The BREWER KEYBOARD

Developed by Unitypo, Inc.

MANUAL No. 2

(In Two Parts)

PART I: Installation, Adjustment and Maintenance of the Brewer Keyboard

PART II: Operation of the Brewer Keyboard

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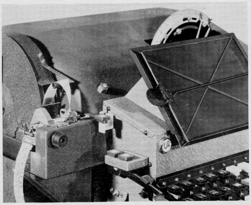
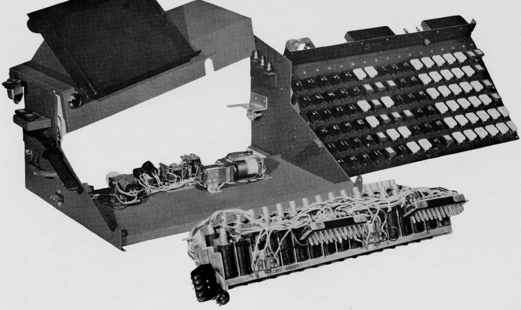
BL-179

INTERNATIONAL TYPOGRAPHICAL UNION P.O. Box 428, Indianapolis, Ind.

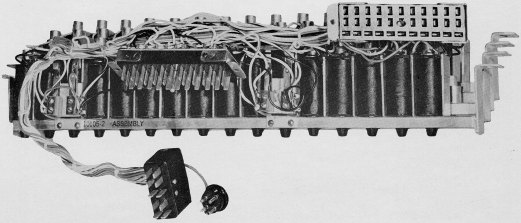


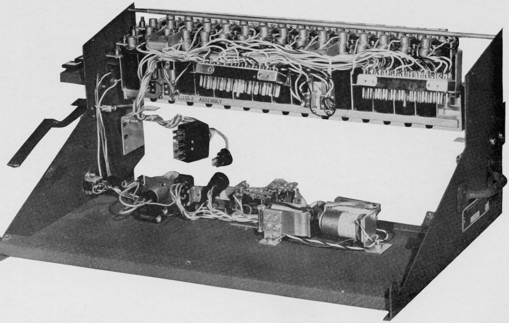
The Brewer Keyboard is shown here installed over a Teletypesetter perforator keyboard. A specially-designed stand and compact power converting unit are furnished with the keyboard. The stand accommodates both the Teletypesetter perforator unit and the Brewer Keyboard secured in place and connected for ready operation.



The Brewer Keyboard is assembled from four main sections: (1) the chassis, (2) the chassis cover, (3) the solenoids, and (4) the keyboard. All are shown above. Any of the other three sections may be removed from the chassis independently of any other of the three.

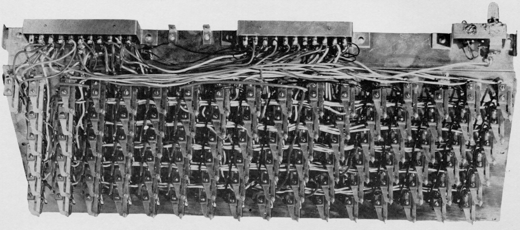
The cut below shows the solenoids section. All solenoids are wired to the plug side (top) of the connectors (identified as "B" and "C" in BK Wiring Diagram No. 2). The plugs shown hanging below the solenoid assembly will connect to corresponding parts of the chassis assembly ("A" plug left; "D" plug right—see BK Wiring Diagram No. 1). The four rows of solenoids will be anchored to the brackets of the chassis.

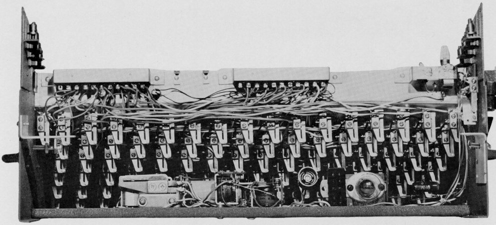




Here the solenoid section has been added to the chassis. The stabilizing bar of the chassis added after the solenoid bars have been attached but before bars are adjusted to the brackets. This cut shows a clearer view of the relays and the side bracket of the chassis which holds the chassis to the TTS perforator.

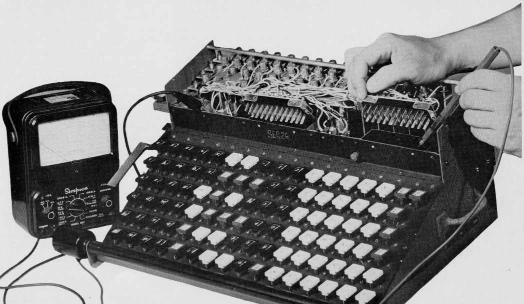
The cut below shows the bottom of the Keyboard section ready for assembly. It shows the Keys wired to the bottom half of the connectors and shows the jumper wires connecting lower case and upper case keys. The light on the upper right corner is the upper rail light which turns on when the upper rail key is depressed and remains on only when the upper rail is being used.

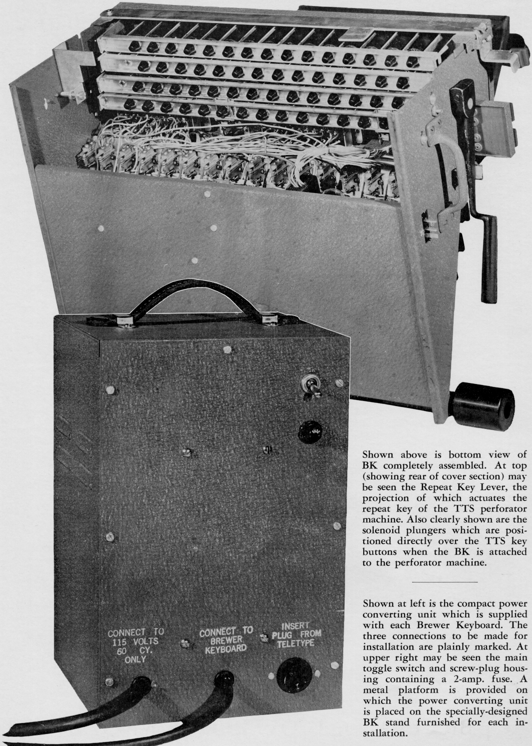




Here is a rear view of the keyboard added to the chassis section. The corresponding parts of the two plugs ("D" and "A") shown hanging in illustration 2 can be noted in this one. The large light bulb in the chassis section is for the purpose of dissipating excess over necessary current used. The time-delay relay (lower left) is used in the operation of the keyboard. The smaller relay to the right of it is used in connection with the upper rail light. This cut also shows the adjustable side brackets which hold the chassis to the TTS perforator machine.

The cut below shows the solenoids and the keyboard sections added to the chassis. The plugs, wired to the solenoids, are poised above the bottom part of the connectors which are a part of the keyboard section and to which all keys of the keyboard section are wired. One prod of a volt-ohm meter is grounded to the chassis and the other prod is shown touching a terminal connector to determine if a short is present. (If full deflection of needle of ohm meter is noted, it indicates that particular key circuit is shorted. If there is no deflection of needle, key circuit is in order.) Each solenoid coil may be checked by placing one prod of ohm meter on terminal (plug side) P-33-C, and the other prod on to each terminal of the plug successively. (See procedure outlined on Page 12 for specific ohm meter readings.)





Shown above is bottom view of BK completely assembled. At top (showing rear of cover section) may be seen the Repeat Key Lever, the projection of which actuates the repeat key of the TTS perforator machine. Also clearly shown are the solenoid plungers which are positioned directly over the TTS key buttons when the BK is attached to the perforator machine.

Shown at left is the compact power converting unit which is supplied with each Brewer Keyboard. The three connections to be made for installation are plainly marked. At upper right may be seen the main toggle switch and screw-plug housing containing a 2-amp. fuse. A metal platform is provided on which the power converting unit is placed on the specially-designed BK stand furnished for each installation.

Installation, Adjustment and Maintenance Instructions

(SYMBOLS: BK—Brewer Keyboard; TTS—Teletypesetter

Read Instructions Carefully and Follow Them Step by Step

1. Assemble machine stand (packed in paper carton). Bolt firmly together the two sides with the three cross bars between. Locate bolts on bottom of table top in the holes provided and tighten acorn nuts.

2. Place TTS machine on stand, *locating same with equal distance on the sides and flush to the rear.* Remove cover from TTS machine temporarily.

3. Remove the nuts from the six bolts securing the top of wooden box containing BK. With the aid of a screwdriver raise top from box evenly to avoid damage to cover. Remove Power Converter and install same in the stand (see picture).

4. Remove and unwrap small package containing a space band button, a repeat key lever, a punch block cover, 2-piece adjusting wrench, a forked rod and (for Standard model only) 4 spacers and 4 long screws.

5. Standard Model only: So that one BK chassis will suffice for both the Multiface and Standard Models it is necessary to raise the Standard Model with spacers between the feet and bottom TTS frame. Raise the TTS to rest on back end, remove screws. Insert the spacers and secure with the longer screws provided. Multiface model does not require this.

6. The only addition to TTS machine is a space band key button. Fasten this button on space band lever, located at extreme right of TTS keyboard with the set screw provided. Align this button with the other keys in the first row (see drawing). The plunger of the solenoid that is actuated when the space band lever of the BK is depressed will engage this button.

7. To fit the BK to TTS it is necessary to replace the TTS Repeat Key Lever with the modified lever supplied with the BK kit. Remove the Repeat Key Lever from the TTS machine by extracting the shoulder screw, being careful to leave the spring in its place. Secure modified BK Repeat Key Lever in place. This will allow Repeat Key Lever button to clear the back row of solenoids on BK.

8. Remove the brackets in the packing box of BK which hold down the rear of BK. Grasp the handles on the ends of BK and raise from box, tilting forward and exercising care not to damage the keys on left side.

9. Fasten copyboard to the bracket on the cover of BK.

10. Before placing BK in position over the keyboard of TTS, first note the spacing brackets on the inside at rear of each of the sides of BK. These are for locating BK in proper position over TTS. Raise BK to clear TTS frame and set BK in place over TTS keyboard. Note small brackets that will clamp BK to TTS by fitting into the available opening in TTS frame.

11. This BK was properly located on a TTS before packing and should need no further alignment. However, due to irregularities in the casting of the TTS frame it may become necessary to recenter the plungers over the TTS keys. Adjustable spacing brackets are provided for this purpose. STANDARD MODEL: Forward and backward movement is controlled by adjusting the spacing brackets fastened by screws to the side walls of the chassis. Side movement is controlled by the adjusting screw on the left side of BK. To reset, loosen the locknut, turn screw in or out. Next move the chassis forward or backward until the rubber plunger buffers are in the center of TTS keys. While performing this operation note position of the screw in the right side bracket, it too may need to be reset. If so, loosen locknut and turn screw in or out. Now tighten all screws and locknuts.

MULTIFACE MODEL: Forward and backward movement is controlled by adjusting the spacing brackets fastened to the sidewalls of the chassis. If side movement is necessary, remove one or more of the washers on one side, and insert them between the bracket and the chassis sidewall on the opposite side until a good centering job is obtained. Then tighten all bracket screws.

12. Make sure that the plant voltage and electric current are 110 volts AC. Then connect the service cord to a light or wall socket. If 110 volts AC is not available do not connect the machines.

13. Throw the toggle switch on TTS downward.

14. Connect the service cord of TTS to marked outlet of Power Converter.

15. Connect the marked cord of the Power Converter to BK.

16. Remove copyboard from TTS cover. (For interchangeable use, relocate TTS copyboard studs one inch above present location.) Replace cover on TTS machine.

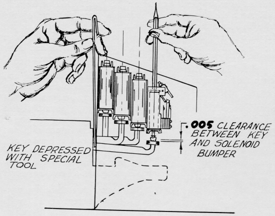
17. Throw toggle switch on Power Converter. Both machines are now ready to be operated.

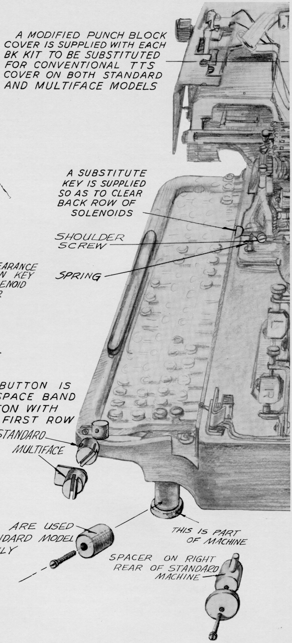
18. On both TTS models the cover of the tape punch block will have to be replaced with the modified cover supplied with each BK kit.

Keep BK CLEAN and COVERED when NOT IN USE

Adjustment and Modification Diagrams

KEY ADJUSTMENT





NOTE:

HOOD IS REMOVED TO PERFORM THESE OPERATIONS.

How to Make Adjustments

This BK was adjusted and tested on a TTS before packing and should operate properly. Inasmuch as the TTS is heavier than the BK, it is possible it will settle into the felt cover farther than the BK.

If there is chattering of the shift or unshift plungers, the solenoids of that row are too low and must be adjusted upward. Use the socket wrench supplied with each BK to make such adjustments. All rows must then be similarly adjusted. If key on BK is depressed and no perforation appears in tape the solenoids must be adjusted downward. Proceed as follows:

a. Remove cover on BK.

b. With the blunt end of a pencil depress the shift key solenoid plunger (left side) down until it stops. (Note drawing)

c. Using the forked rod, depress shift key lever of TTS which can be reached between the rear of BK and the TTS frame. (.005 is about the thickness of a heavy piece of paper.) There should be about .005 clearance between top of TTS shift key button and bottom of rubber buffer on BK solenoid plunger. If not, then:

d. Loosen hexlock nuts with socket wrench (supplied with each BK) and adjust the screws supporting the first solenoid row to obtain proper clearance.

e. Adjust the unshift solenoid plunger (right side) in the same manner.

f. Adjust the remaining 3 rows of solenoids to insure against any downward over-travel of solenoid plungers. In other words there should be a very small clearance (about .005) between the top of the key button on the TTS and the bottom of the rubber buffer *when both are fully depressed.* By the "feel" of the forked rod against the key lever this amount of clearance can be detected. Replace cover on BK.

g. If a TTS key happens to be lower than it should be, it may reach a critical point in the downward stroke to cause two or more perforations in the tape. This can be remedied by building up the TTS key with scotch tape, gummed paper or any other such material available. The purpose is to drive the key beyond the critical point.

A spare parts kit supplied with each BK contains: 1 overload and 2 indicator light bulbs; two 2-amp. fuses; 1 solenoid coil; 2 solenoid plungers with E clip spring and buffer; 4 E clips; 4 buffers, and 6 self-tapping screws.

INITIAL INSTALLATION

If following the above instructions does not bring completely satisfactory results, phone (collect) Mr. Brewer at I.T.U. headquarters.

SAVE SHIPPING BOX CONTAINING BK OR RETURN TO THE ITU—C.O.D.

BK TOOL KIT

A tool kit containing three specially-designed tools to be used in making adjustments on the Brewer Keyboard is supplied with each complete assembly. Included are a socket wrench, a forked rod, and a contact spring adjusting tool. Procedures to be followed for using the special tools are explained elsewhere in this manual.

Modification of TTS Counting Mechanism Cover

With the Brewer Keyboard set in place on the perforator unit, a slight modification in the attachment of the counting mechanism cover is suggested to enable the operator to completely remove this cover for easier access to counting pointer and spaceband justification pointer settings.

To effect this modification in the hinged TTS counting mechanism cover, two stamped metal pieces of spring brass (forks) are furnished with the BK, which are to be inserted in the place occupied by the hinges of the TTS counting mechanism cover. The following procedure is suggested for making this change:

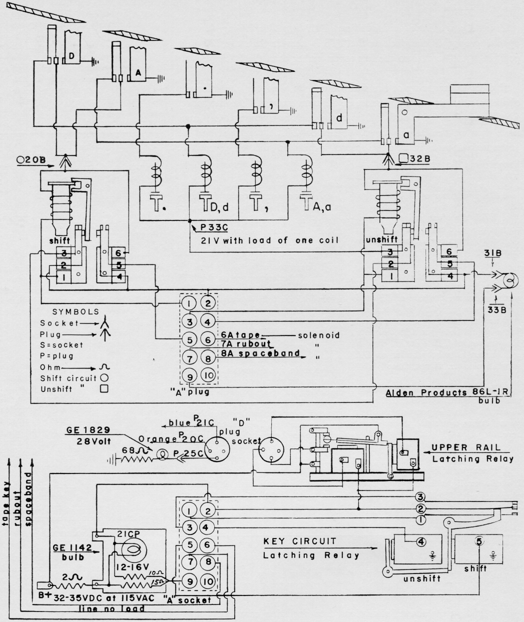
1. Remove lock nuts from the screws that fasten the hinge to the TTS cover. Lift out cover and hinges.
2. Insert forked pieces provided with BK in the place formerly occupied by the cover hinges. Secure in place with the same hinge screws and nuts removed in step 1.
3. Set counting mechanism cover in place in the forked pieces (or clips). Adjust the forked pieces to hold the cover securely in place.
4. The counting mechanism cover may now be lifted completely off the machine and replaced easily as counting pointer adjustments are made.

Checking BK Solenoid Plunger Adjustment

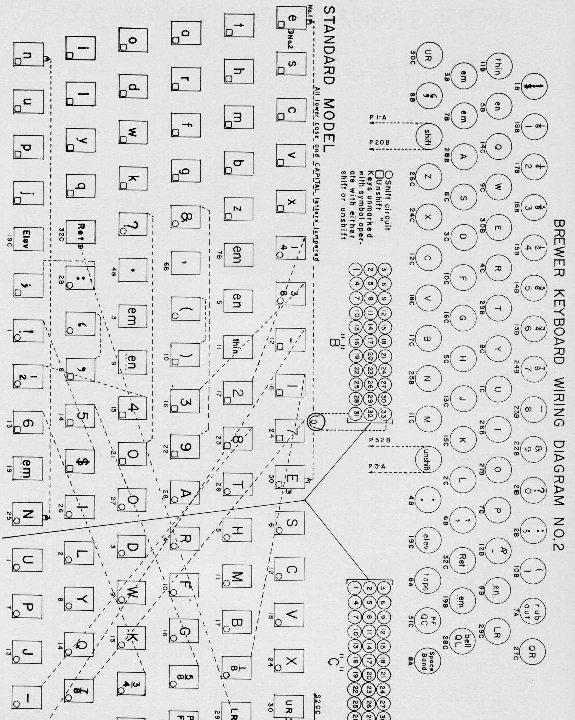
If it is necessary to adjust the downward travel of the BK solenoid plungers in relation to TTS keys, as explained on this page, these adjustments should be carefully checked for EACH key button.

This may be done for each key by depressing the BK key button *and* REPEAT key button simultaneously. If the BK solenoid plunger is adjusted correctly, the perforation will repeat continuously. If repeated perforations are not obtained, it indicates BK solenoid plunger for that key is not adjusted properly and further refinement of the adjustment is necessary.

BREWER KEYBOARD WIRING DIAGRAM NO.1



All keys attached to the keyboard are wired to the socket side (bottom) of the 33 terminal connectors "B" and "C"; all solenoids are wired to the plug side (top) of said connectors. The Spaceband, Rubout, and Tape keys are wired to their respective solenoids through the "A" connector (under the keyboard). The wires that connect the shift and unshift solenoid switches to the Key Circuit Latching Relay are connected through the "A" connector also. The UR Light circuit wires are attached to the plug side of the "D" connector (under the keyboard); the socket side is connected to the Upper Rail Latching Relay. This arrangement permits either the solenoid unit or the keyboard to be removed from the chassis by separating the connectors to which the wires are soldered.



BREWER KEYBOARD WIRING DIAGRAM NO.2
STANDARD MODEL
All lower case and CAPITAL letters jumpered
Shift circuit
Unshift "
Keys unmarked with symbol operate with either shift or unshift
"B"
"C"
P1-A
P20B
P32B
P3-A
S20C
S21C

BK Trouble-Shooting Procedure

Although each Brewer Keyboard is properly adjusted and bench-tested on a TTS perforator machine before it is packed, certain mechanical and electrical malfunctions may be caused either in shipment or in its initial installation. Listed below are a few of the possible malfunctions and the minor adjustments necessary to eliminate them:

If BK fails to function properly, DO NOT TAMPER with any contact points before first performing the following preliminary procedures:

1) Make certain TTS perforator machine is working properly.

2) Make certain that none of the keys are sticking. Run finger down each row of keys to free any key lever that may not be functioning properly.

3) Check indicator lights (red light on right side of front panel and white overload light underneath keyboard section). If there is a definite short, both lights will glow. Although a positive short circuit may not be indicated, a "near" short passing enough current to partially energize one of the coils in the latching relay.

4) If the keyboard fails to operate entirely, check 2-amp. fuse in power converting unit.

* * *

MALFUNCTION: When a white or black key is depressed, both the shift and unshift solenoid plungers work rapidly up and down. This is indicative that both the shift and unshift circuits are closed.

REMEDY: Turn off power switch. If the trouble occurred when a white key was depressed, check to see if any of the black keys are also depressed. A small grain of dirt or other foreign matter may have the key lever fouled. If this trouble occurred when a black key was depressed, check white keys for freedom of operation.

* * *

MALFUNCTION: Either the shift and/or unshift solenoids go down upon depression of a white or black key, and stay at the bottom of the stroke. This indicates that the latching relay is not functioning properly.

REMEDY: Remove keyboard section from chassis, exercising great care not to damage key button contacts. Then check the following in order: 1) Check for proper line voltage to power supply (this should be between 105 to 120 volts AC, 60 cycle); 2) Check from terminal No. 4 or 5 of the key circuit latching relay to ground (minimum voltage of 19 volts DC with one BLUE key button depressed; 3) Check for open coils of key circuit latching relay, and 4) Check to see if key circuit latching relay is fouled mechanically. Lubricate latching fingers of key circuit latching relay LIGHTLY. If this does not correct the trouble, it may be necessary in some cases to lessen the tension of the spring on the unshift coil of the key circuit latching relay slightly.

* * *

MALFUNCTION: (This is a malfunction of TTS machine.) Semaphore signal on TTS does not show completely white in shift position when a white key is depressed. This indicates that the TTS semaphore detent spring is not sufficiently strong to prevent a rebound when lever strikes the positive stop.

REMEDY: Replace present spring with a stronger one.

* * *

MALFUNCTION: With either black (unshift) or white (shift) key depressed, unshift or shift solenoid operates, but succeeding character perforation is not obtained. This indicates contact points No. 2 and 3 of solenoid switch (cf Wiring Diagram No. 1) are not making positive contact.

REMEDY: Adjust set screw of rocker arm on malfunctioning shift or unshift solenoid switch by turning set screw downward approximately $\frac{1}{3}$ of a turn.

* * *

MALFUNCTION: Red indicator light (right side of front panel) and white overload light (underneath keyboard section) burn brightly. This indicates a direct short circuit.

DISCONNECT POWER SUPPLY.

REMEDY: First check to make certain that none of the keys is depressed. If this is not causing the indicated short, using an ohm meter (in the low scale) check all terminal connections in the socket section of the "B" and "C" connectors. Procedure: To test key circuits, connect one prod of meter to chassis for ground and with the other touch each terminal connector successively. (If full deflection of needle on ohm meter is noted, it indicates that particular key circuit being tested is shorted. If there is no deflection of needle, key circuit is in order.) To test solenoid circuits, attach one prod of meter to terminal (plug side) P-33-C, and the other prod on to each terminal of the plug successively. Needle of ohm meter should show a reading of 19-20 ohms for all solenoid circuits except the following:

P-20-B and P-32-B: For these two circuits readings taken when Contact 2 of the key circuit latching relay is engaged with Contact 3 are: of P-20-B, no reading; of P-32-B, 15-16 ohms. When Contact 2 of above relay is engaged with Contact 1, reading of P-20-B is 15-16 ohms, of P-32-B is no reading.

P-31-B will show full deflection of ohm meter needle. (Red indicator light is wired to this plug.)

P-33-B will show a reading of 6.5 ohms. (This is other connection wired to red indicator light.)

P-20-C and P-21-C will both show a reading of 250 ohms. (These terminals are wired to the coils of the upper rail latching relay.)

P-22-C and P-23-C are idle terminals—no connections.

P-25-C: No deflection of ohm meter needle will be noted. (This is wired through the upper rail indicator light.)

* * *

BK SPACEBAND LEVER ADJUSTMENT: The spaceband lever on the Brewer Keyboard is adjustable in height to the operator's touch in similar manner to that of conventional linotype spaceband lever. However, in adjusting spaceband lever on BK, care must be exercised to maintain proper relation of contact points located inside the cover. This should be adjusted so as to make positive contact slightly before spaceband lever strikes bottom rubber buffer on the keyboard chassis.

OTHER MALFUNCTIONS AND THEIR REMEDIES

MALFUNCTION: BK solenoid plungers do not move freely in their vertical plunger shafts. This malfunction may be caused by variations in the diameter of the solenoid plunger itself, which cause the plunger to bind.
REMEDY: Take out the solenoid plunger by removing the rubber buffer and the "O" ring and "E" clip which fit into a notched slot on the plunger stem. Then, with a micrometer, check the diameter of the solenoid plunger throughout its length. If variation is found, place the solenoid plunger in a drill or lathe and remove excess metal with a fine file. (If plunger is binding, marks are usually found on the tapered end of solenoid plunger or on the brass stem, indicating the point of stricture.)
NOTE: If malfunction of solenoid plungers is experienced, UNDER NO CIRCUMSTANCE should any type of lubrication be used to try to correct the situation.

* * *

MALFUNCTION: Rubber buffers work loose and become dislodged from their position on solenoid plunger stems.
REMEDY: A drop of "glipton" or other similar quick-drying paint or cement may be applied to the tip of the solenoid plunger stem to hold the rubber buffer securely in place. However, in cementing the rubber buffer to the plunger stem, extreme care must be exercised to prevent any of the adhesive material being used from becoming smeared over the "O" ring and "E" clip on the solenoid plunger. Adhesive on these parts would prevent proper operation of the solenoid plungers.

* * *

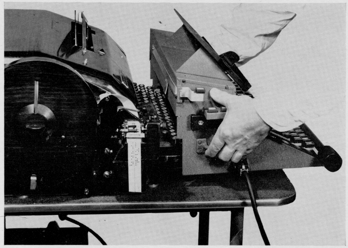
MALFUNCTION: Contact points on leaf contact springs (underneath keyboard section) not making positive connection. (These leaf springs are actuated by movement of the BK key levers.
REMEDY: Adjust leaf contact spring with specially-designed tool provided in BK tool kit for this purpose. Each end of this tool is slotted to accept the flat leaf spring, and one end is angled to enable adjustment of springs to be made without completely dismantling the keyboard.

* * *

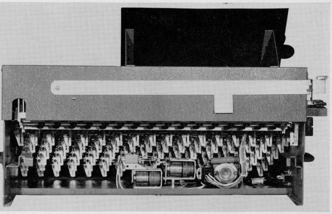
Removing BK Chassis Cover

To remove the BK chassis cover (over the solenoid section) from the frame, merely loosen the four retaining screws (2 at each side), and lift cover off.

Setting the BK In Place



Shown is a Brewer Keyboard being set in place on a Teletypesetter perforator. The specially-designed stand, furnished for each Brewer Keyboard installation, accommodates both the perforator unit and the BK. The perforator is set in place first, locating the unit flush with the rear edge of the stand, and with equal distance on either side. The Brewer Keyboard is then set in place on the perforator unit, with the spacing brackets (inside rear of BK—one at each side) fit into available recesses in the perforator unit casting. On the BK Multiface model for use with Multiface TTS perforator, the spacing brackets have a projecting lug which fits into available slots in the perforator machine to lock the BK securely in place.



Shown above is a rear view of the Brewer Keyboard. In this view, the spacing brackets may be clearly seen on the inside edge of each chassis side. As explained above, these brackets fit into available grooves in the perforator casting to lock the BK in place. The spacing brackets on the Standard Model BK do not have projecting lugs, and, therefore, may have to be adjusted further. A positive "set" of a Standard BK on a Standard perforator may be obtained by "peening" the flat top side of each spacing bracket with a hammer to spread the metal. Remove bracket from machine for "peening" adjustment. (Differences in tolerances between one TTS casting and another sometimes make this procedure necessary in installing the BK.)

Part II: A Manual of Instruction On Operation of the Brewer Keyboard

Including Requirements of the Teletypesetter System and How they are Fulfilled by the Brewer Keyboard Operator

Before going into the operating details of the Brewer Keyboard, it is necessary to explain some of the basic facts about the system of producing type on line-casting machines by remote control through a paper tape containing punched code combinations.

First of all, the system is not new. It has been around for quite a long time. If you will brush off the dust on the 1930 volumes of The Typographical Journal, you will find an article on the teletypesetter in the September issue of that year.

Written by an ITU member, this article describes such an installation in Westchester County, New York. It is claimed that here, in August, 1930, the first actual transmission of "live" news from a central distributing point direct to typesetting machines at remote localities by use of the teletypesetter was successfully accomplished.

The unusual aspect of the system is emphasized by the following description of this early installation: "If by chance one should stray into a newspaper office and observe the keys on a typesetting machine bobbing up and down, the disc wheel turning, the distributor and other mechanisms performing their intricate duties apparently unaided by human hands, there is no occasion for alarm. Neither ghosts nor hobgoblins are in control. It is the teletypesetter."

Since 1930, various improvements have been made on the component units of the teletypesetter system, but the basic idea has remained unchanged. Paper tape with punched code combinations, along with various types of perforating machines and electronic sensing devices, have been brought into use in industries other than printing. Recent introductions of addressing and mailing equipment make use of the same basic principles of "automatic," remote-control operation.

The International Typographical Union does not endorse or promote the idea that the tape method is the most efficient method of production. If an employer insists on using tape we must be prepared to give him tape. Despite many recognized shortcomings of the teletypesetter method as compared to direct manual operation of line-casting machines, it must be realized that this method will and is producing newspapers. It also must be realized that the publisher will determine the type of equipment to be used in his plant.

To make it possible for ITU trained linotype operators to adapt their typesetting skill to the teletypesetter system in the most efficient and direct manner, the ITU through Unitypo, Inc., has developed the Brewer Keyboard.

Using the basic arrangement of the double-alphabet linotype keyboard, the Brewer Keyboard is designed for use on the teletypesetter perforator unit—the keyboard of which is basically the standard, single-alphabet, typewriter keyboard. Thus, the BK makes it possible for the linotype operator to punch tape without having to learn the teletypesetter keyboard.

The following points must be kept in mind by the operator who makes the transition to the Brewer Keyboard and the teletypesetter system:

1. There is considerable difference between operating the Brewer Keyboard to run a teletypesetter and operating the linotype machine itself. On the latter you are running a machine with many mechanical features to watch. On the former you only punch tape on a machine which has a high speed potential.

2. Setting type and punching tape are two quite different functions. The fact that the same keyboard (BK) is used must not be allowed to obscure this difference. There are quite a number of technical matters about tape-punching to be learned just as there is more to operating a linotype than hitting the keys.

In this manual of instruction you will find the information you need on the technical matters of tape punching, plus instruction for producing tape on a TTS perforator operated by the Brewer Keyboard. First we will list the units of the teletypesetter system and their function.

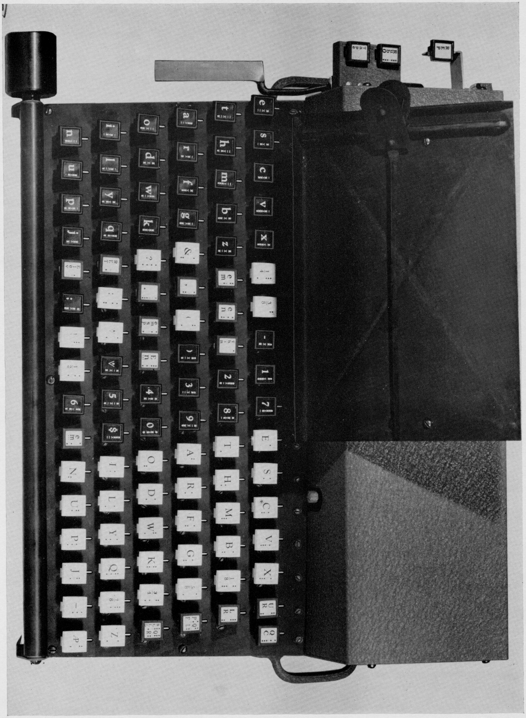
Teletypesetter Perforator: This is the machine on which the operator punches coded tape to be used in actuating the operating unit on the line-casting machine. It is on this unit that the Brewer Keyboard is set in place. The perforator contains a counting pointer and spaceband justification pointers which indicate the width of each character and the minimum and maximum expansion limits of the spacebands.

Operating Unit: Is the piece of equipment mounted directly to the linecasting machine through which the punched tape is fed to actuate the key levers and other parts of the machine. The operating unit "senses" the code combinations in the prepared tape and translates them into mechanical actions for automatic operation of the line-casting machine.

Transmitter Distributor: Is the unit into which perforated tape may be fed for the purpose of automatically producing a duplicate tape on receiving apparatus located in adjacent rooms locally or at distant points on a teletypesetter circuit.

Reperforator: Is the unit which automatically reproduces teletypesetter tape at the receiving end of a circuit. Whether or not the Sending and Receiving Printer (described below) is used, the Reperforator is always used to provide tape for the operating units on linotypes at every reproducing point.

Sending and Receiving Printer: This unit will transmit and receive messages, from six-unit tape, in upper and lower case. When connected to the teletypesetter circuit the printer will provide a typewritten copy of the contents of tape in lines which will justify. This machine differs only from news service printers in that the news service printers operate on a five-unit tape and are therefore limited to upper case.



Two Perforator-BK Models

There are two TTS perforator models in general use today. Consequently, there are two models of the Brewer Keyboard—the Standard model for use on the standard perforator, and the Multiface model for use on the multiface perforator. Specific differences between the Standard and Multiface Brewer Keyboard models are pointed out elsewhere in this instruction manual. Below is listed the general differences in purpose of the Standard and Multiface perforator:

The Standard Perforator is designed for use with matrices cut on the unit system and is most widely used in the newspaper field. Unit matrices are made in widths directly proportional to the "em" quad of the type face used, each unit being 1/18 of the brass width of the em quad matrix. With the unit system, eleven groups of various unit widths are used for the entire font of type characters. The narrowest is six units wide, and the unit widths are 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, and 18.

Multiface Perforator

The Multiface Perforator is employed primarily for book and job composition where a variety of type faces is required, but also is used by a number of newspapers desiring to retain their own distinctive type dress.

To count an accumulating line of normal (not unit-manufactured matrices) it was found that the full font of these matrices could be divided into 28 groups by set-widths. For the basis of counting, the em quad is divided into 32 units (as compared to the 18 units with the special TTS matrices). The narrowest characters are 5 units wide, or 5/32 of the em quad.

The Multiface Perforator uses a removable counting magazine instead of the built-in device of the Standard Perforator. The magazine may be removed and another inserted in a few seconds. Magazines can be provided (or assembled) for any normal font of type from 5 to 14 point.

For the 32-unit counting scheme, the magazine contains 126 counting blades, in 64 positions. The counting blades, actuated by the perforator key levers, perform all the necessary selections and similarly control the counting mechanism for the 28 set-width groupings of the matrices.

This counting arrangement is accurate enough to be practical for measures from 6 picas to 25 picas for smaller type sizes, and from 10 to 30 picas for type faces from 8 to 14 point. However, it does not count with absolute mathematical accuracy as does the Standard Perforator, since brass widths of the matrices may vary slightly from one face to another.

The Tape

In learning to "set type" in the teletypesetter system by operating a TTS perforator equipped with a Brewer Keyboard, one of the main concerns of the operator centers about the perforated tape.

The tape, with its punched code combinations, is the product turned out by the operator.

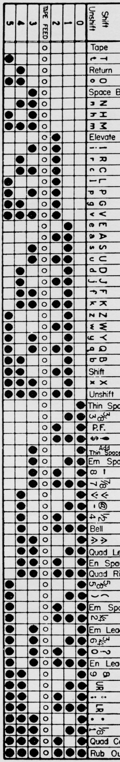
Tape is not the end product—which still remains to be justified lines of type cast on metal slugs by the line-casting machines. But in the TTS system, the perforated paper tape is the all-important medium which actuates the slug-casting machine through impulses "sensed" from the punched holes in the tape by the operating unit.

The code combinations are obtained by punching a maximum of six holes in tape, which is ⅞" wide. For each of the six locations on the tape in which a hole may be punched, there is a corresponding code bar in the operating unit. On the perforator, six pairs of perforating selector bars and a universal bar extend across the width of the keyboard. The bars are notched with an integrated system which positions a similar series of punch bars. Thus, depressing a given key selects its proper code signal, positions the proper punches for that code, and releases the punching mechanism to make clean holes in the tape at the right locations.

Therefore, the tape must be accurately prepared by the operator. The code combinations are punched in the continuous tape to accumulate "justified" lines. Each "line" is ended with the code combinations RETURN and ELEVATE.

It is obvious that the operator must learn how to read the tape—that is, to know what each punched code combination means as a type character, space, or other function that must be "fed" into the line-casting machine through the operating unit. The punched combinations in the tape are called the selection code.

A diagram of the six-unit code is provided in this manual for the operator to study and commit to memory. The arrangement of the dots (representing the holes punched in the tape by the machine) in this diagram has been found easy to learn because of the progressive presentation of the dots according to number and position. Each vertical row in the diagram represents the six possible locations of a complete character or line-casting ma-



LEARN TO READ THE TAPE. This arrangement has been found easy to learn because of the progressive arrangement of the dots according to number and position.

chine function. The small holes in the center of the tape are feed holes for advancing the tape through the operating unit. The letters and characters at the top of the diagram are not a part of the tape as it is punched in the perforator.

Basic Features of Six-Unit Code

A study of the diagram of the six-unit selection code reveals some basic characteristics of the teletypesetter system which will aid the operator in learning to punch tape with the Brewer Keyboard.

Remember, the TTS is a remote-control system. The operating unit attached to the line-casting machine cannot think for itself. This means that through the medium of the tape, the operator must "send" into the machine all the information necessary to control the matrices in each of the 90 channels on the line-casting machine, PLUS information to perform other functions (e.g. raise elevator with assembled line) that he would perform manually in direct operation.

How then does the six-unit code provide for the necessary number of distinctly different impulses to perform all these tasks?

A study of the tape diagram will show that through the use of six units a total of 64 different combinations are possible.

"This is not enough to run a 90-channel linotype and perform other functions," you say.

But wait. Let us go one step further—and herein lies the major difference between operating the Brewer Keyboard to run a teletypesetter and operating the linotype machine itself.

Two of the possible 64 code combinations are applied to a shift procedure familiar in typewriter construction. These two perforations—"SHIFT" and "unshift"—position the operating unit on the line-casting machine so that the character (upper or lower case) or function performed depends upon whether any of the remaining code perforations are preceded by a "SHIFT" or "unshift" code combination in the tape.

In this manner, the total number of possible code combinations in the six-unit system that may be used for controlling the casting machine is doubled —to 124. (This is the maximum number possible if each vertical row would be utilized for a double code combination. It also discounts two possible double combinations that are eliminated by the positions used for the "SHIFT" and "unshift" code.)

Of the total possible 124 code combinations, the TTS system and the Brewer Keyboard make use of 105 separate and distinct signals for controlling the line-casting machine.

Of the 105 combinations, 41 are doubles (different selection of characters depending upon whether they are preceded by an "unshift" or "shift" perforation)—making a total of 82 combinations; and 21 are singles (providing identical selection regardless of whether they are preceded by a "shift" or "unshift" perforation). The two remaining combinations are those of the "shift" and "unshift" perforations.

Again referring to the tape diagram, you will note that the uppermost or zero perforation is only used for figures, special characters, and functions. This fact will aid in learning to read the tape.

Shift-Unshift Procedure On the Brewer Keyboard

As we have seen from the above description of the six-unit selection code system, limitations on the number of different code combinations possible make it necessary to increase the capacity of the system by using two of the code combinations to carry out a shift procedure similar to that of simple typewriter construction.

In simpler terms, this means ONE code combination in the tape may be used to control TWO channels of character matrices on the line-casting machine. For example: one perforation in the tape in the No. 1 position if preceded by an unshift code will produce a lower case "e"; if preceded by a shift code, will produce a capital "E".

This procedure may be a bit confusing at first glance of the Brewer Keyboard, and in fact may seem unnecessary, because you will see the Brewer Keyboard layout retains the basic characteristic of any linotype keyboard you have seen—a separate alphabet of keys for both lower case and capital characters.

But REMEMBER—with the Brewer Keyboard operating a teletypesetter perforator, you are still producing tape —limited to a certain number of code combinations as described above.

And SECONDLY, the Brewer Keyboard is actuating the keys of the TTS perforator, and these follow the standard, single-alphabet typewriter keyboard incorporating a shift procedure.

Let us then see how the shift procedure is accomplished in producing tape with the Brewer Keyboard:

With the Brewer Keyboard operating the Teletypesetter perforator, the "SHIFT" and "unshift" perforations are obtained semi-automatically, in that no specific key must be struck to obtain either of the two required perforations.

The "unshift" perforation may be punched in the tape by striking any key of the unshift circuit. On the BK, these are black keys and have a white character printed on a BLACK background.

The "SHIFT" perforation may be obtained by striking any key of the shift circuit. On the BK, these are white keys and have a black character printed on a WHITE background.

Besides the above designations, certain keys give proper results without regard to either shift position. On the BK, these are blue keys and have a black character printed on a BLUE background.

With the Brewer Keyboard, the "SHIFT" and "unshift" perforation in the tape may be produced in either one of two ways.

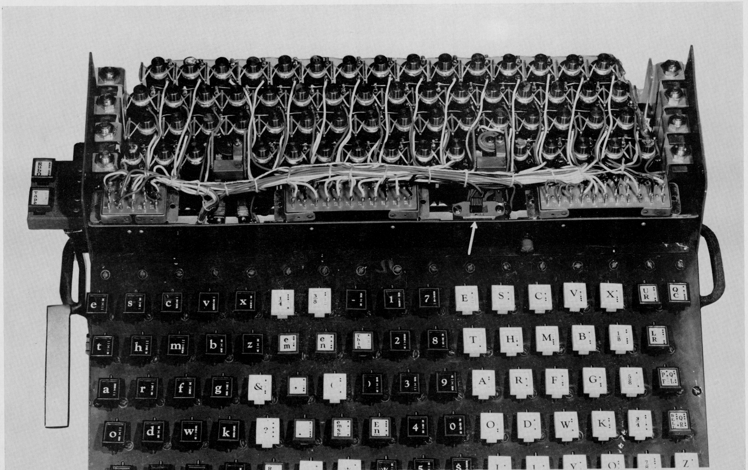
If a capital (SHIFT position) is desired, the operator may either (1) hold the key down about one-tenth of a second—thus getting both the SHIFT perforation and the letter perforation in quick succession; or (2) he may quickly depress the key of the letter desired twice (first impulse produces the SHIFT perforation; second impulse produces the letter perforation).

With either method, the keyboard then remains in the upper case (SHIFT) position until a lower case key is depressed in like manner, as above described, which first produces an "unshift" perforation and subsequently perforations for lower case characters.

A semaphore signal indicator is located just below the counting scale on the teletypesetter perforator. This enables the BK operator to determine whether the keyboard is in the shift or unshift position. A red signal indicates "SHIFT" (caps) and a white signal "unshift" (lower case) position.

In working from "SHIFT" to "unshift" position, or vice versa, on the Brewer Keyboard, the operator needs only to remember the color designation on the keys and key background. Those keys which operate only on the "unshift" circuit are black and have a BLACK background; those which operate only on the "SHIFT" circuit are white and have a WHITE background; and those which operate on either the shift or unshift circuit are blue and have a BLUE background.

In addition to the letter or character, each key button of the Brewer Keyboard contains the printed code com-



Top view of Brewer Keyboard with chassis cover removed. At the extreme left and right sides are the solenoid bracket adjusting screws, at the end of each horizontal row of solenoids. The four rows of solenoids may be adjusted if necessary by these screws for correct position of solenoids over the key buttons of the perforator keyboard. Located inside the front top edge (at lower right) is the selector switch (arrow) for QL-QR or PF-Bell circuit (on multiface model only). With the switch thrown to the left, the Paper Feed and Bell perforations may be made in the tape. With the switch thrown to the right, Quad-Left and Quad-Right perforations may be made in the tape. (See detailed explanation in the accompanying text.)

bination that corresponds to the code for such letter punched in the tape by the perforator unit. This provision will aid the operator in reading and learning the punched tape, for correcting errors, and adjusting a line for proper justification.

Additional Keys On the Brewer Keyboard

As emphasized previously, the teletypesetter system of producing type through the medium of a punched tape is a remote-control system. Therefore, there must be included in the coded tape certain perforations that transmit instructions to the operating unit for "functions" that are normally performed manually by the linotype operator in direct operation.

Among these are tape perforations to control the operation of the duplex rail, elevator, and automatic quadding device (for line-casting machines so equipped).

Also provided is a perforation for RET (return of counting pointers on TTS counting scale); RUBOUT (for correcting errors in the tape); TAPE (to advance or "feed" tape); PF (paper feed); and BELL.

The two latter perforations are normally only needed in telegraphic transmission through a sending and receiving printer, such as in telegraph copy familiar to all linotype operators. Therefore, keys for punching the PF and BELL code combinations in the tape are provided ONLY on the Multiface Model of the Brewer Keyboard, as described below under "double key circuit".

On the Brewer Keyboard model manufactured to operate the Standard TTS perforator, there is no standard provision for obtaining the PAPER FEED and BELL perforations in the tape. The available keys on the Standard TTS perforator are used for quad perforations. If the PF and BELL perforations are required for a particular teletypesetter installation, alterations have to be made in the selective code bars of the particular teletypesetter being used.

On the Brewer Keyboard, provision for obtaining other "functional" code perforations in the tape is made by the addition of the required number of extra keys (ten more than the standard linotype keyboard) as follows:

In the additional row at the extreme right side of the keyboard, are located keys to provide for the following perforations in the tape: UR (upper rail); LR (lower rail); QL (quad left), and QR (quad right). Also an additional key, QC (quad center) is located in the extreme upper right corner of the keyboard.

The RETURN and ELEV keys (blue) on the Brewer Keyboard are located in the last two positions of the fifth vertical row of keys from the left side of the keyboard. Each line of code combinations in the tape is ended with these two perforations successively; the first (RET) returning the counting pointers of the perforator counting scale to line commencement position, and the second (ELEV) actuating the operating unit on the line-casting machine to raise the first elevator with the assembled line of matrices. The position of these two keys on the Brewer Keyboard is most convenient to the operator because he is more frequently fingering the lower case side of the keyboard.

The TAPE and RUBOUT keys are conveniently located on a bracket slightly above the spaceband lever, readily accessible to the left hand of the operator.

The REPEAT key is located slightly above and behind the two above-mentioned keys. This key is attached to a bar on the BK chassis cover which provides mechanical linkage to operate the "repeat" key lever of the TTS perforator. These three key buttons—Tape, Rubout, and Repeat—have a BLUE background, indicating that they operate with the keyboard in either the unshift or shift position.

Spaceband Lever

The spaceband lever on the Brewer Keyboard is identical to that of the linotype keyboard in design and position. When depressed, it closes a switch which operates a solenoid positioned over the spacebar on the TTS which puts the spaceband perforation in the tape. The spaceband, like those keys marked with a BLUE background, provides identical selection in either shift position.

Extra Em Space Key

On the Brewer Keyboard layout providing for fractions, the Vertical Rule key is used to provide a tape perforation to control a special channel of em spaces cut to run in the vertical rule channel of the casting machine.

Special Characters

Since the Brewer Keyboard is a linotype keyboard it is adaptable to special characters in the same way as though no tape were used. If a channel contains special character mats the corresponding key on the keyboard must be so marked. The tape perforation made by that key will cause the special mat to drop.

Double Key Circuit

On the Multiface Model Brewer Keyboard (see cut), the QL (quad left), and QR (quad right) keys are doubled with PF (paper feed) and BELL, respectively.

The QL and QR keys are operative on one circuit; PF and BELL on the other. A double-pole, double-throw switch is located under the top cover of the keyboard to enable selection of one or the other circuits. With the switch thrown to the left position, the PAPER FEED and BELL perforations may be made in the tape. With the switch thrown to the right position, the QUAD-LEFT and QUAD-RIGHT perforations may be made in the tape. This switch must be positioned before the keyboard is put into operation according to the type of installation for which the punched tape is intended.

Circuit Overload Safety Factor

A safety factor has been incorporated in the Brewer Keyboard in the form of an overload circuit to prevent damage to its various mechanisms by draining off excessive flow of current.

A red indicator light located on the front panel above the keys warns the operator of possible shorted electrical circuits in the keyboard. A light wired in this overload circuit absorbs excessive current and prevents fuse blowouts. If two or more keys are accidentally depressed simultaneously, the red warning light is illuminated. The white light underneath the keyboard will show if the key is held down too long and will also show when the red light shows.

BK Indicator Light for Duplex Rail Operation

In describing additional keys on the Brewer Keyboard provided to perforate codes in the tape to actuate certain "functions" of the line-casting machine, we have pointed out two keys used to control the operation of the duplex rail—marked UR (upper rail) and LR (lower rail).

On the Brewer Keyboard, working in conjunction with these two keys, there is a UR indicator light positioned at the lower left end of the copyboard. This signal light warns the operator that bold face or italic characters are being set. When the UR key is depressed this light is illuminated and remains on until the LR key is struck when setting a mixed line. The light automatically goes out at the end of each line set when the Return key is struck.

To perforate tape for copy calling for the bold face or italic characters of the linotype double-face matrix, the following procedure should be followed:

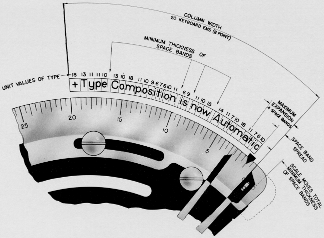
To set type in bold face or italic, depress the UR key. All subsequent characters will then be set in the upper rail position *for the remainder of the line.* The lateral rail is constructed so that it *automatically returns* to the lower rail or roman position upon completion of the line. If it is desired to return to lower rail position before the completion of the line, this may be accomplished by depressing the LR key.

Having once positioned the lateral rail in either the upper rail or lower rail position, the operator may proceed to select *both shift and unshift* characters as required in the line to be set without affecting the position of the lateral rail.

NOTE: When the tape is to be used on an operating unit not equipped with lateral rail delay mechanism, it is necessary to precede each UR or LR tape perforation with a time interval consisting of three TAPE (blank) perforations. However, this time interval is not required at the beginning of a line.

* * *

In learning to produce tape with the Brewer Keyboard operating a teletypesetter perforator, the operator must also learn certain machine settings and other procedures that are an integral part of the TTS system, but also apply to Brewer Keyboard operations. Among those settings and procedures are the following:



Shown above is the TTS counting mechanism and indicator scale, which is also of functional importance to the Brewer Keyboard operator. The cumulative total of widths of the characters is shown by the moving pointer (matrix pointer) at the top of the scale. The justification range of the spacebands in the line is indicated by the two pointers at the right end of the scale. Settings of the scale are made to adjust the counting mechanism to various type sizes and widths of line to be composed. When a line is completed, a single keystroke (Return) resets the pointers.

Counting Scale and Pointers

The counting device used in operating the teletypesetter perforator equipped with the Brewer Keyboard is located on top of the perforator unit. The counting device indicates proper justification of the composed line.

On the manually operated linotype the operator notes the accumulation of matrices and spacebands—when they reach the normal limit for the length of line he "sends the line in" and proceeds with the next.

But in TTS operation the Brewer Keyboard operator is producing tape with coded holes punched in it. The length of the accumulating line is shown by the Indicator Scale, and the spacing to be provided by the spacebands in the line is also indicated. To provide these measurements that will insure a properly justified line requires that the mechanism must count the width of every type character and also show the remaining portion of the line to be occupied by the spacebands when they expand during the casting operation of the linotype.

In operation, the TTS counting scale is set for the set-width of the type to be composed and for the measure of the line. As the various characters are touched by the operator's fingers on the Brewer Keyboard the counting pointer (on the upper edge of the curved scale) moves from left to right. However, when the spaceband lever is struck, the counting pointer remains stationary, but the counting scale (attached to the right-hand pointer) moves from right to left. Each movement of the scale represents the minimum width of the linotype spaceband, while the left-hand pointer moves a greater distance to the left, corresponding to the maximum thickness of the spaceband. (See diagram of the indicator scale.)

Thus the counting mechanism not only accumulates the sum of the brass widths of the matrices for a line, but it also indicates the total range of spread of the spacebands which will justify the line on the casting machine. In operation, when the counting pointer is between the two justification pointers, then the line may be ended. The operator depresses the BK keys for "return" and "elevate"—then proceeds with the next line.

Counting Pointer Setting

Each full scale division on the TTS counting scale represents a thickness equivalent to the EM space for that particular font of type. One-half of a scale division represents an EN space, which is one-half the width of the EM space.

As pointed out above, the counting pointer is arranged to move from left to right along the counting scale in varying amounts proportional to the width of the characters added to the line as the various BK key levers are depressed. Therefore, the starting point of the counting pointer is adjustable and should be positioned to conform to the column measure of the composition to be set.

This is how the starting point for the counting pointer is determined:

When using unit system matrices, the EM space has a count value of 18 units, and all other alphabet characters, figures, punctuation marks and special characters have a count value directly proportional to the EM space. When using the Multiface perforator and non-unit system matrices, the EM space has a count value of 32 units, and the other characters a counting value proportional to the EM space being used.

Thus, the counting pointer moves one full scale division on the counting scale for each 18 unit value (using unit system matrices) or 32 unit value (using non-unit system matrices).

Accordingly, when the perforator is used to count matrices with an EM space value of .1107″ (unit system), the counting pointer moves a full scale division for each .1107″ of type. The theoretical counting pointer setting for any column measure is therefore determined by dividing the column width (measured in inches) by the EM space value (.1107″). Thus, using unit matrices for a length of line of 12 picas, the counting pointer would be set at 17.8 divisions on the scale. (This is obtained by also allowing .2 of a scale division as a safe allowance to provide a margin against the possibility of sending tight lines into the vise.)

This is how the counting pointer setting of 17.8 is obtained:

Column measure ..... **12 picas**
Col. in inches
.... **12×.166″=1.992″**
Value of EM.......... **.1107″**
Theoretical Setting
...... **1.922″÷.1107″=18 div.**
Allowance .... **.2 div.**
Counting Pointer
Setting .... **17.8 div.**

The counting pointer stop is positioned by loosening its clamping screw and moving the stop to a position so that the counting pointer returns to the calculated point of the counting scale when the "return" key is depressed. After the clamping screw has been tightened, recheck the setting and refine if necessary.

Spaceband Justification Pointers

Two spaceband justification pointers are used on the TTS counting mechanism. The right-hand pointer, attached to the movable counting scale itself, moves the scale to the left each time the spaceband lever is struck, to indicate the minimum expansion of the linotype spaceband. The left-hand pointer, moving independently, and a greater distance to the left each time the spaceband lever is struck, indicates the maximum expansion of the spacebands being used in the line-casting machine.

As each justification pointer measures a different factor, they have different settings. The right-hand spaceband justification pointer is set first.

The movement of the spaceband justification pointers must be adjusted to agree with the font of type and also with the kind of spacebands being used in the line-casting machine. The minimum thickness of the spaceband most commonly used is .037″ and the maximum thickness is .122″. The difference between these two measurements is the total expansion of which the spaceband is capable.

Setting Right-Hand Pointer

When properly set, the right-hand spaceband justification pointer moves the indicator scale to the left, a distance proportional to the minimum thickness of the spacebands in the line.

The motion of this pointer is adjustable and must be set so that it indicates the proper relation to the brass size value of the type face being set. Therefore, the right-hand spaceband justification pointer must be reset each time the perforator is to be used to perforate tape for a font of type in which the EM space value changes from that of the font previously used, or when spacebands of a different size are to be used.

The following procedure should be followed for setting the right-hand spaceband pointer on a perforator equipped with the Brewer Keyboard where spacebands having a minimum thickness of .037″ and a font of type having an EM space value of .1107″ are used in the casting unit:

1. Move the counting pointer by hand to a convenient even scale graduation, such as 15.

2. Depress the spaceband lever 10 times.

3. Open the hinged door in front of the adjustable spaceband mechanism. On a perforator equipped with the Brewer Keyboard, this hinged door is set in spring clamps and may be lifted completely off the machine to make these settings. Next, position the right-hand spaceband justification pointer by means of the right-hand thumb screw so that its total motion is 3.4 scale divisions. This is indicated by the change in counting pointer location from 15 to 11.6 on the indicator scale. Return the pointers to their start position by depressing the "return" key.

4. Recheck the setting and refine if necessary.

5. The setting of 3.4 scale divisions is calculated as follows:

Minimum thickness
of band .... **.037″**
Total min. of 10 bands.. **.370″**
Brass value of one
scale div. .... **.1107″**
No. divs. for 10 space-
bands ...**.370″÷.1107″=3.4***
***(3.35 actual: use next 1/10 above or 3.4)**

Setting Left-Hand Pointer

The following procedure should be followed for setting the left-hand spaceband pointer on a perforator equipped with the Brewer Keyboard where spacebands having a maximum thickness of .122″ and a font of type having an EM space value of .1107″ are used in the casting unit:

1. After the right-hand pointer has been set and checked, and the pointers have been spread by depressing the spaceband lever 10 times, adjust the position of the left-hand pointer by means of the left-hand thumb screw so that the spread between the right and left-hand pointers is 6.0 divisions.

The setting of 6.0 divisions for movement of the left-hand pointer in the above-stated conditions is calculated as follows:

Spread per band
.... **.122″÷.037″=.085″**
Spread—10 bands ...... **.850″**
Per cent of spread
usable **85%**
Total usable spread
.... **85% of .85=.723**
Setting:
...... **.723″÷.1107″=6.5 div.**
***Reduction to absorb**
.2 allowance in counting
pointer: .... **.5 div.**
Net pointer spread... **6.0 divs.**

(*In calculating the reduction, it is estimated that there will be an average of four spacebands per line. Therefore, the motion for four spacebands will be reduced by .2 scale divisions and proportionately, the motion for 10 spacebands will be reduced by .5 scale divisions.)

Other operating procedures and functions fundamental to the teletypesetter perforator, but which are also applicable and basic to the Brewer Keyboard operator, include the following:

Correcting the Tape

If an error is made in perforating the tape, it should be backspaced, by depressing the backspace lever once for each combination until the incorrect perforation is directly over the tape punches (when the combination which is immediately to the left of the chad chute is backspaced once, it will be over the punches), and deleted by depressing the "rubout" key. The "rubout" causes all six holes to be punched. This is a "dead" combination insofar as any operation of the casting machine is concerned.

It should be kept in mind that when a character or letter is rubbed out in the tape, the pointers are not backspaced. Therefore, if there is any doubt as to whether the line is within justification range, the punching mechanism should be turned off and the line remeasured.

If it is necessary to delete an entire line, rapid backspacing may be done by holding the backspace lever depressed and turning the tape feed thumb wheel clockwise. The perforations may then be deleted by depressing the RUBOUT and REPEAT keys simultaneously. Rubouts in the tape idle the line-casting machine. Therefore, as the operator gains in proficiency, every effort should be made to keep rubouts to a minimum.

Repeat Function

When it is necessary for the operator to feed blank tape (TAPE key perforation only), or when deleting a full line, it is a preferred practice to depress the REPEAT key and the desired key simultaneously. This advances the tape rapidly and eliminates the need for a series of single key depressions. The REPEAT key is used only in conjunction with the TAPE feed key and the RUBOUT key.

Repeated Characters

No key of the Brewer Keyboard should be depressed more than twice in succession (unless the operating unit being used on the line-casting machine is equipped with the Repeat Character Delay Mechanism). This includes such keys as Thin space, EM space, EM leader, etc. There is a limit to the speed with which a given character may be repeated on the line-casting machine. Thus, if a character is perforated three times in succession, it is likely that it will appear only twice in the printed copy. This condition may be avoided by providing a time interval (depression of TAPE key) after the second identical character, so that not more than two identical characters will be perforated in succession.

Perforation Cycle

Similar to the above precaution in perforating successive like characters, the Brewer Keyboard operator must always keep in mind the fact that the TTS machine must be allowed to complete one cycle of operation for EACH perforation. With the Brewer Keyboard operating the TTS perforator, this factor must be compensated for by the operator. Striking successive keys on the Brewer Keyboard before a POSITIVE perforation is allowed to be made in the tape by a complete cycle of action of the TTS machine will result in WRONG perforations. (Necessary key travel for positive tape perforation on the TTS machine is 5/16″, whereas key travel on the Brewer Keyboard is only 1/16″—with the necessary follow through being performed by a solenoid actuating the TTS key.)

Use of Thumb Wheel

The thumb wheel located on the TTS perforator punch block should be used ONLY to back up the tape. The thumb wheel should not be used to advance the tape, as this will result in the omission of the feed hole perforations which advance the tape in the operating unit. The TAPE key is provided for the purpose of advancing the tape, and is used in conjunction with the REPEAT key when needed.

Add Thin Space

If additional space between words is necessary to make a line justify, thin spaces may be added by inserting the thin-space code (zero position) directly above the space perforation (3 position). When the add-thin combination is sensed by the operating unit, both the spaceband and thin space matrix are released.

To use the add-thin space, back up tape to where the last space in the line is over the punch, then depress thin-space key. Next, back up tape until next space is over the punch and add the thin-space combination—continuing until all space combinations in the line have been changed to zero-three combinations.

Adding En Spaces

To add en spaces between words in a line to make it justify, the following procedure may be used:

1. Back up tape to previous return.
2. Strike return and elevate.
3. Re-perforate the first word and space in the line and read it for accuracy.
4. Rubout balance of line.
5. Add en space.
6. Complete line, adding en space after each spaceband.

Centering a Line

The following procedure is suggested for perforating tape to produce a centered line:

1. Throw punch control lever to the right or "off" position.
2. Keyboard words to be centered to indicate count on perforator scale, and note full scale divisions remaining between counting pointer and zero.
3. Subtract two scale divisions for allowance of two spacebands on each side of centered matter.
4. Divide remainder by two. This will give number of em spaces to be used on each end of centered matter along with two spacebands.
5. Throw punch control to left or "on" and perforate line, using correct number of em spaces and spacebands on each end of line.

(Note: The above procedure is unnecessary if tape is to be used on a line-casting machine equipped with an automatic quadding device—as the Brewer Keyboard and TTS perforator provide a code combination for Quad Center (QC) to control this function automatically.)