Speed and convenience, two very important
concepts of communications, are always
part of the design goals for Bell System
equipment. A recent development at Bell
Laboratories incorporates these concepts
in a new attendant's console for PBX's.

Speeding Calls

In recent years, Bell System Engineers have
greatly improved the equipment used by attend-
ants at PBX's (Private Branch Exchanges). The
old-fashioned oak-paneled "plug and jack" switch-
boards have been replaced by modern-looking
counterparts, equipped for pushbutton control
and available in a variety of colors. Compact and
colorful desktop cabinets with switching keys
are also now being used for small manual PBX's.

Also now available are small dial PBX's with
small, pushbutton-operated consoles similar in
appearance to the popular Call Director. In place
of a jack for each PBX station, these consoles
use a dial to establish connections through the
PBX switching equipment to the stations.

Dialing, however, requires several somewhat
time-consuming actions on the part of the at-
tendant when a call comes into the PBX from the
nearby central office. On such a call, the attendant
must determine the extension number desired,
push a button, wait for dial tone, and dial the
digits of the desired station. Then she may find
that the station is busy.

To speed up this part of the call-handling proc-
ess, Laboratories engineers proposed to equip the
attendant's console on the 756A PBX (RECORD,
January, 1959) with a group of illuminated push-
buttons—one button for each PBX station. In

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Through a PBX

Attendant's console for DSS with Busy Indication. Extension number dialing has been supplemented with pushbutton system for incoming calls.

this arrangement, by merely glancing at the pushbutton array on her console, the attendant would immediately know the busy or idle condition of each station. She would complete incoming calls to a station on the PBX merely by pushing one of the buttons, holding it down until the lamp in the button lights, and then releasing it. The lighted button would signify that the connection had been established from the central-office trunk to the desired PBX station, and that ringing had started. This button would stay lighted as long as the station remained busy. The button would of course also be lighted during calls originated by the station.

Since this arrangement offers a method of directly selecting PBX stations, it has been given the obvious name of "Direct Station Selection" or DSS. Also, the illuminated lamps in the DSS pushbuttons have been called the "Busy Lamp Indication." Hence, the Bell System refers to this service as "DSS with Busy Indication."

To investigate the feasibility of DSS with Busy Indication, the Laboratories built experimental equipment and connected it to a 756A PBX. The results of this experiment were so attractive that AT&T immediately decided to conduct a trial of DSS with Busy Indication in their market test program to ascertain customer

acceptance and to determine whether any changes or additions might be needed. Through close cooperation among AT&T, the Western Electric Model Shop, and the Laboratories, 20 trial models of 756A PBX consoles equipped with DSS pushbuttons and busy lamps were installed early in 1960 in 756A PBX's already in service.

The PBX customers participating in the trial were delighted with this new equipment since their attendants could now handle incoming calls more rapidly. As a result, "DSS with Busy Indication" will soon become available as a standard feature in the 756A PBX.

The accompanying diagram shows the basic arrangement of a standard system. Control relays are connected to each of two dial-pulse registers—devices used to count and store dial pulses and to supply dial tone to lines requesting service. The control relays guide the station-selection signals to the digit-storing relays in the register. Each busy lamp is connected to a "make" contact on a "line hold" magnet. When a contact is closed, the corresponding lamp lights at the attendant's console.

Let us follow the operation of this system when the central office completes a call to the central-office trunk circuit. First, a supervisory lamp lights at the attendant's console. The attendant depresses a corresponding "trunk pick-up" key and asks the calling party the number of the station he wants. The attendant next observes whether the DSS pushbutton associated with this station is lit. If not, the station is idle and a call can be completed to the station by merely depressing the DSS pushbutton until it lights.

The attendant can now either release from the call or wait for the station to answer.

If, however, the desired station is busy (signified by the lighted pushbutton) the attendant can immediately tell the calling party. Then, if the calling party wishes to wait, the attendant depresses the pushbutton corresponding to the desired station. This actuates the "camp-on" feature of the PBX which automatically cuts the calling party through to the desired station when it becomes idle.

If both registers happen to be busy when the attendant depresses a DSS pushbutton, the DSS circuits will not function. Therefore, the call will not be set up to the desired station, and the DSS button would have to be pressed again. To avoid this, an "all registers busy" lamp indication in the standard attendant's console advises the attendant of register availability.
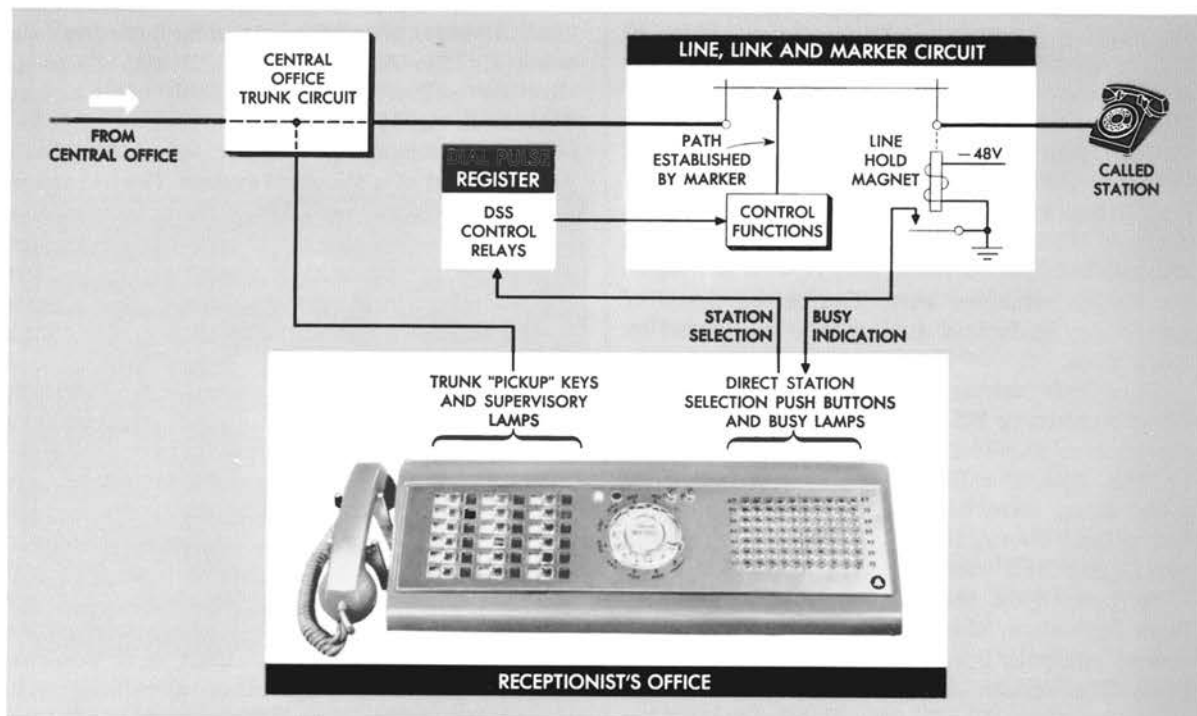
The circuit arrangements required for DSS are quite simple. When one of the pushbuttons is pressed, a register connects to the attendant's console. The tens and units digit information generated by contacts on the pushbutton then goes to the register where it is stored on tens and units storage relays. These storage relays are the same digit-storage relays used on calls made with regular rotary dials.

Once the tens and units digits of the desired station are stored in the register, the marker is summoned and the call is completed to the station indicated by the information stored in the register. The station-busy lamp lights to show that the connection has been established and that the attendant can release the DSS pushbutton. The marker and register restore to normal conditions independently of the attendant's release of the DSS pushbutton.

If the attendant wishes, she can complete a call to a station by dialing instead of by DSS. In this case, she operates a key, and after receiving dial tone, dials the desired station. When the connection is established to the proper line, the busy lamp lights as in DSS-completed calls.

In the trial equipment, DSS functioned only with PBX stations. In the standard arrangements, DSS with Busy Indication will also work with trunks, such as tie trunks and those for recorded dictation and loudspeaker paging.

The enthusiastic reception of Direct Station Selection with Busy Indication in the recent market trials indicates that this feature will be of real value to PBX customers of the Bell System. As a result, it will soon become a standard optional feature in the 756A PBX and plans are being made to include it in other new systems.

Basic arrangement of DSS system. Dial pulse register uses control relays to guide station-selec- tion signals to digit storing relays. Busy lamps, by contacts on line-hold magnets, light pushbuttons.