3.0 TELELINE ISOLATOR CARDS - GENERAL

The card is the active component of the system. It consists of a printed circuit board measuring approximately 300mm by 170mm by 60mm (or approximately 12.0" by 7.5" by 2.0"). The tracks are made of copper, covered by a protective tin guard, and mounted on a high performance dielectric board. The active components of the circuit are located on the reverse side of the card and are covered by a copper ground plane which is kept at driving potential. This plane does not come into contact with any of the active components of the circuit, except to provide power. It serves to maintain a uniform potential on this part of the card and helps prevent build-up of charges which can be harmful to the power operation of the circuit. It also helps to dissipate heat which is generated by circuit operation.

NOTE: Each card requires a specific input voltage for operation. The current consumption varies for each different variety of isolator card (see table 3.1). For isolator card applications, see table 3.2.

3.1 TELELINE ISOLATOR MODEL #7501-01

UNIVERSAL TELEPHONE CARD

Positron's Universal Telephone Card provides high voltage isolation between a telephone line and a telephone set, or between a loop start trunk and a PBX. This card provides low loss, full duplex voice band communication.

It detects, and regenerates ON/OFF hook signalling and dial pulses, simplex from the station towards the line. It detects, and regenerates ringing, simplex, from line to station. The ringing regenerator can ring up to five standard 500 type sets.

The Universal Telephone Card is powered with -24VDC. Power consumption is approximately 10mA idle, 60mA off hook, 70mA ringing one ringer, 130mA ringing two ringers, 190mA ringing three ringers, 250mA ringing four ringers and 310mA ringing five ringers.

The -24VDC is also used to provide battery feed to the telephone on the subscriber side of the card. Battery feed from the Central Office side powers up the C.O. side circuit components. The card will not transmit unless D.C. feed is present on the C.O. side. In order to optimize transmission characteristics, station loop current tracks C.O. loop current, within a precision of 1 mA. For loop resistances between 200 and 300 ohms on the station side of the card, the strap (E2-E3) on the C.O. side of the card should be removed, to prevent transmission degradation due to station loop generator saturation. Such saturation would cause the loop currents on each side of the card to be unequal.

This card is supplied with a ring generator as part of the station circuitry. Connector contacts 3 and 5 of the central office side of the card are associated with ring and tip conductors of the incoming cable. When the ringing signal is detected on the C.O. pair, a trigger pulse is transmitted across the air-gap by a high voltage opto-isolator. This activates the station side ring generator.

On the station side, contacts 5 and 6 of the connector are associated with the tip and ring conductors. Contact 1 connects the local -24VDC supply to the copper plane. Supply current flows through this plane to the different components of the circuit. Contact 3 is connected to the local ground via a ground plane. See figure 3.1

RECEIVING CALLS

Ring signals of 40 to 105 VRMS (between tip and ring conductors) between 17Hz and 30Hz are detected by the circuit located on the central office side of the card. The ringing state and its frequency are transmitted to the station side of the card by an optical coupler. A ring generator in the circuit generates a modified square wave of 160 to 200 V peak to peak, superimposed on a voltage of 20 to 26VDC on the ring conductor of the station loop. The tip conductor is at the same voltage as local ground. The frequency of the square wave is virtually equal to that of the ring signal from the central office. The ring generator is strong enough to drive up to 5 telephone ringers simultaneously.

If the user lifts the receiver during a ring cycle, it causes loop current to increase in excess of 80mA peak, during a pause, it causes an increase in the DC loop current in excess of 16mA. In these two cases, the full release of the central office side is caused by the optical coupler. It creates a current of 22mA DC to 45mA (depending on line resistance) in the central office loop. The central office responds by switching from the ring mode to the communications mode.

The full release is not affected by the polarity change which can occur at this time. This permits the card to work in reverse polarity, a condition which will not occur normally. The communication channel goes through the principal isolating device of the card. When the station hangs up, the loop current drops to below 22mA, sending a "call termination" condition to the central office.

PLACING CALLS

When the receiver is lifted, the loop current of the station side rises to over 14mA DC, which causes operation of the C.O. side relay. The Central Office loop current exceeds 22mA DC, causing the Central Office to provide a tone. The Central Office rings the called end and the subscriber hears the ringing. If the called station goes off hook, a communication path is immediately established. When the caller hangs up, the local loop current drops to below 14mA DC. The C.O. side relay opens and the loop current drops below 40uA DC. The Central Office responds by terminating the call.

NEUTRAL CONDITION

When both station and central office sides are on hook, the local loop maintains -21VDC to -27VDC between ring and tip of the station side conductors with no current. The voltage on the C.O. side of the card rests at the line ON/HOOK voltage potential. The card can accept a line ON/HOOK voltage range of -15 to -60 VDC between the TIP and RING conductors. The loop current on the C.O. side is below 40uA DC.

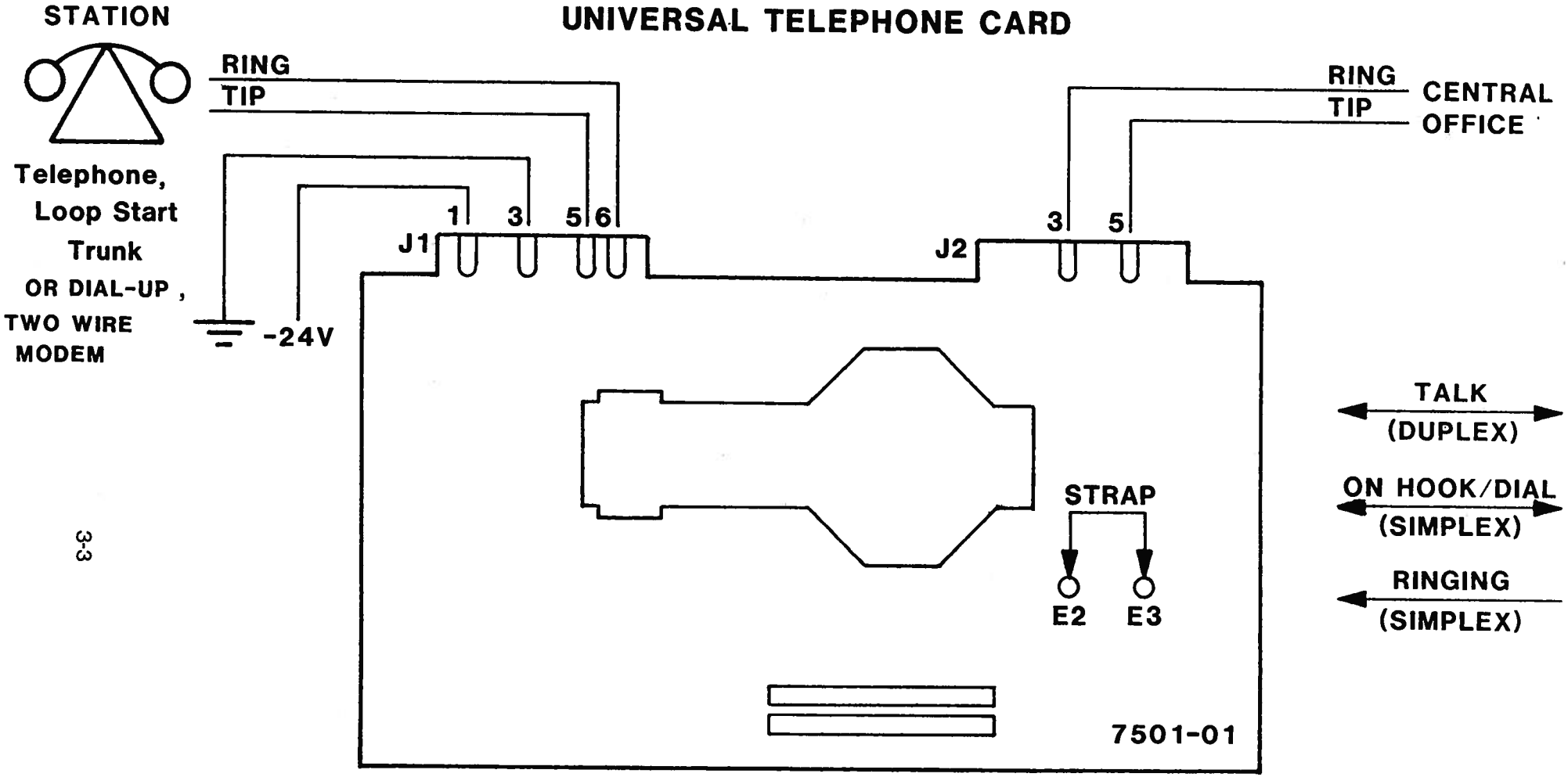

FIGURE 3.1

NOTES:

1. There are no adjustments on this card.
   Card is factory shipped for normal operation (with strap in).
2. For off premises phones (on the same ground mat) with very long lines (i.e.,loop resistances > 200 Ω between telephone and teleline), remove strap.

3.1.1 SPECIFICATIONS — MODEL #7501-01

TRANSMISSION DATA

Longitudinal Balance (C.O. side)	greater than 80dB @ 60Hz greater than 56dB @ 4KHz
Echo Return Loss (either side, opposite side terminated in 600 or 900 ohms)	greater than 23dB
Singing Return Loss (C.O. side, either side terminated in 600 or 900 ohms)	greater than 14dB
Noise 2Hz to 100Hz	— 60dBm
Voice Band (C message weighting)	less than 0 dBrnC
Phase Jitter	less than 0.5°, 300 to 4000Hz
D.C. Loop Resistance (off hook) (C.O. side) (See Fig. 3.1A)	25 ohms below 42mA > 33Kohms above 42mA
Terminal Impedance (C.O. side) (off hook)	greater than 50Kohms (300 to 4000Hz at 10dBm)
Common Mode Rejection Ratio (off hook) (from C.O. side to station side, terminated in 600 or 900 ohms) (300 to 4000Hz)	greater than 80dB
Terminal Resistance (C.O. side) (On hook)	greater than 1Mohm at ± 100VDC
Impulse Noise (off hook)	no more than 1 count in 30 minutes above 48dBrnC
Insertion Loss (at 1000Hz) (measured at 8 dBm)	less than 0.5dB
Frequency Response (300 to 3400Hz)	± 0.4dB relative to 1000Hz level

Ringing Frequency	17 to 30Hz
Ringing Impedance (terminal impedance at 20Hz)	30Kohms
Input Ringing Voltage (C.O. side)	40 to 105 Volts RMS
Ringing Voltage Output (this is constant on station side for an input range from 40 to 105 volts)	approximately 90 volts RMS (with card powered with — 24VDC)
Number of Ringers Driven (any type) (Each card will drive up to 5 (500 type) telephone extensions)	up to 5
Dial Pulse Distortion (Output duty cycle with respect to input duty cycle)	less than 1%, measured at 14mA threshold
Dynamic Range	up to + 10dBm with less than 2% harmonic distortion
Cross Talk	better than — 77dB for signals from 300 to 4000Hz measured at + 10dBm.

NOTE: All off hook measurements are made with a battery feed of approximately 40mA DC, with a loop current load on station side of the card.
= 150 ohms in series with 10 henries.

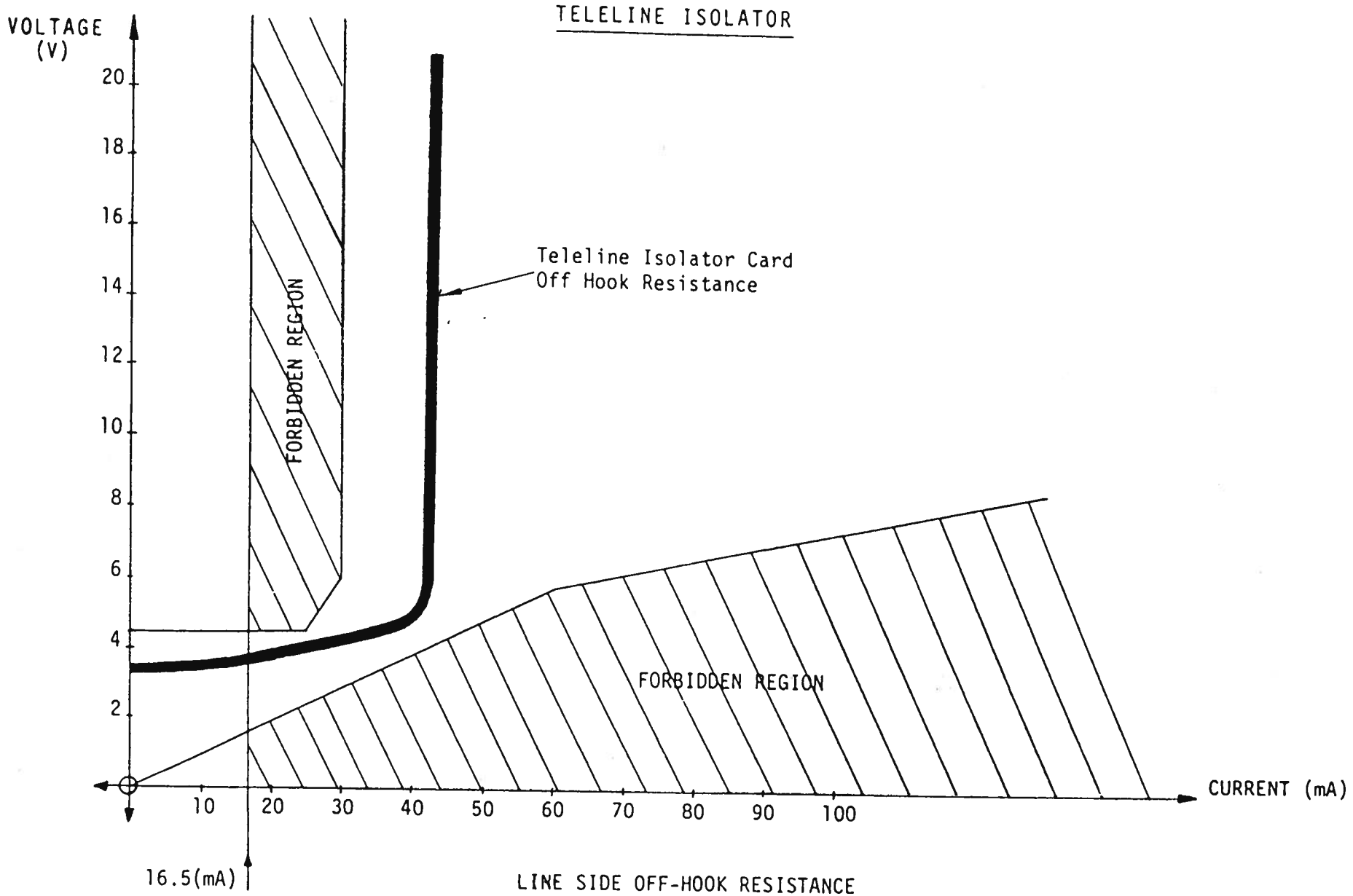
TELELINE ISOLATOR
VOLTAGE (V)
20
18
16
14
12
10
8
6
4
2
FORBIDDEN REGION
Teleline Isolator Card
Off Hook Resistance
FORBIDDEN REGION
CURRENT (mA)
10
20
30
40
50
60
70
80
90
100
16.5(mA)
LINE SIDE OFF-HOOK RESISTANCE
UNIVERSAL TELEPHONE CARD

FIGURE 3.1A