

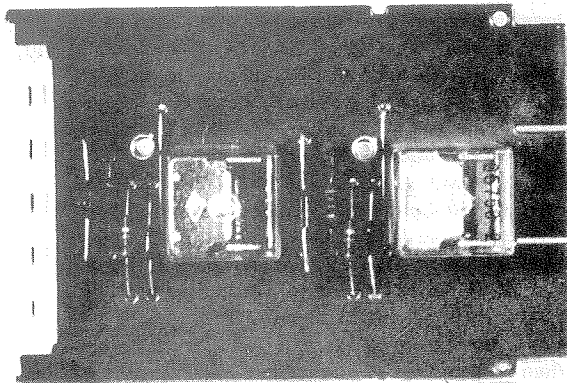
K 405 (A) KEY TELEPHONE UNIT  
MULTI-LINE EXCLUSION CIRCUIT

Figure 1. K 405 A KTU, showing components

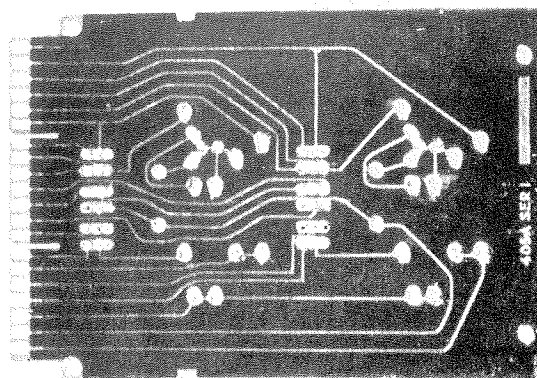


Figure 2. K 405 A KTU, printed circuit side

## 1. SCOPE

This practice covers identification, application, installation, circuit description and maintenance of the K 405 A Key Telephone Unit manufactured by ITT Telecommunications, Apparatus Department, Corinth, Mississippi, 38834.

## 2. RELATED PUBLICATIONS

KSP259-00B, ( K-259 B Key Telephone Unit, 2-Card Adapter)

## 3. PURPOSE OF EQUIPMENT

For use in a K-1A1 or K-1A2 Key Telephone System to provide semi-automatic exclusion feature for two CO or PBX lines. This feature can be expanded in multiples of two lines to accommodate any number of CO or PBX lines with a common control key.

## 4. IDENTIFICATION

The K 405 A Key Telephone Unit is a printed circuit board assembly approximately 5-7/8 X 3-1/2 X 1-3/8". It is designed for plug-in connection, having twenty terminals on one end and a plastic "card-pull" handle at the opposite end. It includes two miniature relays and other semi-solid state components.

## 5. REFERENCE DATA

## 5.01 WORKING LIMITS

20 to 26 V dc

## 5.02 FUNCTIONS AND FEATURES

- A means to exclude a station or stations.
- Visual signal to indicate operated exclusion circuits.
- Common control key at control station.
- Release of excluded circuits without releasing CO or PBX line circuits.
- Automatic release of excluded circuits when associated CO of PBX line circuit is released.

## 6. INSTALLATION

## 6.01 MOUNTING

The K-405 A Key Telephone Unit is designed to be plugged into the K-259 B Key Telephone Unit which will accommodate a maximum of two K-405 A units. The K-259 B unit mounts on standard KSU frames.

## 6.02 CONNECTING

- Connect the K-259 B unit as shown in figure 3. (See note 2 on figure 3.)
- Other exclusion circuits for supplementary control stations may succeed a master control station. Common control keys cannot be connected in parallel to exclusion circuits.
- Control keys may be mounted externally or they may be a part of the station set. Control Keys must be connected under control of the telephone hookswitch.
- Control keys may be non-locking, locking, turn, or an exclusion key. When a non-locking key is used, Z option must be connected. Locking, turn, and exclusion keys do not require Z option to be connected.

- e. Only 500 and 2500 type telephone sets have exclusion keys suitable for use in this circuit. (Desk sets only.)
- f. The exclusion lamp is normally located at the control station only. However, lamps may be located at other stations desiring the visual signal.

## 7. OPERATION

### 7.01 OPERATION USING AN EXCLUSION KEY

- a. When the exclusion key is operated, ground is closed to the S lead, under control of the switch hook assembly, completing the ground path to the E relay.
- b. The associated A lead of an operated CO or PBX line circuit is at ground potential (except on hold). This ground turns on the Q transistor associated with the E relay to be operated, completing the -20 volt path to the E relay. The E relay when operated opens the T, R, and A leads of the line to be excluded from the excluded station or stations. The E relay also closes through lamp battery to  $\pm$  to the visual signal circuit at the control station. When the CO or PBX line circuit is released or placed on hold, the associated A lead is opened, releasing the associated E relay. When a held call is again picked up by the control station with the exclusion key in the operated position, the associated exclusion key is returned to the unoperated position, the S lead is opened, releasing all E relays, and returning the excluded circuit to normal.
- c. Diodes CR1 and CR2 are in series with the associated A lead circuit of control stations to prevent a ground potential on the A lead at stations not excluded or at stations to be excluded from completing the operate path of the associated E relays.

### 7.02 OPERATION USING TURN KEY OR EXTERNAL LOCKING KEY

Turn key or external locking key operation is the same as described above except the keys must be manually returned to unoperated position to prevent operation of the exclusion circuit on the next call.

### 7.03 OPERATION USING NONLOCKING KEY

- a. Operation of the nonlocking key closes ground to the S lead, under control of the switch hook assembly, completing the ground path to the E relays for the period of time that the nonlocking key is operated. The proper E relay, (explained in a. and b. above), operates and locks up through its M3 contact. The M3 contact is wired to ground through option Z. The E relay opens the T, R, and A leads, and applies a short across the R and T leads to the excluded station or stations. A visual signal to the control station is operated (explained in a. and b. above).
- b. When it is desired to release excluded circuits without releasing the CO or PBX line, operation of the hold key opens the associated A lead, releasing the E relay, and returning the exclusion circuit to normal.
- c. When a held call is again picked up by the control station and it is desired to exclude a station or stations, operation of the nonlocking key will operate the exclusion circuit, as previously described.
- d. At the completion of a call, with the exclusion circuit operated, placing the handset on the mounting opens the associated A lead, returning the exclusion circuit to normal.



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