

TAPE SLIDE SYNCHRONIZER

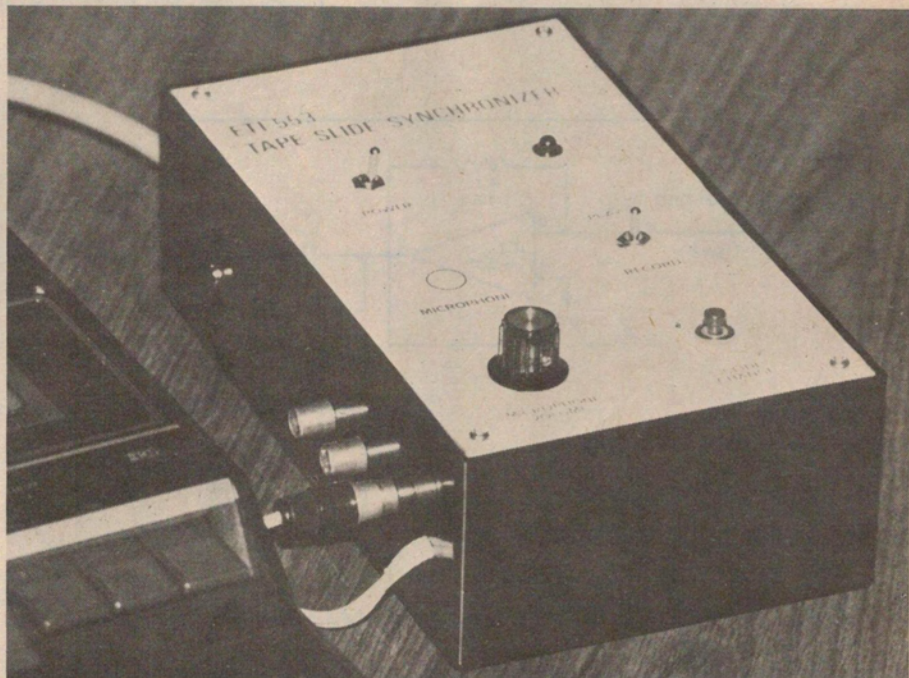
This unit will let you tape record a commentary for your slide show, so you can even give a talk without being there. . .

WHEN PUTTING ON a slide show for your friends or a business meeting, it is usually necessary to have some commentary with it. If it is a one-time presentation this is no problem, but if the show is to be repeated or if you simply want to be able to recall good memories a couple of years later then a tape recording of the commentary is ideal. The problem now is to keep the slides changing in synchronization with the commentary, without having to record that obtrusive phrase 'change slide now' onto the tape.

This unit allows a control tone (100 Hz) to be recorded on the tape along with the normal voice recording; when replayed the tone will activate a relay which will change the slide while a notch filter removes the tone so it is not heard through the speaker. We published a similar design some six years ago which recorded the tone on the second channel of a stereo recorder. While this worked well, a stereo recorder is not always available, and this design allows an economical mono recorder to be used.

Construction

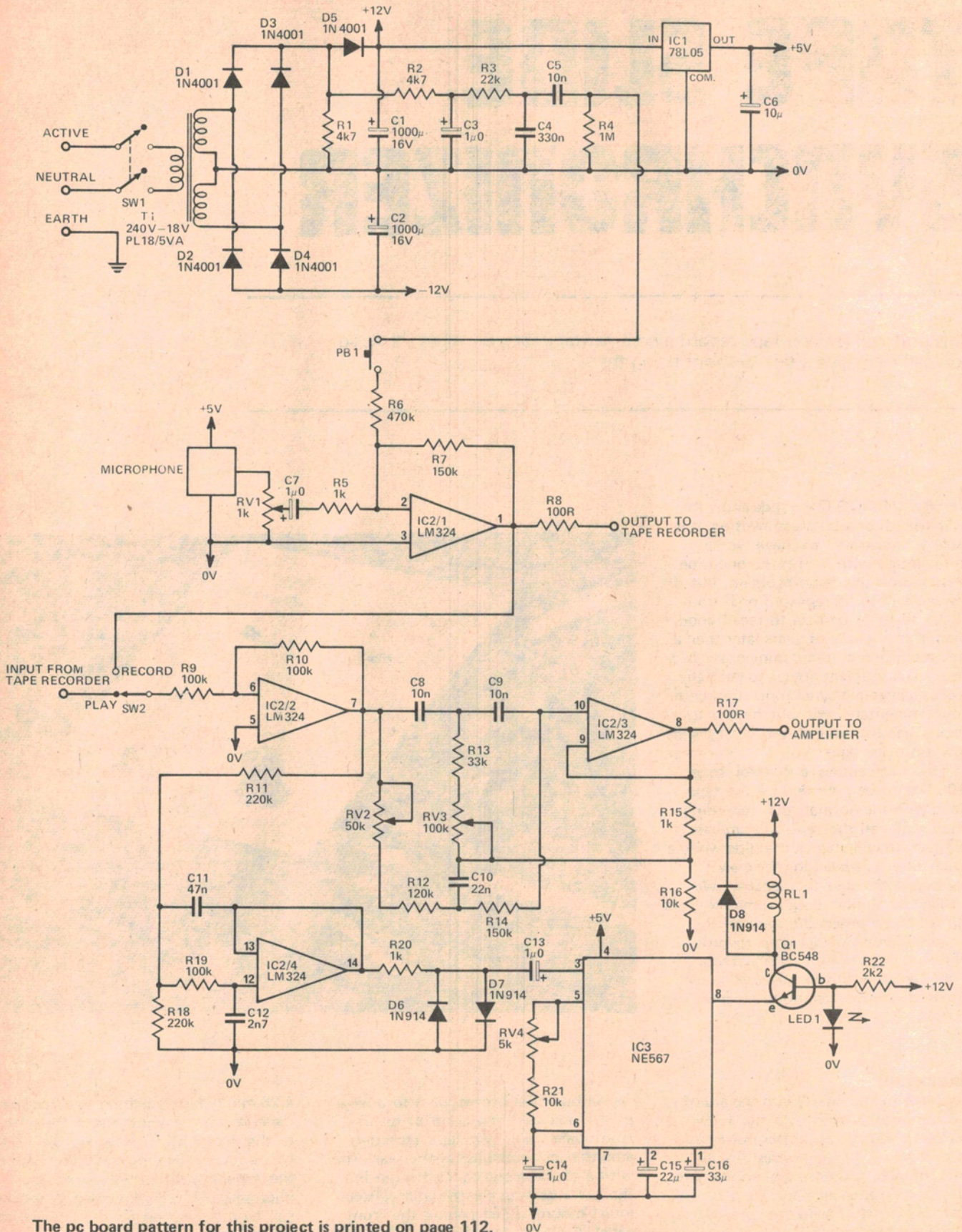
Assemble the pc board with the aid of the component overlay in fig. 1. With the 240 V wiring it is better not to use pc pins but solder the wires directly onto the pcb. A covering of epoxy glue over the tracks leading to the transformer will help to prevent accidental contact.



We built the prototype into a large plastic box with the controls on the front panel and the tape recorder/amplifier connections on the rear. The wiring of the front panel is given in fig. 3. We used an electret microphone insert mounted just behind the front panel. A plastic Scotchcal was used with

a 25 mm dia. hole behind to allow the panel to vibrate and transmit the sound to the microphone. However the noise of the relay operating could be heard on the tape and therefore an external microphone is recommended. A socket can be mounted on the front panel in the microphone position.

Project 553



The pc board pattern for this project is printed on page 112.

HOW IT WORKS — ETI 553

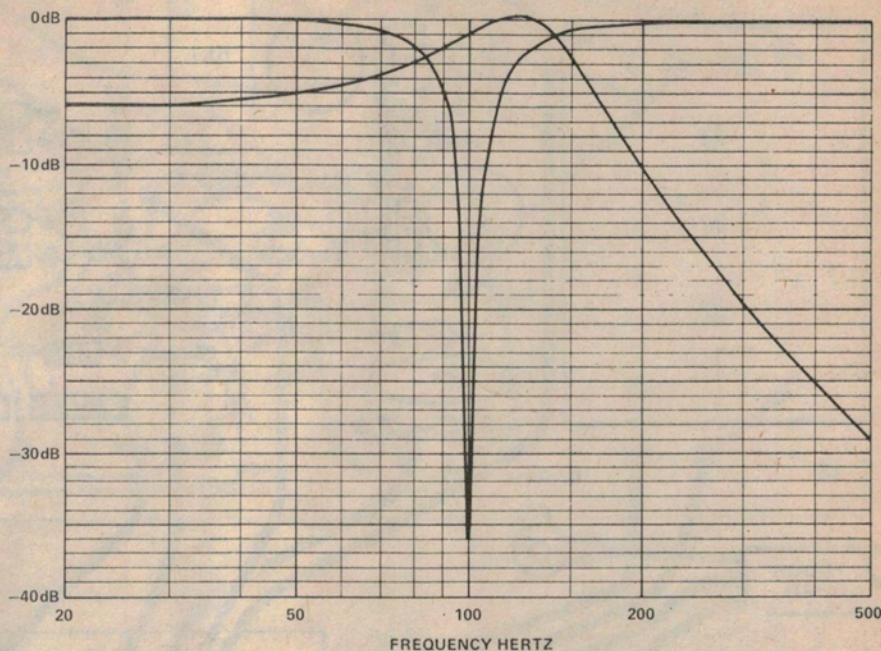
With this unit, unlike our previous design, we record a 100 Hz tone burst on the same channel as the speech whenever we require a slide to be changed. The tone is derived by full wave rectifying the output of the transformer and filtering out the harmonics by R2,3/C3,4.

Pressing the slide change button mixes this tone with the output from the microphone which is amplified by IC2/1. This combined output is recorded on the tape.

In the record mode SW2 connects the output of IC2/1 to the buffer amplifier IC2/2. In the playback mode it connects the output from the tape recorder to the amplifier. The output of this amplifier is split into two paths. One of these is through a 100 Hz notch filter to IC2/3 effectively removing the 100 Hz tone without much change to the rest of the spectrum. This is used to drive an amplifier/speaker system.

The other path for the signal after IC2/2 is via a low pass filter IC2/4. This removes frequencies above 150 Hz and has a response as shown in fig. 3. When the 100 Hz tone occurs, this filter passes it, rejecting speech frequencies, and it is passed to IC3. This is a phase locked loop tone decoder and its output on pin 8 turns on when the correct frequency tone is received. The output stage of this IC is an open collector npn transistor which can sink but not source current. With no incoming tone this transistor will be off, preventing any emitter current in Q1, hence turning it off also. The voltage on the base of Q1 in this case will be set at 1.6 V by LED1. When a tone occurs the output of the IC will saturate to about 0.6 V, forward biasing Q1, turning it on, and closing the relay. The current in R22 is now bypassed into the base of Q1, giving about 1.2 V on the base. This is too low for the LED to conduct and it will go out.

The power supply is simply full wave rectified and filtered for IC2, and a 5 V regulator is used for the PLL IC and the microphone amp.



Using the Unit

With this unit a separate amplifier/speaker system is needed. Also the slide projector must have a remote change button using normally open contacts. Connection has to be made between these contacts and the relay in the unit. Check that these wires are isolated from the 240 V mains and if not be very careful with the connections.

Connect the unit to the tape recorder and projector, assemble the slides in the correct order and switch on. With the record/playback switch in the record position and the recorder set to record, commence the commentary, changing slides with the button on the unit. The high level input on the recorder should be used and the microphone level pot set to give the correct recording level.

When playing back simply set the record/playback switch to playback and replay the tape.

Adjustments

Set the unit up to record and with all trim pots at the centre of their travel and the microphone level at minimum, hold the slide change button down. Probably some 100 Hz signal will be heard on the output of the amplifier. Alternately adjust RV2 and RV3 to minimise this signal. It should be necessary to wind up the volume of the amplifier to finally adjust for a minimum level.

The other adjustment is of the phase locked loop centre frequency. With the push button pressed slowly rotate RV4 until the relay either opens or closes. If it closes, continue to rotate it until it drops out then bring the pot back to the half way point. If the relay opened, reverse the rotation to find the other point at which it opens and leave RV4 midway between these two points.

Check the operation of the relay when pressing the button. There should be about half a second delay before it closes.

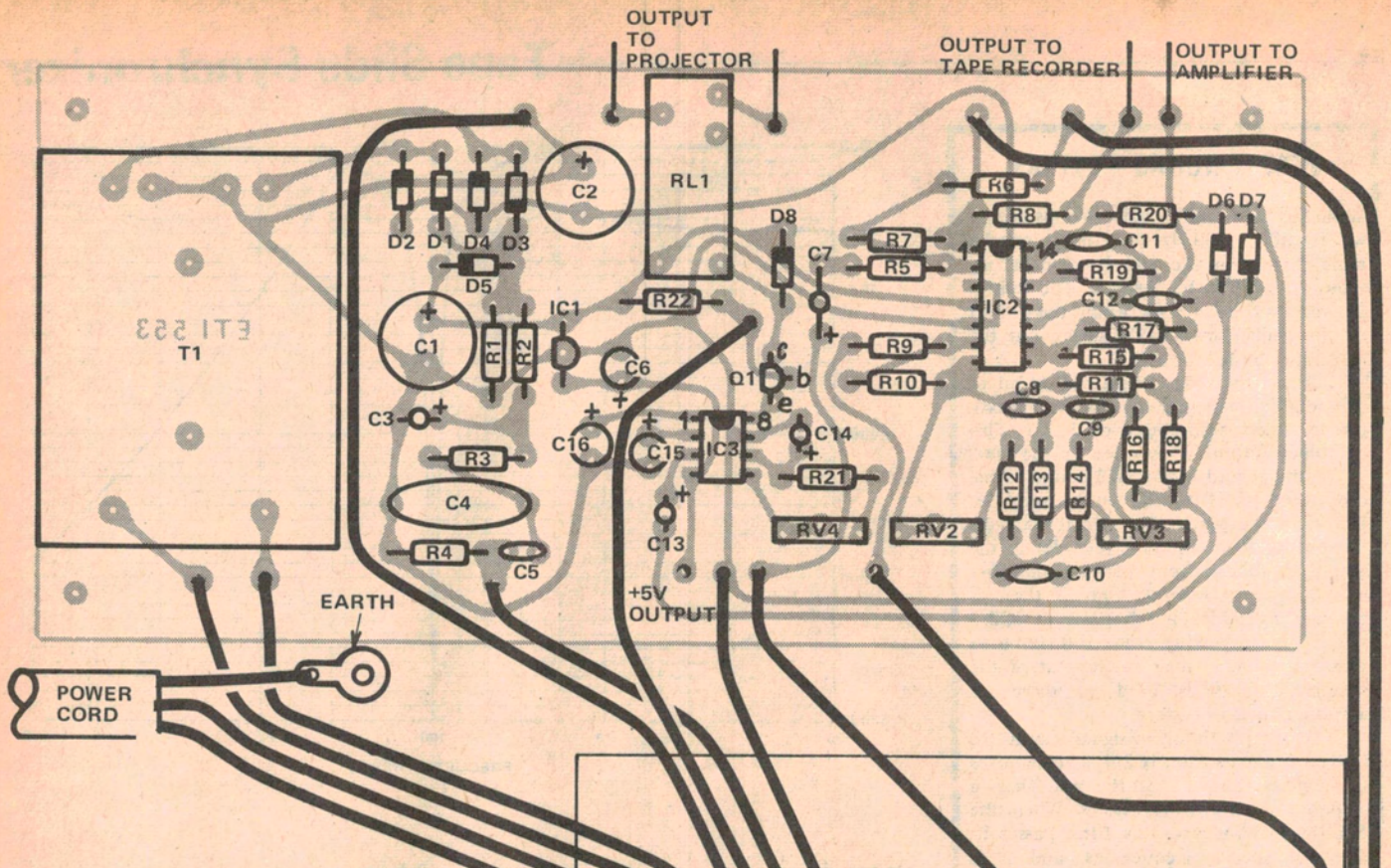


Fig. 3. The component overlay and wiring diagram.

PARTS LIST - ETI 553

Resistors all 1/2W, 5%

- R1, 2 4k7
- R3 22k
- R4 1M
- R5 1k
- R6 470k
- R7 150k
- R8 100R
- R9, 10 100k
- R11 220k
- R12 120k
- R13 33k
- R14 150k
- R15 1k
- R16 10k
- R17 100R
- R18 220k
- R19 100k
- R20 1k
- R21 10k
- R22 2k2

Potentiometers

- RV1 1k log rotary
- RV2 50k trim
- RV3 100k trim
- RV4 5k trim

Capacitors

- C1, 2 1000µ 16V electro
- C3 1µ0 25V electro
- C4 330n polyester
- C5 10n polyester
- C6 10µ 25V electro
- C7 1µ0 25V electro
- C8, 9 10n polyester
- C10 22n polyester
- C11 47n polyester
- C12 2n7 polyester
- C13, 14 1µ0 25V electro
- C15 22µ 10V electro
- C16 33µ 10V electro

Semiconductors

- IC1 78L05
- IC2 LM324
- IC3 NE567 (8 pin)
- Q1 BC548
- D1-D5 1N4001
- D6-D8 1N914
- LED

Miscellaneous

- PC board ETI 553
- Relay 12V 280Ω
- Transformer 240V-18V (PL18/5VA)
- Two toggle switches
- One push button switch N/O
- Box to suit
- 3 core flex and plug
- Output sockets etc.