

## THE HOUSE EXCHANGE SYSTEM

### Operating Procedure

★[NOTE.—As this Instruction has been completely revised, individual paragraphs have not been "starred."]

**1. Scope of Instruction.**—This Instruction describes the operating procedure necessary to establish a connexion on the House Exchange system, and is intended as a guide for installing staff when testing-out an installation after completion of fitting and wiring. The information is arranged under the following headings :—

**4. Key release.**—When any key (or all of the keys) has been operated, replacement of the handset on its rest automatically restores all keys to normal. On telephones having two exchange keys, i.e., "Telephones, Intercom., No. 1/2 . . .", either exchange key may be released from the "hold" position by operating its associated trigger—RELEASE

Subject	" Multiple " station procedure	" Non-multiple " station procedure
Key operation ...	Pars. 3, 4	—
Local calls ...	Pars. 5 to 8	Pars. 27 to 30
Conference calls ...	Par. 9	—
O/g. exchange calls ...	Pars. 10 to 15	Par. 31
I/c. exchange calls ...	Pars. 16 to 19	Pars. 32 to 34
Transfer of exchange calls ...	Pars. 20 to 23	Par. 35
Special facilities ...	Pars. 24 to 26	—
Night service ...	Par. 36	Par. 37
Local calls between multiple and non-multiple stations under night-service conditions	—	Par. 38

For detailed circuit operation, see Q 4001. Booklets A 499 (for Auto. systems) and A 500 (for Manual systems) describe the operating procedure for subscribers use (see Q 3902).

**2. Terms.**—The terms "Multiple station" and "Non-multiple station," respectively, replace the terms "Internal Extension station" and "External Extension station" employed in the previous issue of this Instruction.

### MULTIPLE STATION PROCEDURE

**3. Key Operation.**—The mechanical arrangement of the keys on "Telephones, Intercom., Nos. 1/1 and 1/2 . . ." is such, that when depressed consecutively (except while conference key "C" is depressed) only one key may remain fully operated at any time. If a local key is in the operated position, the depression of a second local key completely restores the first. If, however, the conference key is first depressed, or is depressed after only one local key has been depressed, all the remaining keys may subsequently be depressed simultaneously, and will remain operated (in the speaking position). The conference key and all local keys held by it will be released if an exchange key is depressed or if the handset telephone is replaced on its rest. If an exchange key is in the operated position, the depression of a local key or of the second exchange key will partially release the first key, which will then take up a "hold" position (see par. 13).

—key without replacing the handset and without releasing a local key or the other exchange key, one or the other of which, in "hold" circumstances, will be in the operated position at the time. The release of an exchange key by means of the trigger key is effected by pulling the trigger towards the exchange key until a "click" is heard denoting the release of the exchange key mechanism. The trigger key will not release an exchange key from the fully-operated position.

**5. Local calls.**—*Called station free.*—A call from one multiple station to another or to a non-multiple station is made by lifting the handset at the calling station and fully depressing the plunger key adjacent to the required station number. In the fully depressed position, this key completes a circuit for operating the telephone buzzer at the called station. When pressure on the key is released, the key automatically takes up the speaking position. The call is answered by the handset being lifted at the called station and conversation is then possible.

**6. Called station engaged on local call.**—Local calls are not secret; if, therefore, the called station is engaged on a local call, the calling station will break-in on the conversation.

7. *Called station engaged on exchange call.*—Except as described in par. 24, if the called station is engaged on an exchange call, the buzzer at the calling station operates when the key for the called station is fully depressed. This serves as an engaged signal to the calling station and the conversation of the called station on the exchange line cannot be broken into or overheard.

8. *Called station holding exchange line.*—If the called station is holding an exchange line, while engaged on a local call, the calling station buzzer will be operated (as described in par. 7) but the called station's local call will be broken into and the calling station can listen to the conversation.

9. *Conference call.*—When it is desired to make a conference call, the stations which will participate are first called individually, as described in par. 5. When the attention of these stations has been obtained, the conference key at the calling station is depressed, followed in succession by the keys corresponding to the stations concerned. The conference may then proceed. The conference connexion is released completely by replacing the handset on its rest, or by depression of an exchange key. Therefore, if a station which has set up a conference call makes or receives an exchange call, the conference call is automatically terminated. Any of the called stations may break away from the conference to make or receive an exchange call in the normal manner, as described in pars. 11 to 13, and subsequently, may return to the conference by momentarily depressing the plungers on the handset rest, to release the exchange key. If a called station on conference calls another local station, by depressing the appropriate key, conversation between the two will be overheard by other parties to the conference. It is not possible for the calling station to release stations individually from a conference call.

10. *Outgoing exchange calls.*—*From stations having full facilities.*—Multiple stations with full facilities have direct access to exchange lines, as described in the following pars. 11 to 13.

11. *Exchange line engaged test.*—Except as described in par. 25, an exchange line may be tested by depressing the relevant exchange key without removing the handset from its rest. If the exchange line is engaged, the calling station buzzer will operate. Under these conditions, the exchange key releases automatically when pressure on it is removed. [The engaged test also operates on engaged exchange lines if the exchange key is depressed after the handset has been lifted. The exchange key then remains in the operated position until the handset is replaced or until another key is depressed.] For procedure at a main station having visual exchange-line engaged signals, see par. 26.

12. *Exchange line free.*—If a buzzer signal is not received on depression of an exchange key, the

exchange line is free; connexion to the exchange line may then be obtained by lifting the handset and depressing the exchange key. This operation calls the exchange, if it is manual, or if the exchange is automatic, the caller receives dialling tone and may proceed to dial the required number.

13. *Holding exchange call while making a local call.*—If, during the progress of an exchange call, the calling station desires to speak to one of the local stations, the depression of the local key corresponding to the wanted station automatically releases the exchange key to an intermediate position, in which a "hold" condition is presented to the exchange line. At the termination of the local call, the exchange key may again be fully depressed and the exchange-line conversation resumed.

14. *Holding one exchange call while making a second exchange call.*—On installations with two exchange lines, if a station (while engaged with one exchange call) desires to make a call over the second exchange line, the depression of the second exchange key releases the first key to the "hold" position. At the termination of the second call, the first call may be resumed by again depressing the first exchange key; this, in turn, releases the second key to the "hold" position. The second key may then be completely released by means of its associated trigger key (par. 4).

15. *Calls from stations having restricted facilities.*—It is not possible to obtain direct access to exchange lines from stations with restricted facilities. Such stations desiring to make an exchange call must first call the main station, as described in par. 5, and advise the main station attendant of the exchange and number required. If the call is to be permitted, the caller is asked to replace the handset on its rest and await recall from the main station. The call is then set up by the main station attendant and transferred to the calling station, as described in par. 22.

16. *Incoming exchange calls, and main station procedure.*—*Control by main station.*—All incoming exchange calls are first received at the main station (or other multiple station acting as main station). The incoming calling signal operates an indicator in the unit equipment ("Unit, Transfer, Intercom., No. 1, 1A or 2") fitted at the main station. An audible signal (by bell or buzzer) is also given. The audible signalling apparatus, when not required, may be disconnected by means of the ALARM OFF key on the transfer unit. On installations with two exchange lines each line has an individual indicator, but a common audible alarm serves both. The main station attendant answers the call by lifting the telephone handset and depressing the appropriate exchange key. If the call is for another station it is transferred to that station as described in pars. 20 to 22 or par. 32.

**17. Control by 2nd-choice main station.**—On installations having a 2nd-choice main station all the functions of the 1st-choice station (except as regards non-multiple station calls, the procedure for which is given in par. 33) may be transferred to the 2nd-choice station by means of the TRANSFER key or keys on the 1st-choice main station transfer unit. Incoming exchange calls are received at the 2nd-choice main station and dealt with in the same manner as described in par. 16.

**18. Control by multiple station with extension bell.**—At a multiple station arranged for the receipt of exchange calls, the calling signal is received on an extension bell (or equivalent device) from the main station transfer unit. On installations with two exchange lines, one extension bell serves both lines and it is therefore necessary for the attendant to test for the calling line. This is done by lifting the handset and depressing one of the exchange keys or each exchange key in turn. [No. 1 exchange line should be tested first to minimize the number of occasions on which a false call will be given to the public exchange.] If the call is for another station, it is transferred as described in pars. 20 to 22 or par. 32.

**19. Holding one exchange call while receiving a second exchange call.**—On an installation with two exchange lines, if the main station (or station serving as main) is engaged on one exchange call, another exchange call signalled on the second line may be answered by depressing the second exchange key, thus releasing the first exchange key to the "hold" position (as described in par. 13). If the second call is for another station, it may be transferred as described in pars. 20 to 22 or par. 32. Resumption of the first call and release of the second call may be effected as described in par. 14.

**20. Transfer of exchange calls.**—*Station with full facilities.*—An exchange call, originated (or received) at a main station or multiple station may be transferred to another multiple station with full facilities. At the station transferring the call, the local key corresponding to the required station is depressed, thus releasing the exchange key to the "hold" position (see par. 13), and the required station is asked to "pick up" the call on the exchange line concerned. To do this, the appropriate exchange key is depressed at the called station, whereupon, the buzzer operates at that station and buzzer tone is passed back to the first station where it is heard in the handset receiver. The handset at the first station is then replaced on its rest. This causes the buzzer at the called station to stop operating and the exchange call to be connected automatically at that station. The transfer is then complete.

**21. Station engaged with one exchange call while holding another.**—On installations with two exchange lines a station, while engaged with one exchange call

and having made or received a second exchange call (as described in par. 14 or par. 19) may transfer one of the calls to another station with full facilities, while holding the first call. The procedure for transferring the call is as described in par. 20, except that on receipt of the buzzer tone from the station "picking up" the call, the appropriate exchange key at the first station is released by means of the associated trigger key (see par. 5) and not by replacing the handset on its rest. The call held may then be resumed by again depressing the relevant exchange key or it may, in turn, be transferred to another station (as described in par. 20).

**22. Station with restricted facilities.**—A main station may transfer an exchange call to a multiple station with restricted facilities by proceeding as described in par. 20, except that on receipt of the buzzer tone from the other station, the main station attendant will depress and hold down the EXCH. CALL button (on the main station transfer unit) corresponding to the exchange key on the telephone, then release the appropriate exchange key on the telephone, and lastly, will release the EXCH. CALL button. The EXCH. CALL button must be held operated until the exchange key on the telephone has been released. The transfer of the call is then complete. Any station, other than the main station, desiring to transfer an exchange call to a station with restricted facilities must first transfer the call to the main station by the procedure described in par. 20.

**23. Transfer of exchange calls to non-multiple station.**—The main station procedure for transferring an exchange call to a non-multiple station is described in par. 32. A multiple station, other than a main station, desiring to transfer an exchange call to a non-multiple station must first transfer the call to the main station by the procedure described in par. 20.

**24. Special facilities.**—*Multiple station calling main station engaged on exchange call.*—Where the facility is given (only on installations with two exchange lines), to call the main station while it is engaged on an exchange call, the calling station buzzer does not operate when the calling station fully depresses the local key associated with the main station, as described in par. 6; instead, the main station buzzer operates as if the station were disengaged. To answer the call, the main station attendant depresses the local key associated with his own station. This releases the exchange key to the "hold" position (see par. 13) and connects the main station handset to the local calling line. If it is then desired to transfer the held exchange call to the calling station, the key associated with that station on the main station telephone should be depressed and the call transferred, as described in par. 20. If the procedure is not adopted, buzzer tone will not be heard in the main station receiver, when the calling station

depresses the relative exchange-line key, and the main station attendant will have no indication that the transfer of the call is in process.

**25. Exchange-line monitoring or trunk-offering facility.**—Where the facility is given for a station to monitor on exchange lines (normally limited to a 1st-choice or 2nd-choice main station) the exchange line engaged signal, as described in par. 11, is not given; instead the calling station with the monitoring facility may break-into, or listen to, an exchange call proceeding at another station on the system. This facility is for limited use only, see Q 1001.

**26. Visual exchange-line-engaged signal.**—On installations where the facility is given for the main station to have visual exchange-line-engaged signals, these are given by the indicators in the main station transfer unit ("Unit, Transfer, Intercom., No. 1, 1A or 2"). With this facility, it is not necessary for the main station attendant to test exchange lines by depressing the exchange keys (as described in par. 11) because the presence, or absence, of the indicator signal will indicate whether the exchange line concerned is engaged or free.

#### NON-MULTIPLE STATION PROCEDURE

**27. General.**—Except under night service conditions (as described in pars. 36 to 38), all calls originated by a non-multiple station and all incoming exchange calls for such a station are passed via the main station and require the services of the main station attendant to complete the connexions. Local calls made to the non-multiple station from multiple stations, although passing via equipment at the main station, are made without the intervention of the main station attendant.

**28. Non-multiple station calling main station.**—To gain the attention of the main station, the handset at the non-multiple station is lifted and this results in the operation of the extension indicator (and associated alarm bell or buzzer) in the main station transfer unit, ("Unit, Transfer, Intercom., No. 1A or 3"). To answer the call, the main station attendant lifts his telephone handset and depresses the local plunger key corresponding to the non-multiple station.

**29. Local calls.—Outgoing.**—The non-multiple station first calls the main station (as described in par. 28) and advises the attendant of the local station required. The main station attendant then calls the wanted station and, in turn, asks the latter to call the non-multiple station (as described in par. 5) i.e., the call is reverted.

**30. Incoming.**—Incoming calls are signalled at the non-multiple station in the normal way on the magneto bell associated with the non-multiple station telephone. Local calls to the non-multiple station are made directly (as described in par. 5) and are answered at the non-multiple station by lifting the telephone handset.

**31. Outgoing exchange call.—Control by main station.**—The non-multiple station first calls the main station as described in par. 28 and either asks to be connected to an exchange line or advises the attendant of the exchange and number required. Except as described in par. 26, the main station attendant tests the exchange lines for a free line (see par. 11). When a free line has been obtained, the attendant may operate the EXTN. TO EXCH. key on the main station transfer unit to connect the non-multiple station to the exchange line so that the non-multiple station may proceed to set up the call. Alternatively, the main station attendant may set up the exchange call and, then, transfer it to the non-multiple station (as described in par. 32). On completion of the call, when the non-multiple station replaces the handset on the telephone, the extension indicator on the main-station transfer unit operates to give a clearing signal to the attendant, who then restores the EXTN. TO EXCH. key on the transfer unit ("Unit, Transfer, Intercom., No. 1A or 3"). See par. 33 for control by a 2nd-choice main station.

**32. Incoming exchange call.—Control by main station.**—As described in par. 16, all incoming exchange calls are first received at the main station or other multiple station acting as main station. If an exchange call is to be transferred from the main station to a non-multiple station, the main-station attendant calls the non-multiple station (par. 5) and then operates the EXTN. TO EXCH. key on the transfer unit. The subsequent procedure at the main station is as described in par. 31. For control by a 2nd-choice main station, see par. 33.

**33. Control by 2nd-choice main station.**—If control has been transferred to a 2nd-choice main station (by operating the TRANSFER key or keys at the 1st-choice main station) the 2nd-choice station will receive the calling signals from the non-multiple station but the facility for switching the non-multiple station to an exchange line will remain at the 1st-choice main station. Therefore, if the non-multiple station desires an exchange call, the 2nd-choice main station attendant must go to the 1st-choice main station to carry out the necessary switching. If the attendant remains at the 1st-choice station until the call terminates, the control must be reverted to the 1st-choice station, by restoring to normal the TRANSFER key (or keys) so that the clearing signal for the non-multiple station call may be received there. If the attendant returns to the 2nd-choice station to await the clearing signal, he must go back when he receives it, to the 1st-choice main station to restore the EXTN. TO EXCH. key.

**34. Control by a multiple station with extension bell.**—When a multiple station, fitted with an extension bell from the main station transfer unit, is in control on an installation equipped for one exchange line only but having a non-multiple station, the exchange and non-multiple station calling signals

will be received on the same bell. In such cases, the non-multiple station calling signal will be a continuous ring on the bell whereas the exchange calling signal will be intermittent. The attendant, desiring to connect the non-multiple station to the exchange line or to transfer an exchange call to the non-multiple station, must go to the main station and proceed as described in par. 31 or 32. On installations with two exchange lines and a non-multiple station, one extension bell serves both exchange lines (see par. 18) but the non-multiple station calling signals are extended to a separate bell.

**35. Recalling main station while holding exchange call ; transfer of exchange call to multiple station.**—A non-multiple station user engaged on an exchange call and desiring to recall the main station without releasing the call, may do so (except for certain outgoing calls via automatic exchanges as described below) by "flashing," i.e., by repeatedly depressing and releasing the plunger (or plungers) of the handset rest on his telephone so as to cause the intermittent

operation and release of the extension indicator at the main station. The attendant at the main station lifts his handset, depresses the exchange key of the exchange line concerned and, then, restores the EXTN. TO EXCH. key on the main station transfer unit, thus transferring the exchange line to the control of the main station ; the attendant then calls the non-multiple station, by depressing the associated local key, and asks the reason for the recall. If required, the call may then be transferred to another station (as described in pars. 20 to 22). Alternatively, the call may be reconnected to the non-multiple station by re-operating the EXTN. TO EXCH. key. If the non-multiple station recall signals are received at a 2nd-choice main station (see par. 33) or at a multiple station with extension bell (see par. 34), the attendant must go to the 1st-choice main station to answer the call. If the non-multiple station is engaged on an exchange call which has been originated at the House Exchange system by direct dialling (either from the non-multiple station itself or from another station on the system and subse-

quently transferred to the non-multiple station), the non-multiple station cannot recall the main station without releasing the exchange call.

#### NIGHT SERVICE

**36. Multiple station.**—If a multiple station is arranged to receive exchange calls on night service, the calling signals from the main station transfer unit will be received on an extension bell. The calling signals will be given simultaneously at the main station and at the multiple station, and may be answered at either.

**37. Non-multiple station.**—The non-multiple station may be permanently switched to an exchange line during the night, by the operation of two keys, the **EXTN. TO EXCH.** key and the **ALARM OFF (NIGHT SCE)** key, on the main station transfer unit ("Unit, Transfer, Intercom., No. 1A or 3"). As a warning against misoperation an indicator signal is given if only one of the two keys is operated or if other keys are also operated. Under night service, the non-

multiple station may make (and receive) exchange calls directly over the night-service exchange line in the normal manner appropriate to a direct-exchange-line user. Multiple stations on the installation may use the night-service exchange line when it is not in use by the non-multiple station, but calls so made will not be secret from the non-multiple station. Similarly, a night-service call made by the non-multiple station will not be secret from the multiple stations.

**38. Local calls under night-service conditions.**—On installations with only one exchange line, local calls between a non-multiple station on night service and multiple stations on the system cannot be made. On installations with two exchange lines, a multiple station may call the non-multiple station on night service, via the public exchange over the second exchange line. Similarly, the non-multiple station may call a multiple station (if the main station is attended to receive the call) via the public exchange over the second exchange line.

References :—Q 1001, Q 3902, Q 4001  
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