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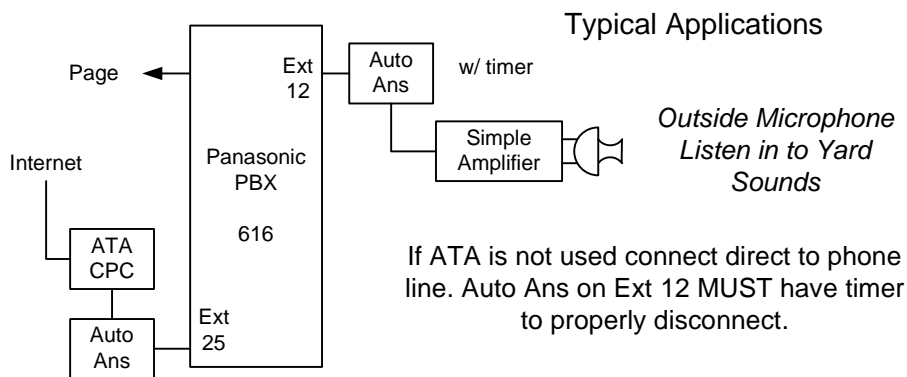
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This design allows you to call in from the outside, either VOIP or POTS line and connect to your PBX. You can then dial numbers on your PBX, page or listen in to sounds in your yard. Ext 25 MUST be programmed NOT to allow access to outside lines. Auto Ans on Ext 12 must have a timer to properly disconnect. PBX does not provide a CPC pulse.

# Auto Answer

Auto Answer & Connect to Audio or POTS Line or VOIP Line

## Building an Auto Answer Device With Timer Instruction Manual and Technical Explanation

This device will answer a regular Telephone Line or a telephone line provided by an ATA (Analog Terminal Adapter) that is used for a VOIP or Internet Telephone Line.

There are two options. Option A is using a CPC (Calling Party Control) signal, interruption of the battery on the phone line, to disconnect when the caller is finished. This may also be called Loop Current Disconnect. This is standard on a line furnished by a Telephone Company Central Office, but may not be provided on an Internet Telephone Line or ATA. If you have an ATA you will need to verify you have CPC. Option B is a timer to force a disconnect after a specific time. This may be used with or without CPC as a back up for disconnect or if you want to limit the connect time.

The design is based on my patent, United States 4,527,015, You are granted the right to manufacture this device for your own use. There are a number of "tricks" in the original design, it is not as simple as it looks. The original circuit included a back up timer for disconnect. The timer IC in the original design is not longer manufactured.

This is an advanced project and you should have average, or better, experience in building electronic projects from diagrams, not kits. I am guessing that if I give out 100 of these little booklets only 1 or 2 will actually build the project.

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## Notes on the Design

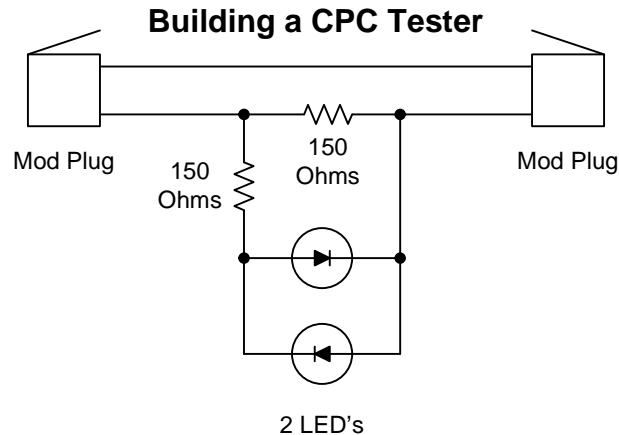
This design is simplified. I strongly suggest you add the simple timer as a back up for disconnect even if you have CPC.

There are 2 circuit designs, one for the answer device and one for the timer. More advanced users may wish to design an IC timer circuit that provides an adjustable timer for disconnect.

Several tests were made on ATAs. Depending on the ATA the open circuit voltage on the telephone line may be 24 or 48 Volts, the newer ones are 48 Volts. The line current is around 24 to 28 MA, this is just adequate. Ringer load will vary from less than one bell to three bells. (1 Bell = 1 500 or 2500 Tel Set).

Some ATAs DO NOT provide a CPC interrupt of the line and you MUST have a timer.

The bell load for this device is about 0.1 REN or less.



Construct the above circuit. Cut a Mod Cord in half and add the resistors and LEDs. Only one LED will light at a time, it will go out briefly if you have CPC. Have someone call you, answer and stay off hook while they hang up and disconnect. If you have CPC the LED will go out briefly shortly after they hang up. If you have reverse battery the LEDs will switch on and off when they hang up (not common).

The Grandstream HT-502 ATA will allow the CPC time to be adjusted for a longer battery interrupt time.

## Frequently Asked Questions

Do you really need a timer?

Yes and no. No if you have CPC, yes if you want to prevent someone from remaining connected for hours and hours or beyond the time you want them to stay on the line.

You could put a switch on the timer to use two capacitors one for a short time and one for a long time. I would suggest 100 Mfd or 220 Mfd and a switch to add 1000 Mfd.

How could you use this device?

Many kits take a microphone and amplify the signal. You could connect the output of the amplifier to this device and you have a house monitor or a warehouse monitor or a monitor for outside your home. (Check local laws first!)

It could connect to an extension port on a PBX so that callers can dial any phone on the PBX. You might want to restrict access to outside lines, those calls to Santa at the North Pole can get expensive.

Is it 100% foolproof?

Almost, I have never had a complaint on using this circuit. There have never been any major issues. It should also work worldwide.

CPC is the key to proper operation.

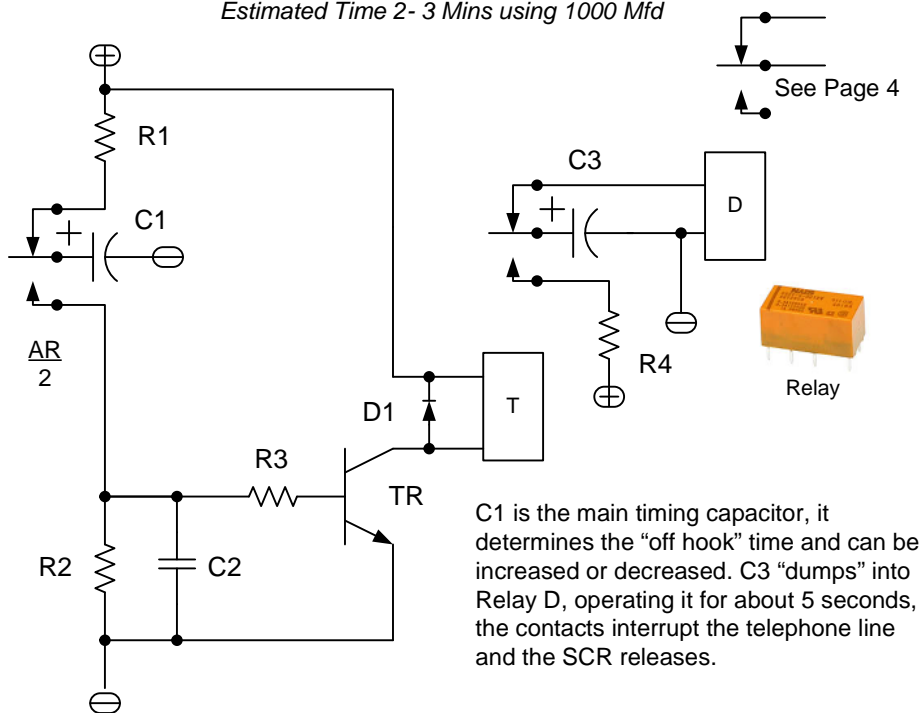
What if I have a problem? Or I want to build this?

Contact me on C Net 798-7676 Pacific Time 8A to 6P

## Back Up Timer

You need to build and test this on your own!

Estimated Time 2- 3 Mins using 1000 Mfd

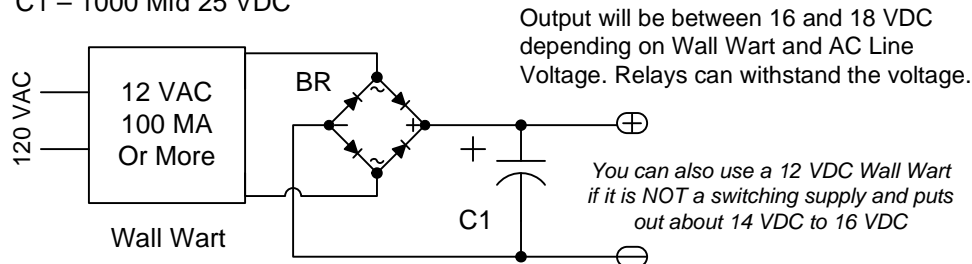


C1 is the main timing capacitor, it determines the "off hook" time and can be increased or decreased. C3 "dumps" into Relay D, operating it for about 5 seconds, the contacts interrupt the telephone line and the SCR releases.

R1, R4 – 47 Ohms – Limit charge current to capacitor R2 – 220K  
 R3 – 100K – Base Current limiter C1 – Aprox 1000 Mfd 25 VDC  
 C2 – 0.1 Mfd 100 VDC – RF Filter C3 – 220 Mfd 25 VDC  
 T and D Relays – 12 VDC Dip Package DPDT Aprox 700 Ohms  
 TR – 2N4401 D1 – 1N4004

## Power Supply 12 VAC to about 16-18 VDC

BR – 4 Ea 1N4004 Diodes  
 C1 – 1000 Mfd 25 VDC



You can add an LED with a 1000 Ohm resistor across C1 if you want an indicator to show the power is on. The same can be wired on the second contact of Relay T to indicate Off Hook.

## Theory of Operation

The bridge rectifier maintains polarity for the SCR and converts the AC ringing to DC.

The neon lamp & photocell, "resistor", form a circuit that has low resistance when the telephone line rings. The "resistor" charges C2 with DC. R2 controls the rate of charge and can be varied for "ring delay".

Once C2 is charged to about 90 Volts NE2 fires and discharges C2 into the gate of the SCR. R3 controls the current and C2 takes about 2 seconds to discharge, this keeps the SCR on for about 3 Hz until the off hook condition is recognized. R4 and C3 keep the gate from being effected by stray voltages, the gate is very sensitive.

When the SCR conducts if remains conducting until the telephone line receives a momentary open and there is no voltage. This is the CPC voltage interruption or an interrupt from the timer.

The SCR conducts and relay AR operates. The Zener keeps only 9 volts across the relay. Contact 1 on the AR relay connects the transformer to the external audio or telephone line. Contact 2 is used for the timer circuit.

For a more detailed description look on my web site for a link to the patent for the circuit.

Key to the circuit operation are the neon lamps.

The photo cell is one that has a high dark resistance and a low resistance when there is light. Almost any cell with these characteristics will work. These cells are about \$1 each.

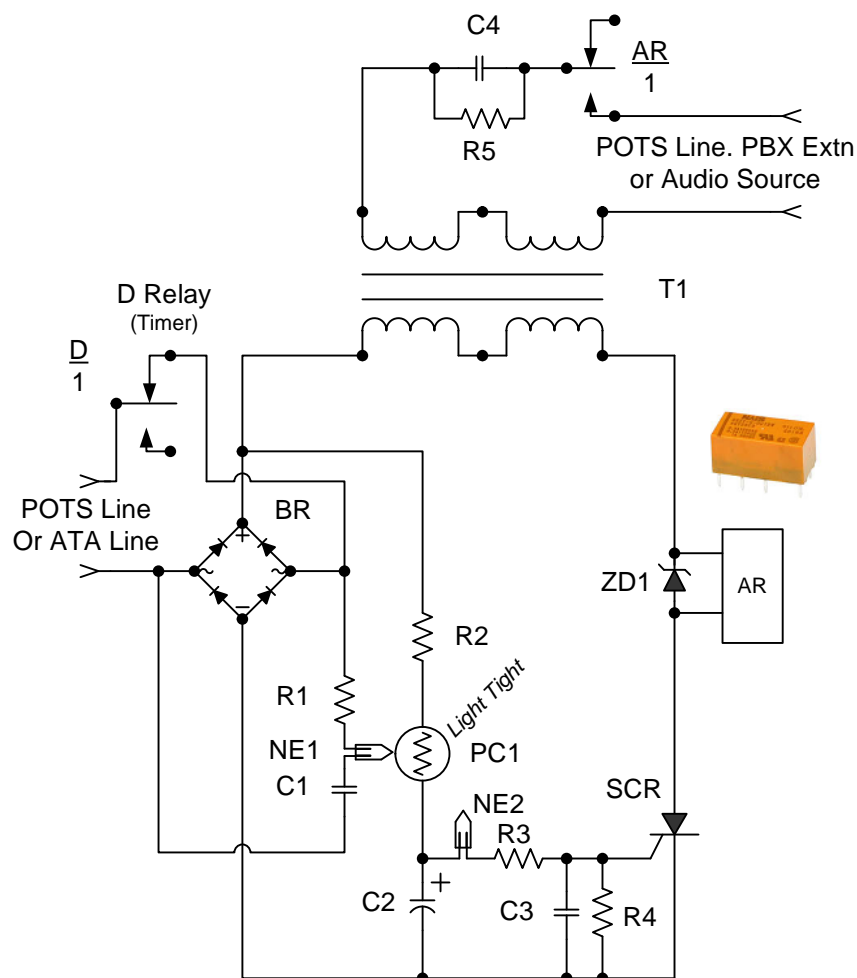
C4 and R5 are needed only if the external connection is to a telephone line or a PBX Extn.

Do not use a high level of audio for the external source.

REN is about 0.1 and less if you increase the 100K resistor.

## Automatic Answer – CPC Disconnect

## Parts List



R1 – 10K – Neon Lamp Current Limiting  
 R2 – 100 K – Ring Delay, use up to 1 Meg  
 R3 – 68K – Current Limit SCR Gate  
 R4 – 68 K – Keeps SCR gate low  
 R5 – 150 Ohm – 2 ea 330 Ohm ½ Watt in parallel – Current limit for phone line, simulates a standard telephone set

C1 – 0.1 Mfd 250 Volts – Isolates DC from Neon Lamp  
 C2 – 10 Mfd 250 Volts – Ringing Delay  
 C3 – 0.022 Mfd 250 VDC – SCR Gate RF Filter  
 C4 – 2.2 Mfd 200 VDC Mylar or Polyester – Audio bypass

NE1, NE2 – Neon Lamp “NE 2” or similar  
 SCR – C106B1 – 200 PRV, 4 Amp, Sensitive Gate  
 PC – Photo Cell – high dark resistance  
 ZD – Zener Diode 9.1 Volts, 1 Watt

T1 - 600/600 Ohms miniature transformer  
 AR – Relay 9 VDC DPDT 405 Ohms

### Notes:

- (1) D Relay contact from timer is shown, this is in series with the line only if the timer circuit is used.
- (2) C4 and R4 only needed if connecting to another phone line, not needed if connecting to an audio source

### Suggested Parts Sources:

<http://www.digikey.com> <http://www.jameco.com>  
<http://www.futurlec.com> (My Preferred source)

The neon lamp is to be glued to the photo cell. The back of the lamp (side not glued to the cell) is to be painted with white out, to reflect light to the cell. The “assembly” is covered in black electrical tape and made light tight. It will look ugly, but this is good. A double wrap of tape is best and very light tight.

Building the project in a black plastic box is good for even more light tightness.

This is an advanced project and you should fully understand how it works before you construct it. You should also understand basic electronics.