VISTAPHONE®
Picture Telephone System

GENERAL DESCRIPTION

Stromberg-Carlson
A SUBSIDIARY OF GENERAL DYNAMICS CORPORATION

STROMBERG-CARLSON PRACTICES SECTION 83-001-02 ISSUE 1 MARCH 1972

VISTAPHONE®
Picture Telephone System
GENERAL DESCRIPTION

Figure 1. VISTAPHONE Station Equipment.

CONTENTS

ILLUSTRATIONS

1. INTRODUCTION

1.01 VISTAPHONE System.

The VISTAPHONE system is a communications medium designed to provide video telephone service between video stations that are served by the same PABX (private automatic branch exchange). Any station equipped with VISTAPHONE station equipment can be used to make video calls to and receive video calls from any other PABX station equipped with VISTAPHONE station equipment.

1.02 Application.

a. VISTAPHONE station equipment (fig. 1) provides a person-to-person view between the calling and called parties. The displayed image can be a close-up or wide-angle view as desired by the users. Conversation is enhanced by watching facial expressions and hand movements; both hands are free. (Sets have been designed for hands-free operation.) The use of this feature is limited only by the ingenuity of the user: Deaf persons can read lips and use sign language, thereby, permitting visual telephone communication; conferences can be held between an individual or group of individuals at one location and a group of individuals at a second location; etc.

b. In addition to person-to-person viewing, the VISTAPHONE station equipment can be operated in a graphics mode, which permits viewing of graphs, charts, and similar data that is placed on the surface (desk, table top, etc.) that supports the video display unit.

c. When equipped for pushbutton dialing, the VISTAPHONE station equipment can serve as an input-output device for a computer, provided that appropriate interface circuits are used. Tone signals can be used to access and interrogate the computer, and information from the computer can be displayed on the video display unit.

2. SWITCHING VIDEO CALLS

2.01 Voice and Video Paths.

The VISTAPHONE system provides intraoffice video telephone service over the existing telephone network and conventional paired-wire cable. The VISTAPHONE system is compatible with most PABX or PAX telecommunications systems. Voice is transmitted over the existing audio pair. The video picture signals are transmitted and received over a 4-wire switch (VISTAPHONE switch) that is controlled via the audio pair associated with a video telephone station.

2.02 VISTAPHONE Switch.

The VISTAPHONE switch is a 4-wire, wideband switch that is capable of switching and carrying video signals. Line equalizers and amplifiers associated with the switch maintain the video signals at the proper level throughout the specified bandwidth. The switch is controlled via the voice paths associated with the VISTAPHONE station equipment. Operation of the switch via line adapters is achieved without modification of the existing PABX or PAX switchboard.

2.03 Station Lines.

The station lines consist of a 2-wire voice transmission path and a 4-wire (transmit and receive) video transmission path. The station lines are used to interconnect the station equipment and the PBX switching equipment. Standard telephone cable such as pulp or plastic insulated cable can be used (with certain restrictions) for station lines and trunks. Unit type construction is preferred because of superior crosstalk properties.

3. VISTAPHONE STATION EQUIPMENT

3.01 Components of VISTAPHONE Station Equipment.

The station equipment consists of a video display unit, a control unit, a telephone set, and a service unit. The video display unit, control unit, and telephone set are supplied in matching colors. The service unit is not supplied in a matching color because it is usually placed in a concealed or inconspicuous location at the station or at a remote location within 85 feet of the station. The components are interconnected by plug and cable assemblies.

3.02 Compatibility.

The VISTAPHONE station equipment is similar to the PICTUREPHONE* in appearance and configuration. The electrical performance characteristics and operational features of both sets are similar, thereby providing for compatibility between installations equipped with VISTAPHONE station equipment and those equipped with PICTUREPHONE sets.

3.03 Video Display Unit.

The video display unit, which weighs approximately 25 pounds, consists of a housing mounted on the pedestal of a ringstand. The housing contains a camera tube, a display tube (cathode-ray tube) with a viewing-screen size of 4.95 inches wide by 4.5 inches high, and a loudspeaker for hands-free operation. A flip-out visor with a mirror is mounted on the front panel of the housing. The mirror is used for displaying graphs, charts, and similar data placed on the surface that supports the video display unit. The housing can be hand rotated on the pedestal in a horizontal arc of 340 degress. A screw located on the underside of the housing provides for tilting the housing to a maximum of 6 degrees above the normal position.

3.04 Control Unit.

The control unit (fig. 2) contains controls and an indicator that are used for operating the video display unit; and it contains a microphone for hands-free operation. Table 1 lists the controls and describes the function of each.

3.05 Telephone Set.

The telephone set is a standard set equipped with a plug-ended line cord. The specific telephone set used will depend on the requirements and capabilities of the installation. For example: single-line or multiline telephones may be used, and they may be rotary-dial, or TONE-DIAL® or equivalent pushbutton-dial telephones. Multiline telephones can be arranged so that one line would be used for making video calls and the remaining lines could be used for making voice-only calls.

3.06 Service Unit.

The service unit contains amplifiers, line equalizers (if required), circuits for controlling signaling, and a power supply. The power supply provides power for the camera and display tubes, the amplifiers and line equalizers, and the hands-free telephone circuitry. The service unit also provides the terminations for

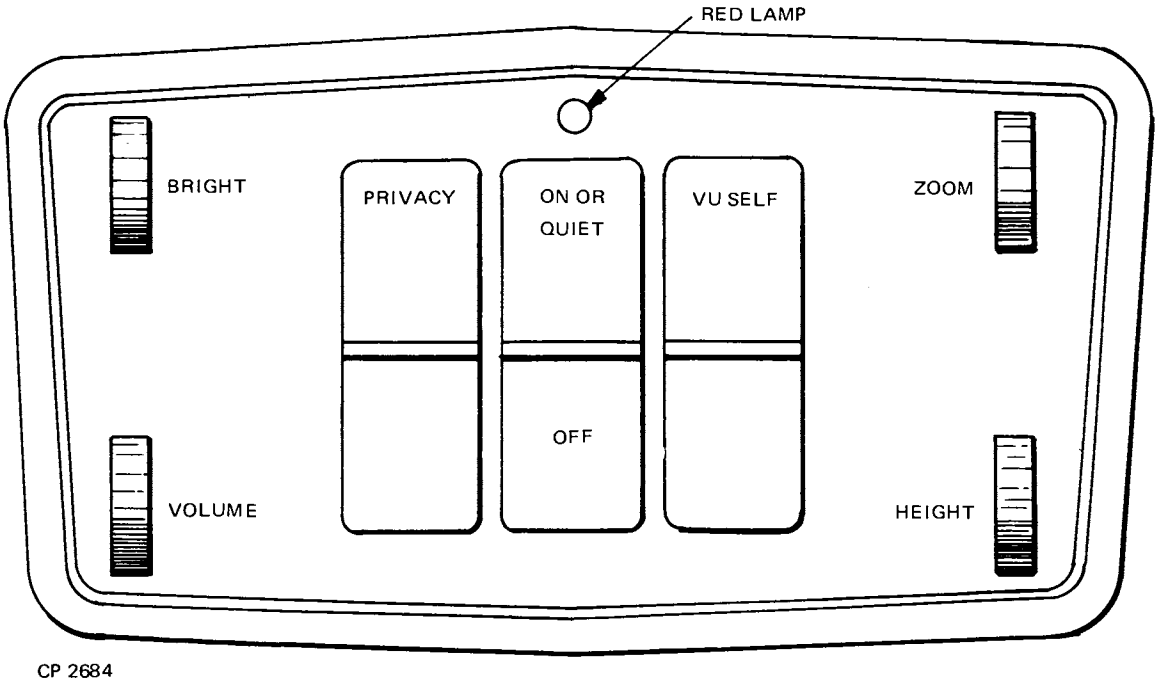

Figure 2. Control Unit.

* Registered Trademark of AT&T Co.

station-to-loop interface and for electrical interconnection of the station equipment. A mounting plate can be used to secure the service unit to a wall. The service unit can be removed from the mounting and replaced without the use of tools, thus facilitating inspection and servicing. The unit is powered from a 110-volt 60-Hz single-phase source.

TABLE 1

CONTROL UNIT CONTROLS

DESIGNATION	*TYPE*	*FUNCTION*
BRIGHT	Thumbwheel potentiometer	Used to increase or decrease brightness of image on screen of video display unit.
VOLUME	Thumbwheel potentiometer	Used to increase or decrease volume during hands-free operation.
PRIVACY	Two-position, locking rocker switch	Used to provide user with privacy; when switch is operated, a black bar is transmitted to distant end.
ON OR QUIET/ OFF	Two-position, nonlocking rocker switch	Used for on-hook, off-hook, and microphone control during hands-free operation. When switch is momentarily pressed to the ON OR QUIET position, station is placed in the off-hook condition; holding the switch in the ON OR QUIET position mutes the microphone. When switch is momentarily pressed to the OFF position, station is placed in the on-hook condition and each operated switch is restored to its normal (nonoperated) position.
VU SELF	Locking rocker switch	Enables user to monitor transmitted image; useful when adjusting ZOOM and HEIGHT controls.
ZOOM	Thumbwheel potentiometer	Used to increase or decrease size of image seen at distant end; image area can be changed by a ratio of 2.5 to 1.
HEIGHT	Thumbwheel potentiometer	Used to effectively raise or lower the vertical aim of the camera when ZOOM control is used to increase the size of the image to the distant end.
— — —	Red lamp	Lighted lamp indicates that station is being operated in the hands-free mode.

3.07 Specifications.

The specifications for the VISTAPHONE set are as follows:

Warmup time	Almost instantaneous from receipt of video supervisory signal (VSS)
Camera Lens	F2.8 wide angle with antireflective coating
Ambient lighting	3 foot-lamberts to 600 foot-lamberts
Field of view (see note)	53 degrees with a horizontal swing of 340 degrees
Depth of field	3 to 20 feet
Zoom reduction	2.5 to 1 in viewed area
Aspect ratio	1.1 to 1 width-to-height
Viewing screen size	4.95 inches wide by 4.5 inches high
Active lines per frame	251
Horizontal resolution	192 lines
Vertical resolution	175 lines
Contrast	Resolution of 10 shades of gray
Geometric distortion	Less than 5 percent
Bandwidth	Dc to 1.0 MHz

NOTE: Normally, the user will be about 36 inches from the video display unit. The field of view at that distance is adjustable from 17-1/2 by 16 inches to 28-1/2 inches by 26 inches.

4. OPERATING THE VISTAPHONE STATION EQUIPMENT

4.01 Answering an Incoming Call.

Incoming video calls actuate the ringer in the telephone set. If you don't want to be seen by the other party, operate the PRIVACY switch before answering. To answer the incoming call, momentarily press the ON OR QUIET/OFF switch to the ON position if you want to use the hands-free feature. (Red lamp on the control unit will light.) Otherwise, answer by picking up the telephone handset.

4.02 Making an Outgoing Call.

To make an outgoing call, momentarily press the ON OR QUIET/OFF switch to the ON position if you want to use the hands-free feature. (Red lamp on the control unit will light.) Otherwise, pick up the telephone handset. Key or dial access digits and digits of the called number as required for the type of call you are making.

4.03 Operation During a Call.

During a call you can do the following:

a. Transfer from handset operation to hands-free operation by pressing the ON OR QUIET/OFF switch to the ON position and then placing the handset on-hook. (Red lamp on the control unit will light.)

Note: The ON OR QUIET/OFF switch must be held in the ON position until the handset is placed on-hook.

b. Transfer from hands-free operation to handset operation by taking the handset off-hook. (Red lamp on the control unit will go out.)

c. Rotate the BRIGHT thumbwheel to increase or decrease the brightness of the image.

d. Rotate the VOLUME thumbwheel to increase or decrease the volume of the other party's voice.

e. Operate the PRIVACY switch to change the image at the distant end to a black bar.

f. Press and hold the ON OR QUIET/OFF switch to the nonlocking ON OR QUIET position to mute the microphone; the microphone remains muted as long as the switch is held operated.

g. Operate the VU SELF switch to monitor the picture being transmitted.

h. Rotate the ZOOM thumbwheel to increase or decrease the size of the image displayed at the distant end.

Note: When adjusting the size of the image, operate the VU SELF switch and monitor the image; if the image is not centered vertically, rotate the HEIGHT thumbwheel to raise or lower the image; then, restore the VU SELF switch.

i. Flip the visor and mirror up to operate the set in the graphics mode.

Note: When positioning the graphic to be viewed, operate the VU SELF switch and monitor the image; then restore the VU SELF switch.

4.04 Disconnecting from a Call.

To disconnect from a call, momentarily press the ON OR QUIET/OFF switch to the OFF position when using the hands-free feature. (Red lamp on the control unit will go out.) Otherwise, disconnect by replacing the telephone handset.

Note: When the ON OR QUIET/OFF switch is pressed to OFF, each operated switch is restored to its normal (nonoperated) position.

5. STATION LINES

5.01 The VISTAPHONE station equipment is connected to switching equipment at the PBX by a 6-wire station line (fig. 3). The voice and video cable pairs can be 22-, 24-, or 26-gauge wire. On station lines of 500 feet or more, line equalizers, which are added to the service unit, must be inserted in the video pairs to overcome transmission impairment that can occur on long lines. With the use of equalizers in the service unit, station lines of approximately 3500, 4000, and 5000 feet can be obtained, depending on whether 26-, 24-, or 22-gauge pairs are used. (Refer to paragraph 7, Transmission Considerations.)

6. SWITCHING EQUIPMENT

6.01 The PABX switching equipment provides a means of connecting the calling station line to the desired called station line. When the calling party keys or dials the number of the called station, the PABX establishes an audio connection between the calling and called station lines; and it applies ringing voltage to the called station line (fig. 4). The ringing is detected by a line adapter, which is bridged on to the line circuit. The line adapter monitors for answer supervision (loop closure). When the loop is closed, the line adapter sends a service request to the common control of the VISTAPHONE switch, which finds and marks the *called* line. A tone is then applied through the line adapter to the *called* line. The tone is forwarded over the audio path and detected by the line adapter of the *calling* line. The detection of the tone marks the *calling* line. With both the *calling* and *called* lines marked, establishment of the video connection is enabled. The common control assigns an idle video link and applies a video supervisory signal (VSS) to each station before completely cutting through. The VSS signals turn both video displays on. The matrix now closes the 4-wire video path; the original audio path through the PABX remains cut through. The video connection through the matrix is now under control of the sleeve lead.

7. TRANSMISSION CONSIDERATIONS

7.01 Video Pair Selection.

a. Pulp or plastic insulated 22-, 24-, or 26-gauge cable pairs with a capacitance of 0.083 microfarads per mile are preferred. Unit type construction is preferred because of its superior crosstalk properties.

b. The sum of all bridged taps shall not exceed 200 feet, and no individual tap shall exceed 100 feet.

c. All loading coils and building-out capacitors shall be removed from the selected pairs.

d. Cable splices should be soldered or crimped.

7.02 Private Line Facilities.

a. Unbalanced private line, dc telegraph, burglar alarm, and clock synchronization circuits should not be in the same unit (binder group) as video pairs, assuming unit integrity.

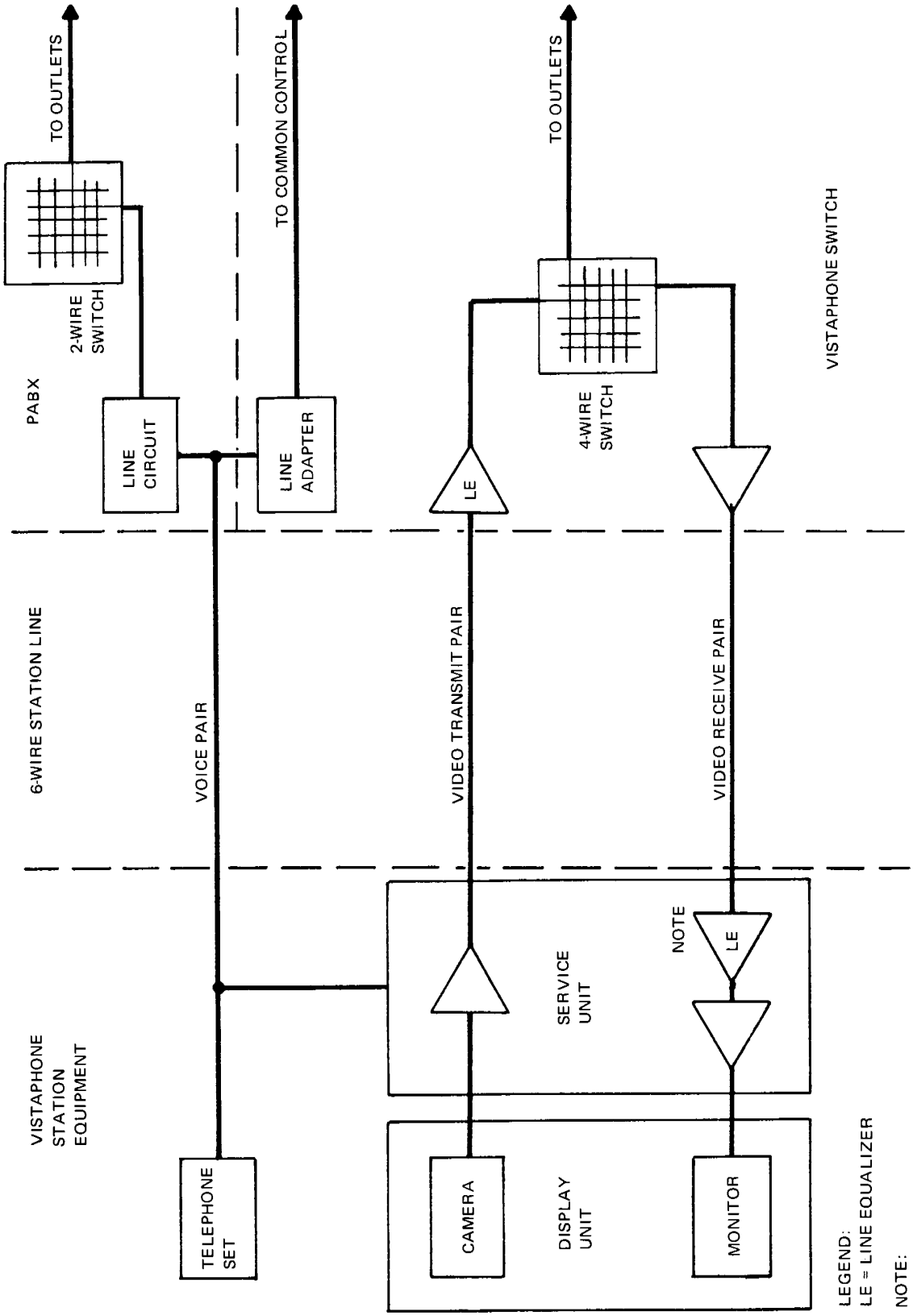

Figure 3. Station Line.

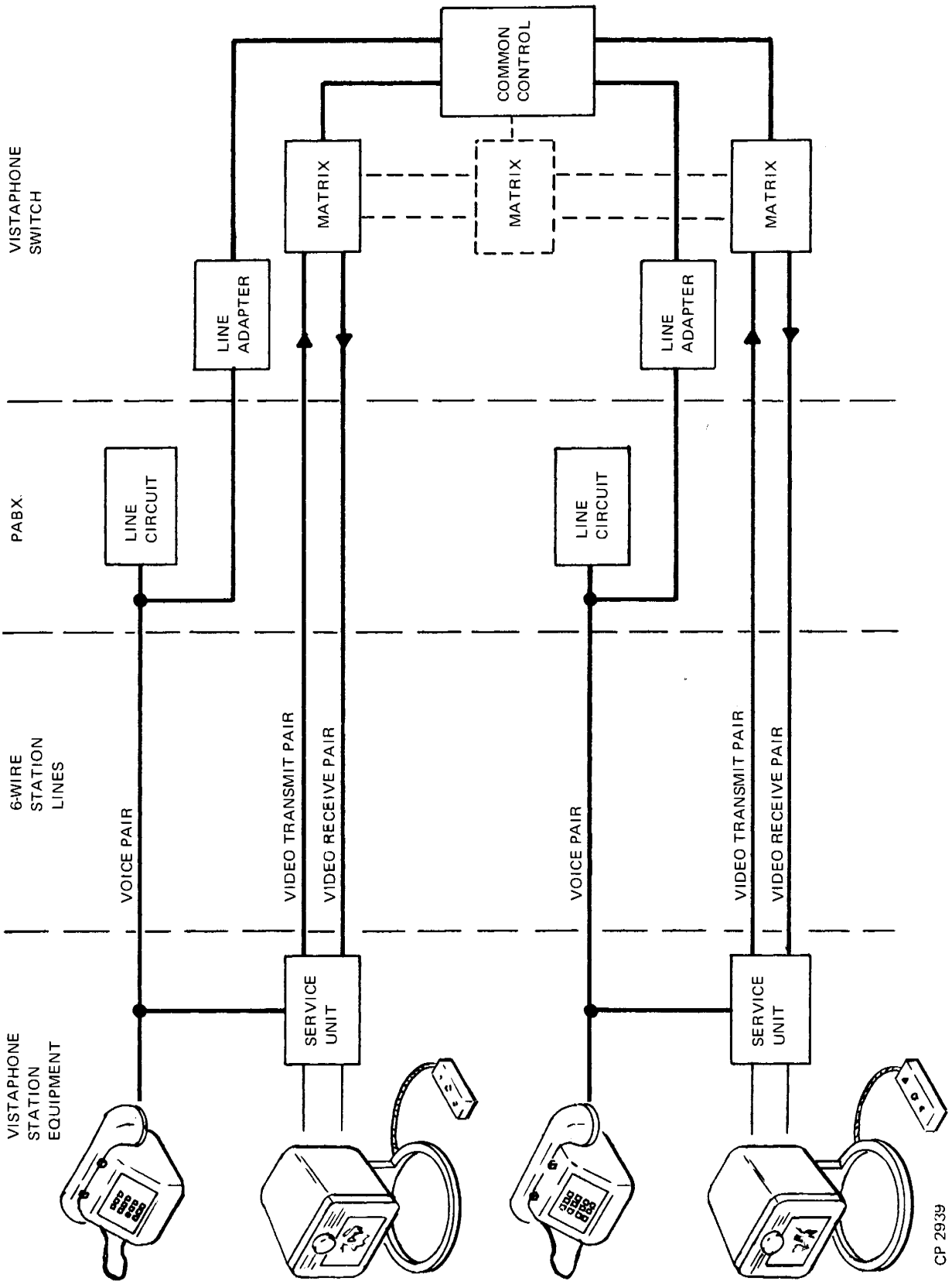

Figure 4. Intra-PABX Call.

b. If unit integrity has not been maintained, video pairs should not be in the same sheath with unbalanced circuits such as those mentioned in a above.

7.03 Radio Frequency Interference.

a. In reinforced concrete or structural steel buildings, a maximum of 200 feet of inside wiring can be left unshielded; all remaining house cable should be contained in metal pipe or building raceways.

b. In buildings, such as wooden structures, that provide no shielding, all house cable should be shielded.

c. A maximum of 500 feet of aerial exposure is allowable for cables carrying video pairs providing the following two criteria are met:

1. The cable sheath is continuous over the aerial portion of the cable.

2. The exposed area is at least 1 mile from any radio broadcast antenna.

SCP 83-001-02/Issue 1/March 72

Stromberg-Carlson

A SUBSIDIARY OF GENERAL DYNAMICS CORPORATION

100 Carlson Road, Rochester, New York 14603