
TELEPHONE - RADIO INTERFACE

MODELS FXS-4870 & FXO-4871

OPERATOR AND INSTALLATION GUIDE

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CONTENTS	PAGE
INTRODUCTION	
Introduction	1
Block Diagram	1
Photograph	2
CUSTOMER TELEPHONE-RADIO INTERFACE UNIT FXS-4870	
Description	3
Specifications	3
Functions	3
CENTRAL OFFICE/PABX LINE-RADIO INTERFACE UNIT FXO-4871	
Description	4
Specifications	4
Functions	4
WIRING DETAILS & AUDIO LEVEL ADJUSTMENT	
Diagrams	5
Audio Level Adjustment Procedure	6



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TELEPHONE-RADIO INTERFACE MODULES

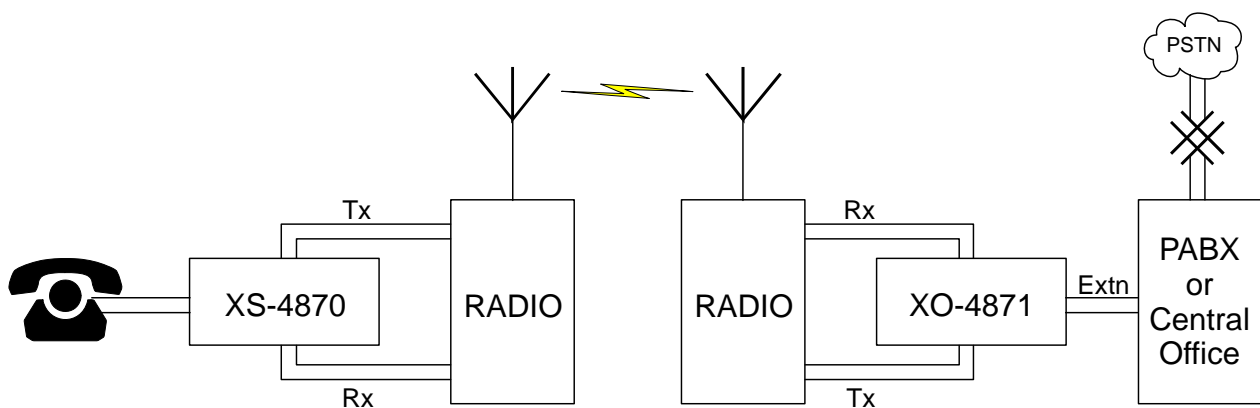
CUSTOMER TELEPHONE-RADIO INTERFACE UNIT FXS-4870

CENTRAL OFFICE/PABX LINE-RADIO INTERFACE UNIT FXO-4871

Introduction

The Telephone-Radio Interface modules extend the 'plain old telephone services' of a Central Office/PABX over a radio link to a remote location.

Block Diagram

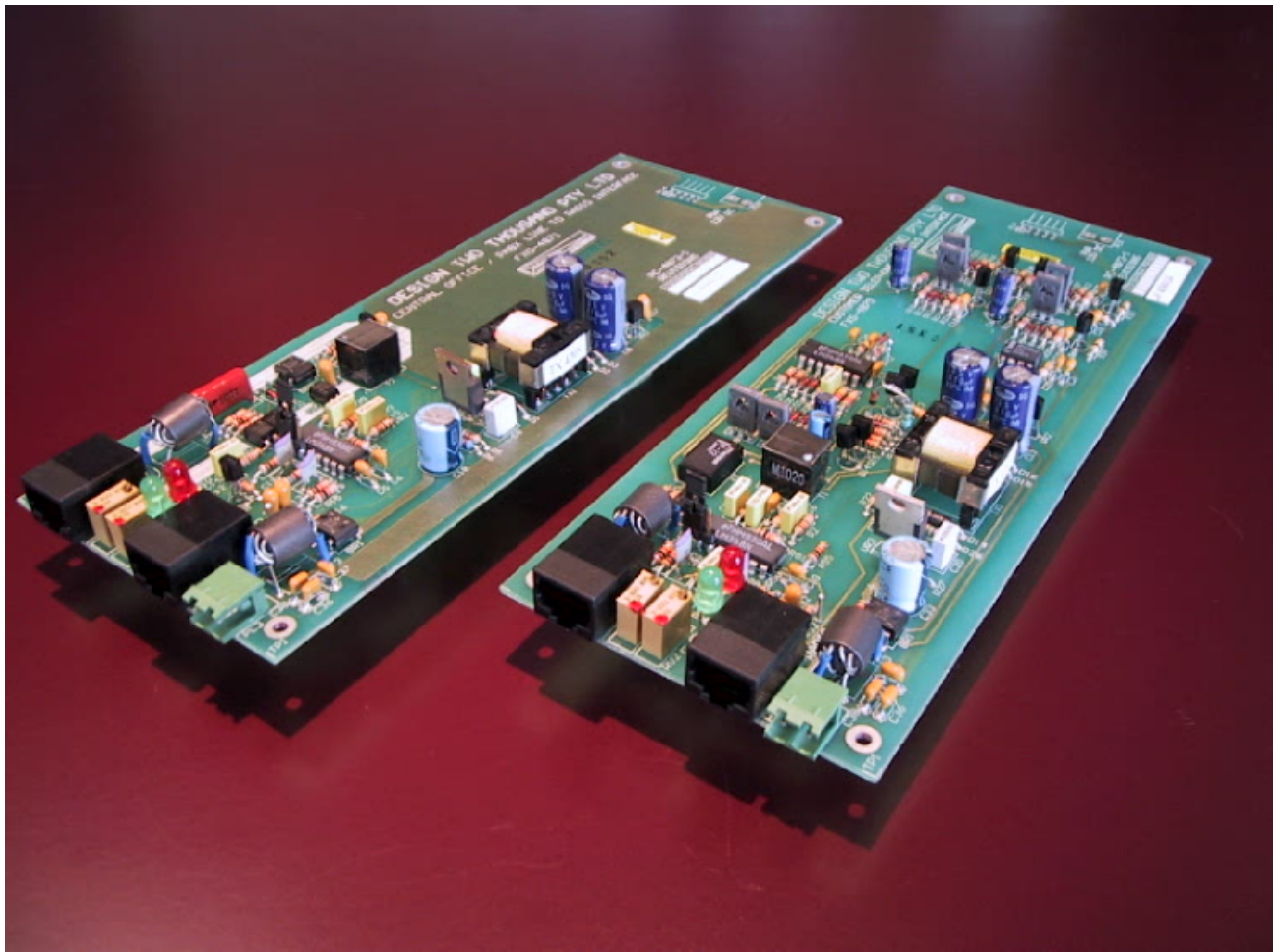


Subscriber End:
-48V DC
Off Hook Detection
PTT
COS Detect
Ringing Voltage Generation

Exchange End:
COS Detect
Line Seize
PTT
Ringing Voltage Detect

Please refer to the following pages for a functional description.

PHOTOGRAPH OF INTERFACE CARDS



CUSTOMER TELEPHONE-RADIO INTERFACE UNIT FXS-4870

Description

At the remote customer (or 'subscriber') end, the FXS-4870 Interface (Foreign Exchange for Subscriber) allows the connection of a standard telephone, fax machine or modem. The telephone interface incorporates a 2 to 4 wire hybrid that separates the transmit and receive audio, and has other basic features of off hook detect and ringing the handset.

The Interface detects when the handset is lifted (goes off hook) and issues a PTT command (open collector to ground) to the Tx section of the duplex radio link. The Interface can also generate ringing voltage for an incoming call when carrier operated squelch (COS) is detected from the Rx section of the full duplex radio link. When the handset is lifted, the loop detect causes the Tx module to PTT, which is detected at the Central Office end and so on.

Dialing is achieved by passing DTMF from the telephone down the radio link to Central Office.

Specifications

Power Requirement:	13.8Vdc nom. (12 – 48 Vdc)
Connectors:	BL-2 (power) RJ45 (radio) RJ45 (phone)
Length of cable:	30m max. (ODX Driver available for up to 4.2 km of 0.4 mm copper wire)
Hook flash detect:	Yes
Audio levels:	350mV RMS (adjustable gain in radio module pre-amp)
Tx Output Level:	1 Volt p-p approx.
Tx Output Impedance:	600 Ohm nom.
Rx Input Level:	1 Volt p-p approx.
Rx Input Impedance:	15k Ohm nom.
COS Detect:	Open collector command from Radio Rx unmute circuit (to be switched to ground during busy/Rx carrier/un-mute)
PTT:	Open collector switched to ground
Return loss:	> 6dB
Mounting:	Four holes for stand-offs
PCB size:	85mm x 227mm in area.

Functions

-48Vdc line feed
Telephone Off hook/On hook detect
PTT (Open collector to ground)
COS detect
25 Hz ac Ringing Voltage (enabled on COS detect but disabled if phone off hook)

CENTRAL OFFICE/PABX LINE-RADIO INTERFACE UNIT FXO-4871

Description

At the Central Office/PABX end, FXO-4871 allows the connection of an analog two wire ring in/loop out powered telephone line. The line interface incorporates a 2 to 4 wire hybrid that separates the transmit and receive audio, and has other basic features of ringing voltage detect and line seize.

The interface detects when the line is ringing and issues a pulsed PTT command (open collector to ground) to the Tx section of the full duplex radio link. This interface also seizes the line when carrier operated squelch (COS) is detected from the Rx section of the full duplex radio link. When the remote telephone is lifted off hook, this interface detects COS and seizes (loops) the line, causing any ring to cease and the continuous assertion of PTT allowing a full duplex conversation to occur.

All Central Office service tones such as dial, ring-back, and busy are in-band and therefore heard at the remote end.

Specifications

Power Requirement:	13.8Vdc nom. (12 – 48 Vdc)
Connectors:	BL-2 (power) RJ45 (radio) RJ12 (Central Office/PABX extension)
Length of cable:	30m max.
Hook flash:	100ms
Audio levels:	350mV RMS (adjustable gain in radio module pre-amp)
Tx Output Level:	1 Volt p-p approx.
Tx Output Impedance:	600 Ohm nom.
Rx Input Level:	1 Volt p-p approx.
Rx Input Impedance:	15k Ohm nom.
COS Detect:	Open collector command from Radio Rx unmute circuit (to be switched to ground during busy/Rx carrier/un-mute)
PTT:	Open collector switched to ground
Return loss:	> 6dB
Mounting:	Four holes for stand-offs
PCB size:	85mm x 227mm in area

Functions

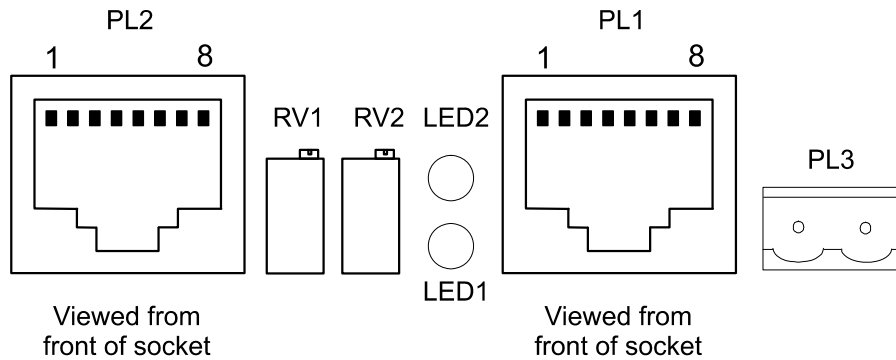
COS detect

Line seize

PTT (Open collector to ground), pulsed with detected ringing voltage, continuous with COS detect

Ring Voltage detect

WIRING DETAILS & AUDIO LEVEL ADJUSTMENT



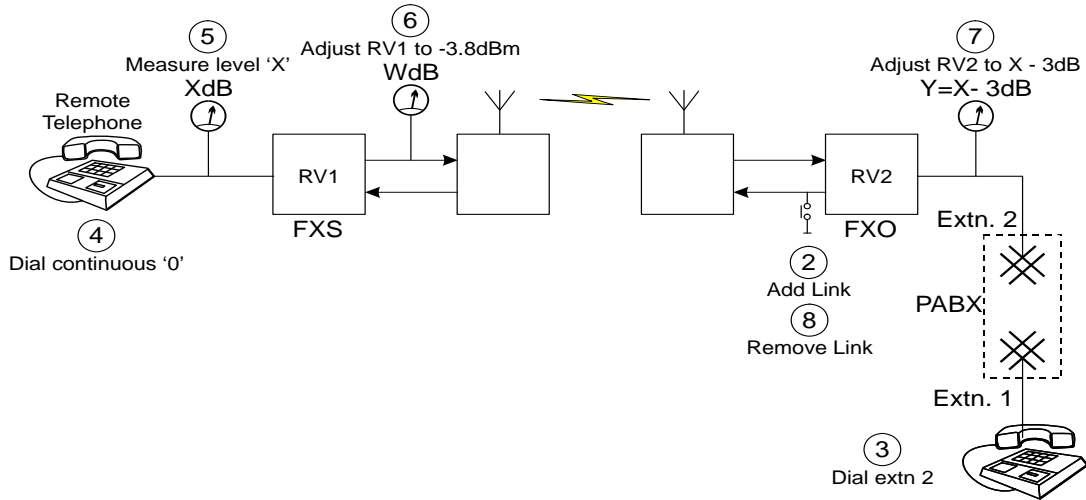
DESCRIPTION	FXS-4870/PC-4872	FXO-4871/PC-4873
CONNECTOR PL2	PHONE	LINE
1	NC	NC
2	NC	NC
3	NC	NC
4	La	La
5	Lb	Lb
6	NC	NC
7	NC	NC
8	NC	NC
RV1 LEVEL	PHONE TO RADIO	LINE TO RADIO
RV2 LEVEL	RADIO TO PHONE	RADIO TO LINE
LED1 RED	POWER	POWER
LED2 GREEN	OFF HOOK	LOOP LINE
CONNECTOR PL1	RADIO	RADIO
1	NC	NC
2	AUDIO TO RADIO	AUDIO TO RADIO
3	AUDIO FROM RADIO	AUDIO FROM RADIO
4	ANALOG GROUND	ANALOG GROUND
5	PTT OUTPUT (OPEN COLLECTOR) SWITCHES TO GND WHEN PHONE OFF HOOK	PTT OUTPUT (OPEN COLLECTOR) SWITCHES TO GND WHEN LINE LOOPED OR RINGING
6	COS INPUT TO BE SWITCHED TO GND TO ACTIVATE RING	COS INPUT TO BE SWITCHED TO GND TO LOOP LINE
7	SIG GND (GND)	SIG GND (GND)
8	NC	NC
CONNECTOR PL3	POWER	POWER
1&2	12-48V DC POLARITY INSENSITIVE	12-48V DC POLARITY INSENSITIVE

AUDIO LEVEL ADJUSTMENT AT THE WORKSHOP

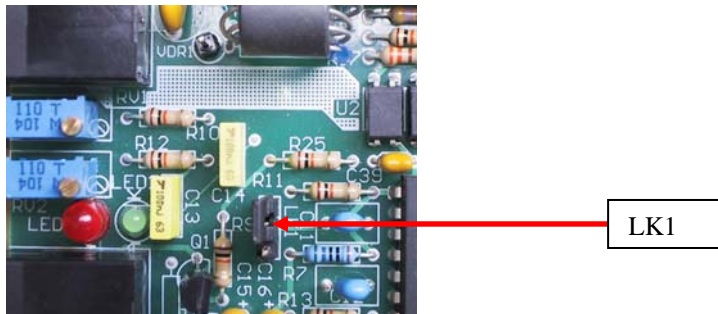
The transmit and receive levels of the FXS and FXO are **preset at the factory**, but set-up and fine tuning is possible using the following procedure as a guide:

Stage 1

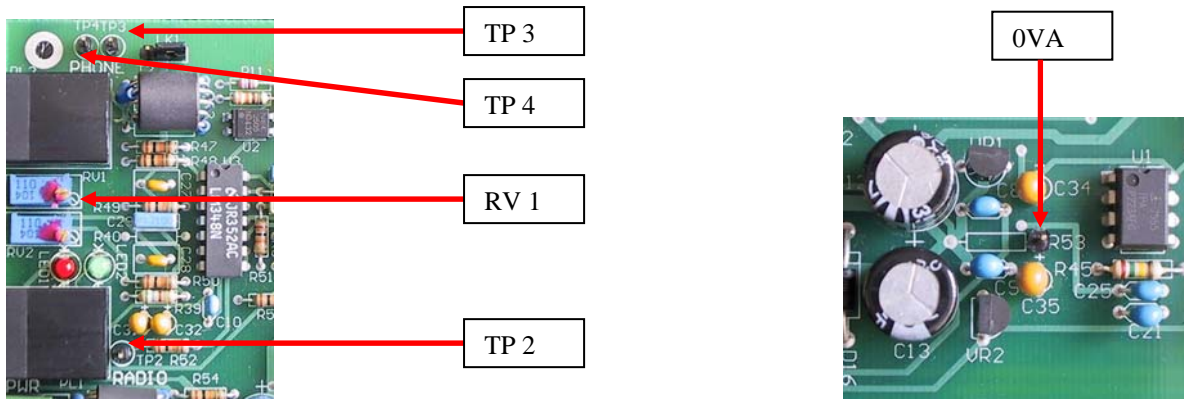
1. Connect Remote Telephone, FXS, Radio modules, FXO and PABX as per diagram.



2. Place the shunt across the top two pins of LK1 on the FXO to break the audio path from FXO to FXS.

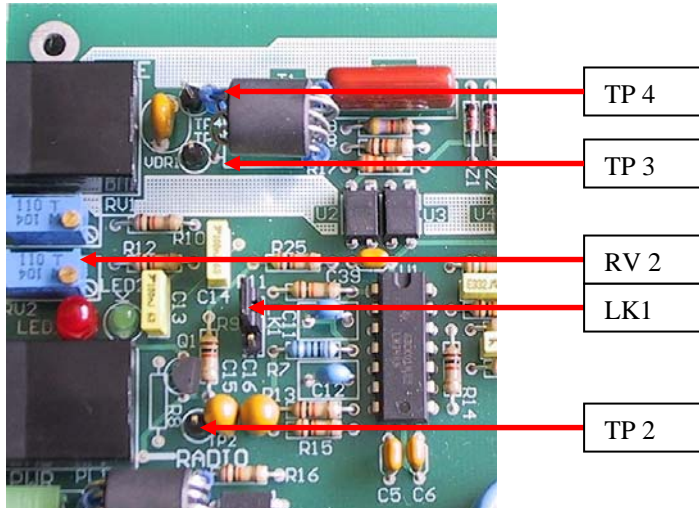


3. From Extn 1 dial Extn 2 and answer Remote Telephone.
4. Dial a continuous DTMF '0' from the Remote Telephone.
5. Measure level X at the telephone input to the FXS – TP 3 and TP 4



6. Adjust RV1 of the FXS so that $W = -3.8\text{dBm}$ is transmitted to the Remote radio – TP 2 and 0VA on R53

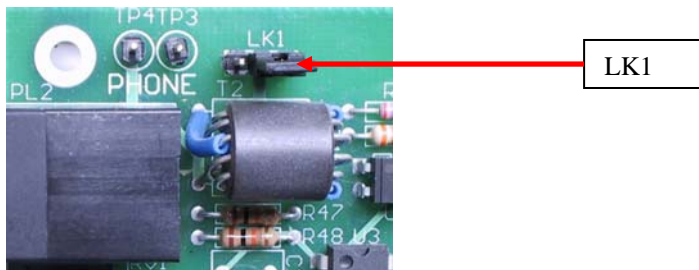
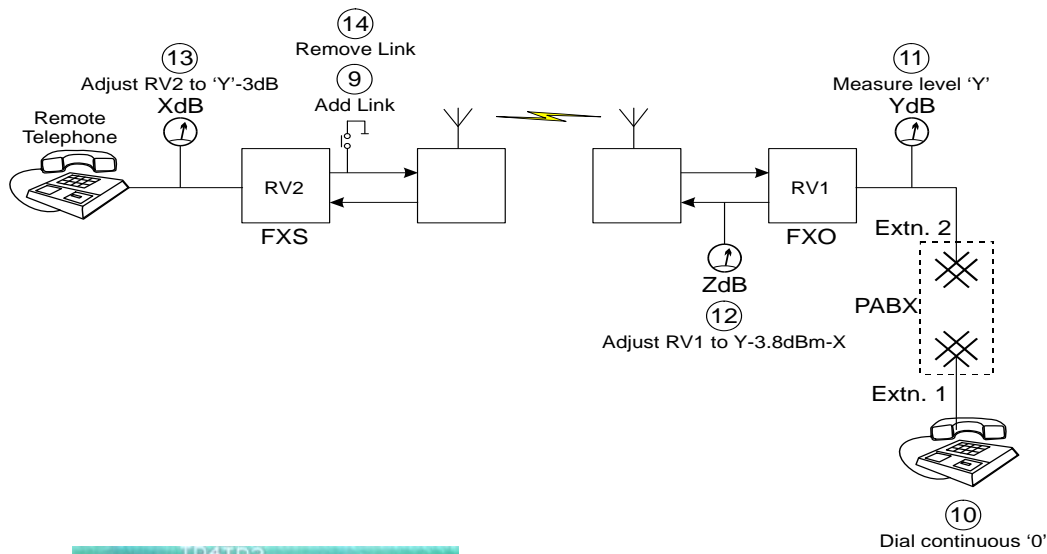
7. Adjust RV2 of the FXO so that the level to the PABX line at Y is X- 3dB.



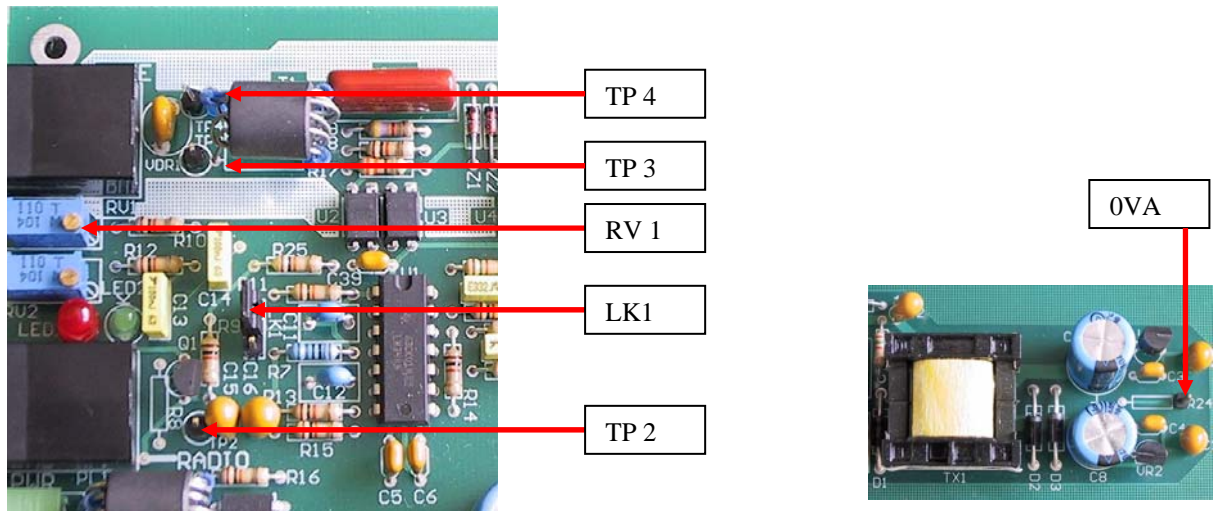
8. Remove the shunt across LK1 of the FXO to restore the audio path from the FXO to the FXS.

Stage 2

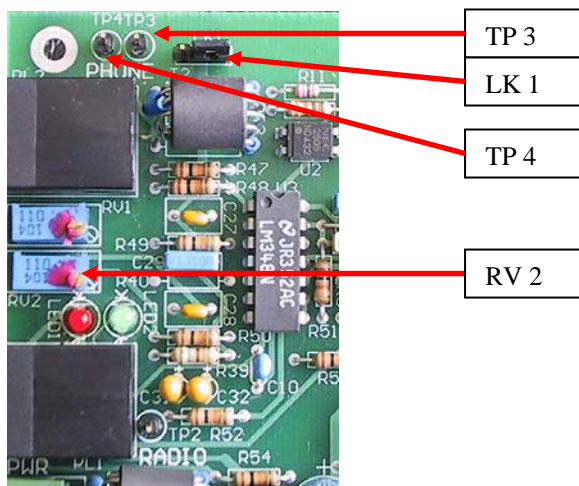
9. Place the shunt across the right two pins of LK1 on the FXS to break the audio path from FXS to FXO.



10. Dial a continuous DTMF '0' from Extn 1 telephone.
11. Measure level Y at the line input to the FXO – TP 3 and TP 4



12. Adjust RV1 of the FXO so that $Z = Y - 3.8\text{dBm} - X$ is transmitted to the Office radio – TP 2 and OVA on R24
13. Adjust RV2 of the FXS so that the level to the Remote telephone at X is $Y - 3\text{dB}$ – TP 3 and TP 4



14. Remove the shunt across LK1 of the FXS to restore the audio path from the FXS to the FXO.
15. The system is ready for use.

Designed and Manufactured in Australia



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