A.E.CO. TYPE 186 TELEPHONE SET DESCRIPTION

1. GENERAL

1.01 This section describes the A.E.Co. Type 186 multi-line desk or wall telephone set, its operation and applications. The instrument is available with either of two types of calling device: a standard dial or a Touch Calling unit. Unlike previous business telephone sets, it is furnished in only three choices of housing color: black, white and beige. However, color variation is possible in the choice of faceplates, which are not furnished with the set and must be ordered separately.

1.02 The standard Type 186 telephone instrument (see Figure 1 for desk versions, and Figure 2 for wall-mounted models) is a six-key set arranged to initiate, answer and (when proper equipment is provided) to hold calls on a maximum of five central office, PBX, PABX or full period lines. These lines are usually in association with the relay apparatus of a 10A, 10A1 or 10A2 key telephone system and accompanying power supply. When used with such a system, line-, busy- and hold-lamp indications are provided by illumination of the key buttons and designation strip.

1.03 The stocklist code stamped on the base of the set identifies the type of service and optional features originally provided at the factory. A typical code for sets in current General System use is NC-866000-ARB. The various elements of the code have the following significance:

NC	indicates a set with Type 811 handset and the 1967 improved network.
866	identifies a desk-style instrument;
966	denotes a set for wall mounting.
00	indicates that housing, handset and cordage are black;
10	indicates beige;
19	indicates white.
0	indicates provision of a key assembly with buttons arranged in an H P P P_S P_S P_S configuration.
A	indicates that the set is equipped with a dial;
J	indicates provision of a 12-button Touch Calling unit with metropolitan designations.
RB	indicates that the set contains both a ringer and a buzzer.

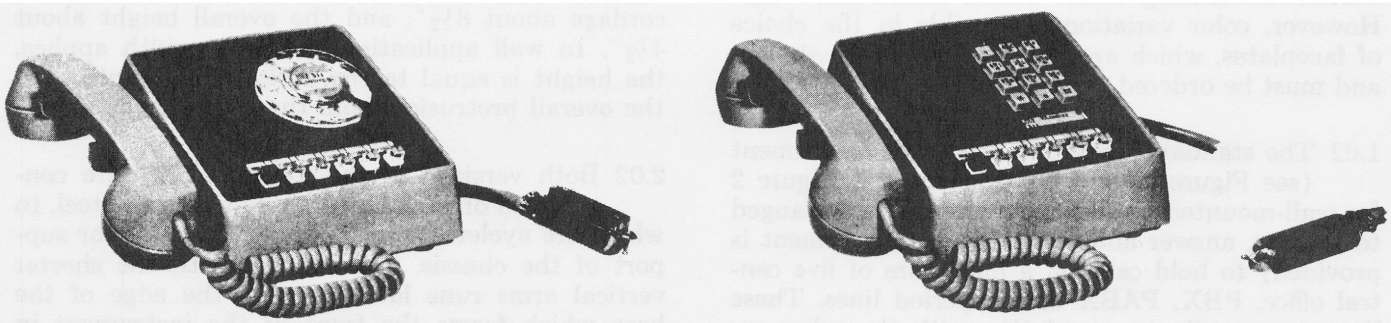
2. PHYSICAL CONSTRUCTION

2.01 The Type 186 desk set resembles the Type 860A 18-key instrument in appearance, but is about three inches narrower as a result of horizontal placement of the single six-button key assembly below the dial or Touch Calling unit. With the handset on the cradle the overall width of the desk version is about 10", the overall depth exclusive of cordage about 8½", and the overall height about 4½". In wall application the same width applies, the height is equal to the desk-service depth, and the overall protrusion from the wall is about 4¼".

2.02 Both versions of the Type 186 set are constructed on a common base of pressed steel, to which are eyeleted two U-shaped brackets for support of the chassis. The bracket with the shorter vertical arms runs laterally near the edge of the base which forms the front of the instrument in desk use and the top in wall service. Two turned-up tabs with horizontal pierced slits extend forward from this shorter bracket and serve to engage retaining lugs in the shorter wall of the housing. The taller bracket is formed with its legs parallel, but canted toward the shorter bracket at an angle of about 20 degrees from the vertical. It lies along the opposite edge of the base and has a central turned-up tab with a vertical slot to engage a retaining screw in the taller wall of the housing.

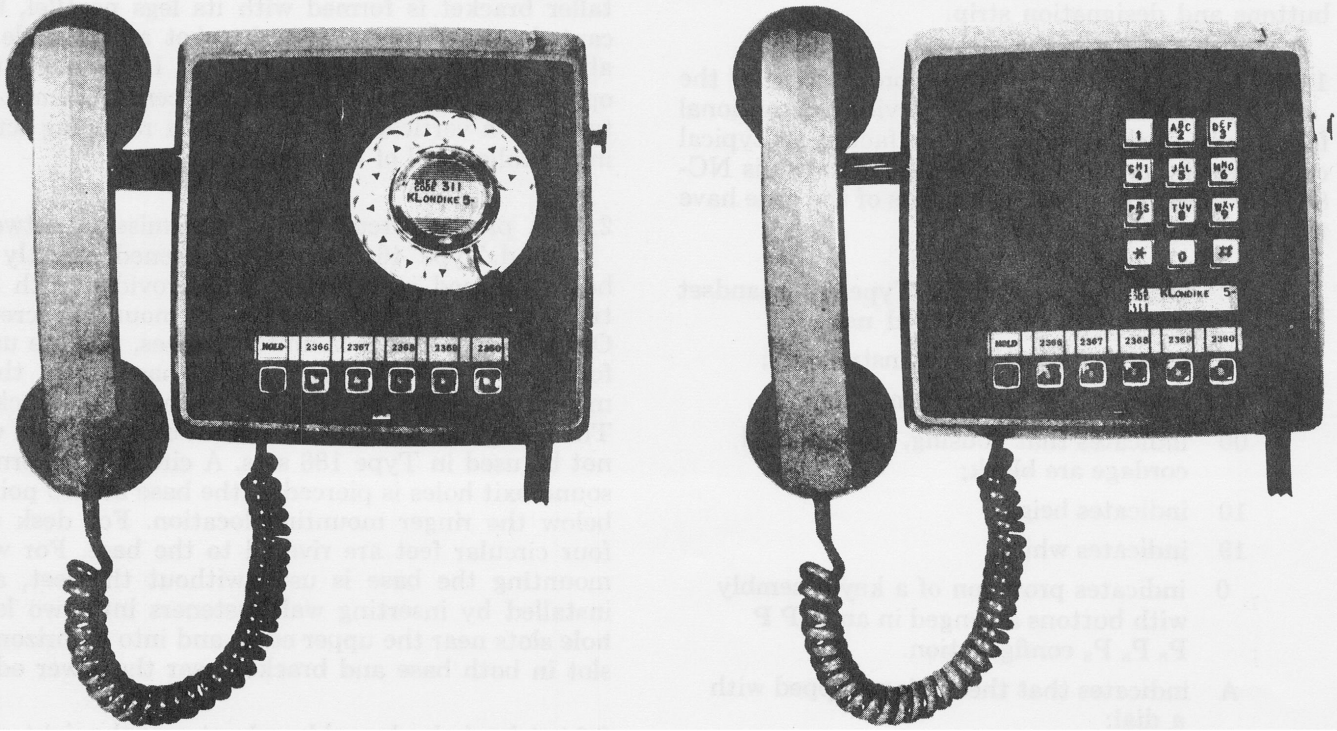
2.03 A printed-circuit board transmission network and Type 46 ringer are fastened directly to bosses formed in the base and provided with extruded holes tapped to receive the mounting screws. Of three such ringer-mounting bosses, two are used for the Type 46 ringer, which has as its third mounting point a tapped hole in the taller bracket. The third boss and two additional bracket holes will not be used in Type 186 sets. A circular pattern of sound exit holes is pierced in the base at two points below the ringer mounting location. For desk use four circular feet are riveted to the base. For wall mounting the base is used without the feet, and installed by inserting wall fasteners into two keyhole slots near the upper edge, and into a horizontal slot in both base and bracket near the lower edge.

2.04 A keyhole-shaped knockout near the right edge of the base (accessible on wall sets only) permits entry of 25-pair inside wiring cable if preferred in place of the plug-ended 50-conductor line cord furnished on all sets. This cord exits at the right rear in desk service and at the lower right when



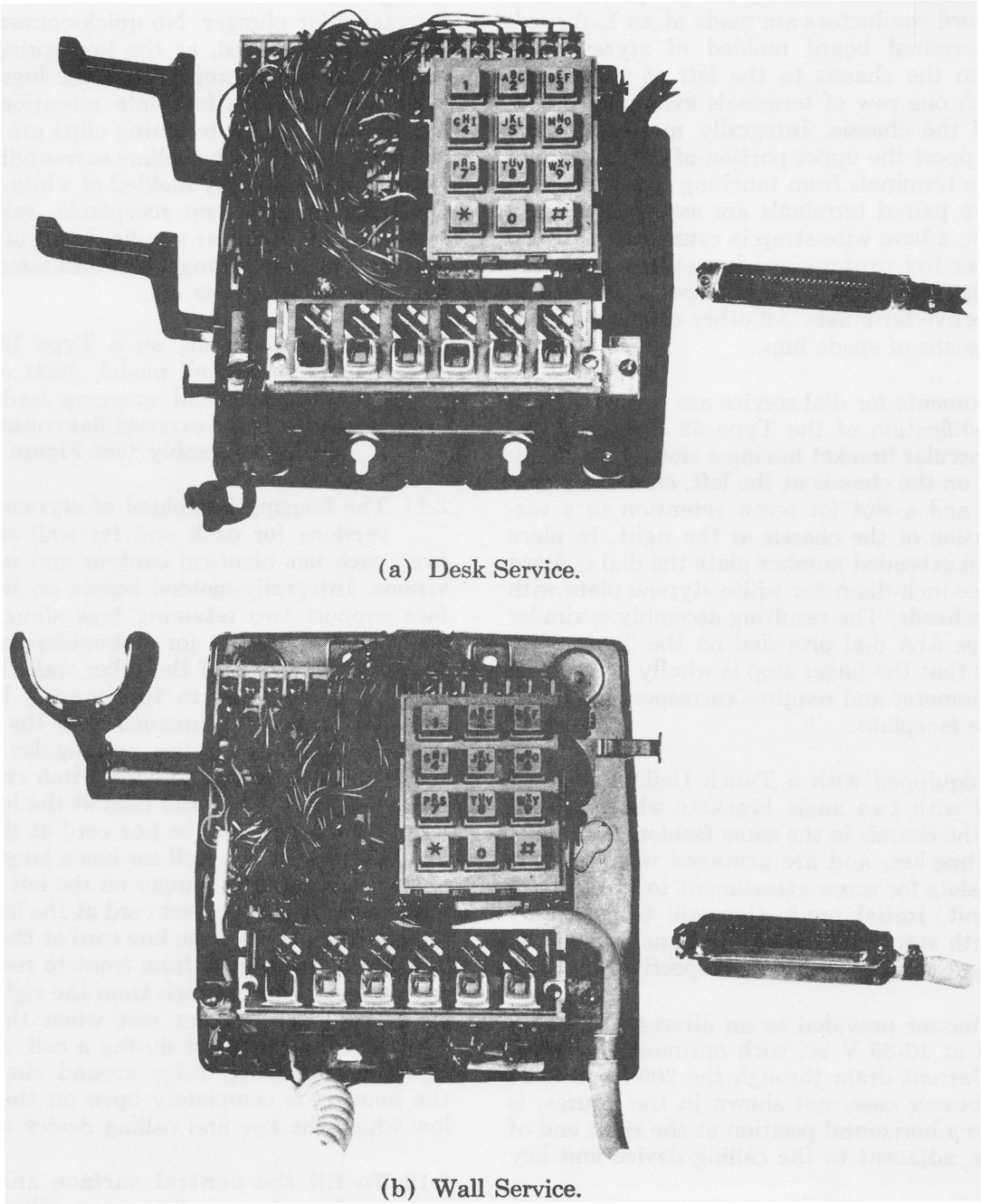
(a) Dial Service. (b) Touch Calling Service.

Figure 1. Type 186 Desk Telephone Sets.



(a) Dial Service. (b) Touch Calling Service.

Figure 2. Type 186 Wall Telephone Sets.



(a) Desk Service.

(b) Wall Service.

Figure 3. Type 186 Telephone Sets With Housing Removed.

wall mounted, and is fastened to the adjacent leg of the taller bracket with a vinyl cable clamp. The rim of the base is pierced at the left front (desk) and lower left (wall) to accept the J-hook strain relief of the handset cord.

2.05 Two horizontal slots in the arms of the shorter mounting bracket, and two axial slots in those of the longer one, are engaged by shoulder-head screws which secure the reversible chassis on which the key assembly, calling device and buzzer are mounted. On desk models a hookswitch assembly is suspended below the left edge of the chassis by means of an angle bracket and is actuated by the style of cradle used in the Type 860A telephone set. On wall models the hookswitch is mounted directly beneath the chassis and actuated by a rotating shaft fitted at its outer end with the style of handset hanger used in the Type 90M telephone set and surrounded by a chrome-plated steel sleeve (see Figure 3). Although conversion from desk to wall operation is possible by changing the housing and hookswitch assembly, reversing the chassis and adding or removing the feet, these changes should be performed only as a shop operation.

2.06 Interconnections between set components and line cord conductors are made at an L-shaped, 56-point terminal board molded of styrene and mounted on the chassis to the left of the calling device, with one row of terminals extending across the top of the chassis. Integrally molded spacers serve to support the upper portion of the board and prevent the terminals from touching the chassis. In cases where paired terminals are assigned a single designation, a bare wire strap is connected between their solder lug protrusions beneath the board. Leads to the key assemblies are likewise soldered to their respective terminals. All other connections are made by means of spade lugs.

2.07 Instruments for dial service are equipped with a modification of the Type 52 dial, mounted on a semicircular bracket having a slotted leg to engage a tab on the chassis at the left, as well as locating holes and a slot for screw retention to a vertical extension of the chassis at the right. In place of the usual extended number plate the dial is fitted with a three-inch-diameter white styrene plate with black arrowheads. The resulting assembly is similar to the Type 51A dial provided on the Type 860A set, except that the finger stop is wholly external to the base diameter and requires corresponding clearance in the faceplate.

2.08 Sets equipped with a Touch Calling unit are fitted with two angle brackets which are attached to the chassis in the same fashion as the dial mounting bracket, and are arranged with locating holes and slots for screw attachment to the body of the TC unit. Initial production will feature gray buttons with star and diamond designations in the eleventh and twelfth positions, respectively.

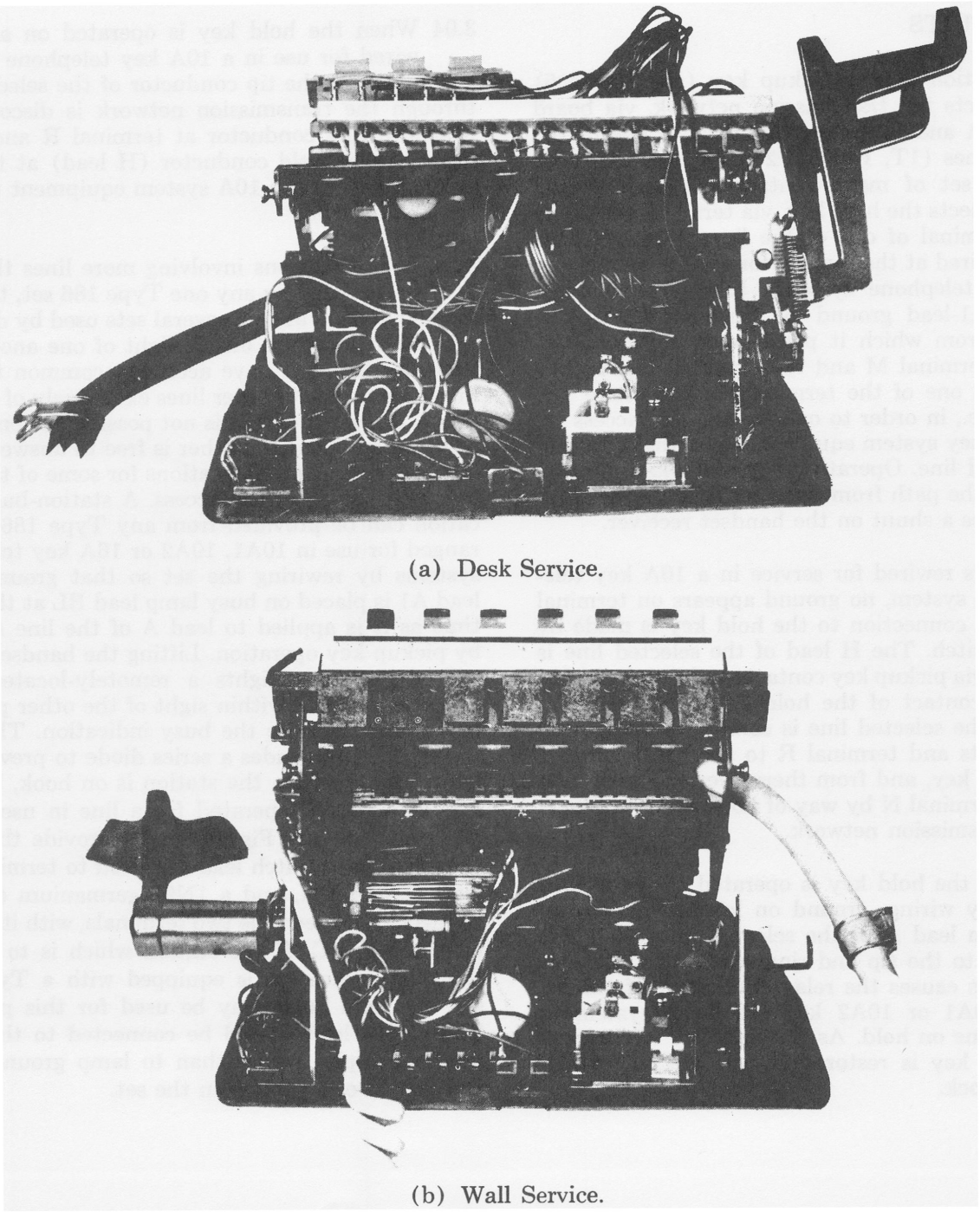
2.09 The buzzer provided as an alternate signal is rated at 10-30 V ac, with optimum operation at 20 V. Current drain through the 200Ω coil is 40 mA. The buzzer case, not shown in the figures, is mounted in a horizontal position at the right end of the chassis, adjacent to the calling device and key assembly.

2.10 The six-button key assembly mounted horizontally on the chassis at the front or bottom edge is a modification of the D-59306-A key which was introduced on the 18-button Type 860A telephone set and is also used in Types AE6050 and AE6051 keys. In this version the zinc die-cast frame has been shortened at the hold button end as a result of the elimination of chaining contacts, which are not required with only a single key assembly. Likewise eliminated for the same reason are the slide bar required to actuate such contacts, and the hooked protrusion of the latch bar required to interlock with an adjacent key assembly. In place of the substructure of J-shaped contact springs actuated by cylindrical plungers, an assembly of flat contact springs has been substituted, each set actuated by a rectangular plunger. No quick-connect female receptacle is provided, as the key springs are wired directly to the appropriate solder lugs on the terminal board. Since faceplate retention is supplied by the housing, no retaining clips are provided on the key assembly. The collars surrounding the pushbuttons are integrally molded of white styrene with the body of the lamp receptacle, rather than as separate parts of clear acrylic. In all other respects, including circuit arrangement and lamp wiring, the key is identical to the old.

NOTE: When working on a Type 186 set, especially the wall model, great care must be taken to avoid snagging leads or components in the exposed flat contact springs of the key assembly (see Figure 4).

2.11 The housing is molded of styrene in separate versions for desk and for wall service. However, each has identical contour and retention provisions. Integrally-molded bosses on the inner surface support two retaining lugs along the shorter wall and the bracket for a shoulder-head retaining screw in the center of the taller wall. The lugs and bracket are secured to the housing by means of self-tapping screws threaded into the bosses. The desk set housing has two rectangular openings on the left side to clear the hookswitch cradle, a small entry slot for the handset cord at the left front, and a large entry slot for the line cord at the right rear. The housing for the wall set has a large slot for the shaft of the handset hanger on the left side, a small entry slot for the handset cord at the lower left, and a large entry slot for the line cord at the lower right. A rib or ridge molded from front to rear on the upper surface about an inch from the right end serves as an off-hook handset rest when the user must leave the telephone set during a call. Aside from a recessed supporting ridge around the inner edge, the housing is completely open on the surface below which the key and calling device are mounted.

2.12 To fill the control surface and provide a greater color variety, a separately-ordered faceplate (not furnished with the instrument) is required at the time of installation. Molded of clear acrylic, the faceplate is finished on its ribbed under surface to match the color of the housing, or in one of the following harmonizing colors: green, vermilion, yellow, blue, flamingo, gold and brown. Two versions are required, one engraved with metropolitan numbering for dial sets, and another with twelve openings to accommodate the buttons of a Touch Calling unit. On ultimate production this engraving will appear in white on most faceplates, and in black on those finished in the lighter colors. The white-engraved styles are also available in clear form for local finishing to match individual decorating schemes.



(a) Desk Service.

(b) Wall Service.

Figure 4. Rear or Bottom View of Type 186 Telephone Sets With Chassis Raised.

2.13 The faceplate is molded with a protruding tab on its upper edge which engages a slot in the supporting ridges of the housing. A corresponding slot in the ridge on the opposite wall of the housing accommodates a spring clip which serves to retain the lower edge of the faceplate and is supplied with the housing as part of the assembled set. To insert or remove the faceplate a fingerwheel removal tool is engaged in a semicircular nick in the exposed edge of the housing clip, and the clip is forced back into the housing slot until it clears the edge of the faceplate.

2.14 An unpainted rectangular area of the faceplate above the key assembly provides a clear window through which the key designations may be viewed. The same designation strip is used as on the Type 860A set and on Types AE6050 and AE6051 keys, and is supplied with the instrument. On Touch Calling sets a rectangular opening below the buttons of the TC unit is arranged to accept an acrylic number card cover which snaps into the opening and holds the number card in place. The cover is supplied with the telephone set, but the card must be ordered separately.

3. CIRCUITS

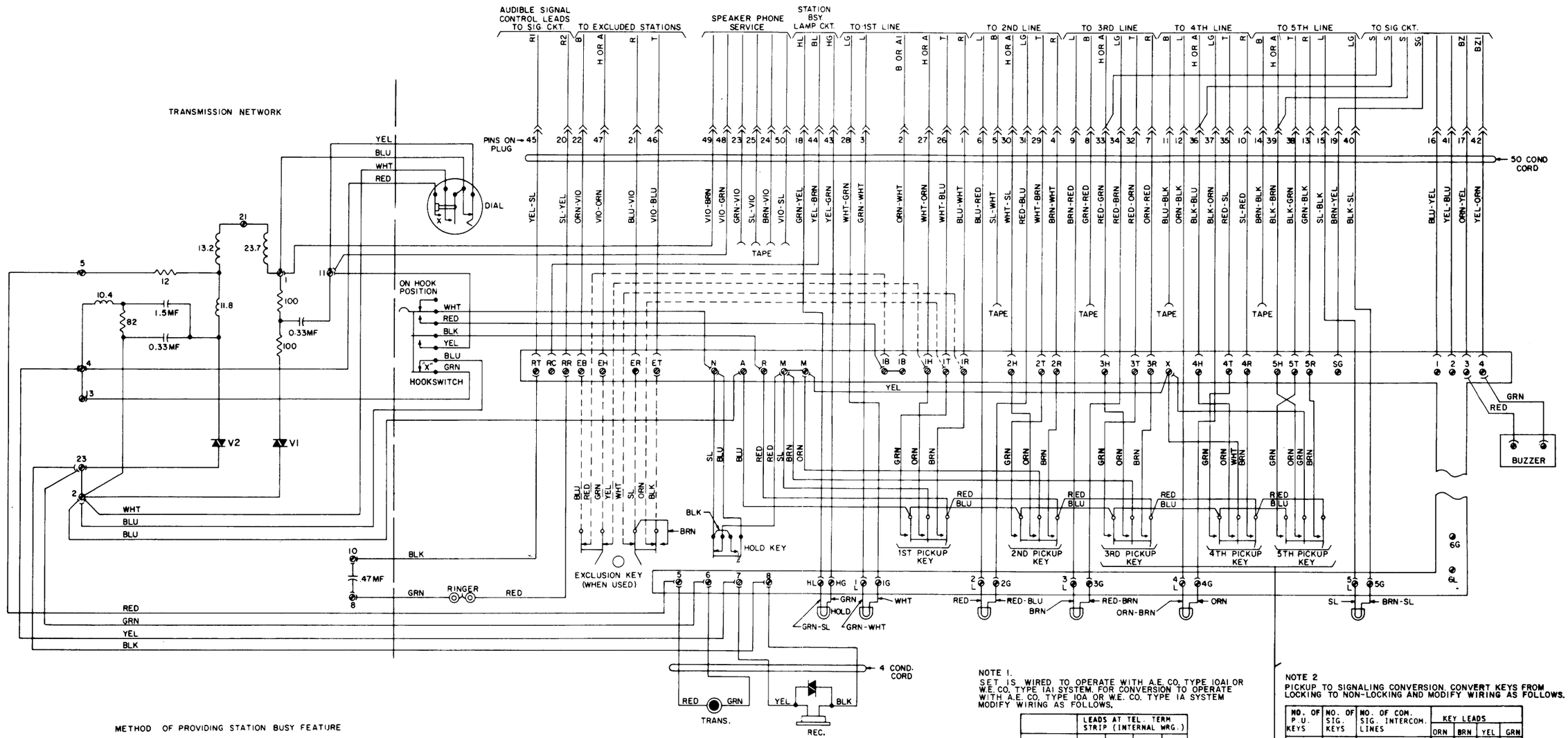
3.01 Operation of any pickup key (see Figure 5) connects the transmission network, via board terminals A and R, to the terminals of one of the accessed lines (1T, 1R; 2T, 2R; 3T, 3R, etc.). An additional set of make contacts on each pickup pileup connects the hold key, via terminal M, to the H-lead terminal of one of the lines (1H, 2H, 3H, etc.). As wired at the factory for service in 10A1 or 10A2 key telephone systems, lifting the handset connects A1-lead ground via terminal 1B to terminal N, from which it passes over the hold key contacts, terminal M and the operated pickup key contacts to one of the terminals in the group 1H, 2H, 3H, etc., in order to operate the line access relay in the key system equipment over the A lead of the selected line. Operation of the hookswitch also completes the path from terminal R to the network and removes a shunt on the handset receiver.

3.02 In sets rewired for service in a 10A key telephone system, no ground appears on terminal 1B, and no connection to the hold key is made by the hookswitch. The H lead of the selected line is connected via pickup key contacts and terminal M to the make contact of the hold key. The ring conductor of the selected line is connected via pickup key contacts and terminal R to the break contact of the hold key, and from there over the lever contact and terminal N by way of hookswitch contacts to the transmission network.

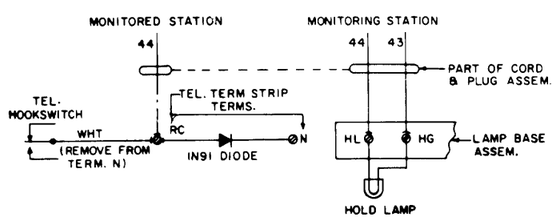
3.03 When the hold key is operated on a set with factory wiring, ground on lead A1 is disconnected from lead A of the selected line, while the connection to the tip and ring conductors is maintained. This causes the relay equipment of the associated 10A1 or 10A2 key telephone system to place the line on hold. As the hold key is released, the pickup key is restored by the mechanical release interlock.

3.04 When the hold key is operated on a set rewired for use in a 10A key telephone system, the loop from the tip conductor of the selected line through the transmission network is disconnected from the ring conductor at terminal R and transferred to the hold conductor (H lead) at terminal M. This causes the 10A system equipment to place the line on hold.

3.05 In installations involving more lines than can be accessed by any one Type 186 set, the lines may be divided among several sets used by different persons at locations out of sight of one another, so that any two sets have access in common to some lines, but access to other lines exclusively of one another. In such a case it is not possible for one party to be certain that the other is free to answer a call, since he lacks lamp indications for some of the lines to which the other has access. A station-busy indication can be provided from any Type 186 set arranged for use in 10A1, 10A2 or 16A key telephone systems by rewiring the set so that ground from lead A1 is placed on busy lamp lead BL at the same time as it is applied to lead A of the line selected by pickup key operation. Lifting the handset to access a line thus lights a remotely-located lamp which is installed within sight of the other party or parties who require the busy indication. The path to the A lead includes a series diode to prevent the lamp lighting when the station is on hook, but has a pickup button operated for a line in use at another station (see Figure 6). To provide this path the white hookswitch lead is moved to terminal RC from terminal N, and a 1N91 germanium diode is connected between the two terminals, with its anode to terminal RC. If the station which is to receive the busy indication is equipped with a Type 186 set, the hold lamp may be used for this purpose. The return lead should be connected to the lamp battery supply, rather than to lamp ground as in the case of other lamps in the set.



METHOD OF PROVIDING STATION BUSY FEATURE



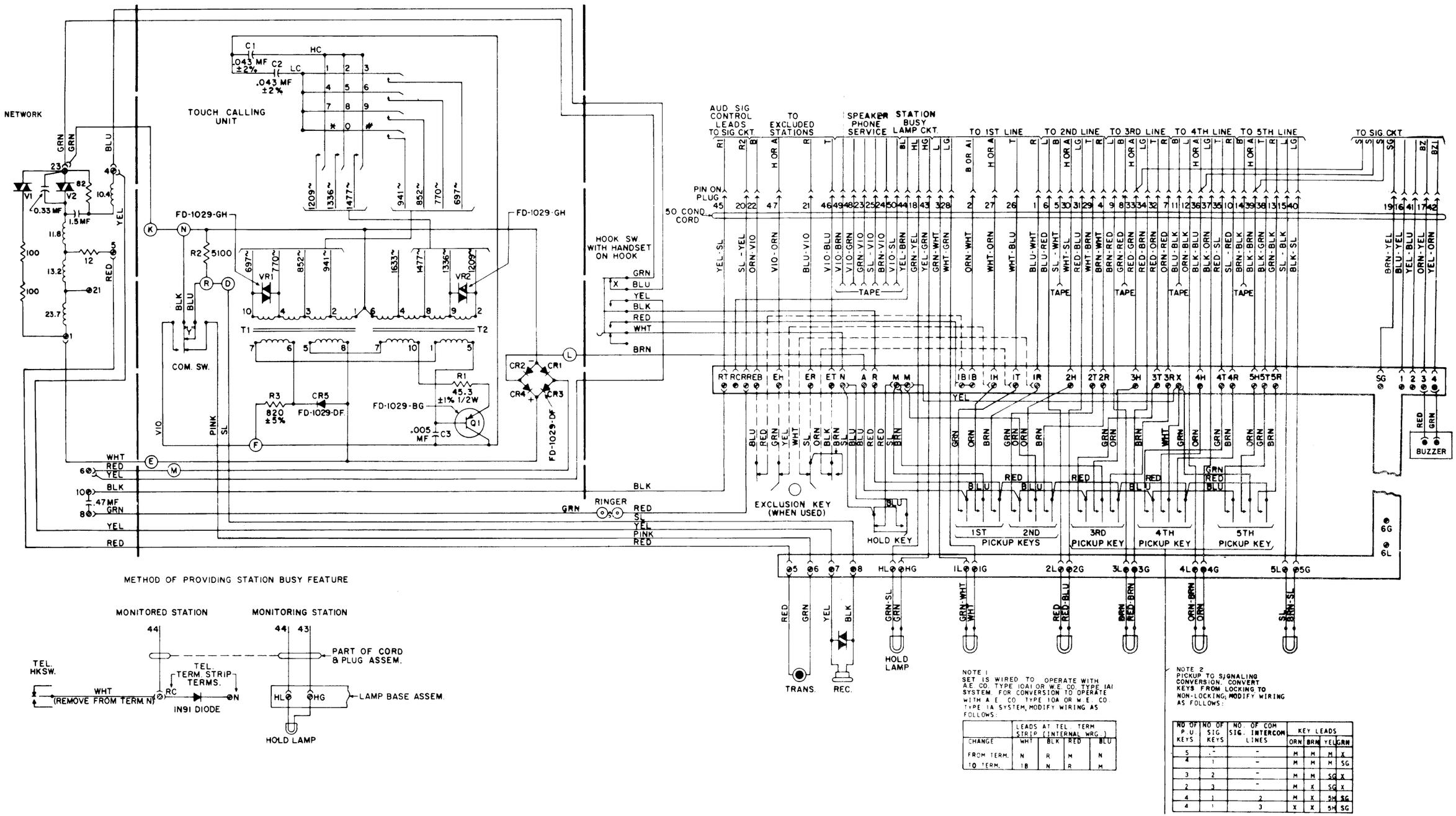
NOTE 1.
SET IS WIRED TO OPERATE WITH A.E.CO. TYPE 10AI OR W.E.CO. TYPE 1AI SYSTEM. FOR CONVERSION TO OPERATE WITH A.E.CO. TYPE 10A OR W.E.CO. TYPE 1A SYSTEM MODIFY WIRING AS FOLLOWS.

	LEADS AT TEL. TERM. STRIP (INTERNAL WRG.)			
CHANGE	WHT	BLK	RED	BLU
FROM TERM	N	R	M	N
TO TERM	1B	N	R	M

NOTE 2
PICKUP TO SIGNALING CONVERSION. CONVERT KEYS FROM LOCKING TO NON-LOCKING AND MODIFY WIRING AS FOLLOWS.

NO. OF P.U. KEYS	NO. OF SIG. KEYS	NO. OF COM. SIG. INTERCOM. LINES	KEY LEADS			
			ORN	BRN	YEL	GRN
5	-	-	M	M	M	X
4	1	-	M	M	M	SG
3	2	-	M	M	SG	X
2	3	-	M	X	SG	X
4	1	2	M	X	SH	SG
4	1	3	X	X	SH	SG

Figure 5. Wiring Diagram, Type 186 Telephone Set for Dial Service.



METHOD OF PROVIDING STATION BUSY FEATURE

NOTE 1
SET IS WIRED TO OPERATE WITH A.E. CO. TYPE 10AI OR W.E. CO. TYPE 1AI SYSTEM. FOR CONVERSION TO OPERATE WITH A.E. CO. TYPE 10A OR W.E. CO. TYPE 1A SYSTEM, MODIFY WIRING AS FOLLOWS:

	LEADS AT TEL. TERM STRIP (INTERNAL WRG.)			
CHANGE	WHT	BLK	RED	BLU
FROM TERM.	N	R	M	N
TO TERM.	1B	N	R	M

NOTE 2
PICKUP TO SIGNALING CONVERSION. CONVERT KEYS FROM LOCKING TO NON-LOCKING; MODIFY WIRING AS FOLLOWS:

NO. OF P.U. KEYS	NO. OF SIG. KEYS	NO. OF COM SIG. INTERCOM LINES	KEY LEADS			
			ORN	BRN	YEL	GRN
5	-	-	M	M	M	X
4	1	-	M	M	M	SG
3	2	-	M	M	SG	X
2	3	-	M	X	SG	X
4	1	2	M	X	SH	SG
4	1	3	X	X	SH	SG

Figure 6. Wiring Diagram, Type 186 Telephone Set for Touch Calling Service.