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PRINCTPLESS OT ERLAY SHLECTION
＊FOR 200 JIIIE SISTMM
DIAGRAM BS 2105
I．OBJECT
The Ioxth AlloRolay automatic Telephone System embodies a number of und que features，not to bo found fa other well knows automatic systom． Amone the most distinctive of these featurse is the tugenions methot of uslng relay 20 solecing one 1 nac out of a lasge gumber of lines．The Loilcwian description is intended en artel introunction to thin North relay selection schem without gotxe into other dstalls of the Morth 8y utom．

2．GANTRAL
The purpose of the AllaRelay telephome system ts to provide telking connections from any callng gtathon to any wanted station in the gystom． Por as megy atations as may wh to thlik at the same ftry．

Ia the All－Reiay Sygten the term Mink is used to designte the oquip－ ment mecessary to completo ons talking connection trom a calling station to a wantod 3tation．Diagrak BS－2405 is a siralliled illuetrablon of one of these links sultabio for a 100 line gystom，but dhowing onis 30 L土nem．

Since itlib mecossary to propide por more than one simultaneous talking connectiong th $\$ 3$ obwloum that a muber of linke mukt be avallable is the systom．Only one of thoss links is shown in the diagran which in datomded primerily to 11 metrate in a schomatic menner how a triking connection is －atablishad．The othor links are oxact duplscates of the one mown and may be ineginsa as boing connacted to the raght hand and of the dingram．

Tor the sake of clarity the lines shown in the dagram constat of single Wire，while actualig a line requires two wires ouvide of the ewtchboard and three wises within the switchboaris．

## 3．WUNCTI OM OF LINK

When a station makes a call it automatically agages an 181． $14 . n k$ pose tho duration of the call．The mannes in which an folin Link not be descesbed here．A full explanation of this function mag be lound in the cotalld civcult description．It the eollowiag．1t will be assumed that the link show in the diastam is the one selectad by the calling station．

After the ink is ongaged the talking connection is completed in the followlag succousive stop：

The anjlig station is comnectod to the connector control relays．
The number of the wanted station is registered，in the connector control rolays by maans of the dial．

The conpector control relays ers connected to the wantul station.
That part of tha link which makes the connaction to the callug lina in called the Hine Finder. The relays in the link thich reglster the wanted number by recelving the dial impulses wom the calling gotion are desigated. "Connecto Control Relays. ${ }^{\circ}$ and the part of the link involved in naking the connection to the wanted station is temed "Connector."
4. ITNE-TMTD:

The fanction of the line-finder is to connoct the dielling line to the sonnotcr sortral relays. To accomplish this, the calliug $2 \mu \mathrm{men}$ me beloctm nd from the 100 2.nos th the systen and a circult extonded prom the 11 ne aloag So the cornector control zelays. The rinowinder pow?oma this fuxction by bew loctiog the Howluo group containing the calling Ifxe and than on line out of these ton For example. 11 11ne 21 is colling, tho line-1ndor selecta the 10-11ne group 20-29 and then line 1 tha this group. thus picking out $11 n$ 21.

The yscopr 10-1tne group if aclected by the operation of one of a number
 desired Ine in the group is picked out by the operation of one of a number

 the gystem moy be axpanded merely by the addtion of puxther mins xelays.

The operation of the line-finder TWW and unITs wayn 10 controllec by the line xaly of the calling station in a manner which need not be describod here. When itne 21 is calling. its In relay causes the oporation of TENS relay $\boldsymbol{F} P$ and UNTMS relay $I 1$ 。By palerring to the diagram $1 t$ will be seen that the operation of THNS relay R20 connects the 10 Ifnes $20-29$ to the L1ne finder UnTh relaya but pa long as no UNITS relay is operates, the connection is not extendod to the connector control relay. As soou an unys relay h operated. line 21 is connected through while the other nine 1 ines in group 20-29 remaln alsconnected at the contacts of UNITS rolays FO and. Pe- 19. The circuite of the other 10-1ine groups remain open at tho contacts of cheir ree spectur ITMN rel.ays.

The Ine circult is now extended to the connector control relays overthe Pollowsig peth。

Station 21, through the contact of relay pro, through the contact of relay Wh to the comnoctor control relays.
S. CONNBCROR CONYROL PBLAFS

The connector control relays are for the purpose of registering the de sired siathos rumber as indicated by the dial. The operation tif these relays noed not be described here; it is sufficient to say that the connector control relays recelve the impulses sent from the dial and cause the oparation of the connector TENS and UNITS relays corresponding to the numaras diallad.

## 6. CONNECYOR

The function of the comector is to axtend the lime from the connector sontrol relaye to the dalled 1 ina. As in the lins-finder a selection mut be made from the 100 lines in the erchance and a cfrcuit extended to the 21ne and to that line alone. This thaccomplished by solectixg the destred 20 Itae erolp and then ons line out of these ton。 The selsetton 1 performed by comactor THNS relays, designated $\mathrm{C2C}, 030, \mathrm{CHO}$, etco. and by comnetor UnTMS relays desfanatod CO, C1. O2, etc.

If Tor axample, the number of tae vantod station 1845 . the callimg subcriber strot lial. the munewal mhn and then the muncral "5月. Dy dialling the numerel "tll bas coangctor control relnys ara caused to punction fn such a
 group 40=49. The comsctor control seloye ane then automattcally switched
 the next aumeral ngn results tn the oparation of the comnector UNITS ralay C5. With relaye Cl and 05 energized the circuit 18 sxtended from the conmector control relays to ths wanted Isne over the tollowng path:

Com sebor control relays, contact of ralm C5. equth oon sct of relay cho, 3tation 15.
 oper at the contacts of selays $60-04$ and $66-09$. The clrcuits ar the othar $10-11 n$ g goups are open at the comtacts of thelr respectre TaNS relay

## 1. ILLUSTRATTONS OT COMPLETED CONNECTIONS

The connection from the callimg atathou 21 to the wanted station 45 Is now completed as a rosult of the operatson of relays rro and El in the lingo finder and 40 and C5 in the connectom. The connection may be traced through the Link as Pollows: beginning at gtation 21 in the upper latt hand corner of the dsagram pollow the horizontal Ine loaving the station to the point Where it connects wht vexticel line: follow the rerical 11 ne down to the contact of zaley IL which is operated. coatinue down and then to the sight to the contect ot relay $\mathrm{HI}^{2}$ and through the connector control relays and to the contact of zelay C5, continue to the wight to the point where a vextical line Is encountered. follow the vextical 1 dne up to the point where a norizortal Ifno 18 not. Iollowing the hordzontal I1ne to the loft will complete the con= saction to station 45 .

A complatad connection Lrom station 39 to atation 30 wovid camas the operetion of relays 730 and 39 in the lineminder and 030 and 00 in the con nector. The elrcult established would now bo: station 39 contact ol relay
 tact of ralay 30. gtation 30.
8. RINGING AND BUSY SIGNALS

Automatic ringing and "Busy Sigmal" aro provided in the exchange in a manmer explafred in the dotailed circuit ascriptions.

Tor those who are familiar with the so-called step-by-step type of automatic telsphone switches. 1t may be polntod out that the operetlon of a TENS relay corcesponds to the selaction of a Marel by means of the rartical stops of the switch whil the operation of a UNINS relay is equivalent to the select= lon of the destred Itne in the mevokn by means of tha rotary steps.

