

301 SWITCHING SYSTEM METHOD OF OPERATION

1. GENERAL

1.01 This section provides a detailed description of the operational characteristics of the 301 Switching System (301 S/S) located at Air Traffic Control (ATC) centers for the Federal Aviation Administration (FAA). The ATC tower console and Terminal Radar Control (TRACON) console attendants will be required to perform either a portion or all of the operations described. The information contained in this section may be used to perform overall operational tests. Section 981-204-100 contains general descriptive information. Detailed lineup and adjustments of the system equipment are contained in the associated CDs and SDs.

Note: Operational environments will require a service release before any testing is performed.

1.02 Typical 301 S/S attendant positions are shown in Fig. 1. Figure 2 illustrates common control keys associated with each position. The remaining keys will be identified as required on the associated designation areas.

1.03 The pushbutton keys are illuminated square buttons arranged for mechanical nonlocking operation. Backlighting is provided for all keys and associated designation areas for dark environments. The number of additional 6-button key units provided at any one position will be specified locally.

1.04 To deactivate a position, the attendant must remove all telephone instruments from the position jacks. The positions are provided with push-to-talk (PTT) features associated with the head telephone set, handset, hand transmitter, or footswitch. Operation of the PTT switch will silence the position loudspeaker.

1.07 The status lamps are basic system features and provide the following indications:

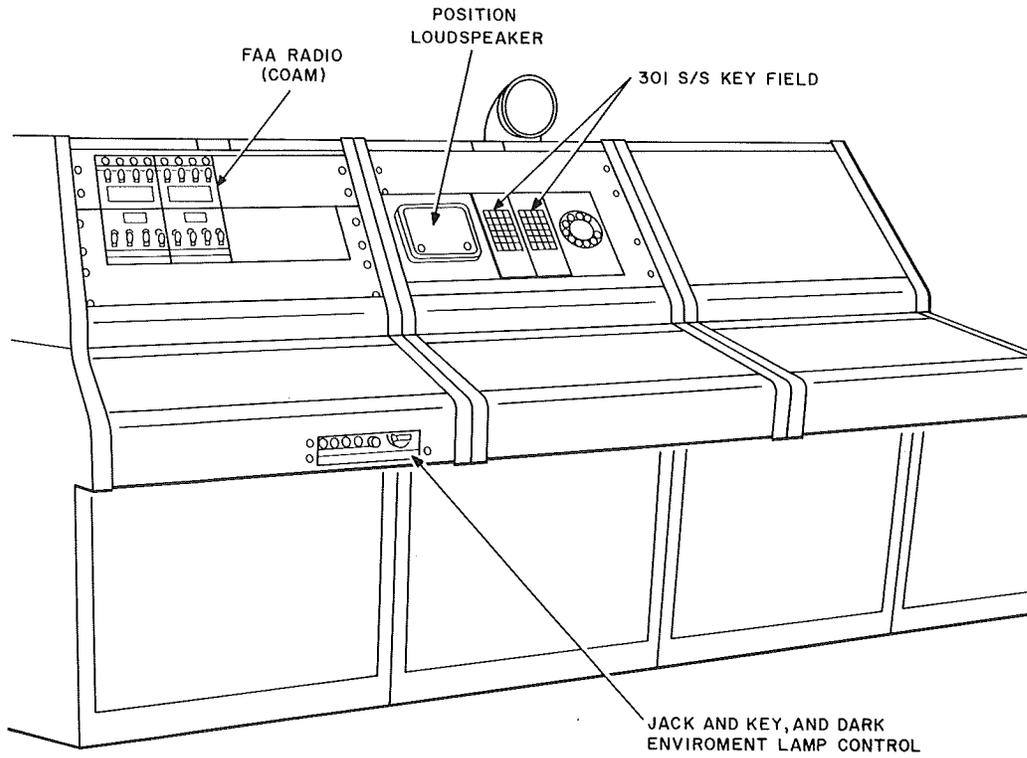
- (a) **Off or Dim**—Indicates line is not in use at any position.
- (b) **Steady**—Line seized at another position.
- (c) **Flashing**—Incoming call. No position connected (60 ipm).
- (d) **Winking**—Central office or PBX line on hold (120 ipm).
- (e) **Fluttering**—Line seized by that position (720 ipm).

2. METHOD OF OPERATION

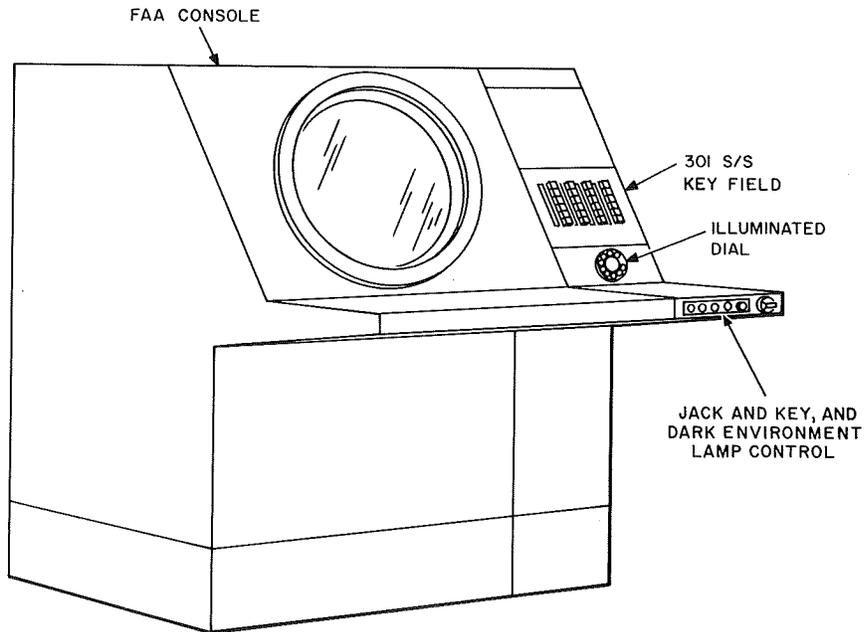
2.01 *Originating Direct Access (DA) Calls:*

- (a) Depress the DA key to select desired position or line. All lines are electrically locking except in hold down operation. See 2.07. The DA lamp will light steadily for the locking operation. In the hold down condition, no lamp indications are required.
- (b) Further signaling depends upon the type of line. See 2.02.
- (c) When call is completed, if no other incoming call is to be answered, depress the release key. The DA lamp will be extinguished or dimmed. If another call is to be answered or placed, depress the DA button for that line and the previous connection will release.

2.02 Placing outgoing calls will require different methods of signaling after the line is selected.



CONTROL TOWER CONSOLE



SEPARATOR CONSOLE FOR TRACON AREAS

Fig. 1—Typical 301 S/S Attendant Positions

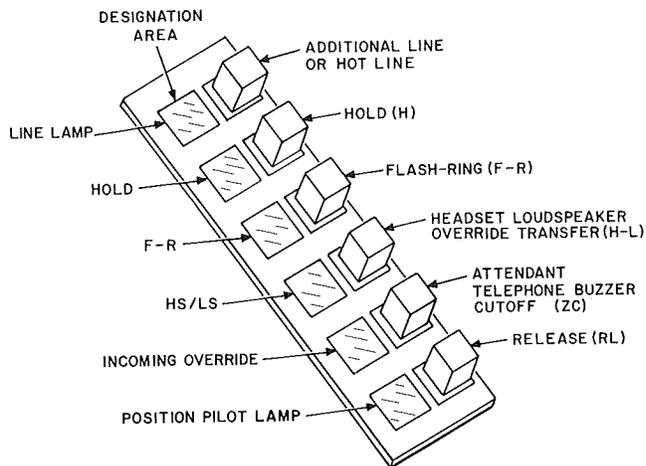


Fig. 2—Control Key Unit Assignments

The type of signaling depends upon the type of equipment at the distant end. The options available are listed as follows:

- (a) Loudspeaker at distant end requires voice signaling.
- (b) Ringdown signaling—Depress flash and ringing key.
- (c) Long-short selective ringing—Predetermined codes are used on this type of circuit. A short ring requires 2 seconds or less of applied ringing with the flash and ring key. Long ringing requires 4 seconds.
- (d) Dial selective signaling—Dial the predetermined code digits of the desired station.
- (e) PBX extension line—Listen for dial tone and dial the station desired.
- (f) Override calls—Depress the direct access (DA) button, monitor line, then talk using the push-to-talk switch unless the override circuit is a hold down operation-type.

2.03 Incoming Call:

- (a) Incoming calls will cause the DA line lamp to flash with full brilliance at all appearances.

- (b) Depress the associated line key. The line lamp changes from flashing to flutter at that position. All other appearances of the line will change from flashing to steady.

- (c) Disconnect by depressing the release key or by selecting another wire line, hot line, or override line.

2.04 The position pilot lamp flashes when an incoming interphone call is specifically directed to that position.

2.05 Supervisor positions are equipped with CALL DIRECTOR® telephones or equivalent. The operation of this position is the same as described in 2.01 through 2.03 with the following exceptions:

- (a) Removing the handset from the switch hook will activate the position. Before answering or originating a call from this position, the handset must be off-hook.

- (b) The position loudspeaker is arranged for override receive only, under control of the handset-loudspeaker (HS/LS) switch. The loudspeaker is automatically disconnected when the handset is off-hook, and is activated when the handset is on-hook.

2.06 Override circuits permit a controller to talk directly into the receiver or loudspeaker of another controller by operating or operating and holding operated the assigned line key for the desired position. This bridges the overriding position telephone instrument with the overridden position telephone circuit.

2.07 Outgoing Override Call:

- (a) Two types of outgoing override operation are available on an optional basis. One is designated "hold down" operation and is installed for use in combining override with radio. The other is designated "locking" operation.

- (b) In the "hold down" operation, depress and hold depressed the line pickup key assigned to the position selected and make voice contact. If the overriding controller is on radio when he

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overrides, the telephone transmitter is energized upon selection of the line, and the push-to-talk switch is used only to control the radio transmitter. If the overriding controller is not on radio, it will be necessary for the overriding controller to press the push-to-talk button in order to converse with the overridden controller. To disconnect, the overriding controller releases the line pickup key and the connection releases.

(c) In the "locking" operation, the override line button is momentarily depressed. Push-to-talk is required to converse with the overridden controller. Disconnection is accomplished by depressing the release button or by selecting another line.

2.08 Incoming Override Call:

(a) If the headset-loudspeaker (HS/LS) button at the overridden position is in the LS position and an incoming override call is received, the overriding controller will be heard in the overridden position loudspeaker. The overriding controller will not hear any conversation at the overridden position. The overridden controller can reply only by operating the HS/LS button to the HS position, at which time all of the conditions described in this paragraph apply.

(b) The overridden controller can talk simultaneously on radio and to the overriding controller by depressing the push-to-talk switch, or only to the overriding controller without depressing the push-to-talk switch.

(c) If the override call is received when the overridden controller is connected to a regular wire line, the overriding controller joins in the conversation on a party line basis, and the overridden controller push-to-talk switch controls the telephone transmitter.

(d) If an incoming override call is received at a time when the overridden controller is connected to a radio channel and another override or hot line circuit, the overriding controller's voice will not be transmitted on radio but will be transmitted to the other wire lines to which the overridden controller is connected. The

overridden controller can talk simultaneously to radio, to the overriding controller, and to the connected wire lines (override and hot lines) with the push-to-talk switch operated. The overridden controller can also talk to the overriding controller and the connected wire lines only by having the push-to-talk switch in the normal position.

2.09 Hot Line (Emergency Paging Line):

A hot line talking circuit may be provided between the control tower and the TRACON room with voice signaling in both directions. When a hot line is selected, the loudspeaker is silenced at the originating position. Both calling and called stations must hold the associated line keys depressed to remain connected. To use the hot line, perform the following:

- (a) Depress the hot line key. Holding it depressed, call for the desired controller.
- (b) The called controller will depress the hot line key, hold it depressed, and answer. This silences the loudspeaker at the called position.
- (c) To disconnect, release the hot line keys.

2.10 Radio Channel Selection: The 301 S/S enables a controller to select radio only, wire line only, or a combination of radio and special voice signaling and override wire lines. Selection of radio frequencies is accomplished by FAA installed and maintained radio selector keys.

- (a) **Radio Selection Only:** To select radio only, the release button or radio (DA) button is depressed to clear any interphone line connection except override and hot line. The radio receive line is connected to the controller headset automatically. However, to transmit on the radio circuit, the controller must operate the push-to-talk switch. Radio receive is transferred from the controller headset to the position loudspeaker when,
 - (1) A line key is operated to pick up a regular wire line.
 - (2) The controller has removed all headset plugs from the attendant jacks.

(3) The controller operates the A transfer key on the attendant telephone circuit to the LS position.

(b) **Radio and Override or Hot Line Combination**

Selection: To select a combination of radio and override or hot line, a DA button associated with the voice signaling lines (override and hot line) is held depressed. This bridges the headset with both the selected line and the radio channel. To talk to the override or hot line and radio simultaneously, operate the push-to-talk switch. To talk on the selected override and hot lines only, the push-to-talk switch is left unoperated. The radio receiver line shall remain connected to the telephone instrument receiver instead of

being transferred to the loudspeaker, as when an interphone-only selection is involved.

2.11 Recording: Each position shall be equipped with two voice recording channels terminated in a demarcation strip. One channel shall carry all voice communications at the controller telephone instrument jacks. The telephone instrument transmitter is cold when the headset is in the standby condition, ie, when not connected to an interphone line, an override line, or in the push-to-talk condition on radio. The second channel shall be associated with the position speaker. If recording is to be accomplished on a single channel recorder, FAA will provide 60 db of isolation between headset and loudspeaker recorder leads.