

Kit 33. TELEPHONE SWITCH FOR TAPE RECORDER

How often do you want to record both sides of your telephone conversations for future reference or for checking what you both said? For commercial orders placed over the phone such a recording device is invaluable. This Kit allows you to construct an electronic switch which will automatically turn on your tape recorder when you pick up the handset of your telephone.

Note that your tape recorder must have both a MIC socket and a REMOTE socket on it so that this Kit can plug into the recorder and control it. Cheaper tape recorders tend to leave off these external plug sockets (although if you know where to look they may still be accessed inside the tape unit on the circuit board.)

Some countries have laws which do not allow unauthorised attachment of devices to their telephone lines. They are enforced to varying degrees. It is the responsibility of the buyer of this Kit not to break these laws in the country where they purchase this Kit.

This circuit is designed to work for the newer 1.5V and 3V tape recorders as well as the usual 6V or 12V ones.

The kit is constructed on a single-sided printed circuit board (PCB). Protel Autotrax and Schematic for DOS were used to produce the board.

ASSEMBLY INSTRUCTIONS

Place and solder the lowest height components first - the diodes and resistors. Do not mix up the VN10K FET with the BC548. Make sure you get them in their correct position as marked on the overlay of the PCB. Note which way the diodes are to be placed - the stripe on the glass of the diode is the cathode and must match the stripe on the overlay pattern for the diode on the PCB. There are two metal links to insert on either side of the PCB mounted DPDT switch. Use some of the metal cut from the diode or resistor leads to make these.

We have included 20" of two strand flat cable wire in the Kit. Cut it into two lengths of 10". These are used to make the connections to the telephone line and to the tape recorder. Connect one end of each length of wire into the PCB at the places marked TO REMOTE, and MIC.

Connect the following connectors to the other ends of the wires:

to the free end of the TO REMOTE wire attach the 2.5 millimeter diameter plug. (This plug is the smaller of the two plugs supplied.) It plugs into the REMOTE socket of the tape recorder.

to the free end of the MIC wire attach the 3.5 millimeter diameter plug. (This plug is the bigger of the two plugs supplied.) It plugs into the MIC socket of the tape recorder.

Use the alligator clip cable for the TO EACH LINE pads. Cut the cable in half. Attach each half into the pads. Each clip goes onto one of the two telephone lines coming into your house. (That is, the Kit is attached in parallel with the phone.) If you find you have four lines going to your phone then the two lines you want will either be the outer two (most likely) or the inner two. You will have to experiment.

CIRCUIT DESCRIPTION

The circuit falls into two parts and these can be easily seen in the diagram. On the left are the connections to each telephone line and to the MIC socket of the tape recorder. The diode and capacitors ensure that no DC voltages pass through to the input of the MIC while the RC network clips large transients. On the right is the circuit which detects when the handset has been lifted and which then turns on the FET. The trim pot adjusts the voltage level of this circuit.

The voltage of the normal telephone line is between 40 to 60 volts (depending on country and telephone system.) When you pick up the handset of the telephone the voltage falls to between 6 and 12 volts. It is this drop in voltage which is used to control the tape recorder through the REMOTE connector. When the line voltage is high the base of the BC548 is pulled high so the transistor is turned on. This pulls the gate of the FET down to less than 1 volt. This shuts off the FET. (N channel enhancement mode FET's need drain bias positive and a positive gate to turn on.) When the line voltage falls (that is, the handpiece is picked up) the BC548 must turn off; adjust the trimpot if it does not. So the FET gate potential rises to the 10 volts set by the zener diode. This turns the FET on to high efficiency conduction mode.

Different recorders may have different polarities in their REMOTE sockets. To allow for this a PCB mounted switch has been added to the board which will reverse the polarity of the REMOTE switch just by switching it.

When the Kit is completed place the Kit and your tape recorder next to the phone. Plug in the 2 sockets (MIC & REMOTE) into the recorder. Attach one alligator clip to each phone line (you may have to remove some plastic or covering from the phone line cables to get a good electrical connection.) Put in a cassette tape and push 'play'. Provided the Kit has been put together correctly either of two things will happen: the tape in the recorder will start to play or it will not.

1. If it does not play then pick up the phone handset. If the tape now starts to play then the Kit is working. Put the handset down, depress the play and record buttons and the tape will now record when the handset is raised.

2. If the tape plays then either of two things need adjustment:

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- move the position of the trimpot across its range of positions and see if this stops the playing. If it does then lift the handset to see if the playing starts. It should. The Kit is ready for use.

- if adjustment of the trimpot does nothing then the REMOTE switch needs to be switched to the other position. Do this and repeat the steps as outlined above. The kit should now work.

WHAT TO DO IF IT DOES NOT WORK

Poor soldering is the most likely reason. Over 80% of Kit problems are due to poor soldering. Check all solder joints carefully under a good light. Next check that all components are in their correct position and orientation especially the transistors and the diodes.

Did you add the two jumper links next to the PCB mounted switch? Are the wires in the 2 plugs short-circuiting when you screw on the cover?

WHAT TO LEARN FROM THIS KIT

The Kit may serve as an introduction to your telephone system and the tape recorder as well as the more basic operation of transistors, FET's as switches and diode operation.

This circuit should work on virtually all phone systems. Cheaper versions of the tape recorder switch use a reed switch mounted inside a coil. More expensive versions have a battery power source with it to make sure that switch turns on when the handset of the phone is lifted.

COMPONENTS

Resistors (1/4watt, 5%):	
220R red, red, brown	1
22K red, red, orange	1
10M brown, black, blue	3
1M (105) Koa trimpot	1
1N4004 diode	1
1N4148 diode	6
BC548 transistor	1
10V zener diode	1
VN10K N-channel DMOSFET	1
100nF (104) mylar capacitors	2
Kit 33 PCB	1
2 strand twin cable	20"
2.5 mm plug	1
3.5 mm plug	1
Alligator cable	1
PCB - mounted DPDT switch	1

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