adjust the length of lines of type. A constant pressure on the "3" space bar will cause repeat spacing.

On-Off Control Button

The *on-off control button* is, of course, present only on electric machines (Fig. 1-20), upper left corner of the keyboard. Generally speaking, if it is found in an obvious place, close to the keybutton format, it will be clearly marked with the words on and off. If it is not found near the keybutton panel, it may be found on the side, or underneath, the keybutton panel, in which case the words on and off may be indicated by a pointer or displayed through a small window.

Frequently, the on-off control button is not embodied in the switch itself, but is connected to the switch through a linkage. Sometimes a misadjustment in this linkage can cause switching problems; therefore, when discussing switching problems, be sure and make the distinction between the switch itself, the on-off control button and the linkage—if there is a linkage.

Shift and Shift Lock Control Buttons

In the lower left and lower right corners of the keybutton panel are located the *shift* control buttons (Fig. 1-18, Item 3). Directly above the shift control button in the left corner is the *Shift-Lock* control button (Fig. 1-18, Item 4).

On a typebar machine, depressing either of the shift control buttons will cause the complete typebar assembly to be lowered in such a manner that the *upper portions* of the type heads, which contain capital letters and other "upper case" characters, will strike the platen. Similarly, on a single element machine, the upper case characters will strike the platen, but in this case it is accomplished by rotating the typing element 180 degrees, since one hemisphere of the element contains the lower case characters while the opposite hemisphere contains the upper case characters. The typebar assembly or element returns to its lower case position when the shift control button is released. Depressing the lock control button will lock the assembly or element in position for continuous upper case typing, and can be released by depressing and releasing either of the shift control buttons.

Carriage Return Control Button or Lever

On a manual typewriter, the carriage is returned to its starting position at the left-hand margin manually (by arm power), when the

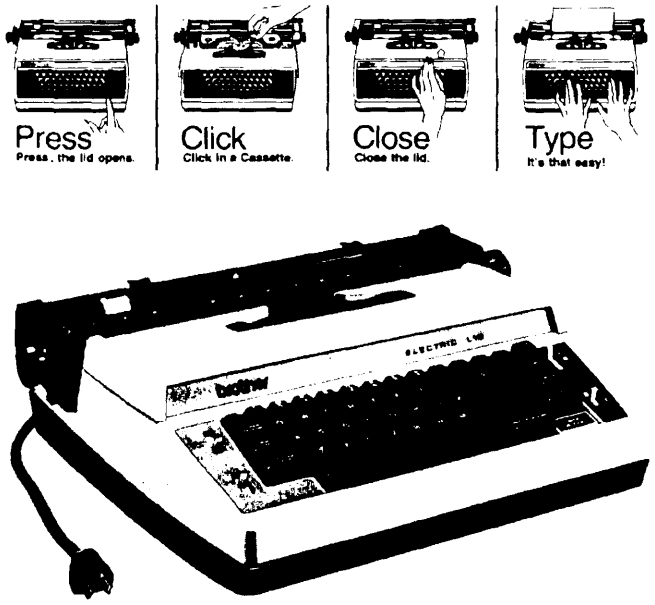


Fig. 1-20. This is the Brother electric, Model JP10. On this particular machine, the on-off switch is clearly marked, but this is not the case on all machines (courtesy of Brother International Corporation).

operator pushes against a lever (Fig. 1-18, Item 12) that extends outward from the left end of the carriage. This lever is also called a *line space lever* because it also controls the mechanism that turns the platen.

On electric typewriters, the carriage is generally, but not always, returned under power through an electrically actuated mechanism when the operator depresses the *return* control button, located on the right-hand end and about halfway up the keybutton panel.

Simultaneously as the carriage returns, the platen will turn to achieve vertical line-spacing between lines of type. The line spacing mechanism will be explained in the next two chapters.

Tab Set and Clear Control Buttons

Tab set and *tab clear* may be one control button, which rocks back and forth (Fig. 1-18, Item 10), or two separate control buttons. While the location varies from machine to machine, it is generally found near the keybutton panel. Depressing the tab set engages a mechanism which sets a tabular stop wherever the carriage or element happens to be located at the time of setting. Depressing the tab clear will eliminate or "clear" previously set tabular stops, providing the carriage/element is tabbed to that stop before depressing the tab clear control button. Actual tabbing (i.e., tabulating) is done through a tab control button.

Tab Control Button

The word tab means tabular stop and even the oldest of typewriters was equipped with these stops which, when appropriately set, would allow the carriage to move in one uninterrupted motion and stop at the preset position. Depressing the tab control button (Fig. 1-18, Item 17) activates a mechanism which momentarily releases the carriage from the escapement mechanism, allowing it to move leftward under spring tension until the first tab stop is reached, where the carriage will stop. Depressing the tab control button subsequent times causes the carriage to move to subsequent preset tabular stops in a series. The mechanism that accomplishes this will be discussed more fully in the next chapter.

Margin Set Control Button(s) or Lever

If the setting of the left-hand and right-hand margins is accomplished through a control button, it will be marked *mar set*—or some similar marking. If it is accomplished through levers located on the paper scale (Fig. 1-18, Item 14), they may not be marked, but their positions make their functions obvious. In the case of a mar set control button, there may be only one control button, with which to set both the left-hand and right-hand margin stops. This is usually accomplished by moving the carriage to the margin that you wish to eliminate, depressing the *mar stop* button simultaneously with the *carriage release* control button, moving the carriage by hand to the new position, and simultaneously releasing

both mar stop and carriage release control buttons. On the other hand, if there are two margin stop levers located on the paper scale, margin setting is accomplished by depressing the appropriate level (i.e., left-hand lever for the left-hand margin stop, etc.) to disengage it from a locked position, and simply sliding it to the new position, where it is allowed to lock in place.

There may be considerable variations from these methods of margin setting, from machine to machine. However, it's usually not difficult to figure out how to set margin stops, even on unfamiliar machines. Here are some points to remember about margin setting.

☐ On any properly operating typewriter, either standard or proportional spacer, the carriage will always stop at the present left-hand margin when the carriage is returned.

☐ On various standard typewriters, the right-hand margin stop may only stop the carriage when characters are being typed, but not when spacing or tabbing. On some proportional spacing machines, setting the right-hand margin does nothing but set the position of a warning bell. It does not actually set a stop that will stop the carriage in its leftward travel.

The actual mechanism of the carriage stops is simple and straightforward and most generally easily visible and accessible. There will be more about this in later chapters.

Mar Rel (Margin Release) Keybutton

A margin release keybutton (Fig. 1-18, Item 5), usually located on the left end of the keyboard, allows the typist to move the carriage beyond the preset left-hand or right-hand margin stops, without the necessity of resetting the stops. Then, when the carriage is again moved between these two limiting stops, the stops are again effective, unless and until the margin release keybutton is again depressed. The mechanism that is activated by the margin release keybutton will be discussed in the next chapter.

Carriage Release Control Buttons

Carriage release control buttons are generally not so marked, but they can be identified by their locations at either end of the platen (Fig. 1-18, Item 19)—generally between the ends of the platen and the platen knobs. The reason for two control buttons is for the convenience of being able to release the carriage with either hand. It is not necessary to depress these control buttons in order

to move the carriage rightward, but it is necessary to move the carriage leftward—or the direction it travels during typing.

The feature of being able to move the carriage (and thus the type heads in relation to the platen surface) by hand is unique to typebar machines, as the element carriage of the single element machines cannot be released. Therefore, nothing comparable to the carriage release control buttons is to be found on single element typewriters.

Ribbon Position Control Button

In normal operation, each time a keybutton is depressed to type a character, a mechanism lifts the ribbon into position to be struck by the type head. When the typebar completes its cycle, the ribbon is lowered. This results in an up-and-down motion of the ribbon during typing. On fabric ribbon machines, the *ribbon position* (or *color control*) button is used to put the ribbon in position where either its top half is presented on the up cycle, or its bottom half. This provides a means of switching from the black portion of the ribbon to the red portion or, in the case of a correcting ribbon, from the typing portion to the correcting portion. Moreover, depressing the ribbon position control button still further will completely disengage the ribbon lift mechanism so that no surface of the ribbon is presented for typing. Thus, with the type head missing the ribbon completely, no printed impression is made when the type head strikes the paper/platen. This is the position used for typing mimeograph stencils. On fabric ribbon machines, the ribbon position control button is located near the keybutton panel, usually on the left side of the panel (it is on the right side of the machine in Fig. 1-18, however).

On certain single element machines (again, notably the IBM Selectric II and comparable machines) there is no color control because, to date, there are no dual-colored ribbons (there are, however, ribbons of various colors, interchangeable simply by changing the cartridge). However, there is a provision, on the element carriage, to disengage the ribbon lift mechanism so that a mimeograph stencil can be typed. Never type on a mimeograph stencil that is not covered with the protective film sheet. If this film is not supplied with the stencil, leaving the ribbon in normal typing position, rather than disengaging the ribbon lift, will keep the element from becoming clogged with the collodion of the stencil.

Touch Control Lever or Control Button

Touch control (also called *touch regulation* and other similar names) keybuttons or levers are found on manual typewriters, for the purpose of regulating the amount of pressure that must be applied to a keybutton to activate the typebar. This is to compensate for the different typing pressures that different people inherently exert when typing. Through this compensation, the pressure with which the typebars strike the platen is indirectly regulated. Touch control is also available on some electric machines.

Typing Pressure Regulation

On some electric typewriters, the pressure with which the type head strikes the platen can be regulated by a pressure regulating mechanism. The button that actuates the mechanism is sometimes called an *impression regulator*, and is often marked with + and – symbols (see Fig. 1-20, the control directly below the on-off switch).

Typing pressure control is not the same as touch control, inasmuch as it does not regulate the amount of manual pressure that must be applied to a keybutton.

On most electric typewriters, in addition to overall typing pressure regulation, the pressures of individual typebars can be regulated through individual screw adjustments, found either underneath the machine or under the top cover of the machine. This procedure will be described more fully in the chapter on adjustments.

Back Space Keybutton

The *back space* keybutton (Fig. 1-18, Item 9) is almost always located directly above the return control button. Depressing it actuates a mechanism that causes the carriage to move backward. The distance of this movement on standard typewriters is one character space. On some machines, a constant pressure on the back space keybutton will cause the carriage to keep moving back until the keybutton is released or the carriage is stopped against the left margin stop; this is the feature of repeat spacing.

On some proportional spacing typewriters, the back space keybutton is found in the traditional location. Rather than moving the carriage backward by the distance of a character, it moves it backward only one unit of measurement, which is inherent to the machine and always less than a character width.

Multiple Copy Control Lever

On most electric machines, the platen can be moved slightly back from the striking reach of the type heads to compensate for the larger effective circumference of the platen when several sheets of paper are inserted. This is accomplished by moving a multiple copy control lever (which may not be marked as such), which may be calibrated in either letters or numbers. This lever will usually be found on top of the typewriter, in the area of the platen, but it may sometimes be found nearer the keybutton panel.

Paper Release Lever

To facilitate straightening the paper after it has been rolled into the typewriter, the paper table and feed rolls can be backed away from the platen, until the platen and feed rolls no longer touch each other. This is accomplished through a paper release lever, usually found on top of and on the right-hand end of the typewriter (Fig. 1-18, Item 20).

Line Space Selector Lever

As I said earlier, when the carriage or element is returned to the left-hand margin stop, a push pawl engaging in the platen ratchet wheel turns the platen by some predetermined number of line spaces. This predetermined number is set through a line space selector lever (not to be confused with the carriage return lever—which doubles as a line space lever—on manual machines), which is generally found on top of the machine, on either the right-hand or left-hand end (Fig. 1-18, Item 13). On some machines, line spacing is available in single-spacing, double-spacing and triple-spacing, and the line space selector lever will be calibrated with the numbers "1," "2" and "3." On other machines, line-spacing is available in single-spacing, one-and-a-half-spacing, double-spacing, and—sometimes but not always—triple-spacing. As a general rule, the line space selector lever will be located on the end where the platen ratchet is found.

Platen Release Knob

The ratchet of the platen can be disengaged from the push pawl, causing the platen to turn freely. This is accomplished by pushing inward on a button in the center of the platen knob (usually found on the left-hand knob only—Fig. 1-18, Item 11), while simultaneously turning the platen knob. On some machines the

platen is released by pushing inward on the platen knob itself. In any case, the knob returns to its normal position under spring pressure, re-engaging the ratchet wheel with the pawl as soon as you quit pushing it.

Keybuttons

Keybutton formats on U.S. typewriters are for the most part standardized, with each keybutton actuating either a lower case or upper case character. However, this format can vary widely among special purpose typewriters—such as those used for advertising layout, etc. Insofar as standard typewriters—and especially typebar typewriters—are concerned, there may be some slight variations in keybutton format from one machine to the other, with most variations occurring in symbols, numbers and punctuation marks.

The variation of keybutton format from one single element machine to the other is slightly greater than on typebar machines, and these variations introduce the problem of selecting the appropriate typing elements for a given machine. Within the IBM single element line, for example, some keyboards are designated as "88 character," while others are designated as "96 character." Typing elements will not interchange between these two IBM models (namely the IBM Selectric II and IBM Selectric III). Of course, there are slight keyboard format differences—with corresponding differences in the typing elements—between the various typewriter brands.

Despite small variations in keyboard format, the variations are never so radical as to cause typing disorientation. A typical variation would be the inclusion of some mathematical symbol on one machine that is not present on another machine, but generally this new keybutton will not usurp the place of one that is traditionally found on typewriters. Everything said here in regard to keybutton format applies to U.S. standard typewriters.

IBM SELECTRIC II CONTROLS

In addition to the foregoing list of commonly found keybuttons and control levers, some typewriters have others. For example, the IBM Selectric II—as well as comparable single element machines—have innovative functions, for which control buttons and levers must be provided. On the Selectric II you would find the following.

Depressing and holding the *index* keybutton turns the platen the number of vertical line spaces at which the line space selector

lever is set, while the carriage (i.e., the element, of course) remains stationary.

Depressing and holding the *express (EXP)* keybutton returns the element leftward, until the keybutton is released or the element reaches the left-hand margin stop, without the platen's turning. Thus, element return can be accomplished without line spacing, if desired.

In the lower-right-hand corner of the keybutton panel is a keybutton marked with the symbol X, enclosed by an arrow pointing leftward. This is the correcting back space keybutton which, when momentarily depressed, back spaces the element one space, while simultaneously engaging a mechanism which will hold the element in position while one character is typed. When a second character is typed, the keybuttons are back in normal operating mode, and the element moves rightward during typing.

On the inside of the right-hand platen knob of the Selectric II is a free-turning dial, calibrated in numbers from 0 to 4. This dial is not connected to any mechanism of the machine, and is simply used to give the operator an indication that the end of the page is being reached (the IBM operator's manual refers to this dial as the *page-end indicator*). It is an unnecessary convenience feature and serves no useful purpose.

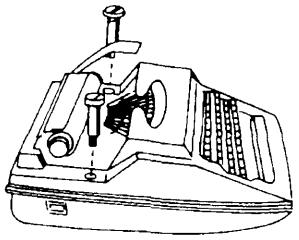
On the right-hand end and almost directly over the platen, on the Selectric II, is an unmarked lever which, when pulled out of its normal position and toward the typist, disengages the platen ratchet in such a manner that when the ratchet is later re-engaged—after turning the platen any number of turns—the lever can be moved to its normal position, re-engaging the ratchet. Line spacing will register exactly as it was before the platen was moved. The IBM operator's manual refers to this lever as the *line finder*.

On the left-hand end of the Selectric II and almost directly over the platen is another unmarked lever. The normal position of this lever is toward the rear of the machine, where it is held by spring tension. Pulling it toward the typist and *holding it* activates a mechanism which moves the element back one-half space. The typewriter can be operated while this lever is held back, to provide one-half or 1½ spaces between words. The IBM operator's manual refers to this lever as the half back space lever.

SUMMARY

What I have attempted to do in this chapter is familiarize you with typewriter terminology and to give you a description of the

locations, names and purposes of the various controls found on typewriters. This is to help you learn the proper language, so you can be on speaking terms with professional repairmen, manufacturers and distributors. It is extremely helpful to call parts, functions, control levers, etc., by their technically correct names. This can save you some delay and frustration when seeking advice, ordering parts or service manuals. In the next chapter I will talk about the internal mechanisms which these external controls activate.



Chapter 2
Manual Typewriter Mechanisms

New manual typewriters are still available. While it may be an overstatement to say that they are an important segment of the industry, it is fair to say that they have been present in the consumer market in sufficient amounts and for enough years that many of the machines seen by professional repairmen are manual typewriters.

While the mechanism descriptions in this chapter are intended to be representative of a fairly large cross-section of machines, the illustrations are those of well-known and popular brands, taken from service manuals supplied by manufacturers. However, the textual descriptions, together with the illustrations, should help you to understand the underlying principles of the mechanisms of just about any manual typewriter.

The part names in the textual descriptions do not always match the ones that I have suggested because, as I explained in the first chapter, there is some variance in terminology between manufacturers. The names were used as they appeared in the service manuals, to make your reference easier.

TYPING MECHANISM

The *typing mechanism* causes a typebar to swing up and strike the platen when a keybutton in depressed. Refer to Fig. 2-1. When the keybutton (key) is depressed down, the key lever pushes down on the bell crank. Since the bell crank is connected to the typebar

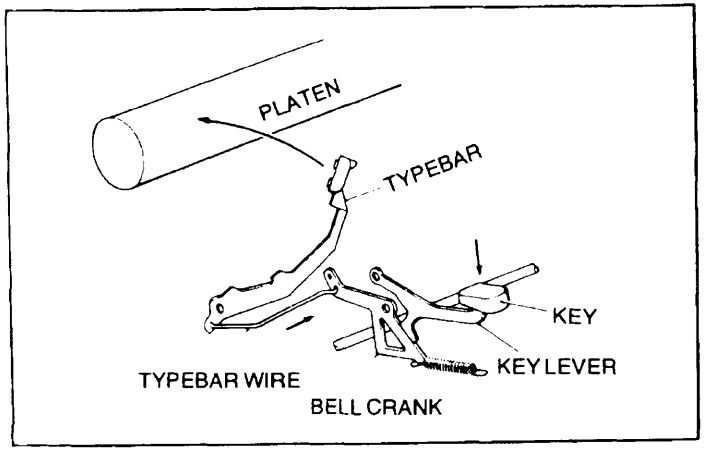


Fig. 2-1. In this illustration, one typebar is isolated from the assembly to clarify the process (courtesy of Brother International Corporation).

by the typebar wire, the bottom end of the typebar is pulled in the direction of the key, and the head of the typebar strikes the platen.

As a further illustration of the typing mechanism principle, refer now to Fig. 2-2. When the key is pushed down, the key lever pulls the typebar wire in the direction of the key, which causes the typebar to swing in an arc toward the platen. Note that in this particular illustration, it is the lower character that strikes the platen, and that the upper character is above the curvature of the platen. This is the positional relationship between the typebar head and platen when the typewriter is set to type lower case characters.

To see yet another illustration of a typing mechanism, refer to Fig. 2-3. When the key lever (1) is depressed, the key lever link (4) is pulled around making the key lever shaft (3) the center of revolution. Because of the movement of the key lever link (4), the sub lever (6) is rotated, with the sub lever shaft (5) being the center of revolution. The typebar link (8) is pulled by this movement, and the typebar (9) swings up and strikes the platen (10). Lastly, the key lever (1) and typebar (9) are returned to normal position by the tension of the sub lever spring (7).

SPACING MECHANISM

The *spacing mechanism* causes the carriage to move one character space when the space bar is depressed. Refer to Fig. 2-4.

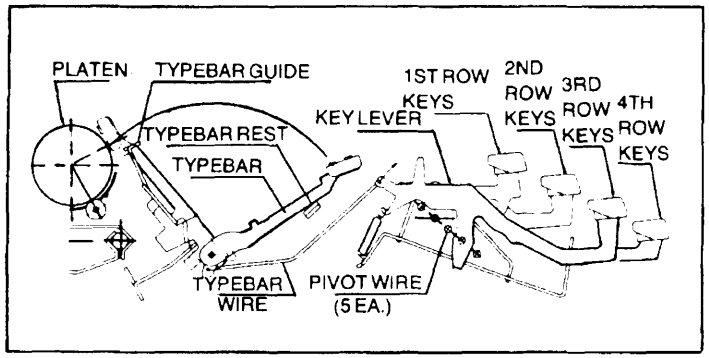


Fig. 2-2. This typing mechanism, from the Brother Model JP7, further illustrates typing mechanism principles (courtesy of Brother International Corporation).

When the space bar is depressed, the space rod is moved in the direction of the arrow, escape crank B moves, and this movement is transmitted to the half space ratchet, which in turn moves the carriage. Releasing the space bar completes the spacing.

To look at yet another representative space mechanism, refer to Fig. 2-5. When the space key (1) is depressed, the space link (3a) pushes a connection (4), which in turn pushes the loose dog (5a), which pushes the fixed dog (6a). This removes the fixed dog (6) from the escapement wheel (7), and the carriage moves one space. Finally, when the space key (1) is no longer depressed by the operator, it—together with the space link (3)—is returned to home position by the tension of spring (8).

ESCAPEMENT MECHANISM

The *escapement mechanism* causes the carriage to move one space when a keybutton is depressed (i.e., when a character is typed). Referring to Fig. 2-6, when the character key is depressed, the escape crank (rear—F-42) will be rotated in the direction of the arrow, by an escape crank (front—F-40). The escape crank (rear—F-42) will shift the half space ratchet (F-48) to the plate where F-48 is engaged with the space ratchet wheel (F-37), via escape crank (rear—F-42).

The half space ratchet (F-48) will be pushed into the inside of the addendum of the space ratchet wheel (F-37). Meanwhile, the space ratchet (F-47) will be disengaged from F-37. In this condition, the carriage will be shifted a half space, by the tension of the spring drum.

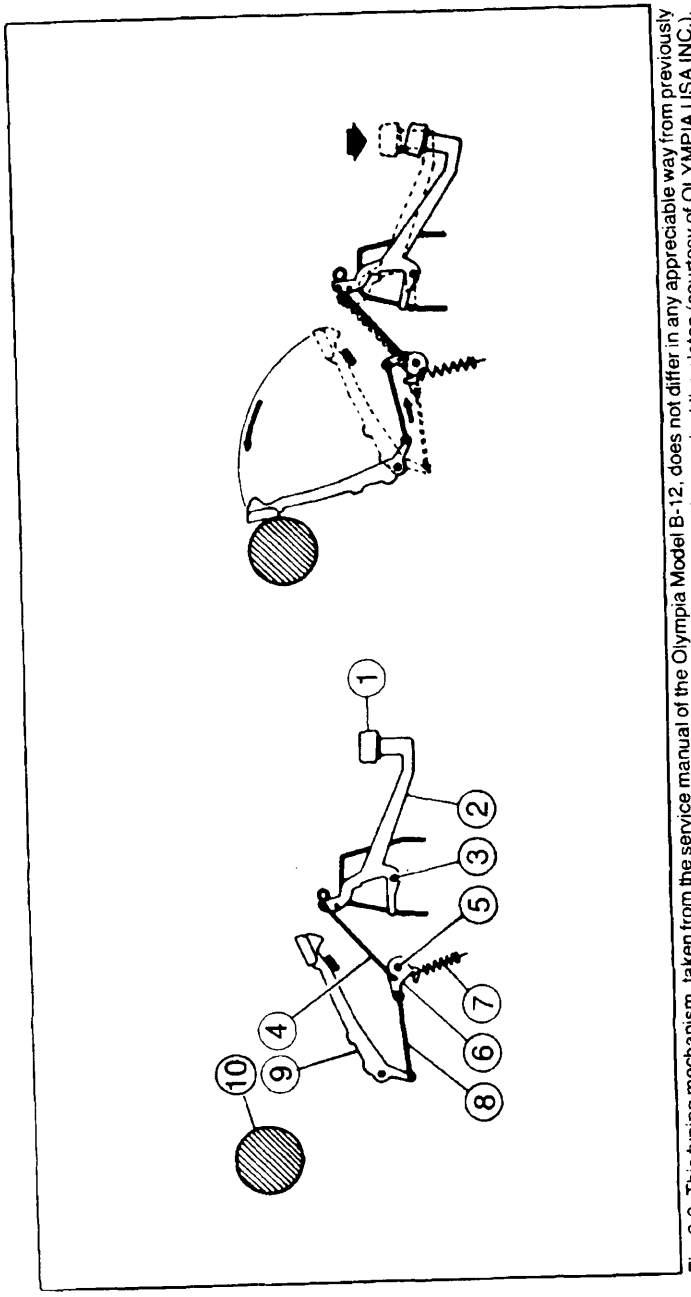


Fig. 2-3. This typing mechanism, taken from the service manual of the Olympia Model B-12, does not differ in any appreciable way from previously shown mechanisms, but further serves to illustrate the basic principle of moving the typebar against the platen (courtesy of OLYMPIA USA INC.).

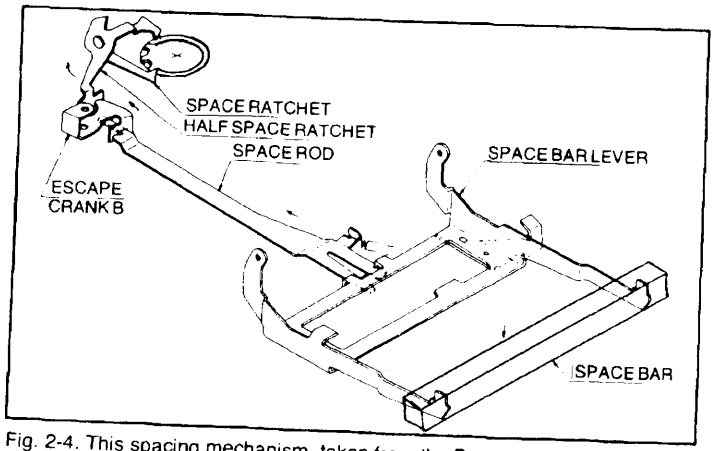


Fig. 2-4. This spacing mechanism, taken from the Brother Model JP7 service manual, shows how spacing is accomplished (courtesy of Brother International Corporation).

F-48 and F-47 will return to the original position by spring action, while simultaneously F-40 will return to its original position, and the carriage will shift another half space. A full space shifting of the carriage has been accomplished.

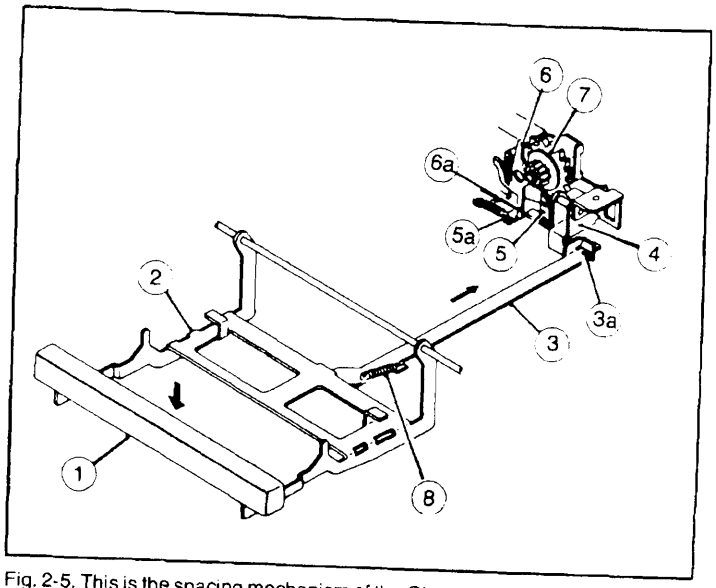


Fig. 2-5. This is the spacing mechanism of the Olympia Model B-12 (courtesy of OLYMPIA USA INC.).

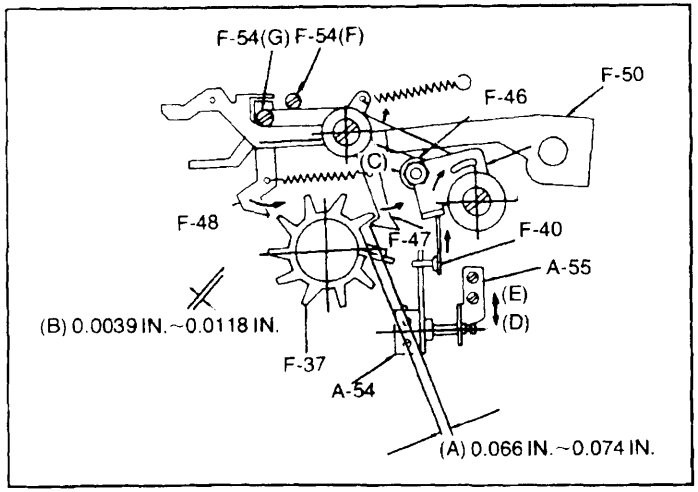


Fig. 2-6. This escapement mechanism is from the service manual of the Brother Model M-100. The adjustment tolerances that are shown here will be discussed in a later chapter (courtesy of Brother International Corporation).

To see another escapement mechanism, refer to Fig. 2-7. When a keybutton is depressed, the typebar (not shown) pushes the escapement drive plate, which moves the escape crank A and

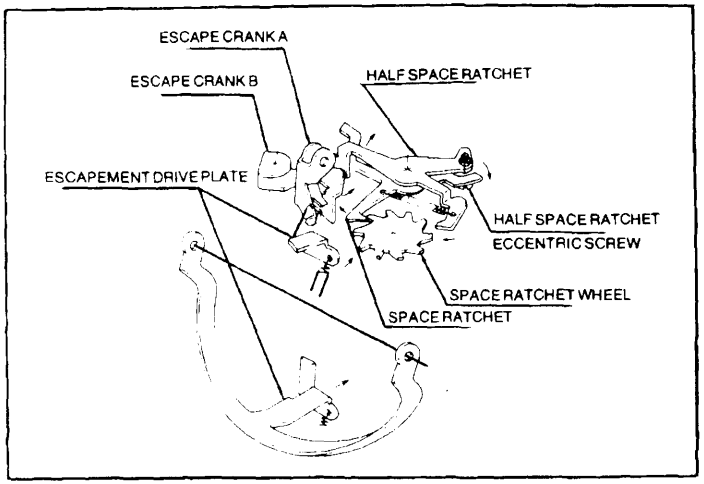


Fig. 2-7. This escapement mechanism is from the Brother service manual for the Brother Model JP7. It's easy to understand if you read the text carefully (courtesy of Brother International Corporation).

also escape crank B, the half space ratchet and space ratchet, which removes the space ratchet from the space ratchet wheel.

For yet another escapement mechanism, see Fig. 2-8. When the key lever is depressed, the typebar is operated in the direction of the platen, and then the side (b) of the typebar pushes the side face (4a) of the segment universal bar. The tip of the bottom part (4b) of the segment universal pushes the connection (5), and then

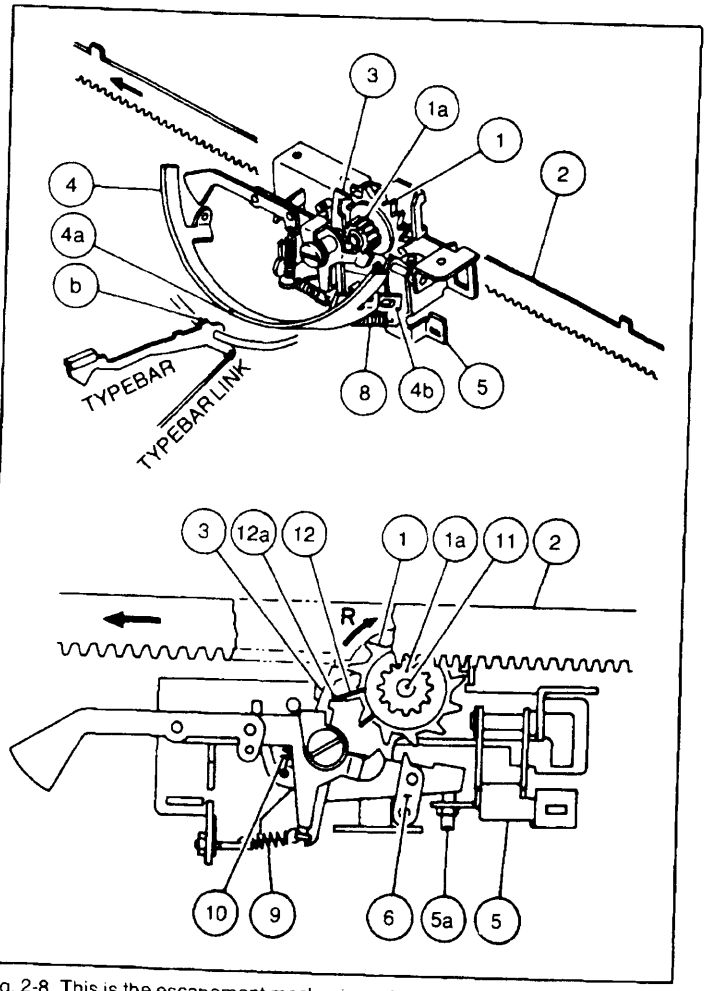


Fig. 2-8. This is the escapement mechanism of the Olympia Model B-12, taken from the Olympia service manual (courtesy of OLYMPIA USA INC.).

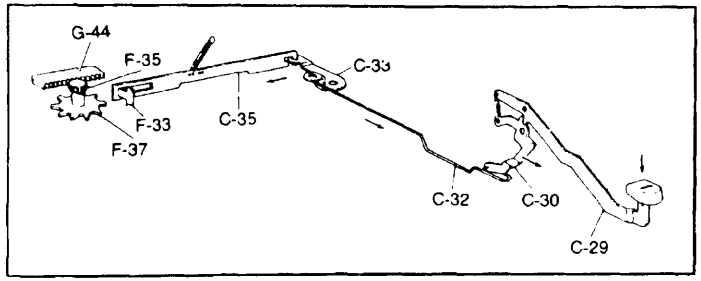


Fig. 2-9. This back space mechanism is of the Brother M-100, taken from the Brother service manual (courtesy of Brother International Corporation).

the setscrew (5a) of the connection pushes the loose dog (6) in the upper direction. The fixed dog (3) leaves the star wheel (1) in accordance with the movement of the loose dog (6).

The carriage moves in the direction shown with an arrow, by the force of the main spring. Then the revolution of the star wheel (1) is stopped by the loose dog (6), and the movement of the carriage stops.

Finally, when the key lever is no longer depressed, the typebar is returned to home position by the sub-lever spring and universal spring (8). The loose dog (6) is released from the star wheel (1) by the loose dog spring (9), and the carriage completes its movement in the direction shown with the arrow, by spring tension. The revolution of the star wheel (1) is discontinued by the fixed dog (3), and the carriage stops.

Incorporated in this mechanism is a "silent return" feature, which operates as follows. The silent return (12) is pivoted on the shaft (11) of the escapement wheel, held friction-tight against the wheel by a special spring. When the carriage is moved from left to right, the wheel (1) turns in the direction shown by the arrow (R), dragging the silent return in the same direction. The arm (12a) of the silent return pushes away the fixed dog (3), which normally rides over the teeth of the wheel. When the carriage resumes its normal forward movement, the silent return returns to home position by the help of the wheel.

BACK SPACE MECHANISM

The *back space mechanism* causes the carriage to move back one space when the back space keybutton is depressed and released. Referring to Fig. 2-9, when the back space key is depressed, the back space lever (C-30) pulls the back space wire

(C-32) in the direction of the arrow. The back space link (C-33) is rotated by the back space wire (C-32), following the arrow direction, and the backspace bar (C-35) is moved by the back space link (C-33), pushing the space ratchet wheel (F-37). Since the ratchet wheel (F-37) is an integral part of the space pinion (F-35), with the latter being engaged in the carriage escapement, the carriage rack (G-44) is moved back one space.

To see another backspace mechanism, refer to Fig. 2-10. When the back space key is depressed, this action is transmitted through the back space key lever to the back space rod, which is moved in the direction of the arrow. This moves the back space crank, which moves the back space pawl and, thus, the space ratchet wheel, which is engaged in the carriage escapement. Note that all the connecting levers, as well as the key lever, are returned to home positions by the tension of a spring.

Another backspace mechanism is illustrated in Fig. 2-11. When the backspace key (1) is depressed, the back space latch plate (5) is pulled by the movement of the back space link (3) and back space crank (4). Thus, the position (5a) is engaged with the escapement wheel (6), which moves the carriage back one space. When the operator no longer depresses the back space key (1), the tension of back space spring (7) returns the back space key to its original position.

MARGIN STOP MECHANISM

The border spaces on the paper, on the left-hand and right-hand edges of the line of type, are called the left and right margins. Normally, the left-hand margin is maintained even, since the carriage automatically comes to rest at the same position on each successive return of the carriage. However, the evenness of the right-hand margin is only approximate, since it is not determined by automatic stopping, but rather by a combination of the preset margin stop and the typist's discretion, with final stopping achieved only when the typist types past the discretionary point. When this happens, the carriage will ultimately stop against the preset right margin stop. Referring to Fig. 2-12, the left and right margins are determined by the position of margin stoppers G-52 and G-55 (G-55 is not shown), and the margin rack (G-57). Carriage travel is limited when the margin stoppers strike the carriage stoppers (F-13). Locking of the carriage at the preset right margin is accomplished as follows.

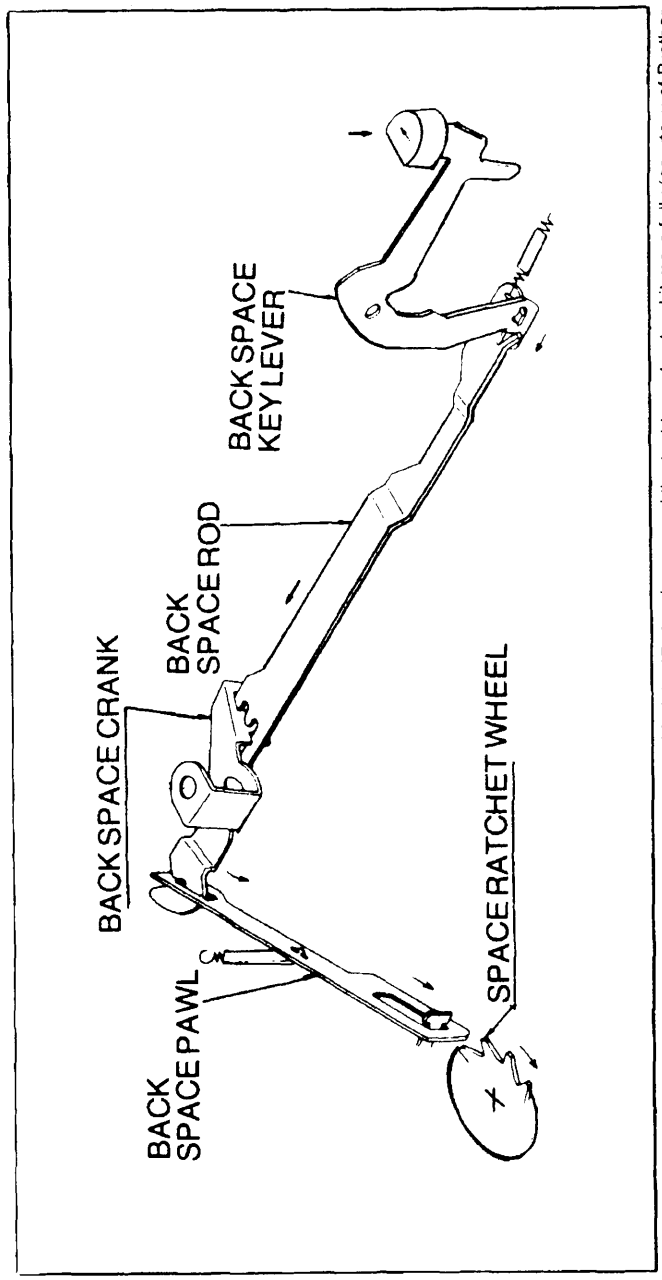


Fig. 2-10. This is the back space mechanism of the Brother Model JP7. As always read the text to understand it more fully (courtesy of Brother International Corporation).

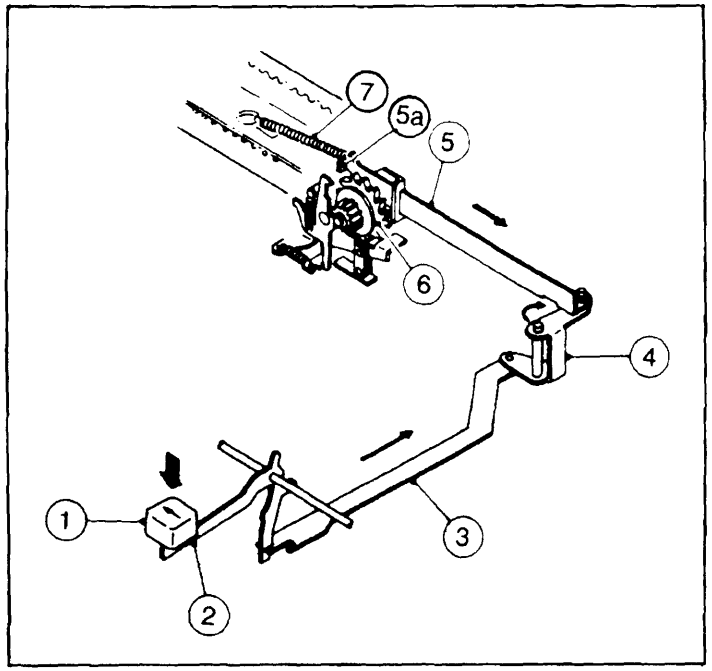
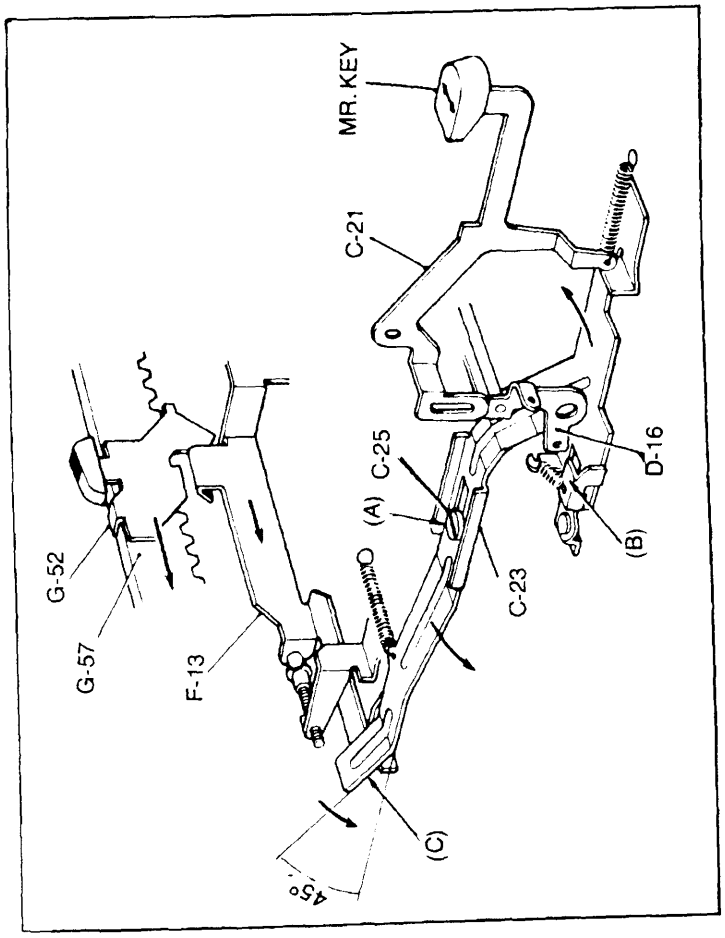


Fig. 2-11. This is the Olympia Model B-12 back space mechanism, as shown in the Olympia service manual. By now it should be evident that the carriage is literally pushed back through manual power as it works through the various levers and linkages, since the natural tendency of the carriage is to move rightward with the tension of the spring drum (courtesy of OLYMPIA USA INC.).

When the last character is typed, that is, when the last typing key prior to margin locking is depressed, the margin stop (G-52) pushes the carriage stopper (F-13) a half space to the left to activate the margin release bar unit (C-23), which is also pushed to the left. The margin release bar unit (C-23) is pivoted at (A), activating the ribbon drive crank (D-16) to the right, drawing the (B) portion of the margin release bar unit (C-23) against the ribbon drive crank (D-16) at the moment the key lever is released. As the key lever is released, the carriage moves the remaining half space. The (B) portion is sprung into locking position, and the key type is locked.

Another margin stop mechanism is shown in Fig. 2-13. The typing key is depressed. The right margin stopper is pushed against the carriage stopper. The escape stopper is pushed in such

Fig. 2-12. This is the margin stop mechanism of the Brother M-100, taken from the Brother service manual. The operator controls of this mechanism are G-52 and mr. key; other parts of the mechanism are under the covers (courtesy of Brother International Corporation).



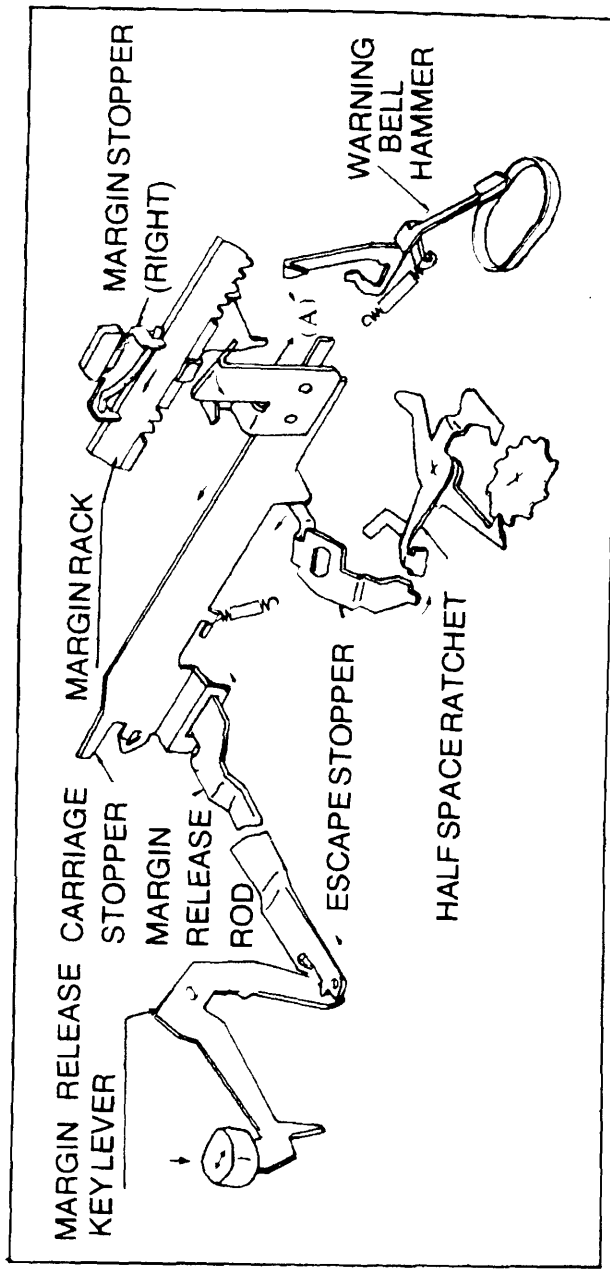


Fig. 2-13. This is the margin stop and release mechanism of the Brother Model JP7, taken from the Brother service manual. Note that margin stopping and margin releasing are two different operations, working into the same mechanism. Margin releasing is described fully in the text (courtesy of Brother International Corporation).

a manner that it swings against the half space ratchet, making it impossible for the half space ratchet to disengage from the ratchet wheel. The carriage is locked so that typing is no longer possible.

Yet another margin stop mechanism is shown in Fig. 2-14. The left margin stop (10) is set where the typing line should begin, and the right margin stop (12) is set where the carriage should stop—or the typing line should maximally end. When the carriage moves toward this latter position by actual typing, the right margin stop (12a) touches the carriage stopper (5a), and, simultaneously, the stopper (5c) touches the back frame (20a). This stops the movement of the carriage stopper (5), and the carriage is stopped.

MARGIN RELEASE MECHANISM

If it is necessary to begin a line of type ahead of the left-hand margin, or finish a line of type past the right-hand margin, a *margin*

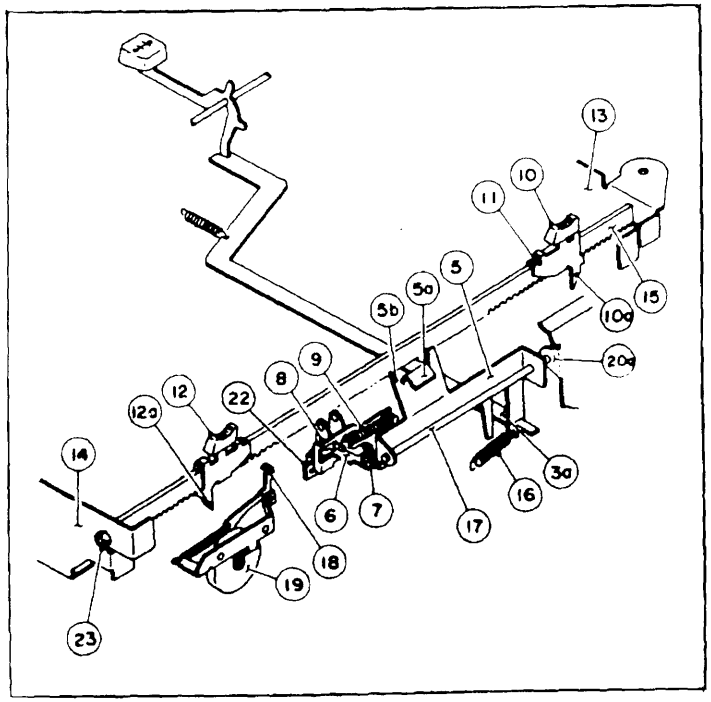


Fig. 2-14. This is the margin stop and margin release mechanism of the Olympia Model B-12, taken from the Olympia service manual (courtesy of OLYMPIA USA INC.).

release mechanism can be activated by depressing the margin release keybutton (usually marked "MR"). The margin release works as follows (see Fig. 2-13 again). When the margin release key is depressed, the margin release rod moves in the direction of the arrow, causing the carriage stopper to come off the margin stopper, at which time it returns in the direction A, allowing the escape stopper to come back, which in turn allows the escapement mechanism to function. It is possible to type through the preset position.

To study yet another margin release mechanism, see Fig. 2-15. When the margin release keybutton (1) is depressed, the margin link (3a) moves in the direction of the arrow to push the carriage stopper (5), and thus (5a) is released from the margin stop

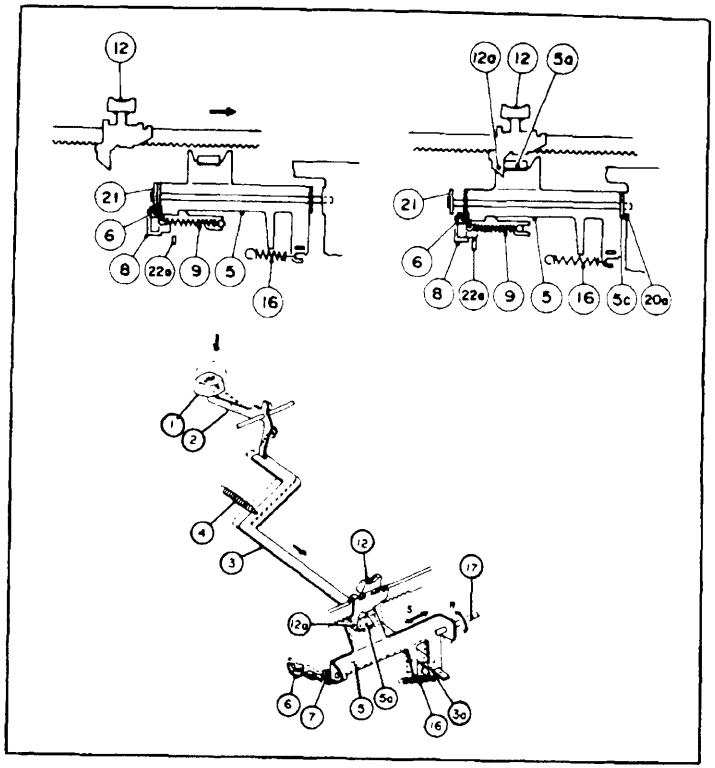


Fig. 2-15. Here, Olympia explains more fully the operation and principle of the margin release mechanism—read the text (courtesy of OLYMPIA USA INC.).

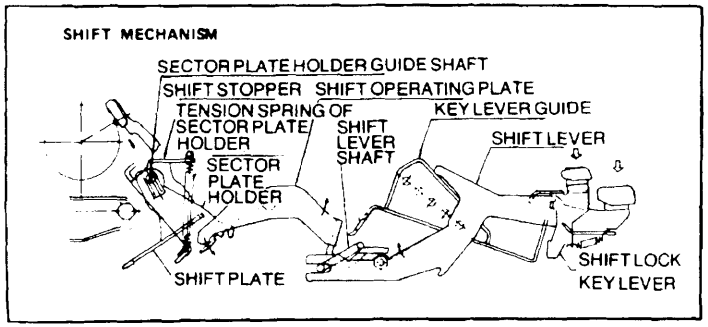


Fig. 2-16. This Brother shift mechanism, taken from the Brother service manual, is fairly typical of those mechanisms which shift the typebar sector; however, later in this book you will see mechanisms that shift the carriage up and down. In either case the typebar strikes the platen on an arc of the curve of the platen in such a manner that the slightly curved typeface hits the platen (courtesy of Brother International Corporation).

(12a). When the typist releases the margin release keybutton (1), the tension of the spring (4) pulls the margin link (3) back, thus returning both the margin link (3) and margin release keybutton (1) to their original positions.

SHIFT MECHANISM

The *shift mechanism* raises and lowers the typebar assembly, so that the appropriate upper- or lower-case characters will strike the platen, while the inappropriate ones will not touch the platen because they are either above or below the curvature of the platen. See Fig. 2-16. When the shift keybutton (the keybutton to the right in the illustration) is pushed down, the shift lever pivots to push the *shift operating plate* in the direction of the arrow, causing the other end of the shift operating plate to move downward in the direction of the arrow, thus lowering the *sector plate holder*. This allows the upper case characters to strike the platen when a typing keybutton is depressed (note that in Fig. 2-16, the mechanism is holding the typebars in lower case position—that is, the shift keybutton is not depressed).

In the context of this discussion, lower case means the characters on the lower half of the type head, which strike the platen when the typebar is *up*. Some service manuals refer to this position of the segment as upper case, presumably on the premise that the segment is in the uppermost position. However, common usage (and strict definition as well) would seem to dictate that the

lower case condition is when the segment is *up*, and lower case characters (as opposed to capitals, etc.) are typed.

To see another shifting mechanism, refer to Fig. 2-17. When the shifting keybutton (1) is pushed down, the shift lever (3) rotates, its pivot point being the key lever shaft (C). This rotates the torsion bar (4), which is retained at the left and right side frames by the shift center (6) and nut (7). Note that the torsion bar is connected to the shift lever (3) by a torsion bar part (4a), and also to the segment hanger shaft (5) and segment base (9) by the torsion bar part (4b). Thus, since the segment (10) is mounted on the segment base (9), the segment base is lowered, placing the typebars in upper case position. When the typist no longer depresses the shift keybutton (1), the torsion bar (4) is returned to its home position by the tension of shift spring (8); and the shift lever (3) and segment base (9) are likewise returned to their home positions.

SHIFT LOCK MECHANISM

When it is necessary to place the typebar assembly in its lower position for continuous upper case typing, the typist may depress a *shift lock* (usually marked lock) keybutton, which holds the segment down. See Fig. 2-18. When the shift lock button (2) is depressed, the tip of the shift lock lever (22) is locked at the shift lock fitting (21).

The shift lock can be released, allowing the segment to return to its normal position, as follows (still referring to Fig. 2-18). When the shift button (1) is depressed slightly more than its locked position, the torsion bar (4b) is rotated by just the pitch of "S" (see inset drawing) of the oval shaped hole (D) of the torsion bar part (4b). This causes the shift lever (3) to lower by the length of stroke S, thus releasing the shift lock lever (22) from the shift lock fitting (21).

VERTICAL LINE SPACING MECHANISM

Vertical line spacing means the vertical space between lines, which is standardized at 1/6 inch (six lines to the inch) on standard typewriters.

The distance of vertical line spacing may differ on special purpose typewriters. For example, on the IBM *Executive* proportional spacer, the vertical distance between single-spaced lines is 3/16 inch.

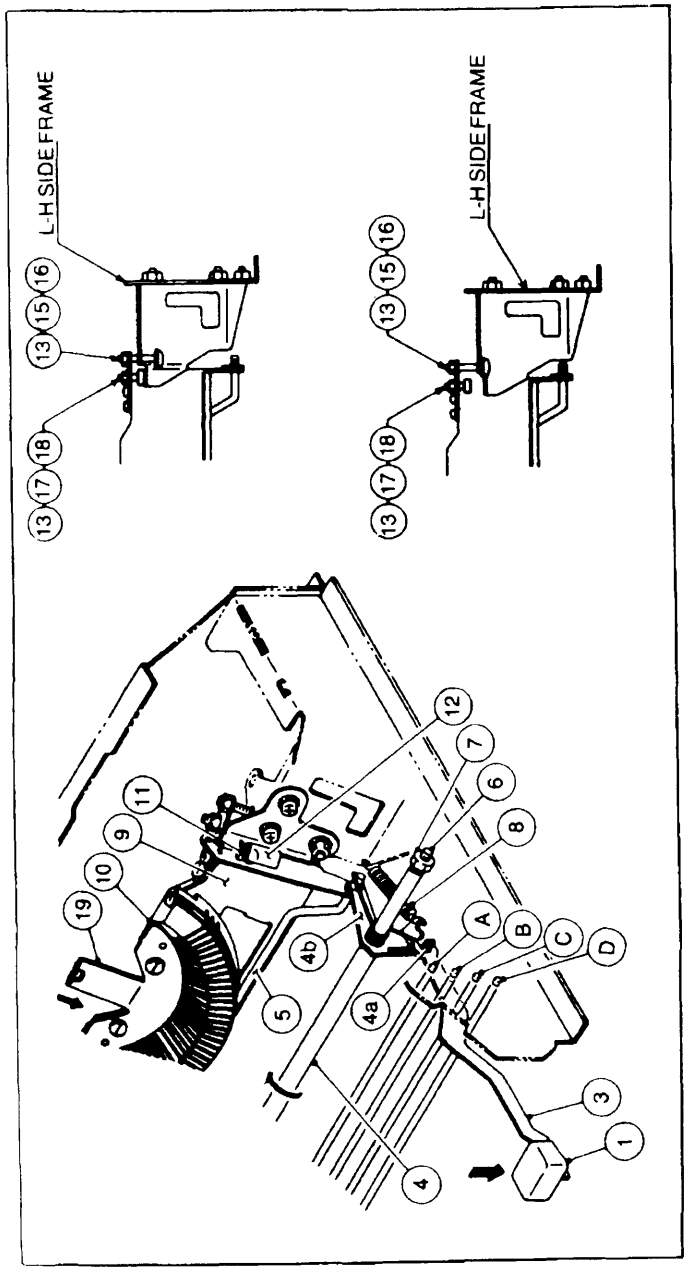


Fig. 2-17. This is the Olympia, Model B-12, shifting mechanism (courtesy of OLYMPIA USA INC.).

On standard, manual typewriters, line spacing is actually accomplished simultaneously with the return of the carriage, even though the carriage return is, strictly speaking, an operation independent of line spacing. However, the lever that is used to return the carriage serves the dual purpose of line space lever. See Fig. 2-19. When the line space lever is pushed, it moves against the line space lever plate, which moves the line space pawl in the direction of the arrow, causing the line space ratchet wheel to rotate. Since the line space ratchet wheel and platen are integral to each other, the platen rolls the appropriate amount, determined by the number of teeth in the ratchet wheel. The paper, which is gripped between the platen and feed rolls, moves a corresponding amount. In this particular mechanism, single-spacing, one-and-a-half-spacing and double-spacing is determined by which ratchet wheel tooth the pawl slides into, which is typist regulated by moving the line space adjusting cam (see Fig. 2-20). This latter mechanism will be explained more fully in the chapter on adjustments.

To see another vertical line spacing mechanism, refer to Fig. 2-21. When the line space lever (1) is operated, the feed arm (3) is rotated by the line space link (2). The line space feed pawl (4a) slides along the cam (6c) of the line space selector (6); thus, the feed pawl (4a) is engaged with a tooth of the line space ratchet (5). Since the line space ratchet is integral to the platen, the platen is turned by an amount corresponding to the travel of the pawl as it slides into a ratchet tooth. The line spacing is restricted by the touch of the feed pawl (4), with a stopper pin (12). The line space lever is returned to its home position by a spring (11).

PAPER FEED

Paper is fed through the typewriter when the platen turns, because the paper is gripped between the platen and a set of small feed rolls (the feed rolls are turned by the rolling of the platen, not vice versa). See Fig. 2-22. When the platen is correctly installed, and the paper release lever (not shown) is in normal position, the platen and paper feed rollers are in spring-tensioned contact. Thus, when a piece of paper is inserted, the back set of paper feed rollers, which are in contact with the platen, catches the paper and rolls it toward the front set of the paper feed rollers. The paper feed plate (the curved plate between the feed rollers, in the illustration) is curved upward on the outfeed side in such a manner as to deflect the paper upward, around the platen. This is an extremely simple

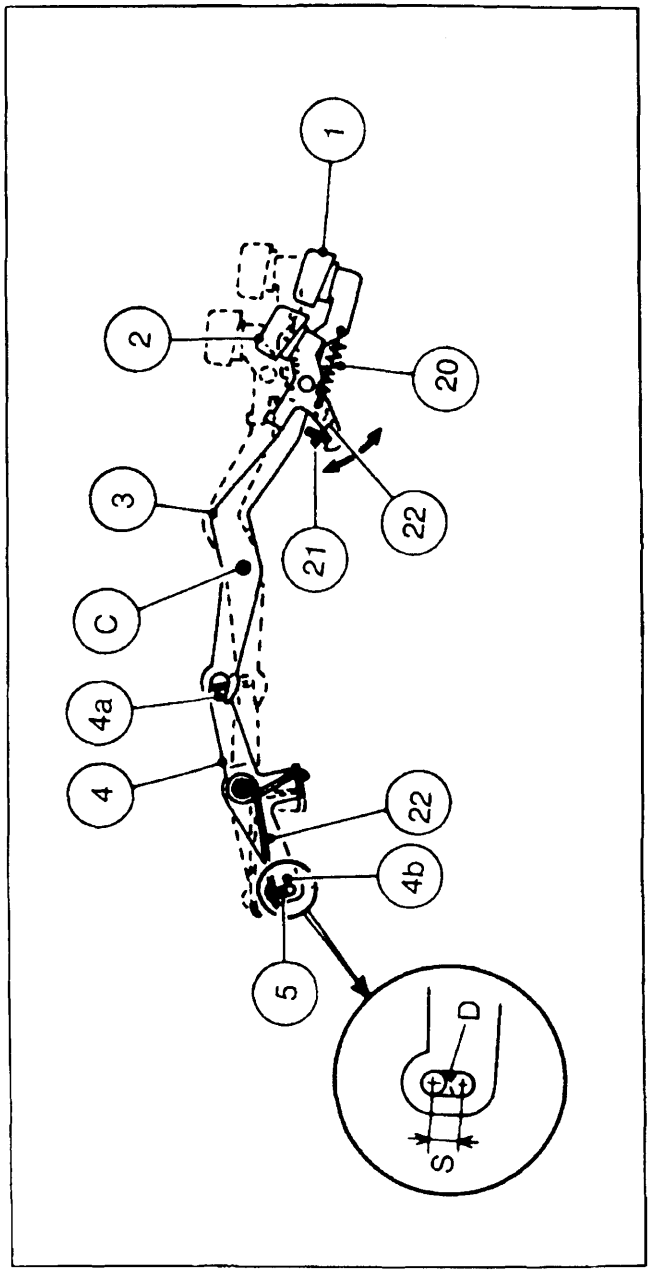


Fig. 2-18. This shift lock mechanism is from the Olympia Model B-12 Service Manual. The dotted lines represent the unshifted position; the solid lines the shifted position (courtesy of OLYMPIA USA INC.).

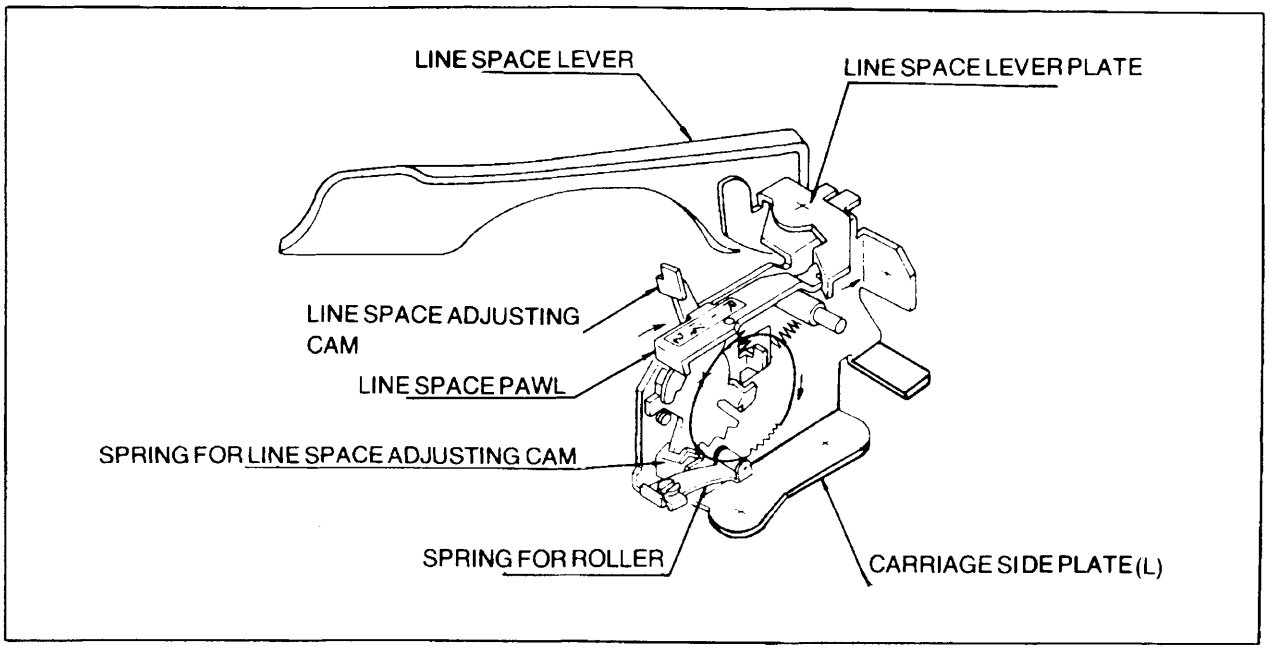


Fig. 2-19 Vertical line spacing is accomplished when the handle (line space lever in the drawing) is pushed sideways to return the carriage. Study this illustration and read the text to understand how (courtesy of Brother International Corporation).

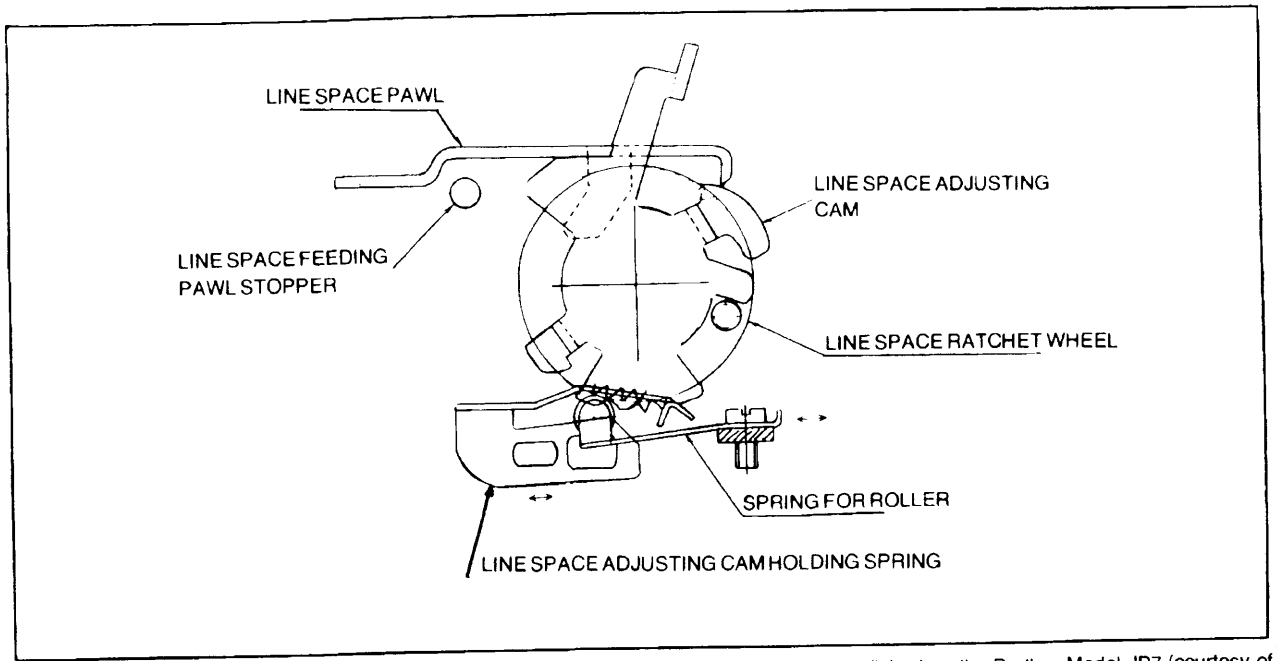


Fig. 2-20. This illustration shows how single, one-and-a-half, and double line spacing is accomplished on the Brother Model JP7 (courtesy of Brother International Corporation).

mechanism and one that is easy to work on (provided that the platen is easily removed, which is not *always* the case).

PAPER RELEASE MECHANISM

The *paper release mechanism* releases the contact pressure between the platen and feed rolls, simultaneously backing the paper pan away from the platen. This releases the paper and allows the typist to quickly remove the paper without the need for turning the platen knob, and/or straighten the paper, in case it was rolled into the typewriter crookedly, without the need to remove and reinsert the paper. The mechanism is activated through a lever on top of the typewriter (the lever is often unmarked). See Fig. 2-23. When the paper release lever is moved in the direction of the arrow (toward the typist in actual practice), the paper pan is pushed away from the platen. Since the movement of the paper pan is interconnected to that of the paper feed rollers (the paper pan usually rests on the feed roll assembly), moving the paper pan downward also moves the paper feed rolls downward—away from the platen. In this condition, the paper is freed from the grip of the feed rolls, as well as from the drag between the platen and paper pan.

For a view of yet another paper release mechanism, see Fig. 2-24. Normally (that is, when the mechanism is set to feed paper through the typewriter), the L-shaft arm (2a) pushes the paper pan (7) toward the platen side by the tension of the spring (3).

When the paper release lever (1) is depressed, the release pin (1b) pushes against the L-shaft arm (2), causing the L-shaft (2a) to move away from the paper pan (7). In the illustrated mechanism, depressing the paper release lever (1) releases the paper bail scale arm (5—connected to 6, the paper bail) by pushing it up. This convenience feature facilitates moving or removing the paper.

RIBBON FEED (OR TRANSPORT) MECHANISM

The *ribbon feed mechanism* causes the ribbon to be fed through the typewriter one small increment each time a character is typed. When the ribbon has passed from one reel to another, the mechanism reverses the direction of the ribbon feed, so that it is fed back to the recently emptied reel. See Fig. 2-25. When a keybutton is depressed, the bell crank will push the ribbon drive crank (D-16), which will push the ribbon feed pawl (right—D-40). The ribbon feed wheel (right—E-2) is rotated in the direction of the arrow by the ribbon feed pawl (right—D-40).

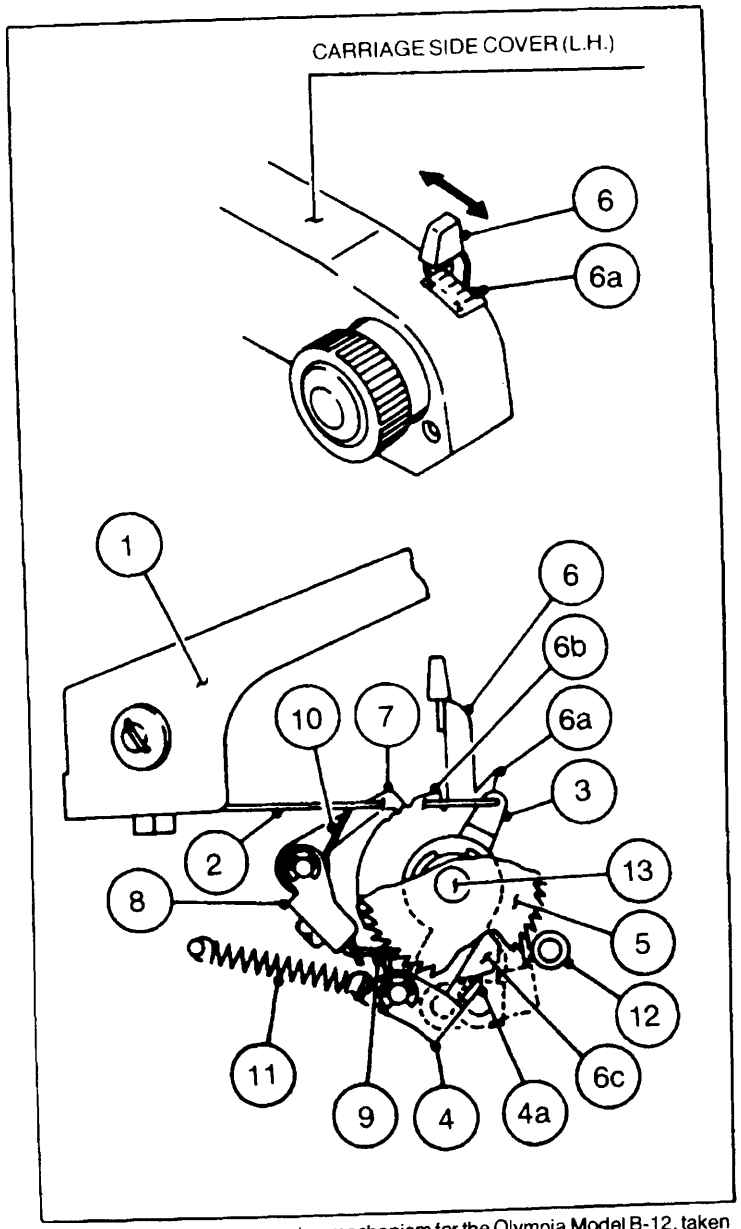
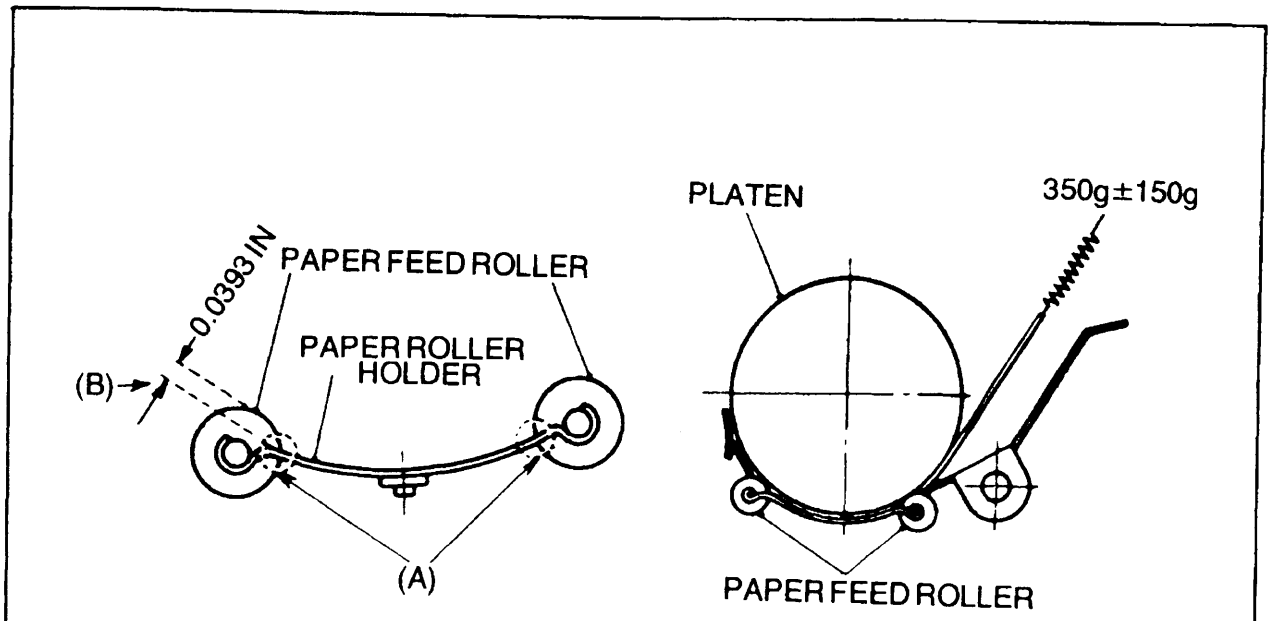


Fig. 2-21. This is the line spacing mechanism for the Olympia Model B-12, taken from the Olympia service manual (courtesy of OLYMPIA USA INC.).



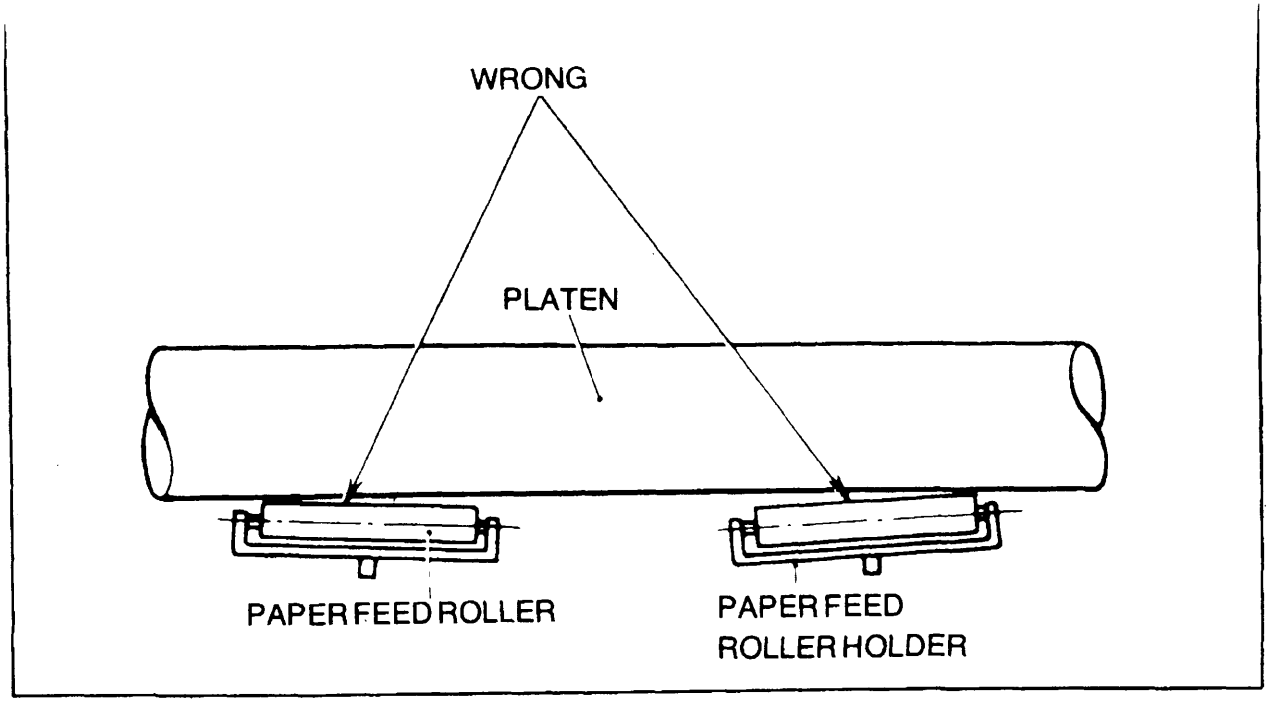


Fig. 2-22. This is the paper feed mechanism of the Brother M-100, taken from the Brother service manual (courtesy of Brother International Corporation).

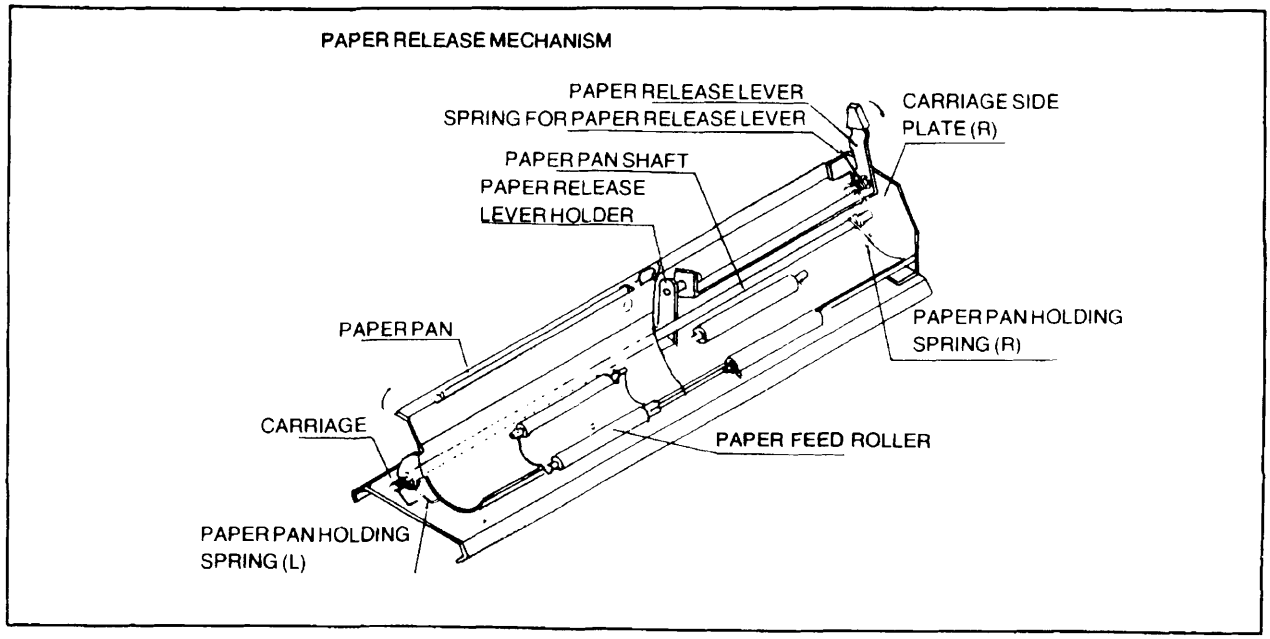


Fig. 2-23. Since the feed rolls are connected to the paper pan, moving the latter away from the platen also moves the rolls, and the paper will be free to move around (courtesy of Brother International Corporation).

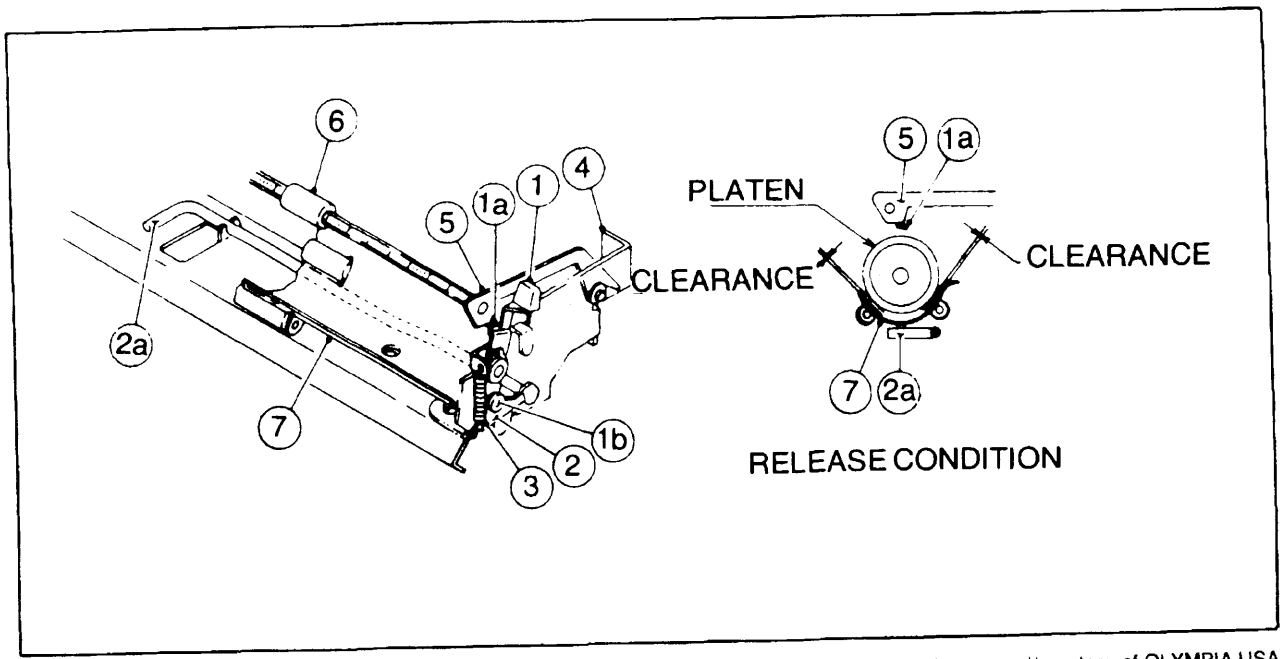


Fig. 2-24. This paper release mechanism is from the Olympia Model B-12, taken from the Olympia service manual (courtesy of OLYMPIA USA INC.).

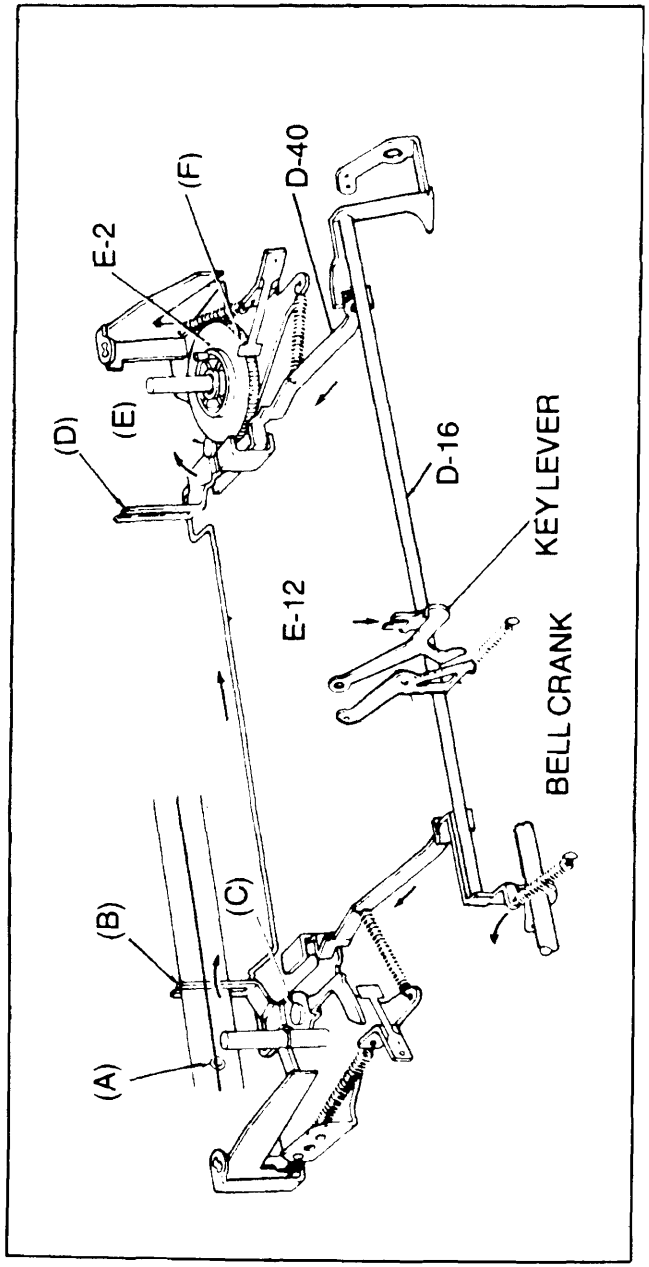


Fig. 2-25. This ribbon feed mechanism, taken from the Brother service manual for the Model JP7, shows how the ribbon is fed from one spool to the other—and then back (courtesy of Brother International Corporation).

When the ribbon is wound all the way on the right reel, the eyelet (A) of the ribbon pulls (B) in the direction of the arrow, with (C) being the fulcrum of the motion. This causes the ribbon reverse wire (E-12) to move in the direction of the arrow, moving (D) clockwise on its fulcrum (E), throwing the ribbon feed pawl (D-40) and stopper plate (E) out of mesh with the ribbon feed wheel (E-2). As a result, the ribbon travel will be reversed and it will be wound to the left side.

Yet another ribbon feed mechanism is shown in Fig. 2-26. When the key lever (1) is operated, the ribbon universal bar (2) pulls the ribbon feed link (4) and also the ribbon feed lever (3). By this pulling operation, the gear feed pawl (5) is engaged with the ribbon ratchet gear (6), causing the ribbon ratchet gear (6) to rotate. The direction of the ribbon winding is reversed as follows.

When the eyelet hole (9a) of the ribbon tape (9) pulls the reverse lever (8) inward, a change of ribbon winding direction is automatically made. Both reverse levers (left—8 and right—7) are

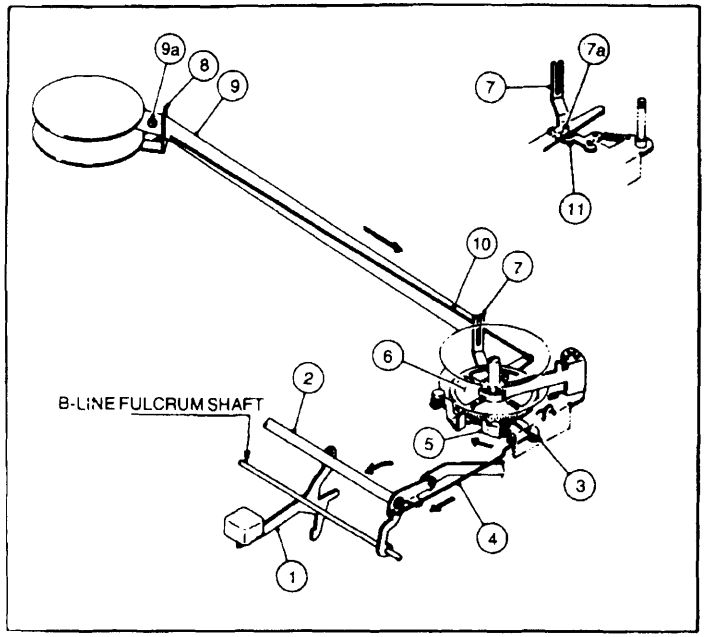


Fig. 2-26. This Olympia ribbon feeding mechanism, taken from the Olympia service manual, shows how the ribbon is fed and reversed (courtesy of OLYMPIA USA INC.).

retained at certain positions by the reverse lever pin (right—7a) and the reverse ring (10). The gear retaining pawl is mounted on the reverse lever (7) and is engaged with the ribbon ratchet gear (6) in order to prevent rewinding. At the same time, the ribbon feed system on the opposite side becomes free, being pushed by the reverse ring (10).

RIBBON LIFT MECHANISM

The *ribbon lift mechanism* causes the ribbon to vibrate up and down, in synchronization with the actions of the typebars, so that the type heads contact either the upper or lower half of the ribbon. When the ribbon lift mechanism is disengaged, the ribbon will not be lifted when a character is typed, causing the type head to miss the ribbon completely as it strikes the platen. This enables the typist to type on a mimeograph stencil without the ribbon acting as a barrier. Since the total height of the ribbon lift is made variable, one-half of a ribbon can serve one purpose (typing black, for instance), and the lower half another purpose (typing red, or laying down a correcting substance, for instance). Thus, in typewriter terminology, "ribbon lift" and "color change" work in conjunction with each other. See Fig. 2-27. When the typist operates (i.e., moves up or down) the color change lever, the motion is transmitted to the color change selector, changing the position of the RV wire against the RV operating plate. The color change stopper moves and the lift and lifting positions of the ribbon are changed.

For a view of yet another ribbon lift and color change mechanism, see Fig. 2-28. When the color selector (1) is operated, the cam lever (3) is rotated around the shaft (4) by the color selector link (2). The cam lever (3) is provided with three cams (3a, 3b and 3c). Position 3a corresponds with "red," position 3b with "black," and 3c with "stencil." The cam lever (3) is retained at the "color-selected" position by the color select detent spring (11).

The mechanism works when a keybutton is pushed down, as follows. As the key (10) is pushed down, both the ribbon lift link (6) and ribbon lift bar (7) are pulled by the ribbon universal bar (5). The ribbon lift crank (8) is rotated, making the shaft (4) the center of revolution, and the vibrator (9) rises. Since the ribbon is threaded through the vibrator, the ribbon rises with it.

The actual amount of ribbon lift is determined as follows. The ribbon lift crank (8) is rotated by the ribbon lift bar (7), being guided by the cam lever (3). If the preset position of the cam lever (3) is

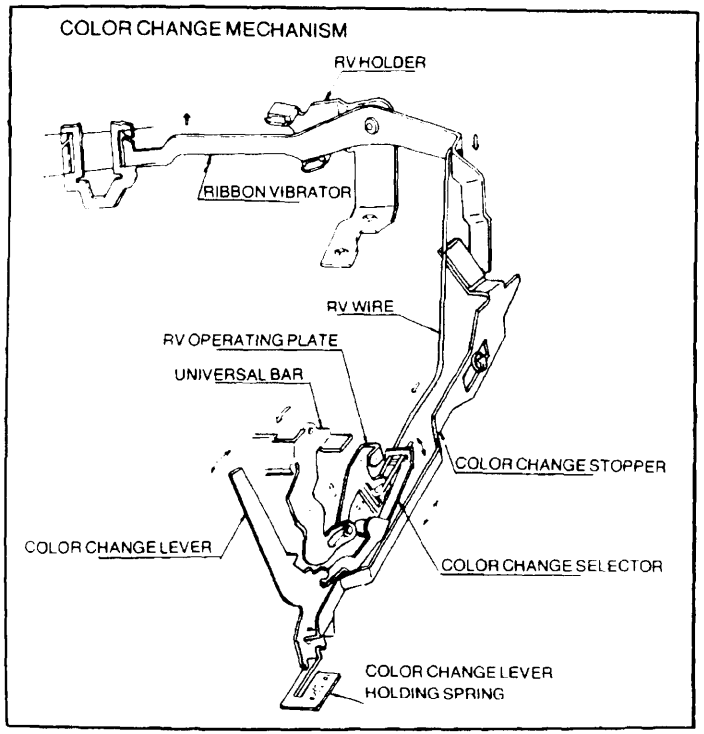


Fig. 2-27. As explained in the text, "ribbon lift" means the distance of the up and down motion (vibration) of the ribbon during typing; and "color change" means varying that distance so that certain portions of the ribbon are used while other portions are missed. If the color change selector is set for "stencil," the ribbon vibrator is (generally) moved downward slightly, where it remains stationary, so it is missed by the typebar (courtesy of Brother International Corporation).

changed by the color selector (1), the revolving angle of the ribbon lift crank (8) around the shaft (4) varies. Thus, the degree of lift of the ribbon vibrator (9) becomes variable.

TABULATION MECHANISM

The *tabulation mechanism* makes it possible to move the carriage leftward, in one continuous, freewheeling movement to a preset position, where it will automatically stop. The typist accomplishes this by presetting tab stops and, thereafter, simply depressing the tab button until the carriage reaches the desired stop. See Fig. 2-29. When the tab key is pushed down (in the arrow direction), the tab operating crank (F-3) is rotated through the

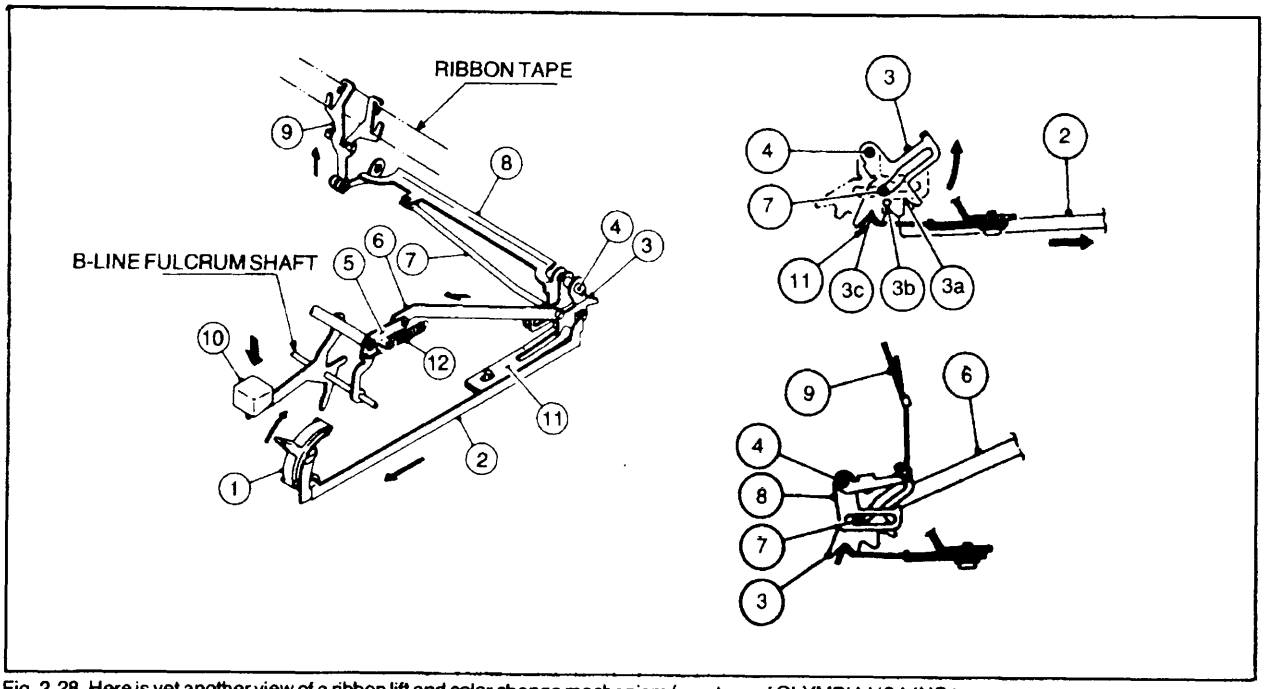


Fig. 2-28. Here is yet another view of a ribbon lift and color change mechanism (courtesy of OLYMPIA USA INC.).

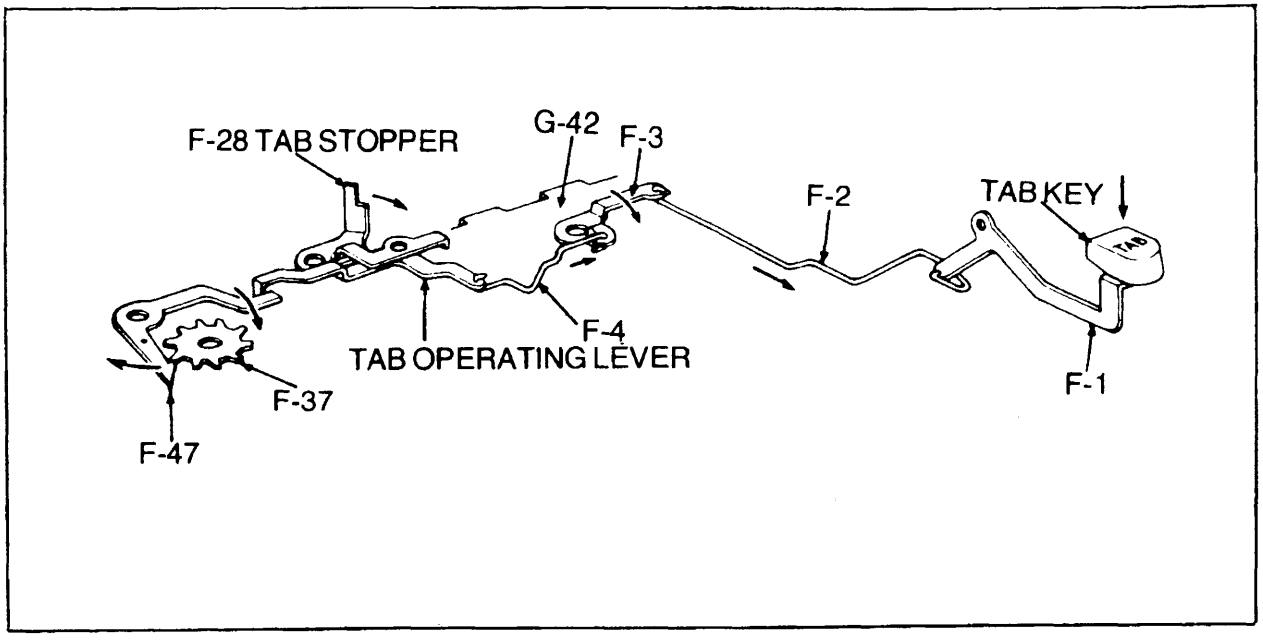


Fig. 2-29.It may be a little difficult to orient this tabulator mechanism to one in a machine,since only the essential parts areshown.However, a tab mechanism is fairly easily examined in the machine (courtesy of Brother International Corporation).

medium of the tab operating wire (front—F-2). The revolution of the tab operating crank (F-3) rotates the *tab operating lever* through the medium of the tab operating wire (rear—F-4). The revolution of the tab operating lever shall first rotate the tab stopper to the arrow direction, and the tip end of the tab stopper will be engaged with the tab stop pawl (G-42). At the same time the tab operating lever will push the space ratchet (F-47) by its tip, disengaging F-47 from the space ratchet wheel (F-37). When F-47 is disengaged from F-37, the carriage is free to move leftward, through the tension of the spring drum, until the tab stopper contacts with G-42.

For a view of yet another tabulation mechanism, see Fig. 2-30. When the tab key is pushed, the tab rod moves in the direction of the arrow, turning the tab operating lever, which turns the tab stopper. The space ratchet is disengaged from the space ratchet wheel. This allows the carriage to move leftward, until the tab pawl hits the tab stopper and stops.

Another tabulator mechanism is shown in Fig. 2-31. When the tab key (1) is depressed, the tabulator main bar (5) is rotated by the

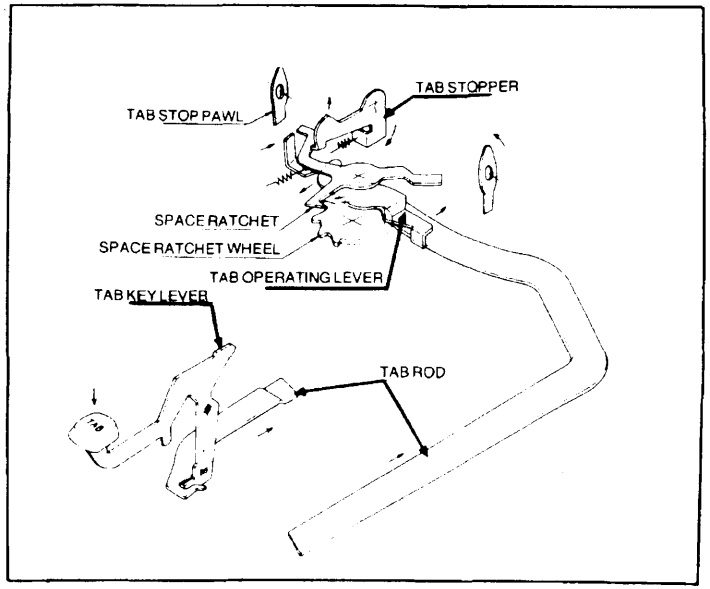


Fig. 2-30. This tab operating mechanism is out of the Brother Model JP7 service manual. Be sure and make the distinction between tab operation and tab set- clear (courtesy of Brother International Corporation).

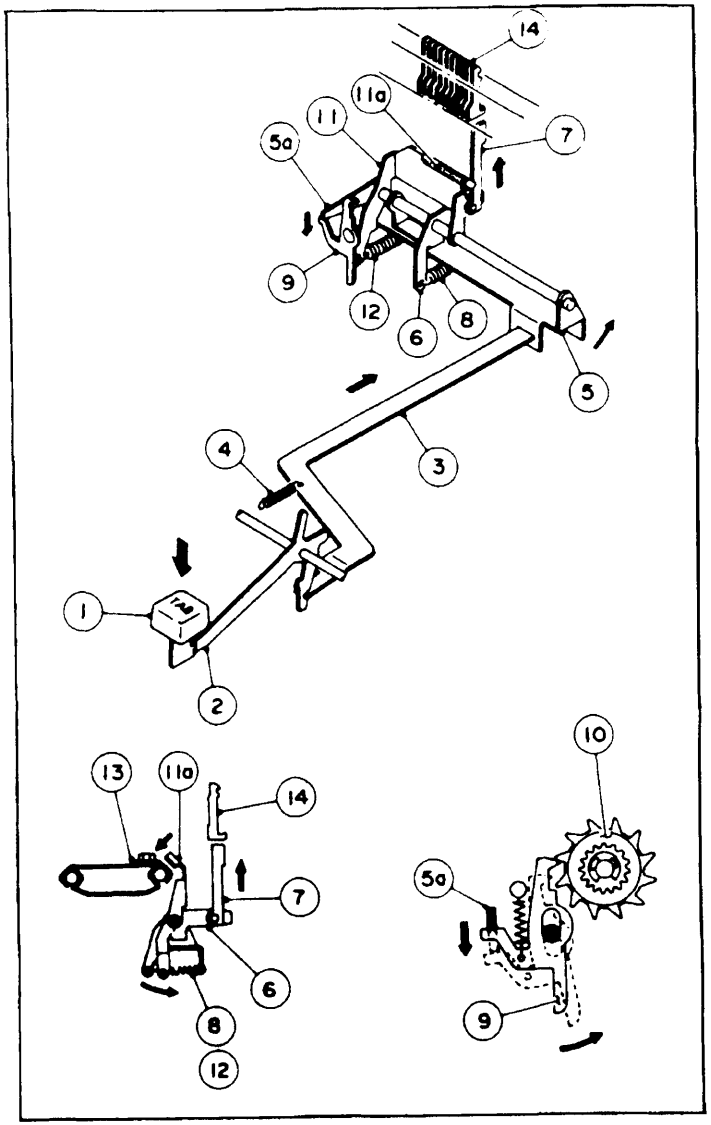


Fig. 2-31. This is an Olympia tab operating mechanism, from the Olympia service manual. The fact that the drawing differs somewhat from that of the Brother mechanism does not mean that the mechanisms are radically different; for example, here you see the tab chips (14), which are not shown in the Brother illustrations but are present in the actual mechanism (courtesy of OLYMPIA USA INC.).

movement of the tabulator link (3). The rotation of the tab stopper lift crank (6), caused from the spring (8), results in the rise of the tab stopper (7).

When the fixed dog (9) is rotated by the tabulator main bar (5a), the fixed dog (9) is released from the escapement wheel (10). This releases the carriage and it moves leftward under the tension of its spring. The tab chip (14), which was preset for tab 1, touches the tab stopper (7).

When the tab key (1) is released by the typist, the tab stopper (7) leaves the tab chip (14), and then the carriage moves leftward. The return of the fixed dog (5a) to its home position causes the rotation of the escapement wheel (10) to stop. The carriage stops at a position where the tab was originally set. In this particular mechanism, there is a braking operation on the carriage, which works as follows.

There is a brake shoe (11a) glued to the brake arm (11). When the tabulator main bar (5) is rotated, the brake arm (11) is rotated by the spring (12) and touches the carriage rail, which results in the stopping of the carriage. Because of this mechanism, the carriage can be released only after both the tab stopper (7) and brake shoe (11a) are set.

TAB SET-CLEAR MECHANISM

The *tab set-clear mechanism* allows the typist to set tab stops at preset positions, from an external control (namely, from the tab set-clear lever, which is usually distinctly separate from the tab keybutton itself). See Fig. 2-32. To use this mechanism, the carriage should be moved to the position at which a tab stop is to be set. This can be done by either tapping the space bar or using the carriage release control, until the carriage is in the correct place. The tab set lever (1) is then moved to set (+), and this movement is transmitted through the linkages to the tab set finger (5), which sets the tab chip (6), through contact with 5a—also see the inset drawing. Consecutive tab chips can be set by moving the carriage to the desired preset position and moving the tab set lever (1) to set (+).

When tab stops are no longer required for a given typing format, their presence becomes a nuisance. They can be removed or "cleared," as follows (still referring to Fig. 2-32). To clear an individual tab chip, the typist must first tab to that stop. The tab set lever (1) is moved to (−). When the carriage moves leftward, the tab chip (6), which was previously set, is returned to the individual

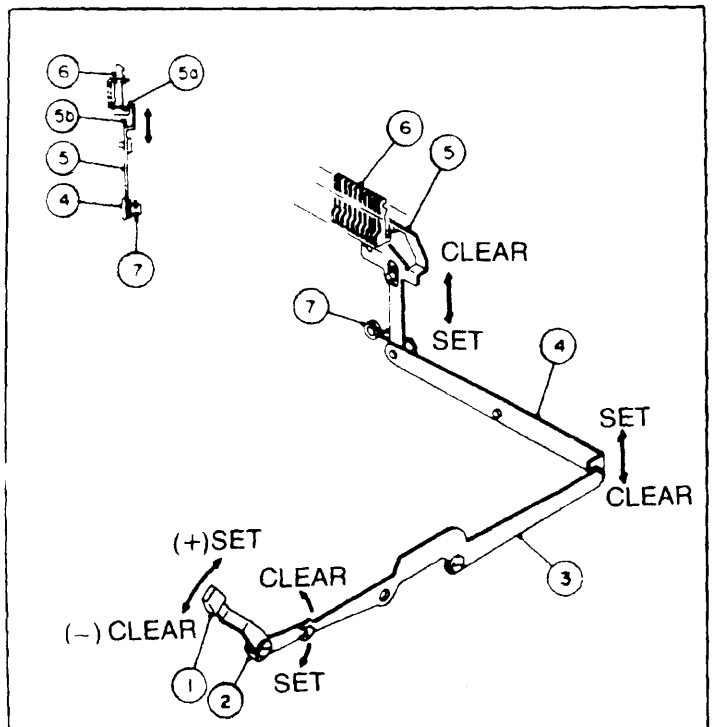


Fig. 2-32. This is a tab set-clear mechanism of the Olympia Model B-12, as taken from the Olympia service manual. About the only thing this mechanism has in common with the tab operating mechanism is its contact with the tab chips (6), which will determine where carriage will stop when a tab keybutton is pushed (courtesy of OLYMPIA USA INC.).

home position by the tab set finger (5b—shown in the inset illustration with Fig. 2-32).

The tab set lever is returned to an intermediate, or neutral, position through the tension of the torsion spring (7) when the typist releases it.

CARRIAGE RELEASE

The carriage is normally held in whatever position it happens to be in, through the engagement of the teeth of the escapement rack with the ratchet wheel. Since it is desirable to occasionally move the carriage leftward from its locked position without the necessity of typing or using the spacing bar, a carriage release

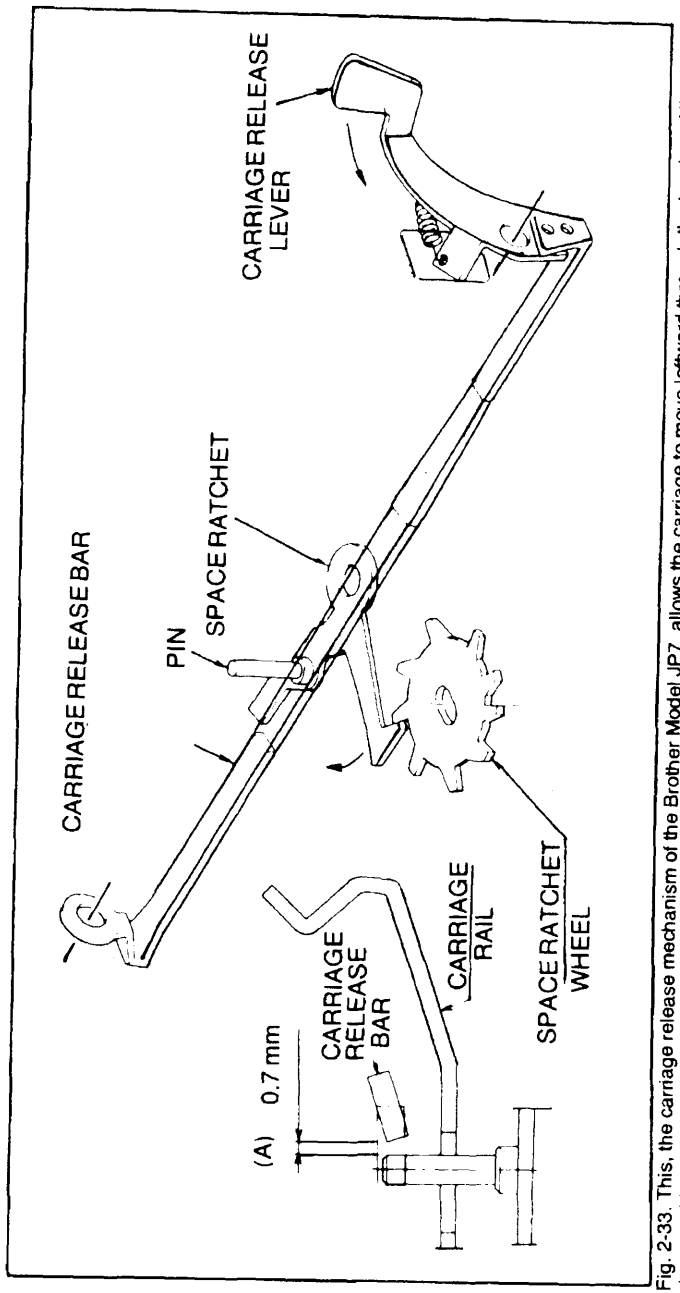


Fig. 2-33. This, the carriage release mechanism of the Brother Model JP7, allows the carriage to move leftward through the tension of the spring drum and is analagous to putting a car "out of gear" (courtesy of Brother International Corporation).

mechanism allows the typist to move the carriage leftward, rather rapidly, by hand. See Fig. 2-33. When the carriage release lever is moved, the movement is transmitted to the space ratchet, which moves clockwise (in the direction of the arrow), disengaging from the space ratchet wheel. The carriage is then free of the escapement to "freewheel" leftward.

Another carriage release mechanism is shown in Fig. 2-34. When the carriage release button (1) is depressed, the rack bracket (4) is pushed by both the carriage release lever (2) and release lever pin (2a). The carriage rack (6) is released from the escape pinion gear (7), swinging at the fulcrum of rack bracket retaining screws (5 and 8). The mechanism is returned to its original status by a release spring (3).

PLATEN RELEASE MECHANISM

The *platen release mechanism* enables the typist to disengage the platen ratchet wheel, so the platen can be turned freely. See Fig. 2-35. The platen knob (7), variable ratchet (7-1) and platen shaft (8) are connected. The push rod (5) is inserted into the push

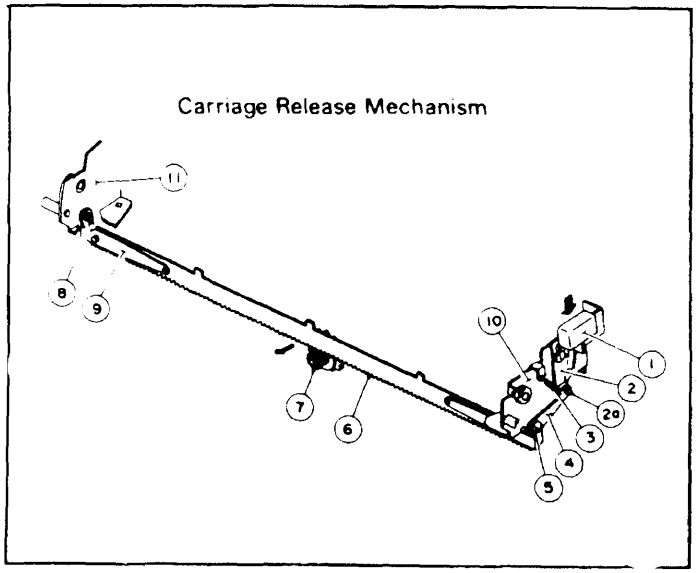


Fig. 2-34. If you study this drawing carefully, you will see a significant difference in its principle of operation, from that of the previous illustration; however, the end result is the same—the carriage is released (courtesy of OLYMPIA USA INC.).

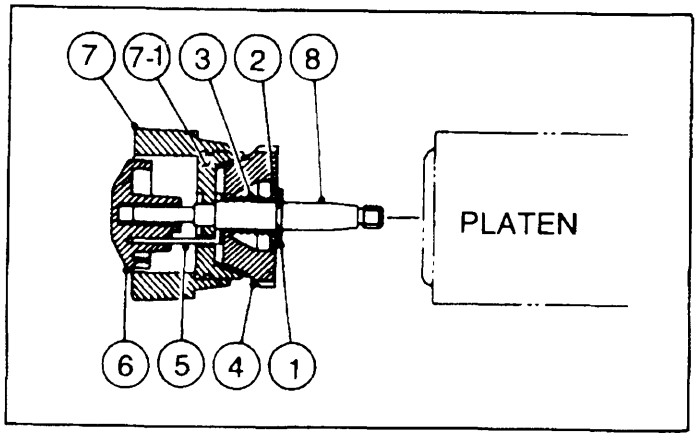


Fig. 2-35. This is a cutaway illustration of the platen disengaging mechanism, which allows the platen to be turned (by hand) in a freewheeling motion. Part (6) is the central button in the platen knob which, when pushed, releases the platen (courtesy of OLYMPIA USA INC.).

button (6). The variable ratchet wheel (4) is engaged with the variable ratchet (7-1) by a spring (3). The part indicated with (1) is the E-ring, and the part indicated with (5) pushes the variable ratchet wheel (4), which is released from the variable ratchet (7-1). Thus, the platen is freed to roll without the drag of the ratchet.

SUMMARY

As you will remember, this chapter was intended simply as an overview of the mechanisms found on manually operated typewriters. Generally speaking, there is little similarity between these and the mechanisms of electric typewriters, the general exceptions being those mechanisms in which the moving of an external lever directly changes the position of an internal part or lever as, for example, the paper release, tab set-clear, margin stops, carriage release and platen release.

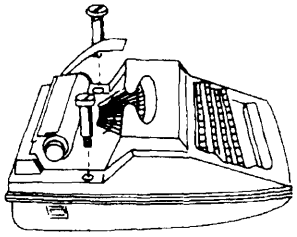
Some points to remember are:

☐ The power to pull the carriage leftward is the tension of spring drum.

☐ Absolutely uniform typing impressions are almost impossible to achieve on a manual typewriter, since the density of impressions depends upon muscle coordination.

☐ Since the carriage is always returned (*slammed,* that is) back to the left-hand margin by arm power, most manuals have an irritating way of moving around on the typing table.

☐ For the reasons listed, and also because manual typewriters do not command a high resale value, the purchase of a manual typewriter as a "fixer-upper" is probably not a good investment. However, an inexpensive one would provide a good machine for the novice repairman to work on. In later chapters I will give repair and adjustment information for specific manual typewriter models. In the next chapter I will discuss the mechanisms generally found on electric typewriters.



Chapter 4
Practical Tips for the Beginning Typewriter Repairman

If you have read the first three chapters of this book, it may be time for you to answer the question: *Just how involved do I want to get in repairing typewriters?* Speaking from the most practical viewpoint, you would need some quite special reasons to equip yourself for the sole purpose of doing the occasional repair job on your own typewriter. It is not inconceivable, however, that you might want to do the work yourself. You may depend heavily upon your typewriter in your own business but live in a remote area, where a call by a reliable serviceman is chancy in the first place, time-consuming in the second place and expensive in all cases, regardless of how difficult or easy the repair problem might happen to be.

Beyond repairing your own typewriter, you may wish to start a part-time business in typewriter repair. With that goal in mind, it is but one more step to visualizing that part-time business expanding into a full-time enterprise. No matter what your goals, there should be some information in this chapter that can help you.

STICKY, DIRTY TYPEWRITERS

Typewriters are thoroughly lubricated as they come from the factory. Because of the nature and thoroughness of this lubrication, the typewriter can be used for several years without the need for further lubrication. That is all quite well, but it does raise one serious problem. Because no ongoing program of lubrication is

called for, and because consumer machines (home machines, as opposed to those used in offices) tend to be stored for long periods in areas where the air is dusty or grease-laden (as in spare rooms or near kitchen areas), the machine that was thoroughly lubricated in the beginning accumulates dust, lint and grease residue from the air. Moreover, through long periods of non-use, the original coating of lubrication gets gummy and sticky. The end result is a typewriter with no serious mechanical problems or misadjustments but one, nevertheless, that may have sticking typebars, erratic spacing, etc. This malfunctioning typewriter, which needs little more than a thorough cleaning and lubrication, is often seen by the professional repairman. In fact, even if the customer assumes that there is some mechanical problem, and the repairman can initially neither verify nor deny the problem, the repairman will routinely clean and lubricate a machine before attempting to repair it. Thus, cleaning and lubricating typewriters is an extremely important aspect of typewriter repair.

The professional repairman might argue that, because of the equipment requirements and amount of cleaning, rinsing and lubricating fluids necessary, a *thorough* cleaning, rinsing and lubrication is beyond the "handyman" repairman's capabiltiy. However, apart from the thorough, professional job of cleaning and lubing, there is an alternate method of cleaning and lubing, which might get a sticking machine back in operation. I'll explain both the thorough and the alternate—or less than thorough—ways of cleaning and lubing a typewriter.

THOROUGHLY CLEANING AND LUBING A TYPEWRITER

To thorougly clean a typewriter means to bring all the mechanical parts of the machine into contact with the cleaning agent. The simplest—but not quite the best—way to do this is to immerse the works of the machine in a vat (laundry tub, for example), containing the cleaning agent, where it is allowed to soak, usually for 12 to 24 hours. A more elaborate method is to steam-clean the machine. Professionally, this would be done in a steam-cleaning machine especially designed for cleaning typewriters. Other, more elaborate methods employ hand spray guns, shower head machines, etc. However, one of the major suppliers of all kinds of typewriter cleaning equipment, tools, etc., the Ames Supply Company, recommends a complete immersion of the machine, with mechanical agitation. The machine suggested for this is the CLEAN-O-MATIC Model 500TA (Fig. 4-1). Whatever

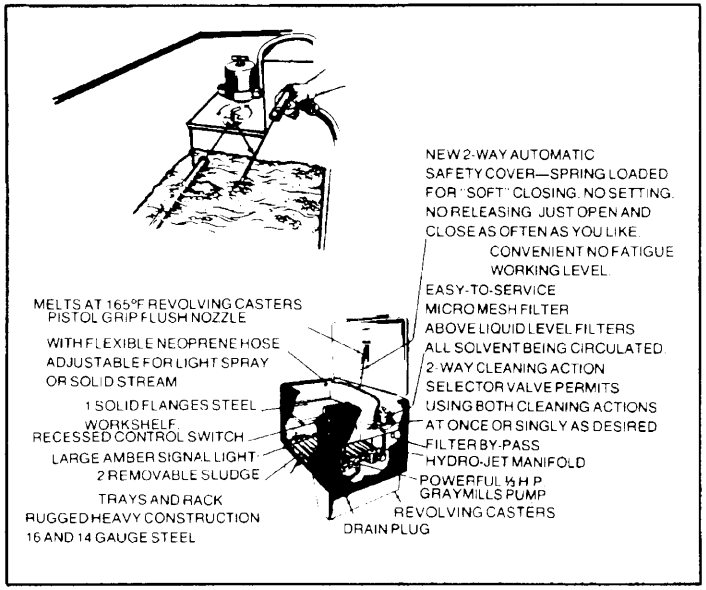


Fig. 4-1. The initial capital outlay for an agitating cleaning tank is relatively high, but it will cut down dramatically on in-tank cleaning time (courtesy of Ames Supply Company).

method is used, a thorough cleaning and lubing actually involves three steps: *cleaning, rinsing* and *lubricating.*

Equipment Requirements

The basic pieces of equipment necessary to thoroughly clean (and subsequently rinse and lubricate) a typewriter are an *air compressor* (Fig. 4-2), and a *vat* or cleaning machine. Since cleaning, rinsing and lubing requires three solutions, it would be helpful to have additional vats; however, one vat, equipped with a drain plug and a provision to save the solutions that are reusable, would do the job, although it would be highly inefficient. You should also have a basket in which to immerse the typewriter.

Cleaning, Rinsing and Lubrication Solutions

As a cleaning solution, Olympia recommends one consisting of 7 parts *Solvasol* #5 to 1 part *LIX* "12" Cleaner. Solvasol #5 is available from Socony Mobile Oil Distributors, in 55-gallon drums only. Lix "12" is a detergent-like product, especially to be added to spirits, available from Ames Supply Company, whose main office is

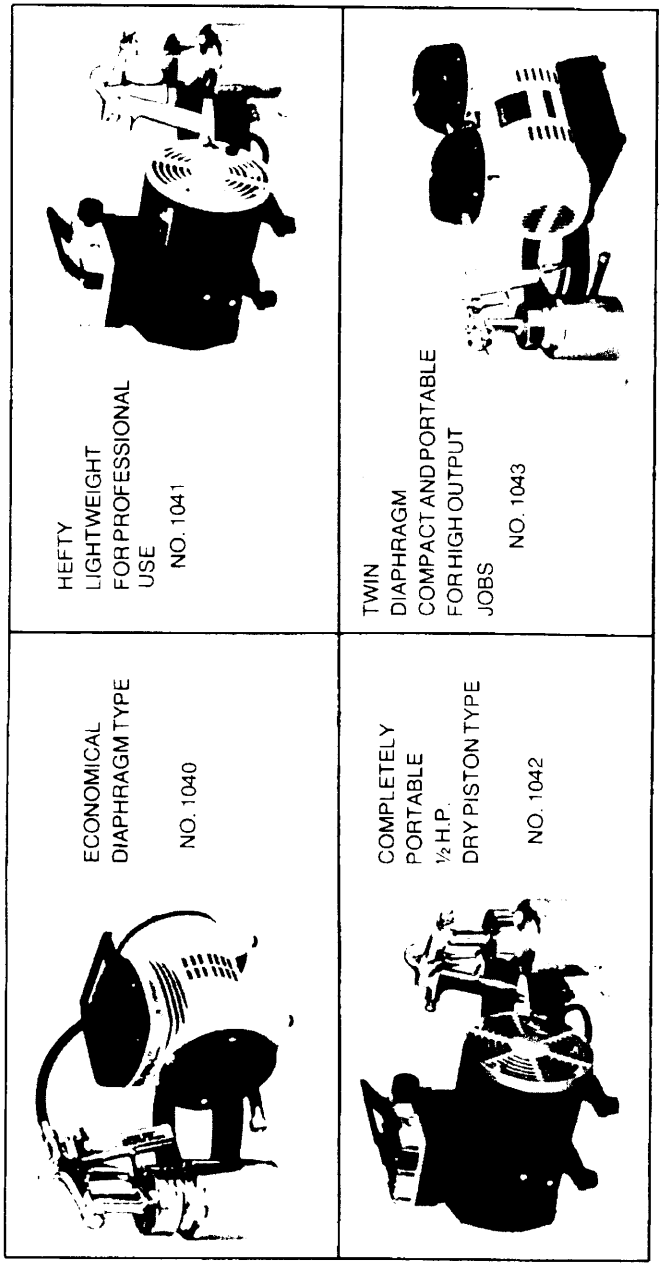


Fig. 4-2. One of the few pieces of mechanical equipment needed in a typewriter repair business is an air compressor. Don't try to get along without one (courtesy of Ames Supply Company).

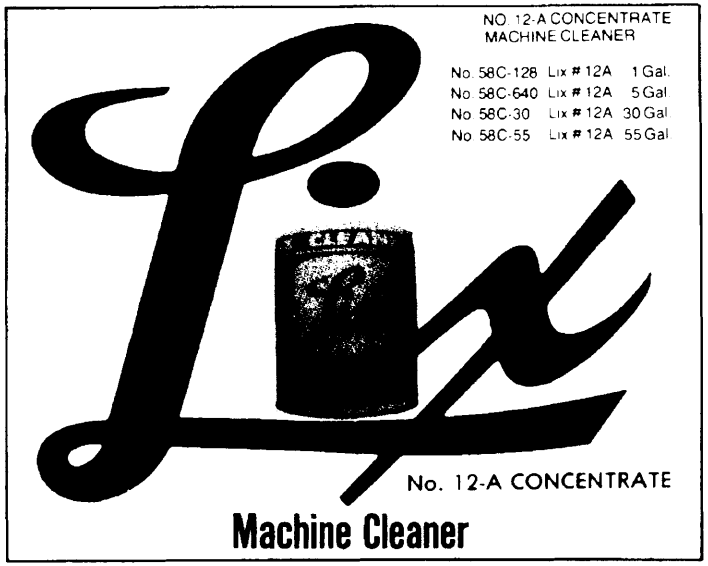


Fig. 4-3. Lix # 12A cleaner is to be used with and extends the use of cleaning fluid (courtesy of Ames Supply Company).

2537 Curtiss St., Downers Grove, Illinois 60515. Lix "12" Cleaner is available in either one-gallon, five-gallon, 30-gallon or 55-gallon amounts (Fig. 4-3).

The lubricating solution is an oil bath, which consists of 10 parts of mineral spirits to 1 part of Ames oil (No. 34L-32—quart—.946 liters, No. 34L-128—gallon—3.8 liters, No. 34L-640—5 gallons—18.9 liters), available in bulk. The oil may be mixed with a high-flash *naptha*, rather than the mineral spirits.

The Cleaning Process

Before immersing either a manual or electric typewriter in the various solutions, several steps should be taken to insure that certain parts of the machine don't come into contact with the solutions. On either a manual or electric machine remove all the outside covers, the platen, the bail rollers, the paper table and feed follers and any miscellaneous rubber parts.

On electric machines, also remove the power roll, if it is rubber, and all the electrical components. After removing all these items, blow out any loose, heavy dirt from the machine to avoid getting it in the solution.

If you use the soaking method, put the stripped machine in the dip basket and immerse it in the cleaning solution overnight. If you

use the agitator cleaning machine, immerse the machine and agitate for 5 or 10 minutes. Whether you use the vat or agitating machine, when cleaning is complete, lift the machine up in the basket and let the excess fluid drip back into the tank so no fluid will be lost.

Rinsing and Lubricating the Thoroughly Cleaned Machine

After cleaning, the machine should be thoroughly rinsed to stop the cleaning action. Use any of the previously mentioned rinsing solutions or hot water. If you use water, the machine should be thoroughly dried in an oven, as any drops of moisture in the works can cause rust.

The last step is to place the machine in an oil bath, which consists of 10 parts of mineral spirits to 1 part Ames oil. As mentioned previously, high-flash naptha may be substituted for the mineral spirits. The spirits will evaporate, letting the oil adhere to the machine and providing a good, deep-down oiling. A lubrication tank called the "3-L Safety Lubrication Tank" (see Fig. 4-4) is available from Ames Supply Company for this purpose.

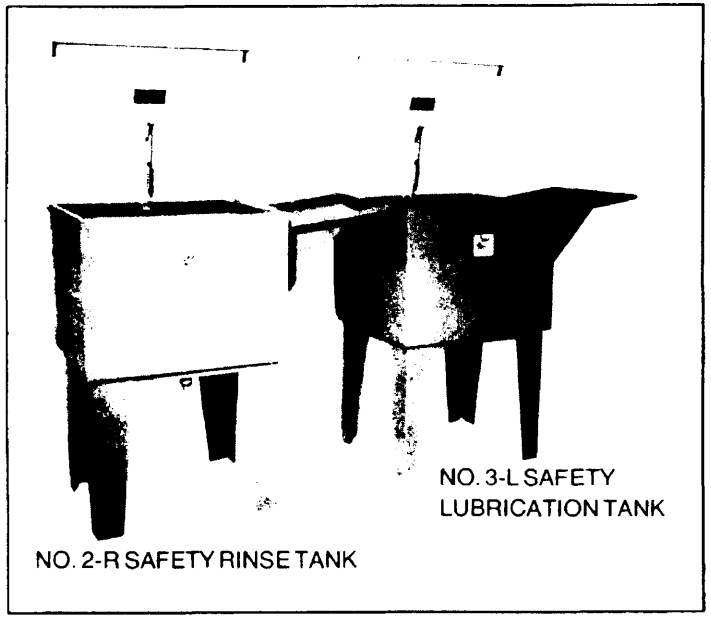


Fig. 4-4. Separate tanks for the three steps of cleaning, rinsing and oiling save time and make the work easier (courtesy of Ames Supply Company).

GIVING A TYPEWRITER A SUPERFICIAL CLEANING AND LUBING

Between thorough cleanings and oiling, minor sticking or binding troubles due to dirt and gum accumulation can occur. While it may be untimely or inconvenient to give the machine a thorough cleaning, you can clean and relubricate the machine with cleaners and lubricants—or combinations of both—supplied in pressurized containers (Fig. 4-5).

As with a thorough cleaning, it is not advisable to get the agent used for cleaning the metal parts in contact with rubber parts of the machine. Therefore, it is better to remove all the covers and parts mentioned previously including, in the case of the electric machine, the rubber power roll and electrical components.

Carefully remove dust and eraser residues from the interior of the machine. Clean the typefaces carefully, after putting a cloth under them, so that the soiled type cleaner doesn't drip on other

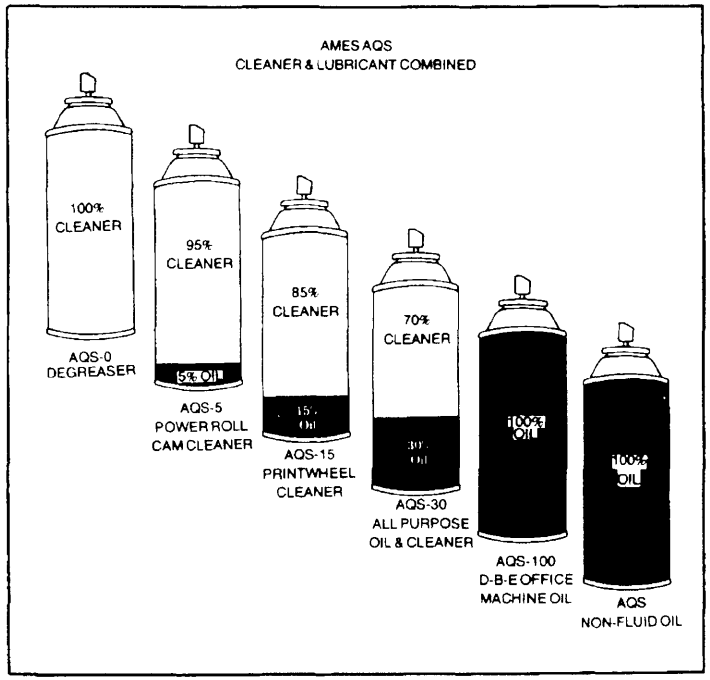


Fig. 4-5. In between thorough cleaning/oiling, sticking problems may be solved through the use of combination cleaners and oils in pressurized cans (courtesy of Ames Supply Company).

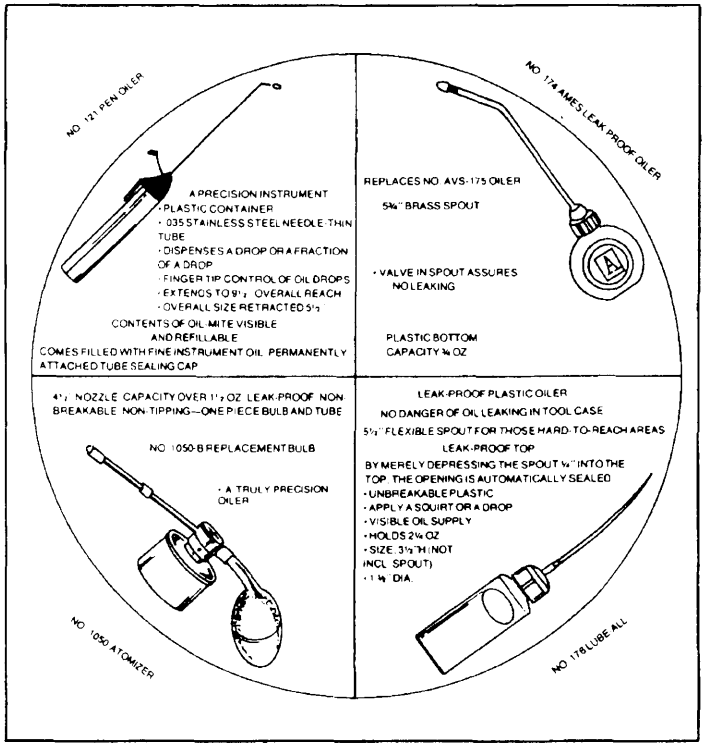


Fig. 4-6. When spot-oiling a typewriter, it's important to get the oil at the problem point, not on the platen, feed rolls or power roll; an oiler with a long spout will help in this task (courtesy of Ames Supply Company).

parts. If the typefaces are quite dirty, don't try to use the blotting paper or "dough" for cleaning. Instead, use a liquid cleaning agent.

Use the spray cleaner—or combination cleaner and oil—to do a job on the internal parts of the machine, following directions. Clean the keylever comb slots carefully with a dry brush. Do not lubricate them.

Don't use any of the all-purpose oils sold in hardware stores for oiling a typewriter. Do try to oil all the parts, without over-oiling.

In lieu of an overall lubrication as described, problem areas (such as the escapement pinion, etc.) can be oiled with the special oilers for machine lubrication, which have long, thin, flexible spouts (Fig. 4-6). Use typewriter oil, being sure no oil gets on the platen, power roll, feed rolls, bail rollers, etc.

COSMETIC CLEANING

Some professional repairmen seem to pay an inordinate amount of attention to the outward cleanliness of a typewriter. For this purpose, special cleaners and polishers are available (Fig. 4-7). Be sure to use the correct cleaner and polisher on painted surfaces, keybuttons, clear plastic card holders, etc., as the wrong solutions (such as denatured alcohol, for instance) can cause fogging. Don't clean the plastic keybuttons too enthusiastically, as it is possible to remove the characters. However, if this should happen, Ames Supply Company provides lacquer sticks (Fig. 4-8) in various colors, which can be rubbed into the engraved lines to restore the lost characters. Typewriters can be given the reconditioned look by painting the covers with special paints (Fig. 4-9). Paint ovens (Fig. 4-10) are used to give the paint job a professional look.

SELECTING TOOLS

Many of the tools which you have in your toolbox will be useful in working on typewriters. However, special tools, which anticipate the special needs of the professional typewriter repairman, are provided for the industry. The question of whether to get tools in standard or metric sizes is difficult, but it can be solved by getting both. Thin wrenches (Fig. 4-11) are especially useful, as are hex wrench and socket sets (Fig. 4-12).

A few special tools include the following:

- ☐ Spring hooks (Fig. 4-13).
- ☐ Typebar twisters (Fig. 4-14).

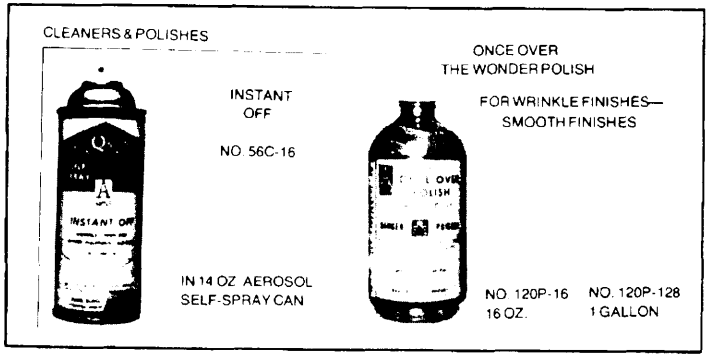


Fig. 4-7. For typewriter cosmetics, it's smart to use cleaners and polishes prepared for the industry, as some products around the home or shop may mar the finish or fog plastic parts (courtesy of Ames Supply Company).

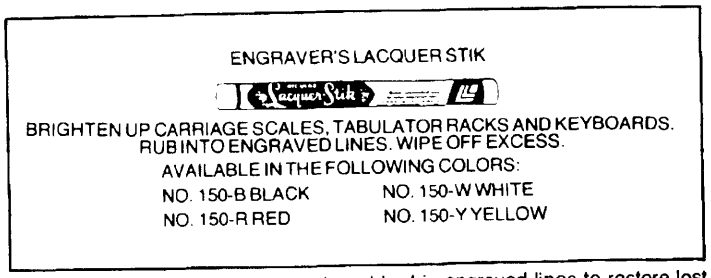


Fig. 4-8. Lacquer stick, which can be rubbed in engraved lines to restore lost characters, can save explanations and embarrassment when returning a typewriter to the customer (courtesy of Ames Supply Company).

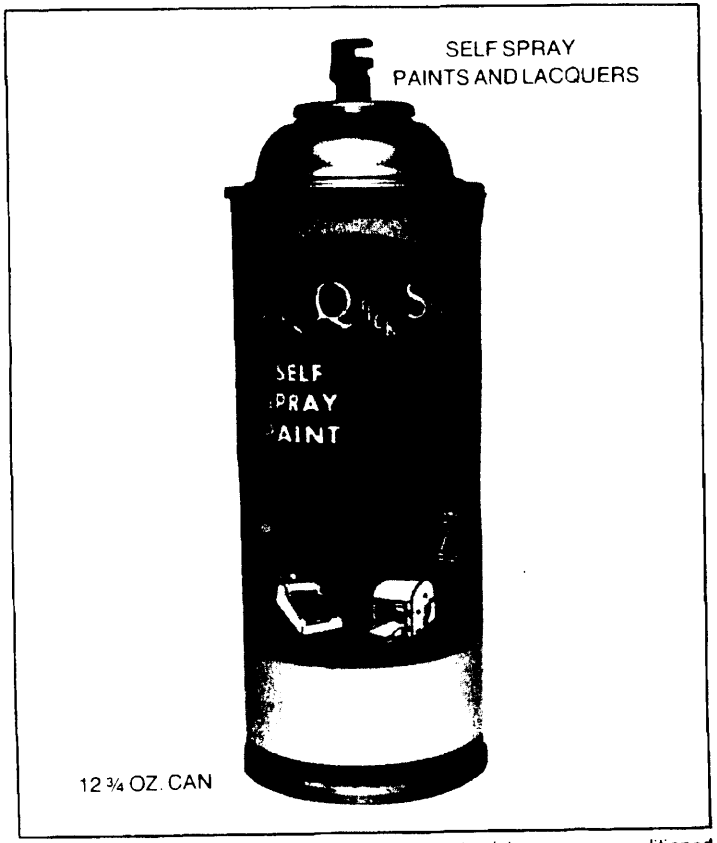
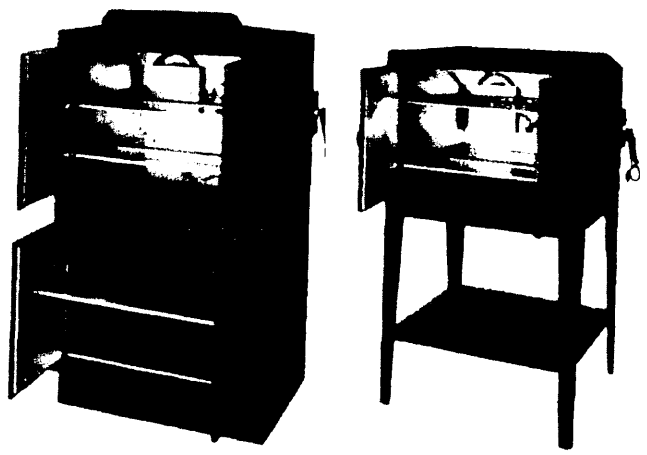


Fig. 4-9. The psychological value of a new paint job on a reconditioned typewriter is tremendous. Paints are available in a variety of "typewriter colors" (courtesy of Ames Supply Company).



SPECIFICATIONS FOR MODELS
1650-AMC & 1650-AM

ELECTRIC: 115V, 60 Cycle, Rating 2000 Watts, Temperature Ambient to 350°.
SIZE: 7.2 Cubic Ft. Inside dimensions: 26"W x 24"D x 20"H. Outside dimensions: 30"W x 26 ½"D x 24"H.
CONSTRUCTION: Fan forced air circulation. Sturdy welded steel construction inside and out.
EQUIPMENT: Comes equipped with 6', 3-wire cord and adapter plug. Two removable sliding shelves and adjustable shelf supports. Adjustable damper control plugs into any 115V outlet. Complete with operating instructions.
SHIPPING WEIGHT: 108 lbs.

MATERIAL AND WORKMANSHIP
GUARANTEED 1 YEAR

Prices do not apply where special fire department ordinances cover electrical appliances.

Fig. 4-10. Paint and drying ovens help turn out professional looking paint jobs (courtesy of Ames Supply Company).

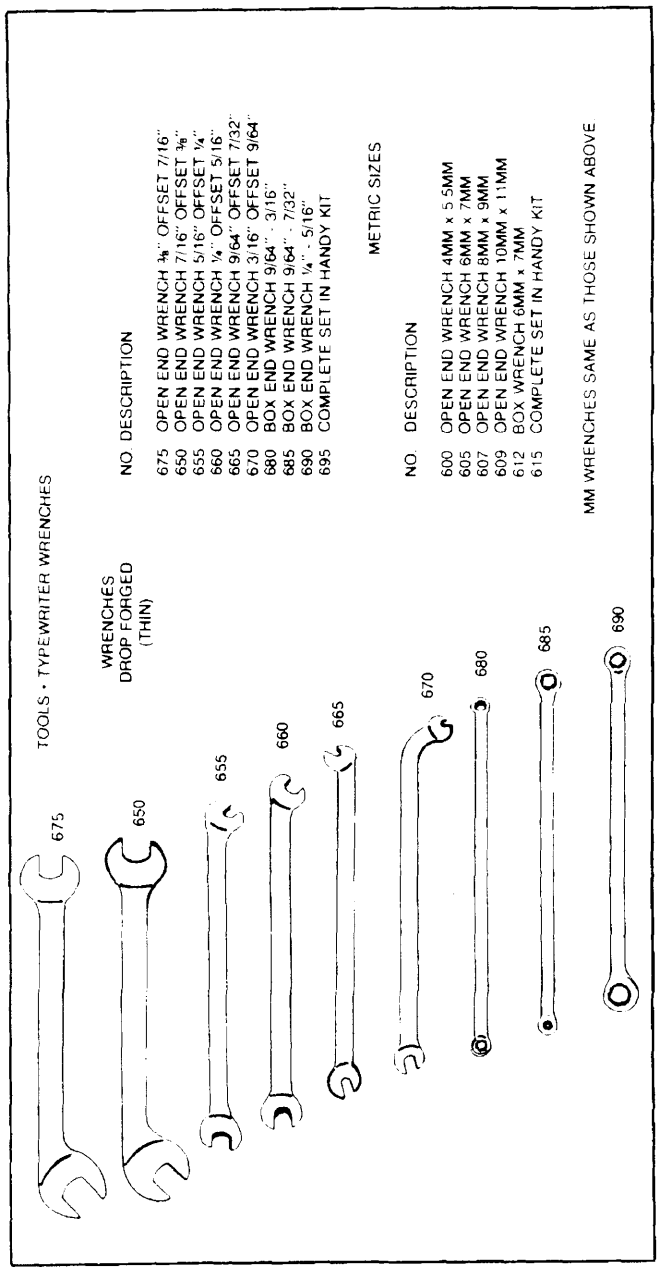
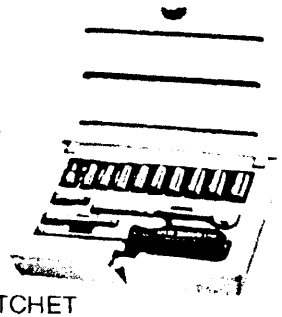


Fig. 4-11. Just as auto manufacturers, typewriter manufacturers build the machine around the screws; thin wrenches help get into these kinds of places (courtesy of Ames Supply Company).

No. 865 SOCKET WRENCH SET
14-PIECE, 1/4" SQUARE DRIVE

NO 685
6 PT. SOCKETS
(Opening Size):
3/16" 7/32" 1/4"
9/32" 5/16" 11/32"
3/8" 7/16" 1/2"
10 PT. SOCKETS
(Opening Size):
1/4" 5/16"
REVERSIBLE RATCHET
4-3/4"
2" EXTENSION
SPINNER/EXTENSION
5-3/4" (1" x 3" handle, 2-3/4" shaft)



No. 850 ALLEN HEX DRIVER UNIT

7 Piece Kit Consists of:
No. 850-C Amberyl handle with clutch No. 850-1
Hex bit 1/16" x 4 3/4"
No. 850-2 Hex bit 5/64" x 4 3/4"
No. 850-3 Hex bit 3/32" x 4 3/4"
No. 850-4 Hex bit 1/8" x 4 3/4"
No. 850-5 Hex bit 5/32" x 4 3/4"
No. 850-6 Hex bit 3/16" x 4 3/4"

IN HANDY PLASTIC CASE

Fig. 4-12. A variety of good quality tools will make your work a pleasure (courtesy of Ames Supply Company).

No. 91 SPRING HOOK SET

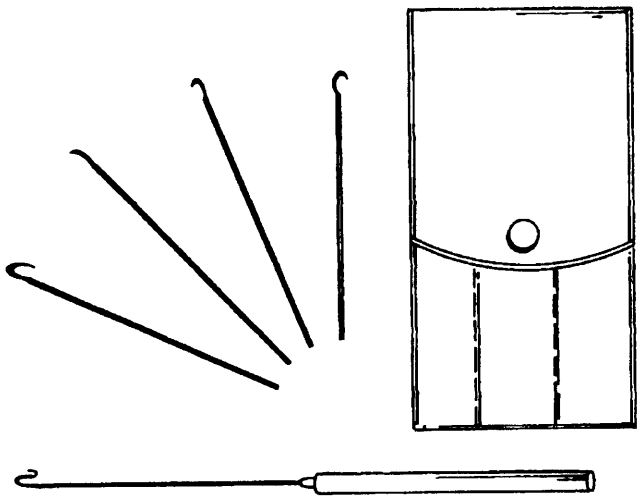
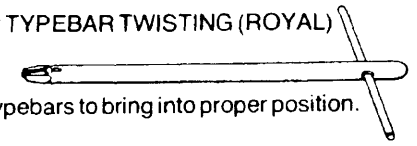


Fig. 4-13. A spring hook may be your most often used tool (courtesy of Ames Supply Company).

- ☐ Keylever benders (Fig. 4-15).
- ☐ Ribbon eyelet pliers (Fig. 4-16).
- ☐ Link benders (Fig. 4-17).
- ☐ Ribbon vibrator arm benders (Fig. 4-18).
- ☐ Segment pick (Fig. 4-19).
- ☐ Type cleaning brushes (Fig. 4-20).

Also see Table 4-1 for a suggested basic tool kit, as supplied by Ames Supply Company.

No. 152 TYPEBAR TWISTING (ROYAL)



For bending or twisting typebars to bring into proper position. 1/16" slot.

Fig. 4-14. If a typebar won't go through the guide correctly, the solution may simply be twisting it slightly (courtesy of Ames Supply Company).

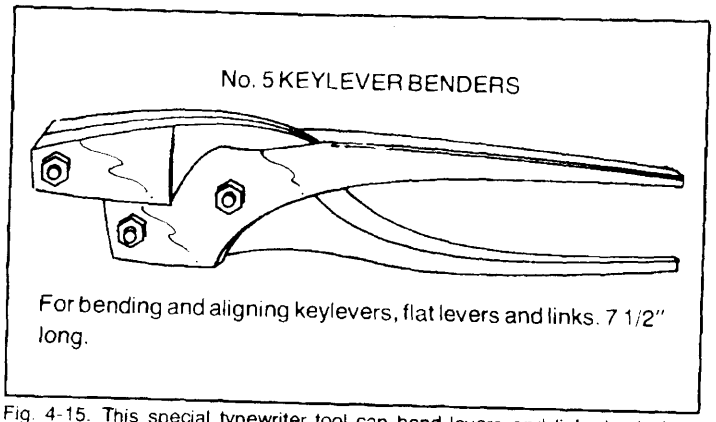


Fig. 4-15. This special typewriter tool can bend levers and links back into alignment (courtesy of Ames Supply Company).

DESIGNING A WORKSHOP

If you begin thinking about a workshop, it follows almost logically that you'll also be thinking about some way to attract business. You'll also be wondering whether to stress service, i.e., machine repair, combine service with the sales of new or used machines or stress sales. Even if such an operation were conducted from your home (as in a garage), you would probably benefit from storefront frontage, even if at first the area was only a place to receive repair jobs.

Making the decision of whether to stress service or sales will be an important one in the long run, because it will determine how you plan to allocate your available capital between resale stock and equipment. If, for example, a repair business has a real potential for expansion, it would not be a viable long-range plan to set the repair shop in an area that is too small, or to invest money in equipment that would later prove inadequate. Moreover, most professionals advise against making up homemade equipment from random parts, since working the bugs out of such a system takes too much time from the more profitable activity of actual repair.

In the early stages of planning, it would be extremely helpful to receive advice from professionals and people in the industry. To that end, here is a quote from the current Ames Supply Company catalog: "Over the years, Ames Supply Company has helped thousands of dealers to set up shops or modernize their old ones. Ames would like to help you to select your equipment and to supply information on any problem you might have."

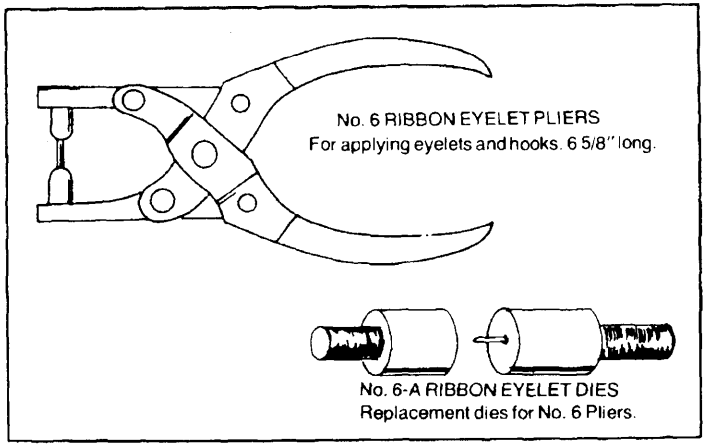


Fig. 4-16. With this tool you may avoid the task of ordering ribbons with eyelets (courtesy of Ames Supply Company).

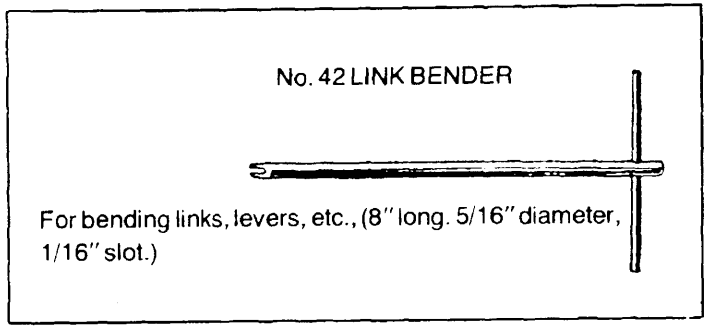


Fig. 4-17. A complete tool set can't be without this tool—the link bender (courtesy of Ames Supply Company).

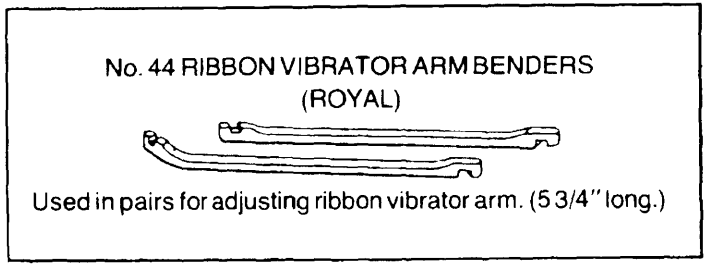


Fig. 4-18. Special tools for the typewriter repair industry can't be purchased in your local hardware store (courtesy of Ames Supply Company).

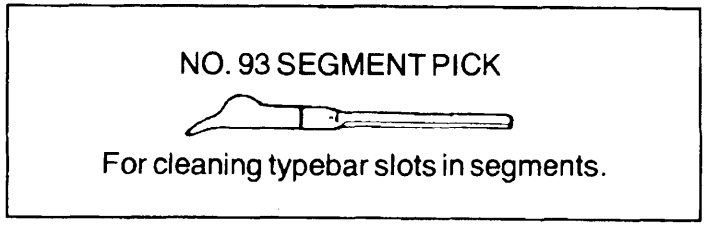


Fig. 4-19. The segment pick is also an essential tool (courtesy of Ames Supply Company).

See Fig. 4-21 for a suggested floor plan, as provided by the Ames Supply Company, for a storefront and shop. Also, see Table 4-2 to understand what the numbered components of Fig. 4-21 represent and for a suggested list of shop and cleaning room accessories.

SECURING TECHNICAL INFORMATION ON TYPEWRITERS

In later chapters I will give step-by-step detailed instructions for repairing specific models of certain brand-name typewriters. While it is a temptation to say that this specific information is all you will need to work on other brand/models, it would be something of an overstatement to say it. The fact is that in all cases you should attempt to get the appropriate service manuals from the manufacturing or distributing firm. If you will need parts to complete the repair, you may get miscellaneous parts from Ames Supply Company and specific parts from either Ames or the manufacturer. To do this, you will need the appropriate parts catalog.

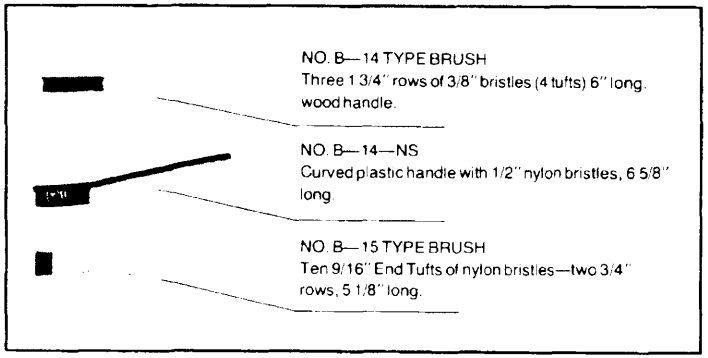


Fig. 4-20. Don't criticize the typical user for not keeping typefaces clean—just be prepared to do it yourself (courtesy of Ames Supply Company).

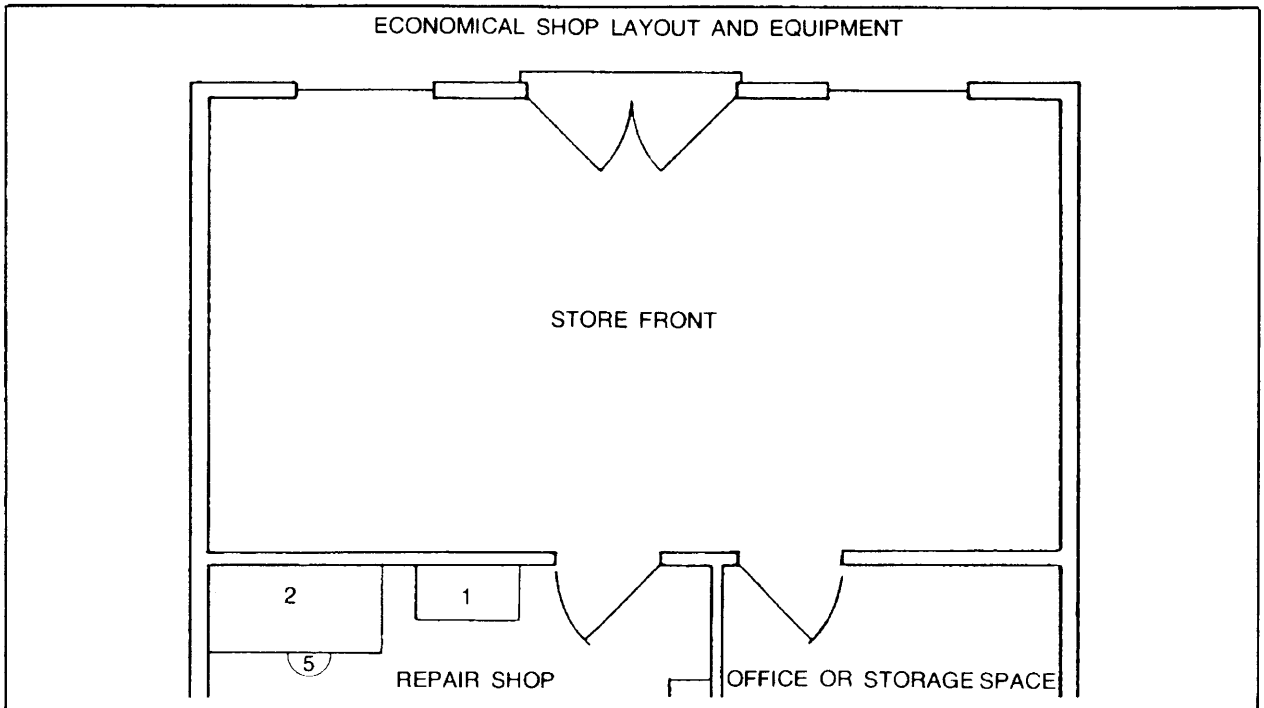
Table 4-1. A Basic Typewriter Tool Kit (courtesy of Ames Supply Company).

Ames Basic Tool Kit			
NO.	DESCRIPTION	NO.	DESCRIPTION
81-6	Screwdriver - 6" Blade, 3/16" Bit	509	Pilot Punch Kit - For Removal Of Spring or Roll Pins, Sizes: 1/16" 5/64" 3/32" 1/8"
81-8	Screwdriver - 8" Blade, 7/32" Bit		
79-6	Screwdriver - 6" Blade, 9/64" Bit	1115	Special IBM Spring Hook - Spring Loaded
A-216-8	Screwdriver - 8" Blade, 5/32" Bit		
A-116-3	Pocket Clip Screwdriver - 3" Blade, 3/32" Bit	910	Puller - 1 1 1/4"L, 3/16" Dia.
A-416-8	Screwdriver - 8" Blade, 1/4" Bit	92	Spring Hook & Scriber
881	Phillips Screwdriver - 6 1/2" L 3/16" Bit	866	Bailey Style Fine Tip Tweezers - 5"L
883	Phillips Screwdriver - 7 5/8" L 1/4" Bit	104-7	Extra Long Tweezers - Serrated Tips, 6 3/4"L
16-5 1 2"	Parallel Flat Nose Cutting pliers - Open Throat Compound Leverage, 5 1/2"L	103	Straight Nose Locking Forceps
		74	Needle File Kit - 12 Sizes No. 2 Cut 5 5/8"L
714	Tip Cutting Pliers - Jaw Size 1/2"L X7/32"W, 4" Overall Leng	63	Handle For Files
		123	Wet Stone - Fine/Coarse
773	Short Needle Nose Pliers - Long Handle 8" L	B-2	Cleaning Brush - For Inner Machine Parts, 1 3/8" Bristles, 3/4" W
704	Wiring Pliers - Serrated Duck Bill Jaws, 7 7/8"L	B-14-OS	Type Brush - (3) 1 1/4" Rows, 3/8" Bristles, 6"L
713	Wiring & Pick-Up Pliers - Serrated Jaws, Dowel Pin, Jaw Sizes Closed 2 7 16"L X 1/2" W	B-15	Type Brush - 9/16" End Tufts, 5 1/8"L
		HJJ-87-8	Set Screw Starter - 8"L
350	Flat Double-End Spanner Wrench Set - One End 5°, Other End 75° Angle, Sizes 1/8" - 1/4"	174	Oiler
		475	Small Magnetizer/Demagnetizer
		1022	Keeper Setter - Small
351	Metric Double-End Spanner Wrench Set - 12 Sizes 3MM - 10MM	77	Brass Hammer
		76	Mechanic's Hammer
354	Socket Wrench - 5MM	1380	Retractable Knife - Small
356	Socket Wrench - 6MM	734	Adjustable Wrench - 6"
357	Socket Wrench - 7MM	93	Segment Pick
1950	Socket Wrench - 1/4" Hex Opening	320MM	7 Piece Open End Metric Wrench Set-Sizes: 5.5MM - 11MM
1955	Socket Wrench - 5/16" Hex Opening		
349	Olympia Adder Millimeter Wrench Kit	322	10 Piece Combination Offset Open End/Box End Wrench Set
348	Hex Key Set - Milkmeter Sizes 1.27MM - 5MM	323	8 Piece Open End Wrench Set
45	Standard Hex Key Set - Sizes .050 - 5/32"	83A	Parts Storage Box
		26A	Parts Storage Box
96	Centering Punch - 1/4" X 4"	789	Cleaning Cloths (5)
94	Pin Driving Punch - 1 4" X 4" With 1.16" P T	1975	First Aid Kit Included
		916	Platt Tool Case Included
Tool Kit No. 918 (TOOL CASE INCLUDED)			

Getting Service Manuals and Parts Catalogs From Companies Other Than IBM

Please understand that in giving the following information on typewriter firms, I have not personally been authorized to speak on behalf of these companies. You may correspond with any of them only to have your request denied or ignored. However, I do believe that an intelligently written, concise letter will draw the desired response. Your basic problem will be whether to request a service manual and parts catalog for one specific machine—in which case you would logically be planning to service your own machine—or a selection of manuals and parts catalogs for a variety of models manufactured by the firm. In the former case, you will have to provide the model number of your typewriter; in the latter case, your request may be up for some discussion, particularly if it is the policy of the company to establish franchised service dealers.

In no case is it advisable to try and order brand-name parts by simply providing the company with a visual or laymen's description



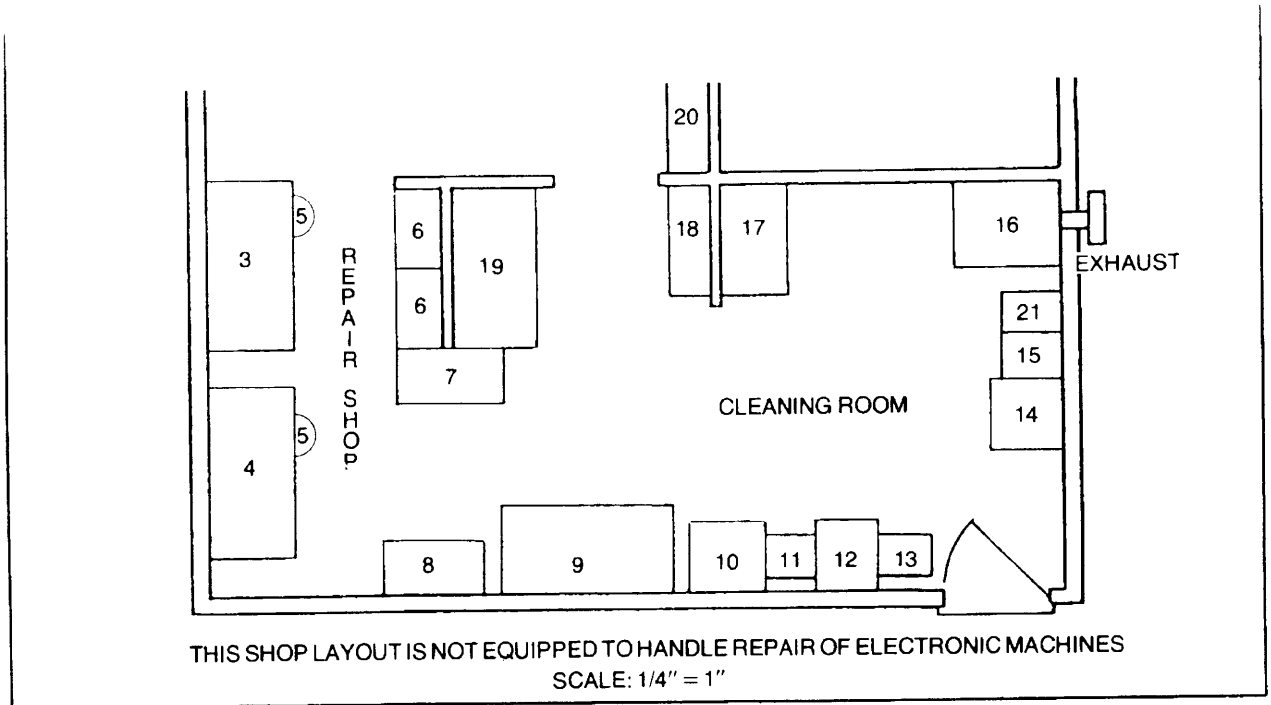


Fig. 4-21. Perhaps this shop plan and equipment layout can be modified to fit your garage, if you're planning a part-time business, or one that can grow (courtesy of Ames Supply Company).

of the part; you will always get a more favorable—and faster—response if you furnish the part number, as taken from an authorized parts catalog, together with the correct name of the part. Alternatively, you may order parts from, or through, Ames Supply Company. Here is an excerpt from the current Ames catalog, explaining its policy on parts ordering.

"The parts listed in the following section (the section mentioned is catalog pages of miscellaneous items, only a few of which are listed by manufacturers' numbers) are some of the miscellaneous items and assortment carried in stock. We stock and will continue to stock many thousands of available manufacturers' parts as well as many hundreds of parts that are now obsolete and no longer available from the manufacturer.

"Because our stock of parts is growing larger and more complex every day, it is becoming more difficult to publish a parts catalog of the items we stock as we have done in the past. Therefore, we do not publish a parts catalog.

"Since our stock numbers for parts are the same as each individual manufacturer's part number, we suggest that whenever possible you use their catalogs and parts number for ordering from Ames branches and agents. If you do not have a number send a sample or drawing of the part needed along with complete information as to the serial number of the machine, make, model, pitch, color, etc., and we will fill in the part numbers for you.

"If you cannot obtain the manufacturer's parts catalog you need, please let us know and we will try to supply what you want on special order. We do not keep a current list for parts catalogs in our offices due to their constant changing in availability and price. We will be glad to obtain this information for you upon your request if catalogs are needed."

The end of the foregoing paragraph is the end of the Ames catalog quotation.

Important Considerations

While I may have mentioned this before, it is important enough to bear repeating. When negotiating with manufacturers for service manuals and parts catalogs, you can assume that two considerations will be uppermost in the mind of the recipient of your request. Do you intend to reproduce (as through copying on a copy machine) these company publications? Do you intend to use these catalogs and manuals to falsely represent yourself as a factory-authorized service dealer of that company? The answers to

Table 4-2. The Numbered Components of Fig. 4-21 Are Explained Here (courtesy of Ames Supply Company).

Economical shop layout accessory description					
Layout Number	Stock Number	Description	Layout Number	Stock Number	Description
1	8045	6 Steel Shelves 3' x 2' x 7' for machines awaiting repair	8	T-3000-3	Compressor
			9	2522	Steel Top Bench 60" x 28" for disassembling machines going into cleaning room
2.	2522	Work Bench 60" x 28" for checking machines to be repaired and estimating repairs		2602	Back and End Stops
	2602	Back and End Stops	10.	2H	Rinse Tank
3.	2530	Wood Top Work Bench 60" x 28" for major and minor machine repairs — each should be equipped with lamp, turntable and minor tools	11	4D	Drain Shelf
			12	2R	Rinse Tank
			13	4D	Drain Shelf
			14	3L	Lubrication Tank
			15.	4D	Drain Shelf
	2602	Back and End Stops	16	1000A	Spray Booth
4.	2503	Wood Top Work Bench 60" x 28" for major and minor machine repairs—each should be equipped with lamp, turntable and minor tools	17	1650AM	Baking and Drying Oven
			18.	8045	Steel Storage Shelves for machines drying and supplies for cleaning room
			19	2522	Steel Work Bench 60" x 28"
	2602	Back and End Stops		2602	Back and End Stops
5	1812	24" Stool	20.	8045	6 Steel Shelves 3' x 2' x 7' for machines waiting to be checked out and picked up
6	1210	2 Flat Drawer Files for parts			
7.	8045	Steel Storage Shelves for excess shop equipment and machines going to cleaning room	21	5440	Flammable Liquid Storage Cabinet 30 gallon capacity

Additional repair shop accessories (not shown in diagram)			Additional cleaning room accessories (not shown in diagram)		
Quantity	No.	Description	Quantity	No.	Description
3		Starter Sets of Tools	2	58C-640	Lix Cleaner
1	871	Soldering Iron	1	55 Gal.	Chlorinated Solvent
1	700	Electric Drill	1	34L-640	Typewriter Oil - 5 Gal.
1	109C	Drill Set			
1	1024B	Dusing Nozzle			
1	950	Moto-Tool Set			
1	370	Gas Welding Kit			
1	816	Machine Carrier			
3	LB-1	Bench Lamps			
3	102	Turntables			

both these questions are, of course, *no*. I would suggest that you make a straightforward statement to this effect in your initial letter (not all companies are concerned about franchised service/dealers, however, and this question may not always arise). Finally, when corresponding with or trying to get publications or parts from manufacturers, allow plenty of time for a response. Which company executive do you address when making these special requests? Logic would seem to dictate that you correspond directly with the technical department; however, I usually have better luck if I contact the sales department (address the sales manager by name if possible—this information is generally available in the current *Standard and Poors Directory of Advertisers*, found in the reference section of libraries).

See the appendix for a list of typewriter manufacturers and/or distributors in the United States.

GETTING SERVICE MANUALS AND PARTS CATALOGS FROM IBM

The policy of IBM in furnishing service manuals and parts catalogs is that IBM is willing to sell these publications to anyone requesting them. IBM does not establish franchised service dealers, and in fact controls the sales of its products quite stringently, through field representatives called "marketing representatives." Accordingly, the only IBM-authorized repair service is through IBM field repairmen, called representatives in "customer engineering." What this means in effect is that no one in your town may advertise his own name, or firm name, as either an IBM sales or service representative; however, as a practical matter, repairmen can be and are trained, in independent training programs, to repair IBM typewriters. IBM phone numbers are listed in the yellow pages of regional or metropolitan phone books. The nationwide toll-free number for IBM is 800-631-5582, except in New Jersey, where it is 800-352-4960.

Identifying Old IBM Typewriters

Speaking of older IBM typewriters, IBM service manuals and parts catalogs combine information for standard and *Executive* machines. Both standards and Executives were manufactured in IBM Models A, B, C and D (all of these models were typebar machines, incidentally). The information on the nameplates of these older models does not always clearly state the model, in terms intelligible to the non-professional. Nameplates may be found in either (or both) of two places—on the bottom side of the

machine and underneath the left-hand platen knob. There seems to be no clear-cut way to determine which of these nameplates will provide model information; however, one or the other of them will contain a serial number (don't confuse a serial number with patent numbers).

If you can't find any letter or number clearly designating the model of the IBM, provide the company with the serial number, together with the following facts:

- ☐ Whether it is a standard or Executive.
- ☐ The color of the machine.
- ☐ Whether it uses a carbon or a fabric ribbon.
- ☐ The length of the platen, and the length of the writing line.
- ☐ The pitch.
- ☐ The number of characters on the keyboard.
- ☐ Whether or not it has a decimal tab system. A decimal tab system differs from an ordinary tab system in that a series of tab set buttons can be preset to enable the typist to tab to a certain decimal digit in a column of dollars and cents figures.

With the foregoing information, together with the serial number, the IBM customer engineering people should be able to identify your machine model and tell you the appropriate service manual and parts catalog to use. They will either send it to you or refer you to the IBM person who will.

As a general rule, the model of the older IBM standard A, B, C and D models will be found on the nameplate underneath the left platen knob (you may have to move the carriage rightward to see this plate), although it will be stated as a *code number*, rather than by a letter. Generally, this code number will be to the left of and precede the serial number. It is a two-digit number, as follows:

—The code number "10" is the *black model*.
—The code number "11" is the Model A (usually grey).
—The code number "12" is the Model B.
—The code number "13" is the Model C.
—The code number "15" is the Model D.

On some Executives, the model will be found on a plastic nameplate, on the underside of the machine. In some instances, the model is clearly designated. The Model C Executive, which has an 86-character keyboard and a carbon ribbon, is the Model 41, for example. The same machine with a fabric ribbon is a Model 45. Most of these particular machines were tan in color. Executives were made with 1/32" and 1/36" unit escapements. The clue to the

escapement pitch is supposed to be given in certain digits of the serial number. I won't attempt to tell you the code since I have not found it consistent. To figure out the escapement pitch yourself, you should understand that on the machine with the 1/32" pitch, 10 three-unit characters will occupy 30/32" on the paper.

One factor that may lead to some inconsistency in Executive identification is that if and when machines are factory-reconditioned, the plate beneath the left-hand platen knob may be removed, and a new number stamped into the metal. Sometimes this number is accompanied by the letter "R," to indicate *reconditioned*.

With Executives, as with standards, be sure to include as much information about platen length, kind of ribbon, etc., as possible.

Identifying Recent Model IBMs

In previous chapters of this book I have generally referred to all single element machines as "single element" machines; however, IBM designates this kind of machine as either the "Selectric" (code 21), "Selectric II" (code 26) or "Correcting Selectric" (code 26). IBM has quite recently marketed a machine comparable to the Selectric II, with additional features, which is called "Selectric III," for which I have no code number information.

The Selectric II and Selectric III may use either the carbon ribbon or fabric ribbon (the fabric ribbon machines are code number 84, which are the third and fourth digits of the serial number). Since the most notable feature of the coding system on IBM Selectrics is inconsistency, I can only suggest that you provide the following information when requesting service manuals and parts catalogs: platen length and writing line length, whether the machine is a single or dual pitch, the number of characters on the keyboard and whether it uses the film ribbon and Tech III ribbon interchangeably.

The older Selectrics had an 8½" writing line with an 11.0" platen. Other older Selectrics, as well as the newer correcting models, had 11" and 13" writing lines, with 13.5" and 15.5" platens, respectively.

RECONDITIONED PLATENS

Ames Supply Company, through its branch companies, offers the service of *reconditioning platens*. One way that a platen may be reconditioned is by grinding it; another is by recovering it.

Some professional repairmen recommend not grinding a platen because, they say, it decreases its diameter, causing the type head to travel an incremental distance farther before striking the platen, therefore changing the striking pressure. In some instances, decreasing the diameter of the platen may affect the way it contacts the feed rolls and cause paper feeding problems. However, I have never had any problems with platens that have been ground one time.

Obviously, the superior way to recondition a platen is to recover it. Here are some facts about platen recovering. The inner part of the platen is called its "core." Platen cores are designed through manufacture to take either a cushion rubber cover or a non-cushion rubber cover. Cushion platens have a rubber wall thickness of over 3/16". Non-cushion platens have a wall thickness of under 3/16" (Fig. 4-22). You cannot put a cushion rubber on a non-cushion core, or vice-versa.

Platens, and therefore platen covers, are coded by hardness, with the hardness selected by the following facts. *Code A* is generally used for one to four copies, most suitable on portables, or for only limited numbers of carbon copies—a soft platen. *Code M* is generally used for four to eight copies. This is standard hardness for machines that require harder platens than Code A—such as some IBMs, Underwood Rhythm Shift, certain Smith Coronas, and Royal MC. *Code E* is generally used for eight to 12 copies. Because of the hardness, it is only used on machines where needed. *Code S* is generally used for more than 12 copies, or for typing on extremely heavy paper or thin cardboard.

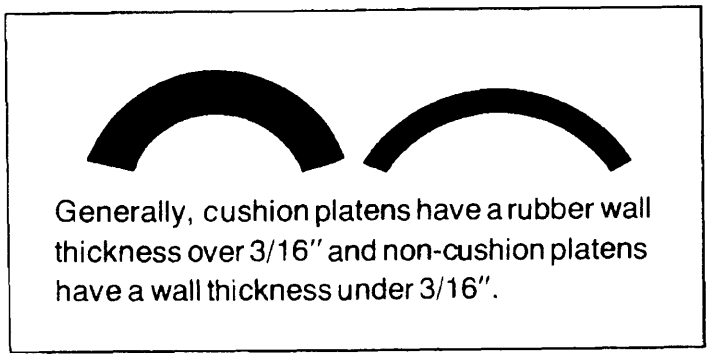


Fig. 4-22. Recovering an old, pitted platen is a viable, relatively inexpensive "way out" for the customer. Ames Supply Company can provide you with more information on this service (courtesy of Ames Supply Company).

Stencil-Rite is generally used for cutting stencils, offset master and fluid masters. These are specially treated to resist the oils from the stencil. Stencil-Rite feed rolls should be used with Stencil-Rite platens. The cost of recovering a platen is determined by its length in inches.

For more information on reconditioning platens, contact Ames Supply Company, who will also provide you with information on shipping, etc.

ADJUSTING THE PRESSURE ON INDIVIDUAL TYPEBARS

Many electric typebar machines have a provision, in the form of separate adjusting screws, to adjust the typing pressures of individual typebars. On some machines there is a row of adjusting screws, accessible after removing the top cover of the machine (on the Olympia Model 35, for example). On other machines (notably IBMs) the screws are accessible at the underside of the machine (Fig. 4-23) after tipping the machine back.

At a given overall typing pressure, as determined by the calibrated setting of the typing pressure lever found on most machines, the pressure of individual typebars can change from time to time, with no apparent reason. Moreover, certain characters (seemingly the "a s" and "8s" on some older IBMs) seem to get out of adjustment more frequently than others.

To make individual adjustments, find the adjustment screws. Generally, the screws will be numbered (the numbers aren't on the screws themselves, but stamped into a metal bar in close proximity to the screws), with each number corresponding to a typebar. The number "1" corresponds to the typebar on the extreme left end of the assembly, number "2" next to "1," etc. After orienting yourself to the screws and corresponding typebars, do the following:

☐ Roll a sheet of paper into the machine. If you normally use a backup sheet, or multiple sheets for carbon copies, roll the normally used number of sheets into the machine so you'll end up with viable results.

☐ Set the pressure regulator at the normally used setting.

☐ Type every character—both upper and lower case—on the keyboard, to determine which needs adjustment.

☐ Remove the paper(s), which will be used as a reference when selecting screws to be adjusted, from the typewriter.

☐ Roll fresh papers into the typewriter. Gain access to the adjustment screws.

Fig. 4-23. You are looking at the underside of an IBM Model A typebar typewriter. Note the row of adjustment screws. Also note the bar above the screws, in which numbers, corresponding to typebars, are stamped. Turning the individual screws will change the pressure with which the corresponding typebar strikes the platen.

☐ Looking at your reference paper to see which screws need turning, tap the appropriate keybutton and note the results. If the impression is too light, turn the screw counterclockwise, in quarter-turn increments, while tapping the keybutton until the impression is dark enough. If the impression is too dark, or the typeface is cutting the paper, follow the procedure mentioned but turn the screw clockwise. There are no locking nuts on the adjustment screws, so you're all done when you complete this last step.

To judge your results accurately, be sure the typefaces are clean and the ribbon is fresh (in the case of a fabric ribbon, especially). In the case of a carbon ribbon, be sure it is of the right density, and that you are using the right kind of paper (also check such "idiot factors" as the position of the multiple copy lever, etc.). If all the impressions are consistently light, perhaps the machine needs cleaning and oiling.

REMOVING TYPEWRITER COVERS

There is no single set of instructions that can explain the removal of covers of all machines. Sometimes, removing the covers can be a major challenge. Covers almost always come off in

separate segments. Some are held on by screws with slotted heads, some with phillips heads, and some with hex heads. Some, such as the cover of the IBM Selectric II, are simply held on by two locking levers. If covers are held on by screws, it is helpful to have an assortment of good quality screwdrivers, and at least one that will hold a screw while removing or inserting it in a hard-to-get-to place (Fig. 4-24). Watch for springs, retaining washers, spacers, washers and rubber grommets. When removing cover segments, note how passage is made around and over external levers and keybuttons so you can replace them accordingly. Covers that can actually be replaced ever so slightly wrong can be the underlying cause of vibration noises when the machine is running.

STOCKING AN ASSORTMENT OF RIBBONS

For exacting customers, the kind and quality of ribbon impressions may be crucial to their satisfaction, as well as to their perception of the quality of the repair job you turn out. Apart from the kind and quality of the ribbon, you'll be faced with the problem of having to supply ribbon for the large variety of typewriters that you encounter. Here are a few facts about fabric ribbons.

Cotton Nylon and Silk Ribbons

Cotton ribbon is considered inferior to either ***nylon*** or ***silk***, but does have the characteristic—which may be an advantage in some cases—of producing a blacker impression with a lighter blow from the typebar. It might be preferred for a manual typewriter, but the striking pressure of an electric machine would wear it out about twice as fast as it would a nylon or silk ribbon.

Nylon ribbon is considered an excellent ribbon, from the viewpoint of clarity, longevity and toughness. It gives an even impression throughout its life, and the impression is sharper and less feathery than that from a cotton ribbon. Nylon ribbon is available in three different grades, for specific applications.

Silk is also considered an excellent ribbon, which gives an even impression throughout its life. The impression is sharp and clear, but not as black as that of cotton.

If you must stock ribbons conservatively, most customers would be satisfied with cotton and nylon. It would probably be helpful if you were to explain the characteristics of each.

Fabric ribbons are available on spools and cartridges to fit specific machines. The spool or cartridge must fit the machine. The ribbon itself must be of the correct width to feed through the

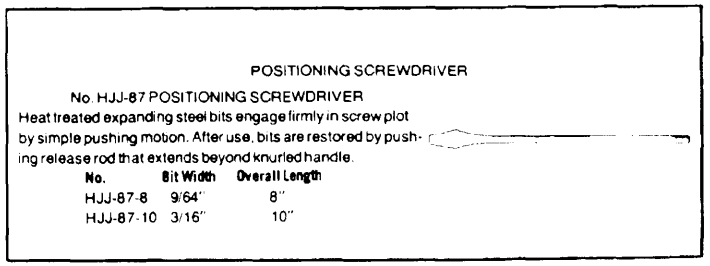


Fig. 4-24. It's essential to have a positioning screwdriver when working on a typewriter (courtesy of Ames Supply Company).

ribbon guide and not so narrow as to lose part of the impression. In some cases the ribbon must be fitted with a hook for attaching to the take-up spool, as well as an eyelet to work in conjunction with the ribbon-reversing mechanism. The commonly encountered ribbon widths for conventional typewriters are ½" and 9/16".

Fabric Ribbon Numbering System

One fabric ribbon numbering system, on ribbons supplied by Ames Supply Company, is coded from TW1 through TW37 (with some omissions), which includes ribbons to fit most fabric ribbon typewriters. You wouldn't need all of these ribbons since part of them fit special purpose machines. Here is a list of ribbon that would be most sought-after.

☐ **TW1.** A ½" ribbon with eyelets 6" from each end; fits *Brother* Standard; *Hermes* Standard Electric and Portable; and *Underwood* O/S and Portable.

☐ **TW2.** A ½" ribbon with eyelet ½" from the end; fits *Noiseless* Standard and Portable; *Remington* Standard, Electric, 17 and Portable N/S; and Underwood No. 150 Core and Electric O/S.

☐ **TW3.** A ½" ribbon with a 1" loop on outside end; fits Royal Standard and Electric.

☐ **TW4.** A ½" ribbon; fits *L. C. Smith* Standard; Smith Corona Standard and Electric O/S.

☐ **TW5.** A ½" ribbon; fits Underwood No. 150 Flange and Electric, N/S.

☐ **TW6.** A ½" ribbon; fits *R. C. Allen* Standard and Electric.

☐ **TW7.** A ½" ribbon; fits Remington Visible.

☐ **TW8.** A 9/16" ribbon on a toothed metal spool; fits IBM Models A and B.

☐ **TW9.** A 9/16" ribbon on a plastic spool; fits IBM Models C and D.

☐ **TW10.** Not listed.
☐ **TW11.** A 9/16" ribbon with eyelets 6" from each end and a hook on the outside end only; fits Royal Electric Portable 9/16" and Royal Ultronic 9/16".
☐ **TW12.** A ½" ribbon with eyelets 3" from each end; fits Olivetti Standard Electric and Portable.
☐ **TW13.** A 9/16" ribbon, is the same as TW11 but without hook and eyelets; fits *Adler* 9/16" and Royal 590, 690, 970 and 971.
☐ **TW14.** A ½" ribbon with eyelets 6" from each end; fits Corona Portable No. 3 Auto.
☐ **TW15.** A ½" ribbon; fits Corona Corsair and Corona Portable Skywriter.
☐ **TW16.** A 9/16" plastic cartridge ribbon; fits IBM Selectric Model 072.
☐ **TW17.** A ½" ribbon with eyelets 6" from each end; fits a Corona Portable, No. 4, Jr. and Prof.
☐ **TW18.** A ½" ribbon with eyelets 5" from each end; fits a Smith Corona Portable, Portable Electric and Compact; and the Smith Corona Standard and Electric N/S.
☐ **TW19.** Not listed.
☐ **TW20.** A ½" ribbon; fits Remington Portable O/S (to 1953).
☐ **TW21.** A ½" ribbon, same as TW1 with eyelets, but shorter; fits Royal Portable.
☐ **TW22.** A ½" ribbon, same as TW1, but without eyelets; fits *Adler* Standard, Electric N/S and Portable; *Facit* Standard, Electric, and Portable N/S; and Olympia Standard, Electric and Portable.
☐ **TW23.** A ½" ribbon; fits Adler Standard and Electric O/S; and Facit Standard, Electric and Portable O/S.
☐ **TW24.** A ½" ribbon; fits Corona Portable No. 3 O/S.
☐ **TW25, TW26, TW27, TW28, TW29, TW30, TW31.** These fit special purpose machines.
☐ **TW32.** A ½" ribbon; fits *Royalite* Portable.
☐ **TW33, TW34, TW35, TW36, TW37.** These fit special purpose machines.

Ribbons listed above without eyelets work in the designated machines because those machines don't require an eyelet for ribbon reversing.

Mylar and Polyethylene Ribbons

If a carbon ribbon is listed as polyethylene, it gives off all its coating in one strike of the type head. It must be used on a machine that advances the ribbon one full character each time a character is typed.

If a ribbon is listed as *Mylar* (or reusable Mylar), it is to be used on a machine that advances the ribbon only an increment of a space.

Polyethylene ribbons make thinner, sharper characters than do Mylar ribbons. Some typists establish preferences for either polyethylene or Mylar.

Certain polyethylene ribbons produce an impression that can be lifted off the paper with either a sticky or dry correction tape or lift-off tab. Correction tapes are used on machines designed for them. Lift-off tabs are available in the case the machine will not accept the tape.

Mylar impressions cannot be lifted off the paper, but they can be covered up. Cover-up correction tapes are available for certain typewriters. Cover-up tabs are available in case the machine will not accept the correction tape.

Carbon Ribbon Numbering System

One carbon ribbon numbering system codes carbon ribbons from CR3 through CR44 (with some omissions), as follows:
☐ **CR3.** A 5/16" × 4" (the latter number is the diameter of the spool of ribbon when brand new) that fits IBM Models A, B, C and D, and all machines listed under CR4. Mylar ribbon.
☐ **CR4.** A 5/16" × 4" polyethylene ribbon for Adler N/S (after 1969); Facit; Hermes 705; IBM Models A, B, C and D; Olivetti Editor 4, 5 and S14; Olympia, except Model 35 (it won't fit the Model 35 because the diameter when new is too large to fit the machine; however, in a pinch part of the ribbon can be taken off and discarded, to decrease the diameter of the spool); Remington, after 1961; Royal, most models; Smith Corona and Underwood.
☐ **CR5.** Not listed.
☐ **CR6.** A 9/16" × 235' polyethylene ribbon; fits IBM Model 071, including Nos. 711, 713 and 715.
☐ **CR7.** A 9/16" polyethylene plastic cartridge ribbon; fits IBM Selectric 072.
☐ **CR8.** 5/16" × 4" polyethylene ribbon, same as CR4 but with optional cartridge; fits IBM Models C (late) and D; Remington Model No. 26; Royal 441; and Royal 660 and 662.
☐ **CR8A.** Same spool as CR4, but with optional cartridge and reverse wound; fits Hermes 705L and 799, Olympia Electric 65 and Remington 100E.

☐ **CR9.** 5/16" × 4" polyethylene ribbon, same as CR4, but without plastic center core; fits Remington O/S.

☐ **CR10.** 1/2" × 440' polyethylene ribbon fits Olivetti Editor 2 and 3.

☐ **CR11.** 9/16" Mylar ribbon in a plastic cartridge, is the same as TW16, except TW16 is fabric; fits IBM Selectric 072.

☐ **CR12.** 5/16" × 3½" polyethylene ribbon; fits Adler O/S, Hermes and Olympia Model 35.

☐ **CR13.** 9/16" × 350' polyethylene ribbon; fits IBM Composer, a special "cold typesetting" machine.

☐ **CR14.** 5/16" × 3½" polyethylene ribbon with twin reels; fits Royal Electric Model 565, Royal twin reels.

☐ **CR15.** 5/8" × 406' polyethylene cartridge ribbon; fits IBM Selectric II and Selectric III. It is identified by the pink portion of ribbon at the end, called the "pink leader."

☐ **CR16.** 5/8" × 290' reusable Mylar ribbon (it is reusable in the sense that it is transported through the machine in increments small enough to allow overlapping of the characters; however, it is never reversed and reused); fits IBM Selectric II and Selectric III. It is identified by the blue leader, which means it can be corrected with the cover-up correction tape or tab.

☐ **CR17.** A 5/16" nylon cartridge ribbon; fits the SCM Coronamatic.

☐ **CR18.** 5/16" polyethylene cartridge ribbon; fits the SCM Coronamatic.

☐ **CR19.** 5/16" Re-Rite, cartridge ribbon; fits the SCM Coronamatic.

☐ **CR20.** 5/8" × 405' correctable polyethylene cartridge ribbon, with a yellow leader indicating that it can be corrected with the lift-off correction tape CR21; fits Adler SE 1000-C/CD; Facit 1850 NS; Hermes 808 NS; IBM Selectric II and Selectric III; Olympia SGE 77; and Royal 5000-C/CD.

☐ **CR20A.** Similar to CR20 but with 505' of ribbon. Orange leader indicates that it can be corrected with CR21-B lift-off tape.

☐ **CR20B.** Similar to and fits the same machines as CR20A, with minor, non-functional differences in the construction of the cartridge. Can be corrected with CR21B lift-off tape.

☐ **CR21.** Sticky lift-off correction tape, used with CR20 ribbon; fits Adler SE 1000-C/CD; Facit 1850 NS; IBM Selectric II and Selectric III; Olympia SGE 77; and Royal 5000-C/CD.

☐ **CR21A.** Dry lift-off correction tape; fits Adler SE 1000-C/CD; Facit 1850 NS; IBM Selectric II and Selectric III; and Royal

5000-C/CD. To be used with CR20 correctable film ribbon, when used on a foreign made machine, except Hermes 808 and Olympia 77.

☐ **CR21B.** Sticky lift-off correction tape, to be used on Adler SE 1000-C/CD; Facit 1850 NS; IBM Selectric II and Selectric III; Royal 5000-C/CD. It is to be used with the CR20A correctable film ribbon.

☐ **CR21C.** Dry lift-off correction tape; fits Adler SE 1000-C/CD; Facit 1850 NS; IBM Selectric II and Selectric III; Royal 5000-C/CD. To be used with the CR20A and CR20B ribbons when used on a foreign machine except Hermes 808 or Olympia 77.

☐ **CR22.** 9/16" × 235' correctable polyethylene ribbon; fits IBM Selectric Model 071, including 711, 713 and 715. Lift-off tabs included.

☐ **CR23.** 5/16" by 4" correctable polyethylene ribbon for IBM Models A, B, C and D, and other machines listed under CR4. Same as CR4 except that it can be corrected with lift-off tabs included.

☐ **CR24.** Not listed.

☐ **CR25.** Cover-up correction tape, for blue leader Mylar ribbons. It can be used on IBM Selectric II and Selectric III.

☐ **CR26.** Not listed.

☐ **CR27.** Cover-up correction tape, for use with CR15 ribbon; fits IBM Selectric II and Selectric III.

☐ **CR28.** 5/8" × 405' correctable polyethylene ribbon to be used on IBM Selectric II and Selectric III, and Remington SR101. Corrects with lift-off tape or tabs, tabs included.

☐ **CR28A.** ⅝" x 505' correctable polyethylene cartridge ribbon; fits Facit 1850; Hermes 808 OS; IBM Selectric II and Selectric III; and Remington SR 101 and MT 200. Lift-off tabs included.

☐ **CR28B.** 5/8" × 505' correctable polyethylene cartridge ribbon; fits Facit 1850; Hermes 808 OS; IBM Selectric II and Selectric III; and Remington SR 101 and MT 200.

☐ **CR29.** 9/16" × 150' correctable polyethylene cartridge ribbon, identifiable by yellow leader, corrects with lift-off tabs, included; fits IBM Selectric 072 (this is the same cartridge as TW16, but with different kind of ribbon).

☐ **CR30.** 9/16" × 264' polyethylene cartridge ribbon; fits Adler SE 1000 and Royal 5000 OS.

☐ **CR31.** 9/16" × 48' nylon cartridge ribbon; fits Adler SE 1000 and Royal 5000 OS.

☐ **CR32.** 9/16" × 264' correctable polyethylene cartridge ribbon; fits Adler SE 1000 and Royal 5000 OS. Lift-off tabs included.

☐ **CR33.** 9/16″ × 264′ Mylar cartridge ribbon; fits Adler SE 1000 and Royal 5000 OS.
☐ **CR34.** 5/8″ × 405′ polyethylene cartridge ribbon; fits IBM Selectric II Electronic Composer.
☐ **CR35.** 5/16″ × 4″ correctable polyethylene ribbon—is the same as CR23, but with optional cartridge, and will fit the machines listed under CR8.
☐ **CR35A.** 5/16″ × 4″ correctable polyethylene ribbon; fits Hermes 705L and 799; Olympia Electric 65; and Remington 100E.
☐ **CR36.** *Qume* cartridge ribbon; this is a 1/4″ by 300′ multi-strike ribbon with blue leader.
☐ **CR37.** Dry lift-off tape to fit Hermes 808 and Olympia SGE 77.
☐ **CR37A.** Dry lift-off correction tape to fit Hermes 808 and Olympia SGE 77.
☐ **CR38.** 9/16″ × 30′ nylon cartridge ribbon; fits Olivetti Audicart 5 and 6.
☐ **CR39.** 5/8″ × 394′ polyethylene cartridge ribbon; fits Olivetti Lexikon 90.
☐ **CR40.** A cartridge nylon ribbon; fits Olivetti Lexikon 90.
☐ **CR41.** Dry lift-off correction tape; fits Olivetti Lexikon and Olivetti Lexikon 90C.
☐ **CR42.** 5/8″ × 394′ correctable polyethylene ribbon; fits Olivetti Lexikon 90C; and Olivetti Lexikon 92C.
☐ **CR43.** 5/16″ × 5½-yard nylon cartridge ribbon; fits Olivetti Lexicart 80 and Olivetti Lexikon 82/83.
☐ **CR44.** 5/16″ × 16.4-yard Mylar ribbon that fits Olivetti Lexicart 80 and Olivetti Lexicart 82/83.

GIVING A CUSTOMER AN ESTIMATE

The hourly rate of typewriter repairmen is higher than that of auto mechanics. At a time when auto mechanic rates were about $19 an hour, typewriter repairmen charged around $30 and IBM "customer engineers" charged around $40 to $45. Most repairmen also inform potential customers that traveling to and from the repair job requires an extra mileage fee. Some repairman avoid this extra charge by making routine weekly trips to outlying areas, with the understanding that a machine repaired at the repairman's shop will not be returned until the first subsequent routine trip after parts have arrived and the machine has been repaired. Most repairmen do not provide a loaner machine while the customer is waiting for the repair to be completed; however, this practice does vary somewhat with how urgently the machine is needed, and with the good will the repairman hopes to establish.

In most cases, if the repairman is seeing the machine for the first time, and it is obviously dirty, the original estimate will include the cost of a thorough cleaning and oiling, at a flat rate. This rate is from $30 to $40 but will, obviously, vary with location and inflation.

After taking on the commitment of keeping a machine in repair, and knowing that the machine has been recently cleaned and oiled, most repairmen will try to make minor repairs at the customer's location—especially in the case of office machines. Generally, the repairman will ask the occasional user of a small typewriter to bring it into the shop and save the expense of pickup and delivery.

In most cases, the cost of a clean/oil and "general overhaul" (the general overhaul may not amount to much, however, since a thorough cleaning and oiling generally solves a lot of problems) will also include the cost of a new ribbon, in the case of a fabric ribbon. However, installing a new carbon ribbon (on a carbon ribbon machine, that is) will not improve the quality of typing from the machine, unless the ribbon was actually past its shelf life. They do this because the quality of the ribbon is so intimately connected with what the customer perceives as good performance from a typewriter.

"Marking up" the wholesale cost of parts and supplies, to arrive at a retail figure, is an important aspect of business. Throughout business in general, markup percentage figures range from 30% to around 50%, with the cost of transportation of the item passed on to the customer, one way or other. Working with percentage figures can be tricky, and many merchants use a "handy-dandy" computer chart for this purpose. I prefer to understand the formula, and then use an electronic calculator to make the process quick and easy.

Here is an example. Suppose you have decided that 40% is a fair markup on a certain item. This item costs you $15, plus $1.50 UPS charge to have the item sent to your shop, from Seattle, Washington. The customer cost of the item is arrived at by *subtracting* 40% from 100%, and dividing the remainder (60%) into the wholesale price. Finally, add the transportation cost; thus, $\frac{\$15}{.60} = \$25.00 + \$1.50 = \$26.50$. The retail price of all parts and supplies should be established in this manner, in accordance with the markup you decide on, and included in the repair bill. Whether these charges are actually expressed or not depends upon various

factors. For example, if you quote a flat rate for a clean/oil, which includes a ribbon as a matter of routine, the cost of the ribbon may not be shown on the bill. Markup figures on various items may vary, depending upon such factors as how long an item is likely to be held before selling it, and whether or not it has a shelf life. The general rule being that the more perishable an item is, the higher its markup to recover possible losses.

If you charge going prices for repair work, including the normal markup on parts, you will be expected to warranty your work. Some repair warranties are for 30 days; some are for 45 days.

In order to attract business, some repairmen offer service contracts under which, for a stated annual fee, they provide service for certain, listed machines. Currently, IBM is charging about $90 a year to provide service for the IBM Selectric II. Some repairmen model their service contracts on the IBM contract. If you decide to write up service contracts, you will be selective about which brands and models—and the age of the machine—they apply to. You should probably consult with an attorney to check legal ramifications and the wording of the contract. In any case, the serial number of the covered machine should be shown on the service contract.

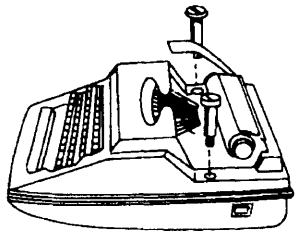
SUMMARY

In this chapter I have attempted to describe the most commonly seen complaints by professional repairmen. These are sticky, gummy machines, pitted or aged platens, and erratic pressures on electric typebar mechanisms. Sometimes, ribbon or paper or a combination of the two, can cause problems which the customer might perceive as mechanical. For example, if a faded ribbon or hard paper produces a dim impression, the user might think the striking pressure isn't adequate.

Just as with any other activity in life, you don't repair typewriters in a void. Somewhere along the way you'll have to contact someone to get parts, supplies, tools or just information. If the machine isn't one that is included in the chapters of this book that follow, I would highly recommend that you get the appropriate service manuals and parts catalogs. The former are necessary for an intelligent evaluation of any mechanical problems. The latter will give a name and number which you can relate to your parts distributor—rather than a visual description and made-up name—thereby establishing a viable relationship with this unseen person, upon whom you will depend for fast, dependable service.

The business aspects of starting up a typewriter repair business might be tough, because competition is ever-present. Most professional repairman rely heavily upon "commercial" accounts—that is, accounts with businesses which use typewriters—rather than on consumer accounts. If you don't see many commercial accounts in the offing, you might do well to rethink your start-up strategy and perhaps look for another location. In any case, set up your shop to be as well-equipped and to operate as efficiently as possible. You'll find, even at $30 to $45 per hour, that you'll have to work efficiently to make up for time taken in other aspects of the business—including talking to customers.

Appendix: Typewriter Manufacturers and/or Distributors



Adler Business Machines
1600 Route 22
Union, NJ 07083

Brother International Corp.
Eight Corporate P1
Piscataway, NJ 08854

Facit-Addo, Inc.
66 Field Point Rd.
Greenwich, Conn. 06830

Hermes Products, Inc.
1900 Lower Road
Linden, NJ 07036

International Business Machines Corporation
Old Orchard Rd.
Armonk, NY 10504

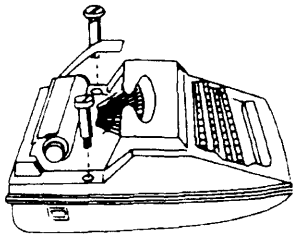
Olivetti Corporation of America
500 Park Avenue
New York NY 10022

Olympia USA, Inc.
P.O. Box 22
Somerville, NJ 08876

Royal Typewriter Co.
150 New Park Ave.
Hartford, Conn. 06106

SCM Corporation
299 Park Ave.
New York NY 10017

Sperry Remington
P.O. Box 1000
Blue Bell, PA 19422



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