



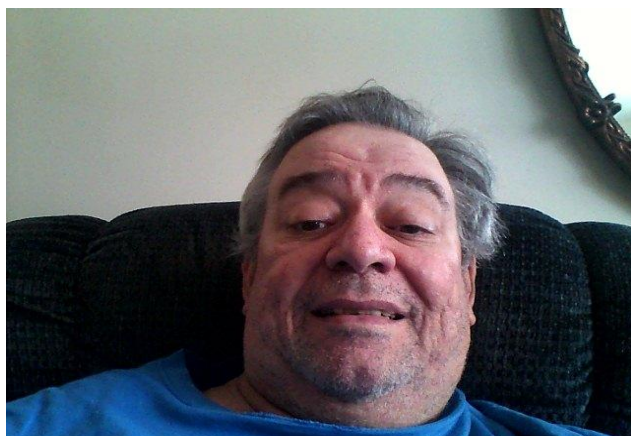
YARC-MITTER

**PRESIDENTS
CORNER**

NEXT MEETING SUNDAY OCTOBER 14th

OCT. 2012

HAPPY HALLOWEEN



I DO NOT KNOW ABOUT YOU, BUT IT SEEMS THE MONTHS ARE FLYING BY. ITS ALREADY OCTOBER, WOW, FEELS LIKE FIELD DAY JUST ENDED. AS REPORTED BEFORE, FRANK BOSCAMPA AA2KY PASSED AWAY ON SEPTEMBER 11TH, AT HIS HOME IN CT. FRANK WAS AN OLD TIME CLUB MEMBER AND A REGULAR ON THE MONDAY NIGHT INFO NET. THE 31/91 REPEATER IS BACK ON THE AIR. REMEMBER WHEN DRIVING AROUND ON HALLOWEEN MAKE SURE YOUR VIGILANT AND WATCH FOR THE KIDS TRICK OR TREATING. IF YOU HAVE ANY REQUESTS FOR A TALK TO BE GIVEN AT OUR MEETINGS PLEASE LET SOME ONE KNOW AND WE WILL TRY TO HAVE A SPEAKER TALK ON THE SUBJECT YOU WANT TO HEAR ABOUT. THE CHRISTMAS PARTY WILL BE COMING UP IN DECEMBER, WE COULD USE A PERSON TO COORDINATE THE EVENT, PLEASE LET US KNOW IF ANYONE IS INTERESTED. THERE WILL BE A BOARD OF DIRECTORS MEETING AFTER THE GENERAL CLUB MEETING ON OCTOBER 14TH.



**JOIN RENEW THE
ARRL THRU THE
YARC, THE CLUB
GETS \$2.00 FOR
EVERY RENEWAL AND
\$15.00 FOR EVERY
NEW MEMBERSHIP
FOR DETAILS
CONTACT WB2AUL**



**NEED HELP,
HELP STUDY
ING FOR UP-
GRADE. GET
IN TOUCH
JOHN,
WB2AUL, HE
MIGHT BE
ABLE TO
HELP YOU**

STUDY AND PASS YOUR EXAM.



OCT. 7TH.

NEXT VE TESTING WILL BE HELD ON OCT. 7TH., AT 830AM . PLEASE BRING TWO FORMS OF ID. ONE ID MUST BE A PICTURE ID. TESTING IS HELD AT THE 1ST PRECINCT ON EAST GRASSY SPRAIN ROAD IN YONKERS NY. FOR FURTHER INFO CONTACT AC2T AT 914-237-5589

RETIRED GUYS/GALS LUNCHEON

THE NEXT MEETING OF THE RETIRED GUYS/GALS WILL BE HELD ON OCT. 18TH, THURSDAY AT MONT OLYMPOS RESTAURANT IN YONKERS. THE TIME IS 1200 PM NOON, YOU DO NOT HAVE TO BE RETIRED TO JOIN US,EVERYONE IS WELCOME ,MEMBER OR NON MEMBER ALIKE IS INVITED. FURTHER INFO

CONTACT WB2AUL

914-969-6548

ANY ARTICLES/PICTURES

ANY ARTICLES.PICTUES WILL BE WELCOMED TO BE PRINTED IN THE YARC-MITTER, JUST SEND THEM TO WB2AUL@YARC.ORG

OCT 21ST



FOXHUNT

THE NEXT FOXHUNT WILL BE HELD ON OCT 21ST.STARTING TIME 900AM. REGISTRATION 830 AM., AT TIBBETTS BROOK PARK, YONKERS NY., FOR FURTHER INFORMATION CALL MIKE, KF2FK AT 914-879-6887.

SWAP SHOP

THE CLUB HAS FOR SALE 4—5 ELEMENT 2METER BEAMS, MADE BY MAXRAD. THESE ARE COMMERCIAL BEAMS AND HAVE NEVER BEEN USED. THE ASKING PRICE IS 50.00 EACH. FOR FURTHER INFORMATION CONTACT WB2Aul

TAILTWISTER HYGAIN ROTOR FOR SALE, COMPLETELY OVERHAULED WITH HD BRAKE AND ALL WEATHER CABLE PLUGS BY CATS ROTORS, CALL WB2AUL,914-969-6548

ALINCO 25 WATT—220 MOBILE RADIO FOR SALE,USED LESS THAN 1 HOUR. WB2AUL

WEST MOUNTAIN SOUND BLASTER PRO FOR SALE,NEW IN BOX. WB2AUL914-969-6548

THE TECHNICAL CORNER

Crowbar circuits

One way to protect a circuit from overvoltages is to use a "crowbar circuit". The idea is to short the [power supply](#) rail to ground if an overvoltage is detected and thereby quickly forcing it down to a harmlessly low voltage. The name of the circuit probably comes from the analogy of throwing a crowbar (or some other thick metal object) across the supply rails to short them.

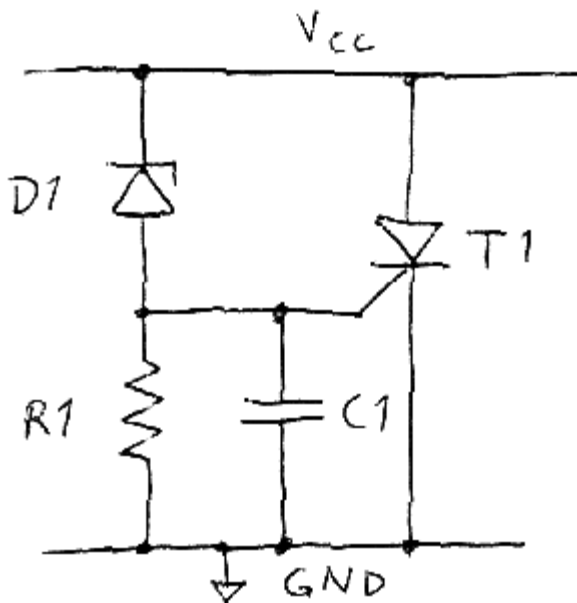
A particularly suitable component to use in a crowbar circuit is the thyristor or SCR (silicon controlled rectifier). This is a semiconductor device that is normally non-conducting, but it can be triggered by a current pulse on the gate terminal and once triggered it conducts from anode to cathode until the current through it is reduced below a low value, often in the range of a few tens of milliamps. When the thyristor conducts, it has a voltage drop of around 1-2 V.

Using a transistor instead of a thyristor would not be so easy, since the power supply necessary to drive the base or gate of the transistor goes away when the supply is shorted, whereas the thyristor needs no further gate drive to stay on once triggered. This is the reason why thyristors are so widely used in this [application](#).

One property of crowbar circuits that is often an advantage is that it becomes very evident that something is wrong and needs fixing once it has triggered.

Basic crowbar circuit

The classic crowbar circuit is shown in the figure below.



When the supply voltage goes above the zener voltage of the zener diode D1 a current starts to flow through the diode and the resistor R1. If the supply voltage reaches the zener voltage plus the trigger voltage of the

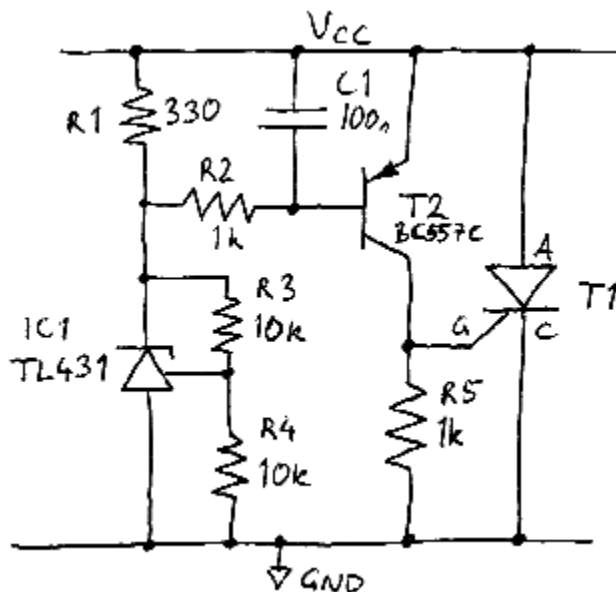
thyristor, the thyristor will trigger and bring the supply rail down to 1-2 V above ground. The thyristor will conduct until the current is reduced to close to zero one way or another.

The capacitor ensures that the crowbar is not triggered by short voltage spikes on the supply.

If the supply of current is unlimited, something will quite quickly start emitting smoke, so for the crowbar to be really successful, the power supply has to be current limited. One way to accomplish this is through a fuse or a polyswitch. Another is to have a current limited supply or preferably a supply with foldback current limiting.

One drawback of this basic circuit is that the turn-on voltage cannot be precisely controlled. Zener diodes are only available in discrete voltages, they have a relatively large tolerance (2-5 %), they are temperature dependent and the voltage-current knee is not very sharp. In addition to this, the trigger voltage of the thyristor is also a very poorly controlled parameter that varies widely with temperature. In [applications](#) where a low nominal supply voltage shall be protected, the turn-on voltage of the crowbar circuit typically has to be more precisely controlled.

Precision crowbar circuit



A low-cost adjustable shunt voltage reference, TL431, is used to allow trimming to any voltage using a voltage divider. Using 1% resistors in the divider R3-R4, the "zener" voltage can be set to a precision of around 1-3% depending on which version of the TL431 is used. Using a TL431 instead of a zener circumvents the problems of the discrete zener voltages available as well as the unsharp knee of zeners.

To improve the situation caused by the ill-controlled trigger voltage of thyristors, a transistor T2 is used. This transistor turns on once the emitter-base voltage is above ~0.6V. The turn-on characteristics of the transistor is temperature dependent (as is the current and voltage required to trigger the thyristor), but the uncertainty of the trigger voltage of the total circuit is much reduced compared to the basic circuit

The reference voltage to the TL431 is 2.5V, so with the given component values, the set voltage of the TL431 is 5V and the trigger voltage of the crowbar is around 5.6 - 6.0 V. This could be suitable to protect a 5V-rail. The capacitor C1 reduces sensitivity to short spikes and also reduces the risk of a false triggering if voltage is applied abruptly.

di/dt protection

There are still potential problems with this circuit that have to be taken into account when selecting components. A major concern is the stress that the thyristor is subjected to when it triggers. If it is triggered softly with a current just above the trigger current, it cannot withstand a very quick rise in anode-cathode current. The gate triggers only a small area of the semiconductor die to conduct and it takes some time for the whole thyristor to start conducting. If a lot of current is forced through the thyristor before it has fully triggered, the current concentration can become large enough to destroy or at least degrade the component. This is specified in data sheets as maximum di/dt and can be on the order of 100 A/μs for a 12 A thyristor. In lucky cases, a destroyed thyristor becomes a short circuit, so that it still protects the rest of the circuit from overvoltage, but this cannot be guaranteed. In general, using a larger thyristor makes the crowbar more rugged.

Having large capacitors with low ESR (equivalent series resistance) on the rail protected by the crowbar increases the risk of overstressing the thyristor. Especially large ceramic capacitors can deliver huge di/dt pulses. One way to protect the thyristor at the cost of slower turn-on is to insert an inductor in series with the anode. The required value can be calculated from the following formula:

$$U = L \cdot di/dt$$

$$L = U / (di/dt)$$

In the circuit above we have a trigger voltage of at most 6V while the residual voltage over the thyristor is at least 1V. This gives $U = 6V - 1V = 5V$. Assuming a maximum allowable di/dt of 100A/μs for the thyristor in use (check the datasheet), we get a minimum inductance of 50 nH, which is a fairly low value. Typically it is not possible to buy power inductors with such low inductance, so a larger value may have to be selected.

The inductor only has to function as a good inductor until the thyristor has fully triggered, which might take around 1μs, so the saturation current does not have to be bigger than the current at the time when the thyristor has fully turned on. A conservative estimate of the inductor (and thyristor) current after time t is $i = t \cdot (di/dt)_{\max} = t \cdot U/L$. So the optimization problem here is to select a small and cheap inductor with an inductance value and saturation current that fulfills the above requirements. It is also important to take a look at the DC resistance of the inductor to check that the $R_{DC} \cdot I^2$ power dissipation will not destroy the inductor when the crowbar has triggered. Also the voltage drop across the inductor might be an issue if R_{DC} is too large, but this is probably quite unlikely to be a problem.

As an example a Coilcraft LPS6225-122ML (1.2μH, 5.4A, 0.04Ω, 6.2*6.2 mm²) inductor is suitable in our case. This gives a current after 1μs of at most $1\mu s \times 5V / 1.2\mu H = 4.2A$, thus no saturation before full triggering. Assuming a fuse or polyswitch of 4A, the long-term current can hardly be much more than 5A which gives a maximum power dissipation in the inductor of 1W which it probably is able to handle, although it will become rather hot.

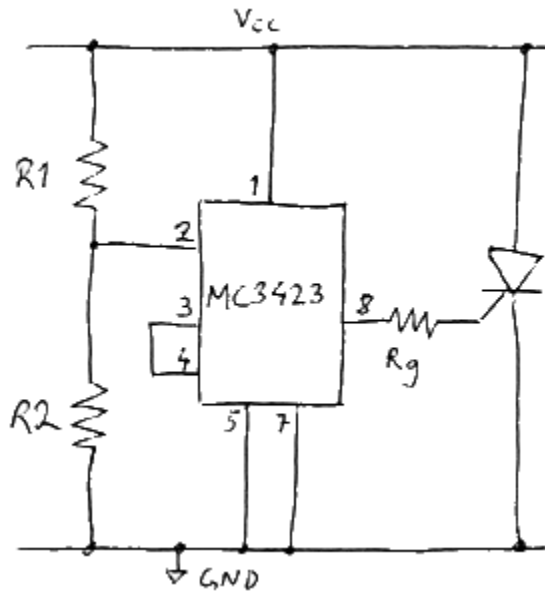
The above crowbar circuit can be set to trigger at voltages from around 3.2V and up to 36V by selecting suitable values for R3 and R4. The current into the reference pin of IC1 can be a few microamps, so R4 should not be selected too small if high precision is required. 10 kohm is probably on the high side and should be decreased if higher precision is required. Going below 1 kohm gives diminishing returns.

Crowbar controller

There is a somewhat dated circuit called [MC3423 from ON Semiconductor](#) that can be used to control the thyristor of a crowbar with even higher precision while giving a higher gate overdrive current to ensure good

turn-on with reduced di/dt problems. The trigger voltage can be set between 4.5 V and 40 V using a resistive divider.

The below schematic shows a basic application of the MC3423.

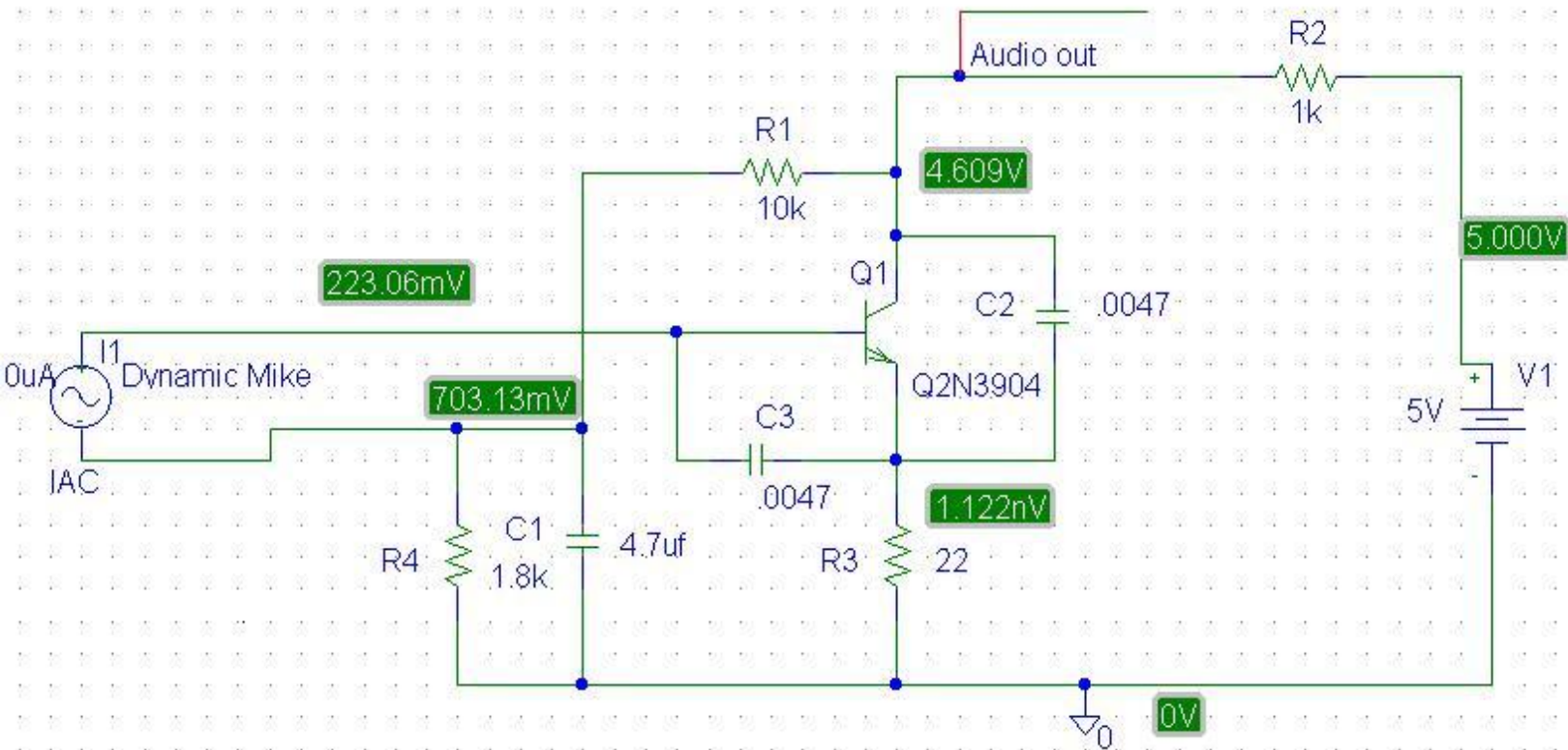


Disadvantages compared to the previous circuits is higher cost, increased power consumption and higher minimum triggering voltage. The size may also be bigger since the MC3423 is not available in any package smaller than SO8.

Links

Here are some links to sites that discuss crowbar circuits.

- [Crowbar circuit article on radio-elctronics.com](#)
- [Crowbar circuit article on Wikipedia](#)
- [Crowbar circuit article on Wikibooks](#)



A Microphone Pre-Amp For Heil and other Microphones

By Mike, N0MF

This is the mike pre-amp I'm using with the Heil HC4. It is an ICOM design that another ham sent me... Of the four I've tried (both bipolar and FET), it seems to work the best for me. It operates the VOX well and drives the transmitter to full output on 160 M.

R2 is mounted at the K2's front panel microphone jumper block to supply power to the pre-amp from the 5V supply in the K2. C2 and C3 can also be 0.01uF caps.

Note--- r2—1k resistor is positive side five volt battery---line at bottom negative side

USEFUL WEBSITES FOR HAMS

W2CZ—EFREM ACOSTA

I suppose I'm like many other hams at YARC and elsewhere. I got my ticket after I was finished with school and had started a family. Important obligations that come with family and work often make it hard for a new ham to learn the "craft" of Amateur Radio. Since I have not had the benefit of having an "Elmer" to guide me I've had to find other sources to get the information I've needed.

Learning about things like propagation, proper DX etiquette (there's such a thing?) and all the different modes that are available can be a challenge. Yet despite this today's ham still has a big advantage over Amateurs from generations ago! That advantage is the availability of vast amounts of information available to ham's via the internet.

Whether your interest is in DX, 10-10, learning CW or just finding out what hams think of a particular radio there's a place to go to find out! Over the years I've found a few interesting websites as well as email lists that can provide information to hams.

Here are a few:

DX related

DX Coffee- www.dxcoffee.com/eng/

DX World- dx-world.net/

DX related

Pete's DX Newsletter- www.dx-newsdesk.co.uk/

DX Code of Conduct- www.dx-code.org/

VE7CC Cluster- www.ve7cc.net

G4FON CW Trainer (Koch Method)
www.g4fon.net/

The International Morse Preservation Society FISTS www.fists.org/

Straight Key Century Club SKCC-
www.skccgroup.com/

ARRL CW Practice Files-
www.arrl.org/code-practice-files

A Beginner's Guide to Making CW Contacts by Jack Wagoner WB8FSV-
www.netwalk.com/~fsv/CWguide.htm

Sites that lists local repeaters

New York Repeater Directory (lists many in New Jersey)- www.nyrepeaters.com/

New England Repeater Directory-
www.nerepeaters.com/ (CONTINUED)
NEXT PAGE



General Information for Hams

American Radio Relay League ARRL-
www.arrl.org/

Eham- www.eham.net/

N4MC Vanity HQ (looking for a special vanity
call?)- <http://www.vanityhq.com/>

These are but of a few of the useful
websites I've used over the last few years.
Many of these are ones that I check often and
still use. Do you have a particular website that
you have found interesting or useful? If so
please share it by sending John WB2AUL an
email. Over the next few weeks I'll try to pass
along here anything else I might find of interest.

Oh Yes..... one last website!

www.yarc.org/

73,

Efrem W2CZ

YARC NET

SCHEDULE

**MONDAY—730PM—INFORMATION
NET**

**K2JJ MODERATOR—146.865—
PL110.9**

**WEDNESDAY—800PM—
TECHNICAL NET**

**WB2AUL MODERATOR---146.865—
PL110.9**

**THURSDAY—800PM—JUNIOR OPS
NET**

**KF2FK MODERATOR—146.865—
PL110.9**

**SUNDAY---700PM—10 METER
NET—28.456MHZ—USB—WB2AUL
MODERATOR**

**BOARD O DIRECTORS
MEETING AFTER
GENERAL CLUB
MEETING ON
OCTOBER 14TH,**