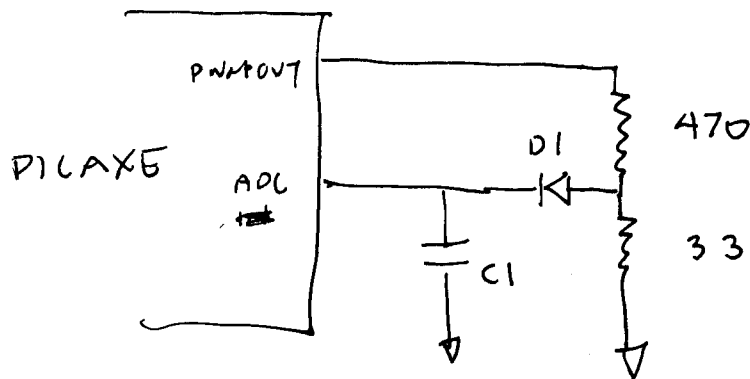


TO TEST WHETHER VOLTAGE CAN STABILIZE ON CAPACITOR



C1 = .01 μ F, MAYBE
EVEN 1000 pF

D1 = SCHOTTKY OR
GERMANIUM

- TEST 1. SHORT D1. PWMOUT = 1. READ ADC VALUE.
 TEST 2. D1 NORMAL. ~~LOW~~ PWMOUT = 1. READ ADC.
 TEST 3. PWMOUT = 0. ADC PIN DRIVE TO \emptyset AS OUTPUT,
 WAIT 1 mS, OR MORE, THEN SET AS INPUT.

$$i = c \frac{dy}{dt} \quad dt = \frac{c}{i} dy = \frac{.01 \times 10^{-6}}{25 \times 10^{-3}} \times 5 = \frac{100 \times 10^{-10}}{25 \times 10^{-3}} \times 5$$

$$= 20 \times 10^{-7} = 2 \times 10^{-6} = 2 \mu\text{S}$$

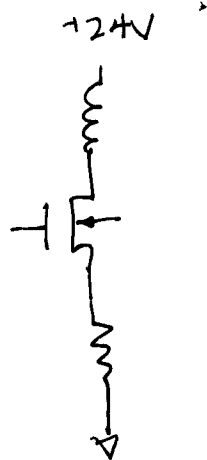
LOOP:
 READ ADC
 SCROUT VALUE READ
 PULSOUT TO PWM PIN
 WAIT ~~1 MS~~ 1 SECOND
 GO TO LOOP

20MAY13 TRIED THE ABOVE. C1 ALWAYS READS \emptyset , UNLESS
 PWMOUT IS HELD HIGH, NO MATTER HOW LONG PULSOUT LAST,
 I BELIEVE THE DIODE CONDUCTS WELL IN THE REVERSE
 DIRECTION, MAYBE BECAUSE IT'S SCHOTTKY. ACTUALLY, IN
 LOW VOLTAGE REGION I DON'T EXPECT A DIODE IS
 MUCH OF A DIODE. MAYBE TRY SAMPLE AND HOLD,

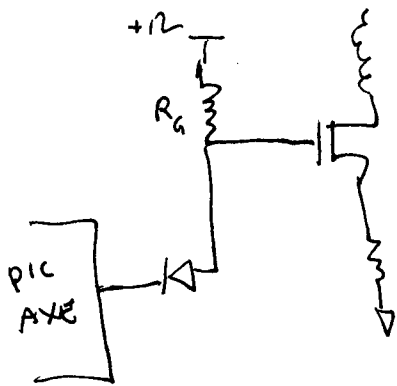
19 MAY 13; Roderick

SECOND ISSUE ABOUT INDUCTANCE MEASUREMENT -

NONE OF SALVAGE TRANSISTORS
WILL SUPPORT I_0 OF 40A
w/ $V_{GS} = 3V$. MUST HAVE
10V DRIVE.

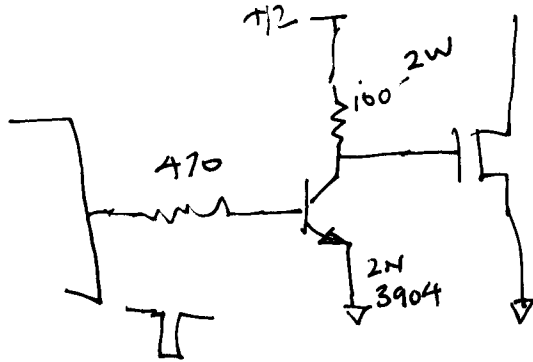


PICAXE CAN SINK 25MA

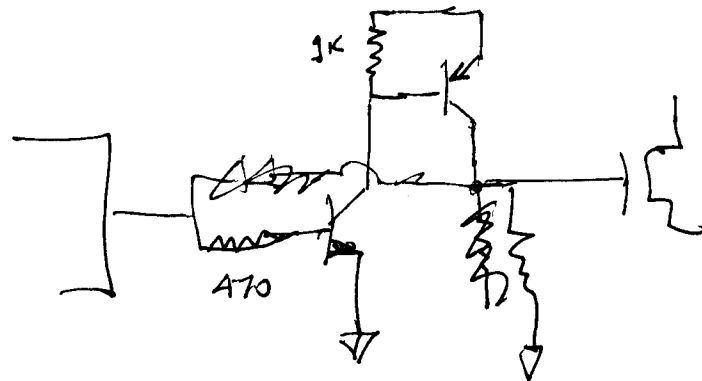


$$R_g = \frac{E}{I} = \frac{12V}{\frac{25mA}{24mA}} = \frac{1}{2} \times 10^3 = 500\Omega$$

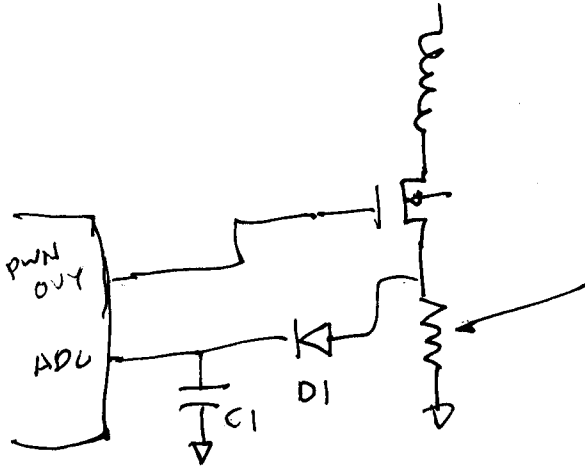
X NO GOOD - GATE WILL CLAMP TO
THE 5V OUTPUT WHEN HIGH.



WASTES LOTS OF POWER, BUT
THAT'S OK - IT'S ONLY A TEST
CIRCUIT.



TO MEASURE INDUCTANCE AT CURRENT, ~~TO USE AWA~~
 CANNOT USE ACS 713 - LIMITED TO 20A. BESIDES, DON'T
 HAVE THE ACS (ALLEGRO CURRENT SENSOR) YET, TRY TO USE PARTS
 ALREADY IN JUNK BOX.



50 mΩ, 5W
 IF CONTINUOUS 40A,
 WOULD BE 2W.

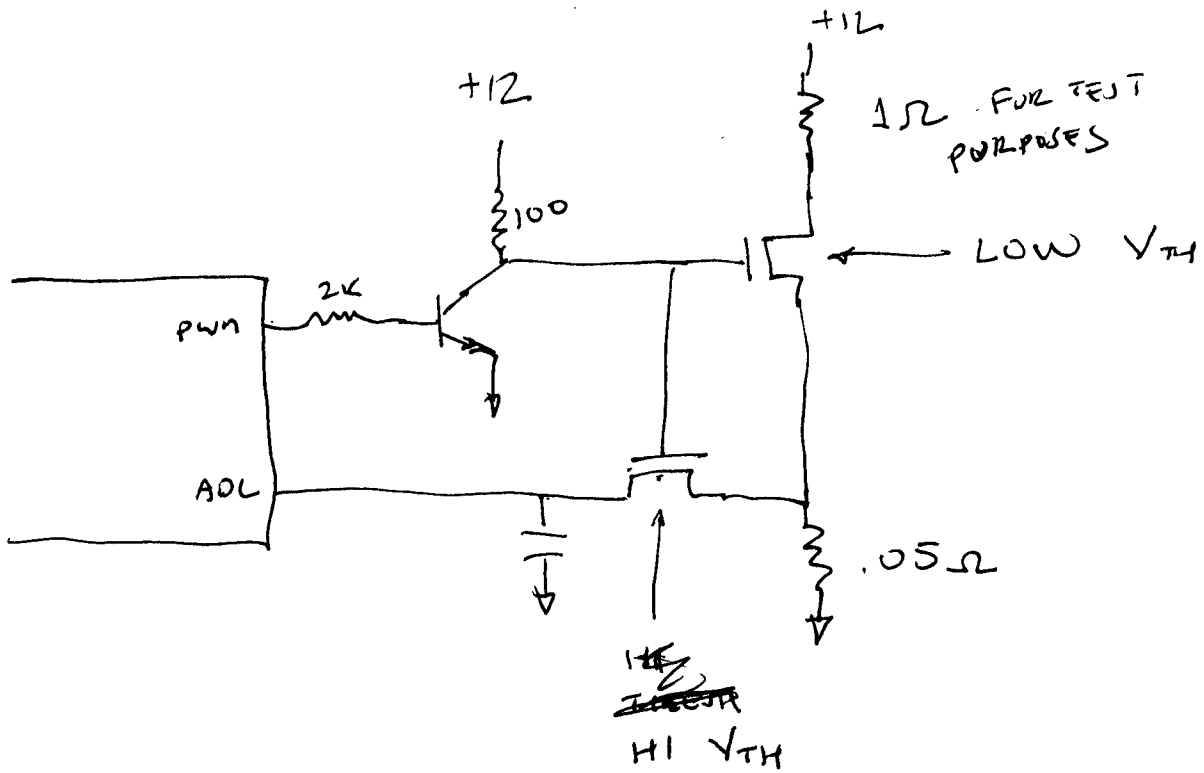
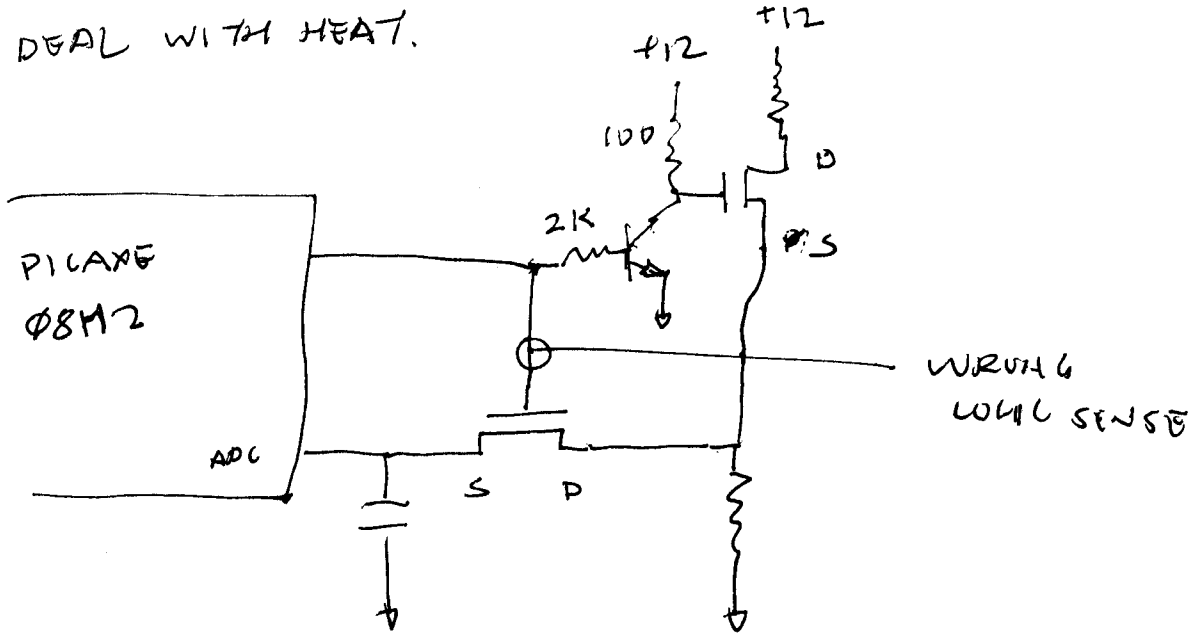
$$40A \Rightarrow 40 \times 0.05 = 2.0 \text{ VOLT IR DROP}$$

THE 2.0 VOLT DROP WOULD BE SIGNIFICANT IF DRIVING TRANSISTOR
 GATE FROM LOGIC. IF $V_g = 5.0V$, $V_s = 2.0V$, $V_{GS} = \text{ONLY } 3.0V$
 FOR TEST CIRCUIT, CAN DRIVE $V_g = 12V$. IN PTC, WILL ~~NOT~~ DRIVE
 GATE STRAIGHT FROM LOGIC, BUT ~~WILL~~ WILL NOT HAVE SENSE RESISTOR
~~ISS~~ ON SOURCE. CAN ALSO FIND A "LOGIC LEVEL" MOSFET FROM
 NXP SEMI WITH LOW $V_{GS(TH)}$.

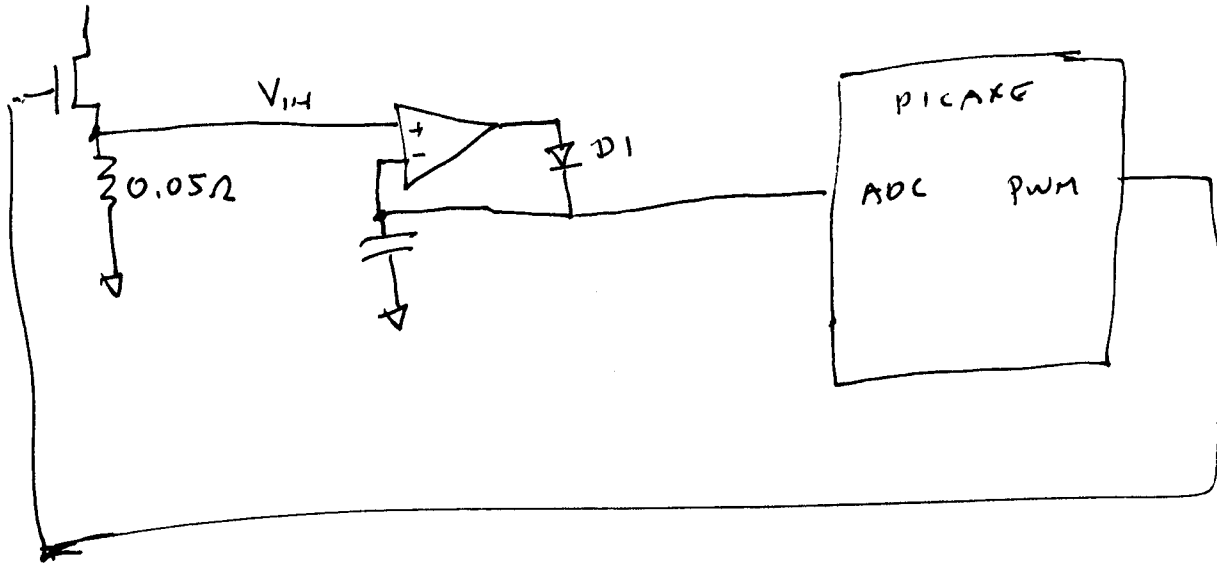
DIODE MAY NOT HAVE A DROP, IN THIS TEST SETUP. USE A SCHOTTKY
 OR GERMANIUM, BUT ~~WHEN~~ IT SHOULD STILL CONDUCT CURRENT
 VIA $I = I_0 \left(e^{\frac{qV}{kT}} - 1 \right)$, AND PEAK VOLTAGE OF C1
 SHOULD SETTLE, IF PULSES REPEAT ENOUGH.

CURRENT INDUCTANCE MEASURE SYNCHRONOUS RECTIFY,
AKA SAMPLE AND HOLD.

ANY KIND OF AVERAGING TECHNIQUE FOR CURRENT
WOULD MEAN HAVE TO RUN SWITCH CONTINUOUSLY, AND
DEAL WITH HEAT.



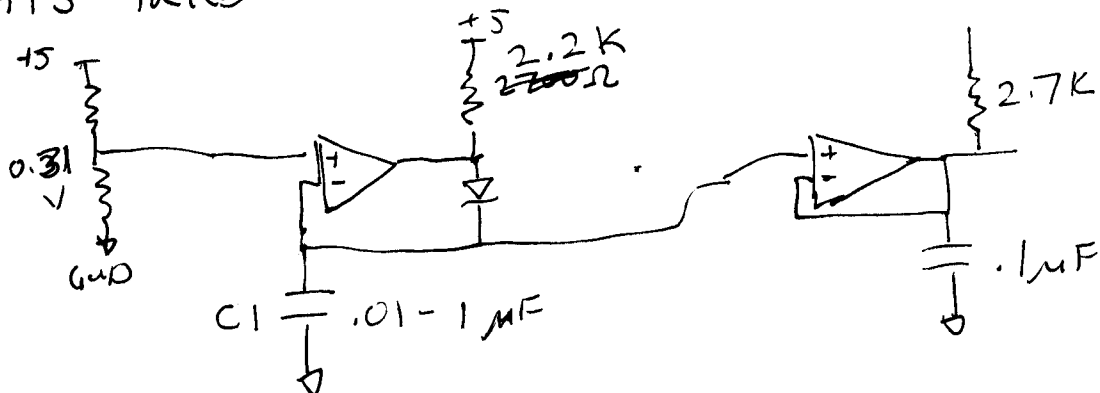
BETTER THAN SAMPLE & HOLD WOULD BE A PEAK DETECTOR.



ANODE OF DI WOULD GO ABOVE CAPACITOR VOLTAGE, WHATEVER IT TAKES, TO CHARGE CAP TO VOLTAGE EQUAL TO V_{IN} .

WHEN V_{IN} DROPS, ANODE OF DI IMMEDIATELY GOES TO GROUND, BUT CAN READ CAP FROM ADC QUICKLY BEFORE REVERSE DIODE HAS A CHANCE TO DISCHARGE IT,

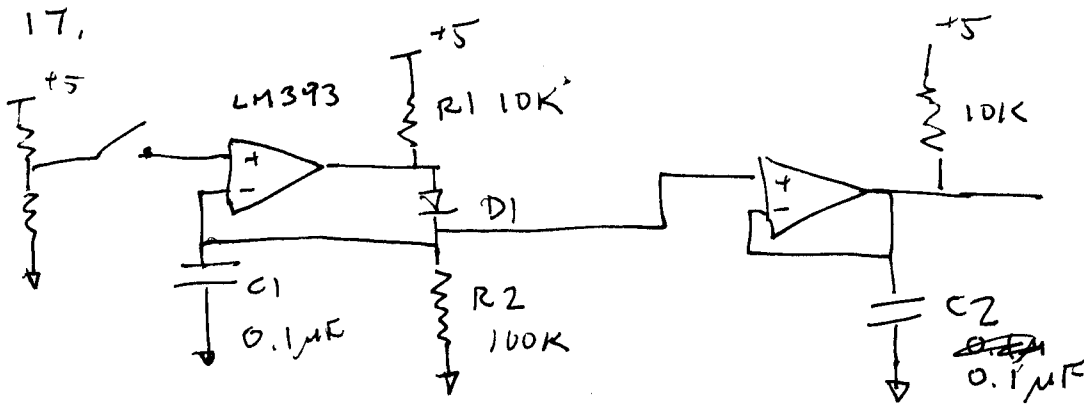
21MAY13 TRIED



VOLTMETER READS 0.31V ACROSS $C1$, BUT IF CONNECT TO ADC, SEE NICE LIKE 3V. DITTO IF PUT VOLTAGE FOLLOWER AS SHOWN. LM393 USED. TRY LM358 INSTEAD.

25 MAY 13; Roderick

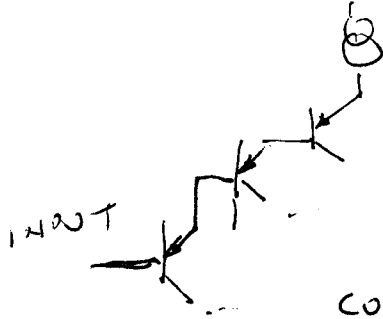
PEAK DETECTOR FROM INTERNET DID NOT WORK, BUT I HAD MODIFIED



I HAD REDUCED R1 TO 2K TO GET QUICKER RESPONSE,
AND DELETED R2, THINKING THAT WOULD GIVE BETTER
HOLD TIME. WITH A VOLTMETER, THE VOLTAGE
ACROSS C1 WAS MEASURABLE 0.31V, BUT THE
OUTPUT AFTER THE VOLTAGE FOLLOWER WAS MORE LIKE
2-3 VOLTS. BUT I ONLY HAD THE ONE VOLTMETER.
COULD BE THAT THE VERY ACT OF CONNECTING THE
VOLTMETER ACROSS C1 GAVE ENOUGH CURRENT PATH
TO GROUND TO MAKE THE CIRCUIT STABLE? - YES,
PUT AOL ON C1, THEN SAW VOLTAGE DROP AS SOON AS
I PUT ON DVM.

WILL TRY LM358 INSTEAD. SAME ISSUE. EVEN WITH
DIODE REMOVED, VOLTAGE ACROSS C1 SLOWLY CREEPS UP,
FOUND OUT THERE IS I_B , A BIAS CURRENT, FLOWING OUT OF
THIS OP AMP

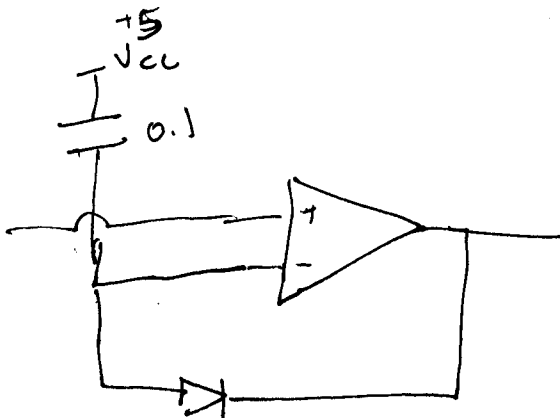
25 MAY 13; Roderick.



SAW A CIRCUIT FOR NEUTRALIZING BIAS CURRENT, BUT THAT INVOLVED EXTRA COMPONENTS INCLUDING 2N929 - ~~THE~~ HIGH GAIN @

100 nA ~~WAS~~ NPN.

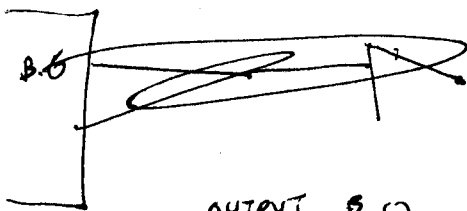
WHAT IF I REFERENCE THE VOLTAGE TO V_{CC} ?



PROBLEM: OUTPUT COULDN'T PULL LOW ENOUGH.

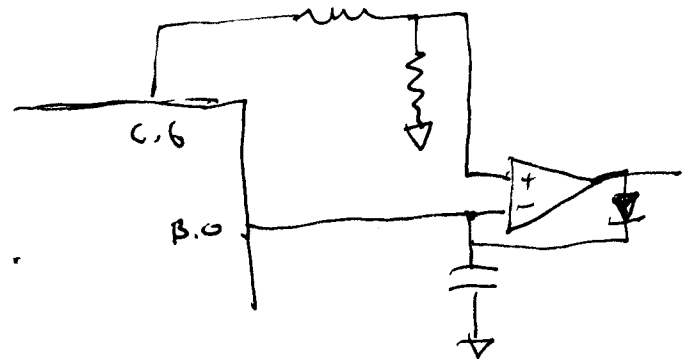
MAY HAVE TO JUST READ VOLTAGE QUICKLY, BEFORE IT DECAYS.

TEST:



OUTPUT 5.0
LOW B.0
INPUT B.0 PAUSE 100

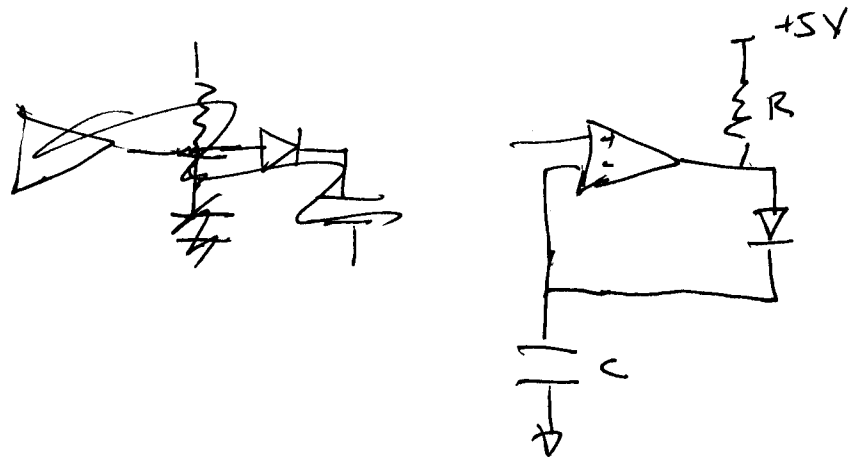
PULSOUT C.6, 1
PULSIN C.6, B.0, W3



TRIED LM358 -
CONSISTENTLY REPORTS TOO HIGH.
TOO MUCH DRIVE GIVES
OVERSHOOT, TRY
LM393 W/ 10K
RESISTOR.

WHAT IS I_B OF LM393? SPEC SHEET SAYS ~~400 nA~~
 400 nA OR LESS. IF 1 μ A, 1 μ F, 1 V/SEC.

1 mV/ms

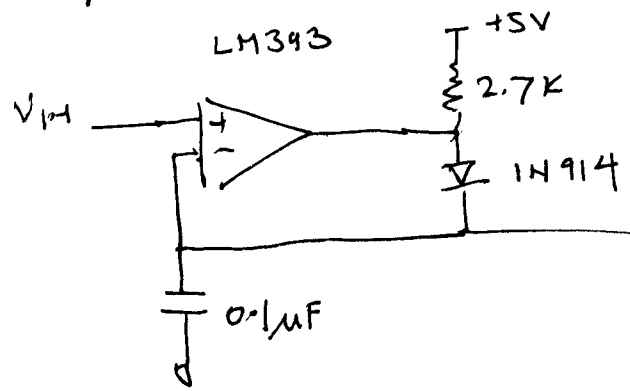


ASSUMING VOLTAGE ACROSS C IS SMALL, CHARGING CURRENT
 WILL BE ABOUT $\frac{4V}{R}$ TO BE ABLE TO MOVE

1 mV/ms, NEED ~~$\frac{4}{R} = 10^3$~~ $C = 10^{-6}$
 $I = C \frac{dv}{dt}$ ~~$I = 10^3$~~ $I/C = 10^3$ $I = 10^{-3} = 1 \mu A$

HAVE STOMACH FLU. NOT THINKING STRAIGHT.

$\frac{4}{R} = 10^{-3}$ $R = 4K$



THIS CIRCUIT WORKS WELL WITH
 10 μ S PULSE CONTIN. IN. IF CAP
 IS 1 μ F, IT DOES NOT CHARGE TO
 FULL INPUT VOLTAGE.

TO PICAXE
 ADC PIN

DRIFT = 1 COUNT
 PER 50 MS.
 $\approx 5 mV$