



Wired Audio Monitoring via PSTN Lines

(RFM / TSE 4006)

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System Introduction

The room and telephone monitoring system TSE 4006 is developed by GAMMA to allow the audio monitoring of room and telephone conversation via standard PSTN telephone lines. The TSE 4006 is designed to operate without interfering with the normal functions of the telephone system and to provide the very high speech quality requirements of surveillance operatives. Transmitters use current when operating and this normally creates a voltage drop in the PSTN line being used. The TSE 4006 receiver is equipped with a special circuit which replaces the current used so that there is no voltage drop in the telephone line. This makes the TSE 4006 difficult to detect by automatic central exchange loop current detector systems.



Description

The TSE 4006 is specifically designed for covert audio surveillance operations. The TSE 4006 has the ability to monitor a room and its telephone line by utilizing the existing telephone system. All room and telephone conversations can be monitored and recorded from a remote location. TSE 4006 utilizes techniques which have not been previously used in PSTN line monitoring and consists of two units: a front end transmitter module TSE 4006-TX and an FM receiver combined with a line intercept amplifier TSE 4006RX.

Transmitter

The TSE 4006 transmitter module incorporates a highly sensitive microphone coupled to a pre-amplifier with a wide dynamic range, fast acting AGC (Automatic Gain Control), and FM-modulator. It is protected against high voltage spikes and calling signals on the line. The TSE 4006 is available in a variety of forms including a scrambled version TSE 4006-TXS-S or TSE 4006-TXR-S.

Receiver

The TSE 4006-RX receiver is built into a strong aluminum housing containing the FM receiver, Mixer circuitry and a line intercept amplifier with a high impedance differential input and very high common mode rejection. This assures that the highest possible signal to noise ratio is achieved. The built-in mixer circuitry allows the operative to listen to either the room conversation or the telephone conversation - or both at the same time. The receiver TSE 4006-RX is equipped with a de-scrambler module, which is capable of de-scrambling the signals from TSE 4006-TXS-S and TSE 4006-TXR-S. Outputs are provided for Headphones, Tape/aux., VOX switch and a 600 ohm balanced output for re-transmission on a standard PSTN dial up line or CCITT M1020 line (leased line).

Applications

A hard wired audio surveillance system is more difficult to detect than a conventional radio transmission system and is capable of giving better speech quality. There is no "drop out" of signal, a common problem with radio transmission systems. The TSE 4006 system incorporates some unique features, and is specifically designed for covert operations. The transmitter is to be installed via parallel connection with the target line and can be concealed inside the telephone, behind the wall socket or anywhere with direct access to the telephone line.

The TSE 4006 system is designed to work with PSTN slave lines without amplifiers and filters.

Typical methods of deployment:

- During new construction work
- Exchanging the telephone
- Hard wiring into the telephone line during covert entry
- Simulated repair of the PSTN communication network

Audio Level/Line Voltage Meter

The TSE 4006-RX is fitted with an analog meter, which enables the line DC voltage or the audio dBm level to be measured by switching between the two modes.

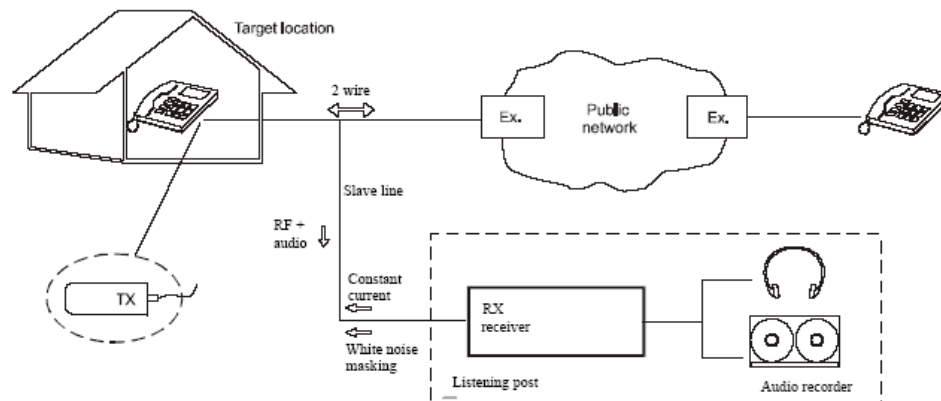
Smart Vox with Noise Cancellation

VOX sensitivity can be set on the front panel. The newly developed intelligent VOX circuitry is equipped with two LEDs for easy setting, and has the capability to distinguish a voice from ambient background noise, increasing the VOX reliability in noisy environments.

Dual Output

The TSE 4006-RX is fitted with 2 audio outputs; an RCA jack socket with line level output for tape recorder and a standard 600 ohm balanced telephone line output for re-transmission of the monitored audio via the PSTN network.

Telephone based operational set up



Technical Features

Fitted with CRS System

All transmitters use current when operating. A major problem for most PSTN line parasitic transmitters is the current drawn from the PSTN line that enables the transmitter to function.

If the transmitter draws more than approx. 6 mA, the line status changes from on-hook to off-hook. This change in current consumption, even when less than 6 mA, is easily detectable by counter surveillance methods and indicates an abnormality in the line. Gamma has developed a Current Re-injection System (CRS) to overcome these problems. The CRS system re-inserts the current used by the TSE 4006-TX unit which avoids a voltage drop across the target telephone line. This ensures that the targeted PSTN line is unaffected by the presence of the TSE 4006-TX unit and makes the system difficult to detect by conventional counter surveillance methods.

Operational Features

Adjustable Off-Hook Threshold Level

The TSE 4006-RX unit is equipped with on-hook/off-hook threshold level adjustment at the rear of the receiver, which can be set between 10 and 40 Volts.

Parametric Equalizer

In order to optimize the audio quality, the monitored signal is passed through a parametric equalizer with variable boost or cut in the 100 Hz to 10 kHz frequency range and variable Q.

Activity Indicator

For ease of operation the receiver unit TSE 4006-RX is fully equipped with LED status indicators.

Options

Standard Transmitter Module

The TSE 4006-TXS is our standard miniature transmitter with built-in microphone.

Extended Microphone Version

On the TSE 4006-TXR transmitter the microphone is mounted on 2 metres of cable, separate from the transmitter board. This allows the microphone to be placed in the target room and the electronics package to be in an adjacent room - a technique that makes it very difficult to locate the transmitter by conventional counter surveillance methods.

British Telecom Outlet Versions

Integrated wall outlet TSE 4006-TXBT-I and External wall outlet TSE 4006-TXBT-W.

Scrambled Versions TSE 4006-TXS-S and TSE 4006-TXR-R

The TSE 4006-TXS-S transmitter uses a Gamma developed, analogue-speech protection system, which ensures the highest possible quality of retrieved speech. A descrambler module in the TSE 4006-RX receiver is able to decode the signals from the TSE 4006-TXS-S or TSE 4006-TXR-R.

Capacitor Housing Version TSE 4006-TXC

The TSE 4006-TXC transmitter is built into a capacitor housing, which allows the unit to be deployed inside existing electronic equipment.

Technical Specifications

RECEIVER/INTERCEPT AMPLIFIER TSE 4006-RX	1.1.
Carrier to be specified by customer or standard	140 kHz +/- 500 Hz
Sensitivity (fmod. = 1kHz, deviation + - 3kHz)	- 82 dBm at 20 dB S/N
Sensitivity (fmod. = 1 kHz, deviation + - 3kHz)	- 48 dBm at 50 dB S/N
Selectivity - 30 dB	+/- 20.65 kHz
Common mode rejection	70 dB
AM rejection (Vin = - 20 dBm, AMmod = 30 %)	40 dB
Distortion (Vin = - 20 dBm, deviation = + - 3 kHz)	0.55 %, 1kHz
Input impedance (140 kHz)	> 1kOhm
Audio frequency response - 3dB (line out)	300 Hz to 5 kHz
Over voltage spikes and ring protection circuit	> 180 V
AUDIO SECTION	1.2.
Differential input impedance AC	> 25 kOhm
Differential input impedance DC	> 3 mOhm
Gain (input to line out)	0 dB (1kHz)
Frequency response (input to line out)	290 Hz - 8.3 kHz - 3dB
Common mode rejection (0 dBm input)	> 70 dB
Signal to noise ratio (0 dBm input)	> 60 dB
Harmonic distortion (0 dBm output, 1kHz)	< 0.2 %
Off hook level adjustment range	10 to 40 VDC
MIXER AUDIO SECTION	
Output voltage line out (deviation = +/- 3 kHz)	700 mV (no load)
Output voltage telephone out (deviation = +/- 3kHz)	230 mV (600 ohm load)
Output impedance telephone out	600 ohm
Output impedance line out	1 kOhm
Output impedance headphones out	47 ohm
Parametric equalizer frequency adjustment range	100 Hz to 10 kHz
Parametric equalizer Q adjustment range	0.4 to 4
Parametric equalizer gain adjustment range	+/- 15 dB
Meter range RF level	- 80 to -20 dBm
Meter range DC level	0 to 60 VDC
Output line current for transmitter	3 mA DC
Max. output voltage for transmitter	72 VDC
Max. noise masking voltage for transmitter	0.3 V RMS
Power supply	115/230 VAC (50 - 60 Hz)
Dimensions	265x260x82 mm
	10.4x10.2x3.2 inches
Weight	2.8 kg / 6.17 lbs
TRANSMITTER TSE 4006-TX	1.3.
Carrier frequency	140 kHz +/- 500 Hz
Output impedance	47 ohm
Output voltage (140 kHz square wave)	500 mV RMS
Max. modulation	+/- 5kHz
Frequency response	150 Hz to 3.5 kHz - 3 dB
Current consumption	3 mA DC
Over voltage spikes and ring protection circuit	> 180 V
Audio amplifier AGC range	50 dB
Microphone vibration sensitivity	< 66 dB
Dimensions TSE 4006-TXS	38x10x10 mm
	1.5x0.4x0.4 inches
Dimensions TSE 4006-TXR	38x10x10 & 10x7x5 mm
	1.5x0.4x0.4 & 0.4x0.3x0.2 inches
Dimensions TSE 4006-TXC	30x10x21 mm
	1.2x0.4x0.8 inches
Dimensions TSE 4006-TXS-S	38x10x14 mm
	1.5x0.4x0.6 inches



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