KEYBOARD F
SPACE BAR MECH.

IBM Technical Disclosure Bulletin Vol. 21 No. 9 February 1979

SELF-BIASING SPACE BAR STABILIZER MECHANISM

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FIG. 2

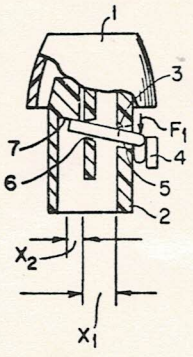
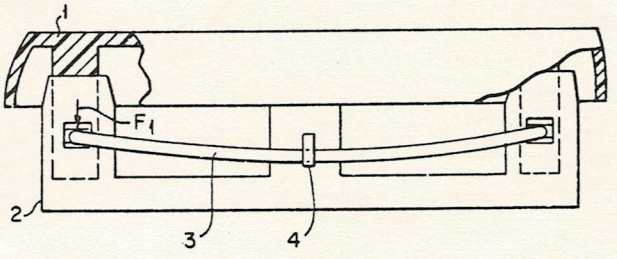


FIG. 1



Keyboards having space bars often require stronger return force in the space bar mechanism because of the additional weight of the longer key button assembly. The additional force is usually provided by separate return springs or of a higher force return spring in the space bar key module. Some inertia balance mechanisms are also utilized and they work well, but are more complicated to assemble and require considerable space.

Fig. 1 illustrates an improved space bar mechanism in which a stabilizer bar is flexed to provide an additional return force and to eliminate the requirement of additional springs or parts. The space bar consists of a one-piece plastic key top 1, a one-piece plastic housing 2 and a steel spring stabilizer bar 3. The space bar key button is guided to slide vertically up and down in the end portions of the housing 2, as may be seen to greater advantage in the cut-away end view of Fig. 2. The center portion of housing 2 contains the transducer used in the keyboard to indicate activation of the space bar. The ends of the stabilizer bar 3 fit into housing pivot apertures 5, and the ends of the stabilizer bar 3 are bent at approximately right angles to that portion exterior to the housing pivot apertures 5. These ends of the stabilizer bar 3 pass through pivot apertures 6 in the space bar key button top, as shown. A stabilizer retainer 4 holds the central portion of the stabilizer bar 3 in a slightly depressed flexed condition, as shown in Fig. 1.

When the space bar key button 1 is depressed in the center or at either end, a moment is imparted to the stabilizer bar 3 which transmits a downward force on the space bar to its other end to prevent the bar from cocking or skewing when it is depressed nearer to one end than the other. The degree of flex imparted in the stabilizer bar 3 by the retainer 4 creates downward forces F1 at each end of the space bar through the lever system, resulting from the reaction force produced by

pivoting stabilizer bar 3 at pivot point 5 at the inner edge of the aperture 5, seen to greater advantage in Fig. 2. This results in a net upward force on the space bar key button 1 through its pivot 6 proportional to the distance X_2 and the ratio it bears to X_1 shown in Fig. 2. The forces may be varied by varying the distances X_1 and X_2. Upward travel is limited by allowing an interference between the end of the stabilizer bar 3 with a molded ledge 7 in the housing 2.

IBM® Technical Disclosure Bulletin Vol. 20 No. 4 September 1977

COUNTERWEIGHT SPACE BAR MECHANISM

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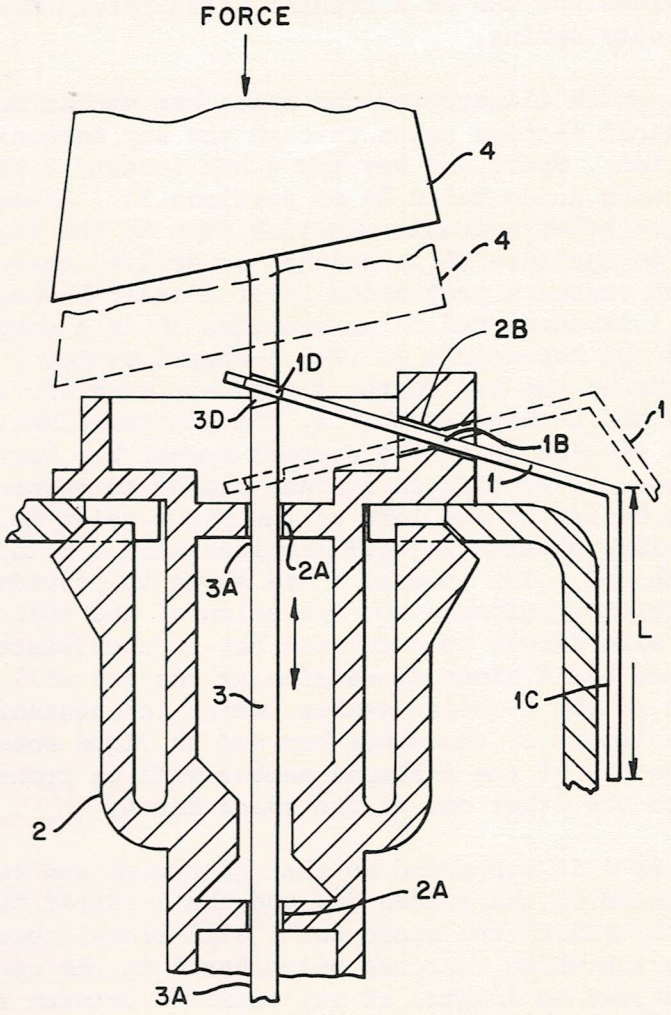

This article describes a space bar mechanism that is immune to actuation by external vibrations and that allows the use of a regular return spring in a key switch module which does not require a different force characteristic to overcome the greater mass of the elongated space bar. A number of previous space bar mechanisms have utilized torsional bars connected to each end of the space bar as a means of guiding the space bar and for supporting it so that actuation near either end would be transferred to the opposite end. In such systems the addition of these parts to an elongated key button that is already much heavier than a

regular key button produces a system with considerably more mass than a regular key module can sustain. The larger mass requires a larger than normal return spring in the key module to produce the same key force as a regular smaller key button. The return force on the space bar must be increased further beyond this point to prevent space bar actuation that may result from external vibrations. The present article describes a space bar mechanism that is immune to such actuation by external vibration and that allows the use of a regular force return spring instead of a special heavy duty spring.

The figure, which illustrates the space bar mechanism for a key board, is a vertical section taken through the key mechanism to show its method of operation. Space bar key top 4 has inserts 3 which support it as it passes through guide holes 2A on portions 3A. Inserts 3 are flat pieces of metal or other suitable material seen in the figure in an edgewise view. An aperture 3D is punched or drilled through insert 3 and through which passes a projection 1D of a metal L-shaped member 1. L-shaped member 1 is supported in an aperture 2B in a support block which is part of the key module 2. The L-shaped member 1 forms a counterweight to the mass of the key button 4 together with the guide members 3 and a portion of the L-shaped member 1, the counterweight being pivoted at section 1B in portion 2B of the support member 2. Portion 1C has a length L, as shown, to provide sufficient weight to counterbalance the remaining key mechanism to the left of the pivot point 1B. The space bar 4 is, typically, plastic injection-molded with a metal insert 3 pressed into each end. The inserts 3 are shown to provide horizontal, vertical and torsional guidance for operation of the space bar. The L-shaped member 1 also serves as a torsion bar to coordinate motions at both ends of space bar 4 since depression at one end will be transferred along the length of the L-shaped member, which is coextensive (approximately) with the length of the space bar and is rigid enough so that depression at one end of the L-shaped member will be transmitted throughout its length to the other end of the space bar 4.

The space bar 4 is supported so that clockwise and counterclockwise moments are resisted by the guides 2A, and the L-shaped torsion bar insures that both ends of the space bar 4 will travel together. The key module with a spring which restores space bar 4 in the upward direction is not shown, but can be located at any position between the inserts 3. The pivot point 2B forms a fulcrum, with the weight and return force acting to the left and a counterweight torsion acting to the right. The mass of the space bar assembly can be approached by varying the length L in portion 1C of the L-shaped member 1. Since the additional mass of the space bar 4 and its assembly can be compensated for, the regular key module return spring can be utilized to return the space bar 4. Actuations which may result from external vibration are eliminated because the fulcrum 1B creates a balance in inertial forces between the space bar assembly and the torsion bar.