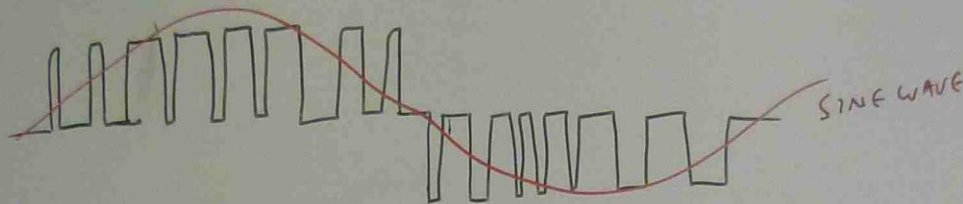


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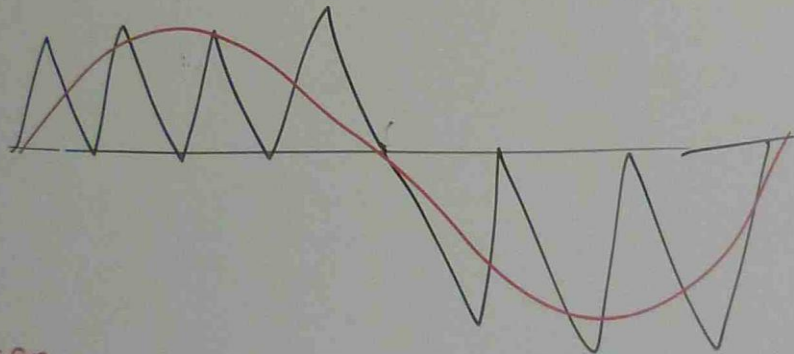
Semester (4)

K035

INPUT
REFERENCE
WAVE FORM



THE SIGNALS
WHICH ARE
PASSED INTO
COMPARATOR
TO ACHIEVE
PWM WAVEFORM



TRIANGULAR WAVE IS
PASSED INTO A VOLTAGE
SUMMER WITH A
SQUARE WAVE (MADE FROM
SINE REFERENCE) TO
CREATE ONE WITH IDENTICAL
FREQUENCY WHICH
CREATES THE MODIFIED
SINE WAVE

THE SIGNAL IS USED TO CONTROL
MOSFET.

FILTERING

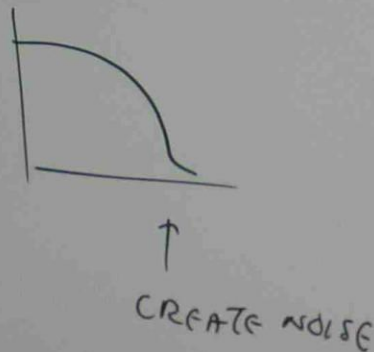
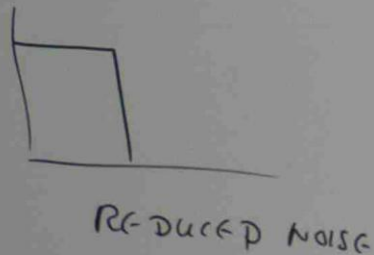
PASSIVE FILTERS

PASSIVE FILTER INTRODUCES HIGHER RESISTANCE AT LOWER FREQUENCIES.

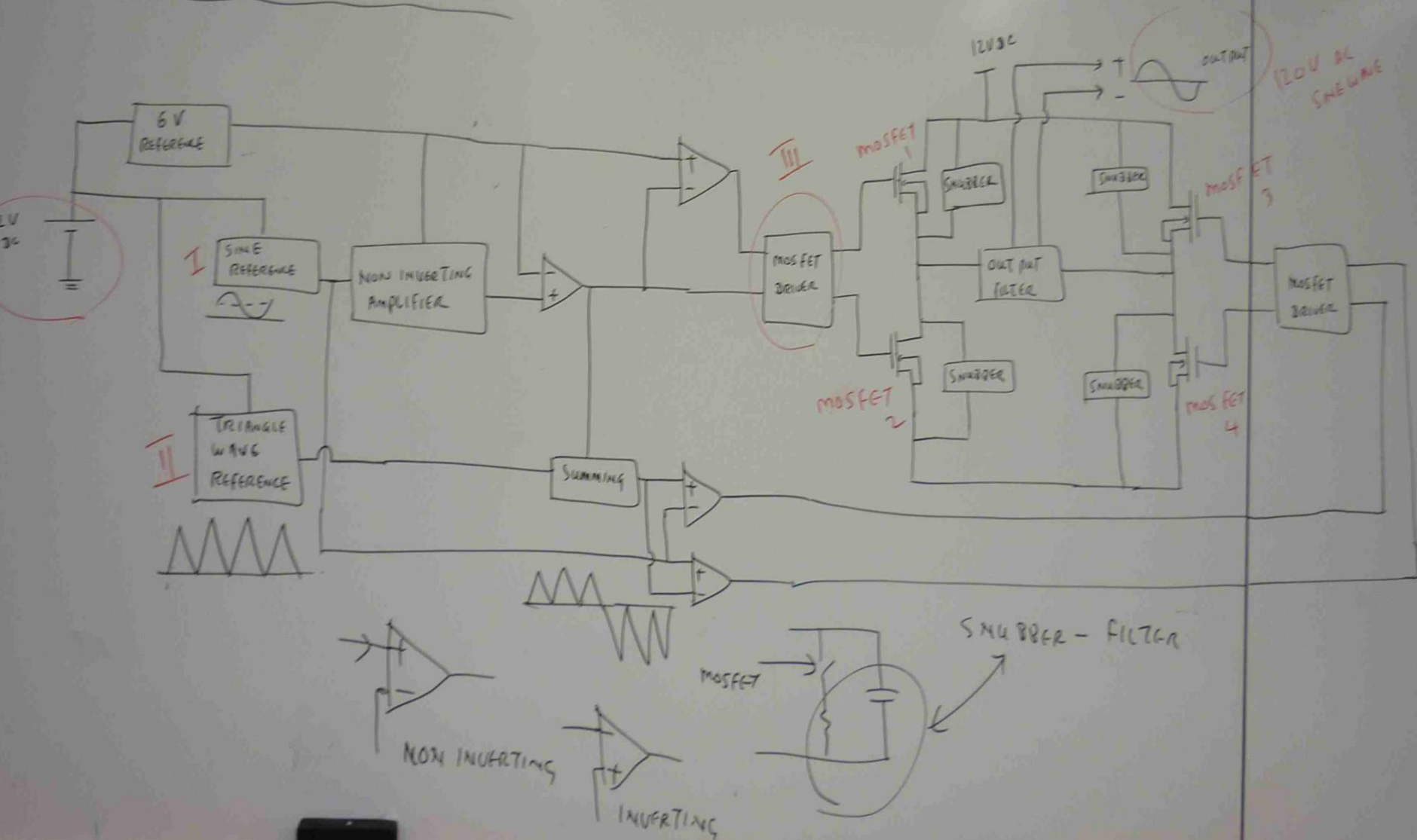
SWITCHING MOSFETS INTRODUCE MORE SWITCHING LOSSES AT HIGHER FREQUENCIES

ACTIVE FILTER

IF THE RESPONSE IS SIMPLY LOW PASS / HIGH PASS AND BAND PASS BEHAVIOUR WITH A SET FREQUENCY, AN ACTIVE FILTER CAN BE MADE TO HAVE A VERY SHARP EDGE AT THE CUT OFF, RESULTING IN ENORMOUS REDUCTIONS IN NOISE AND VERY LITTLE ATTENUATION OF SIGNAL.



12V DC TO 120V PURE SINE WAVE INVERTER



FROM HERE, THE SIGNAL IS SENT THROUGH A LOW PASS LC FILTER SO THAT THE OUTPUT DELIVERS A PURE SINE WAVE.

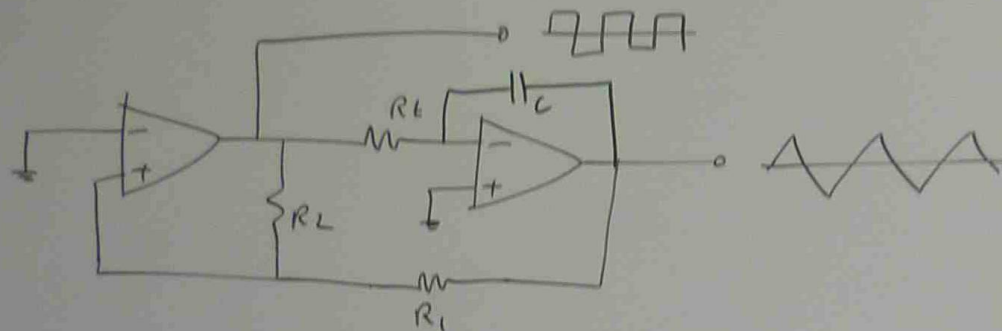


THAT CONTAINS VERY LITTLE DISTORTION

P_5 - LEAST DISTORTED

II CARRIER WAVE GENERATOR

GENERATING A SINE WAVE AT 60 HZ REQUIRES BOTH THE REFERENCE SINE WAVE AND A CARRIER WAVE AT THE SWITCHING SPEED OF THE POWER SUPPLY. CARRIER WAVES CAN EITHER BE SAWTOOTH (OR) TRIANGULAR SIGNALS.



TL084 OP-AMP

THE ABOVE CIRCUIT OSCILLATES AT A FREQUENCY OF

$$\frac{1}{4R_f C}$$

, AMPLITUDE IS CONTROLLED BY R_1 & R_2

TL084 OP-AMP $R_f = 1k\Omega$, $R_1 = R_2 = 10k\Omega$ $C = 1\mu F$

OSCILLATING FREQUENCY = 5 kHz, SWITCHING SPEED = 43 kHz

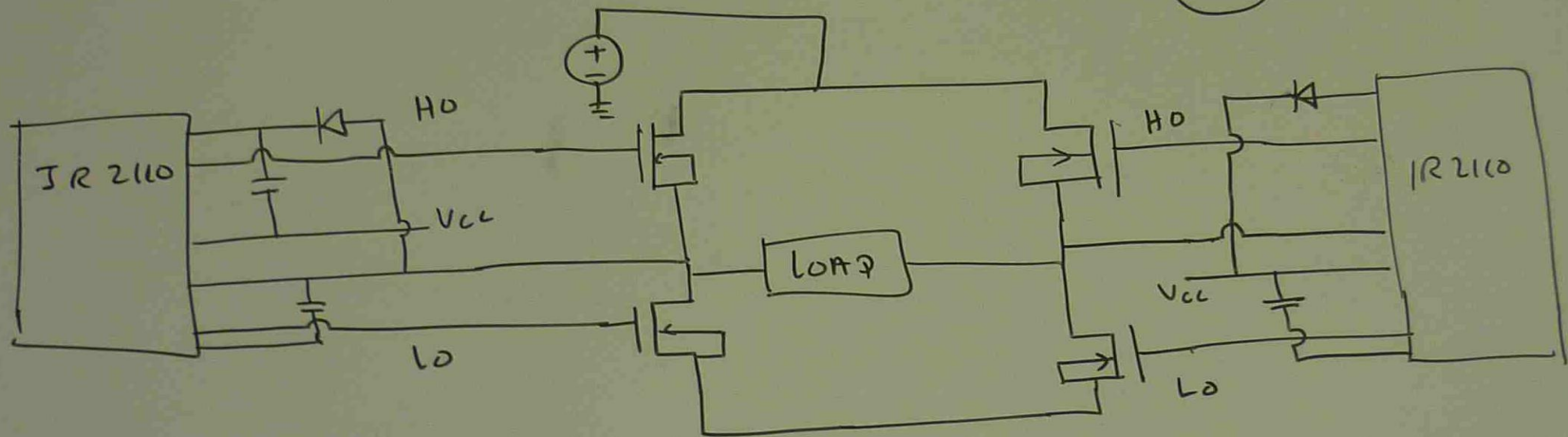
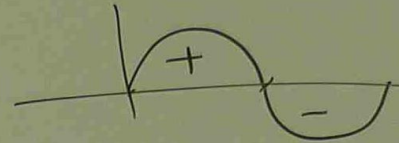
$C \downarrow$ SWITCHING SPEED \uparrow $C = 0.01\mu F \rightarrow$ SWITCHING SPEED = 50 kHz

H BRIDGE

GENERATING A SINE WAVE CENTERED ON ZERO VOLTS REQUIRES BOTH POSITIVE AND NEGATIVE VOLTAGE ACROSS THE LOAD.

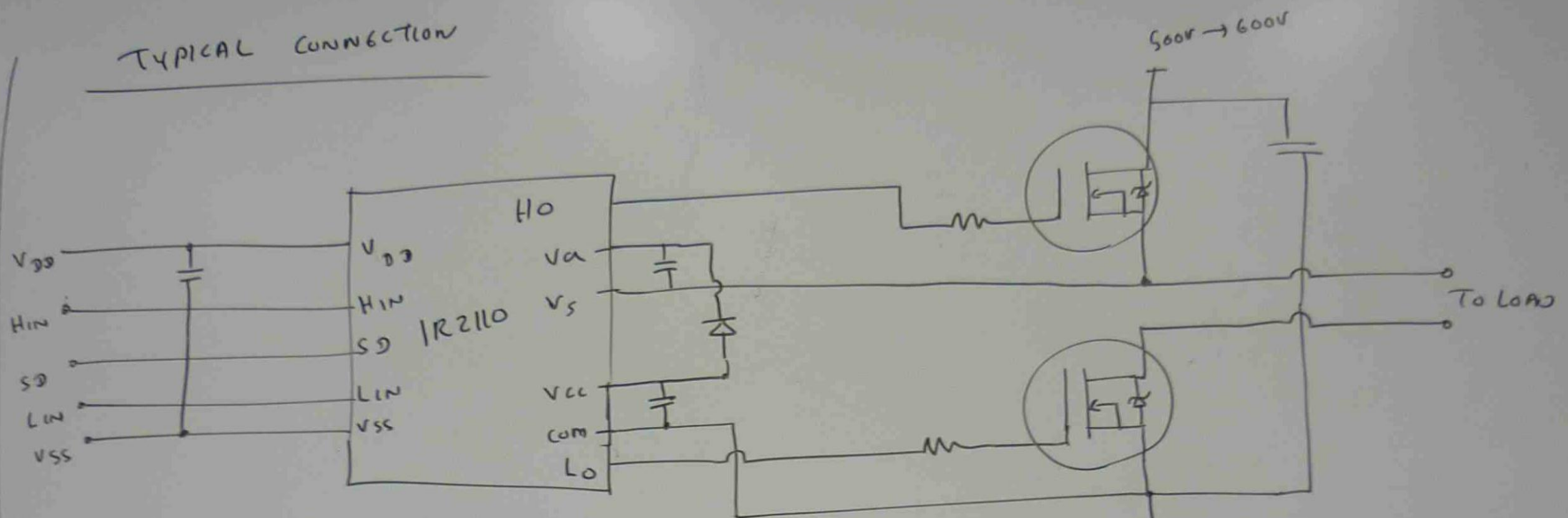
THE USE OF FOUR MOSFET SWITCHES ARE ARRANGED IN H BRIDGE CONFIGURATION

IR 2110 MOSFET DRIVER IS UTILIZED.



CAN SUPPLY 500V AT 2A

TYPICAL CONNECTION



OPERATION OF IR2110 DEVICE WILL BE CONTROLLED THROUGH
GENERATED PWM SIGNAL.

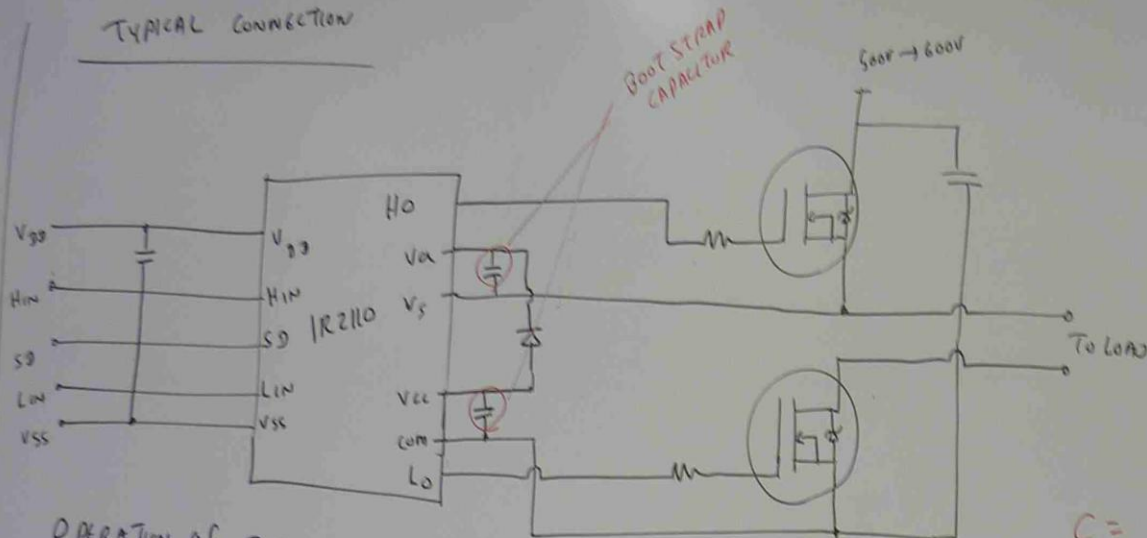
PWM SIGNAL WILL BE FED TO HIN & LIN SIMULTANEOUSLY.

IF INTERNAL LOGIC DETECTS A LOGIC HIGH, HO PIN WILL BE DRIVEN
LOW — LO —

SD PIN - CONTROLS THE SHUT DOWN OF THE DEVICE

VCC PIN IS FED WITH 12V

TYPICAL CONNECTION



$$C = \frac{2 \left[2Q_g + \frac{I_{gb(max)}}{f} + Q_{IS} \frac{I_{ch(peak)}}{f} \right]}{V_{CC} - V_F - V_{DS} - V_{min}}$$

$$= 24f \text{ for } 60Hz$$

$$= 51mf \text{ for } 50Hz$$

$$Q_g = \text{GATE CHARGE } 110mc$$

$$I_{gb} = \text{QUIESCIENT CURRENT } 230\mu A$$

$$Q_{IS} = \text{LEVEL SHIFT CHARGE } 5mc$$

$$I_{cb(Leak)} = \text{LEAKAGE CURRENT } 250\mu A$$

$$f = \text{FREQUENCY (50Hz/60Hz)}$$

$$V_{IS} = \text{VOLTAGE DROP } 1.5V$$

OPERATION OF IR2110 DEVICE WILL BE CONTROLLED THROUGH GENERATES PWM SIGNAL.

PWM SIGNAL WILL BE FED TO HIN & LIN SIMULTANEOUSLY.

IF INTERNAL LOGIC DETECTS A LOGIC HIGH, HO PIN WILL BE DRIVEN

LOW — LO —

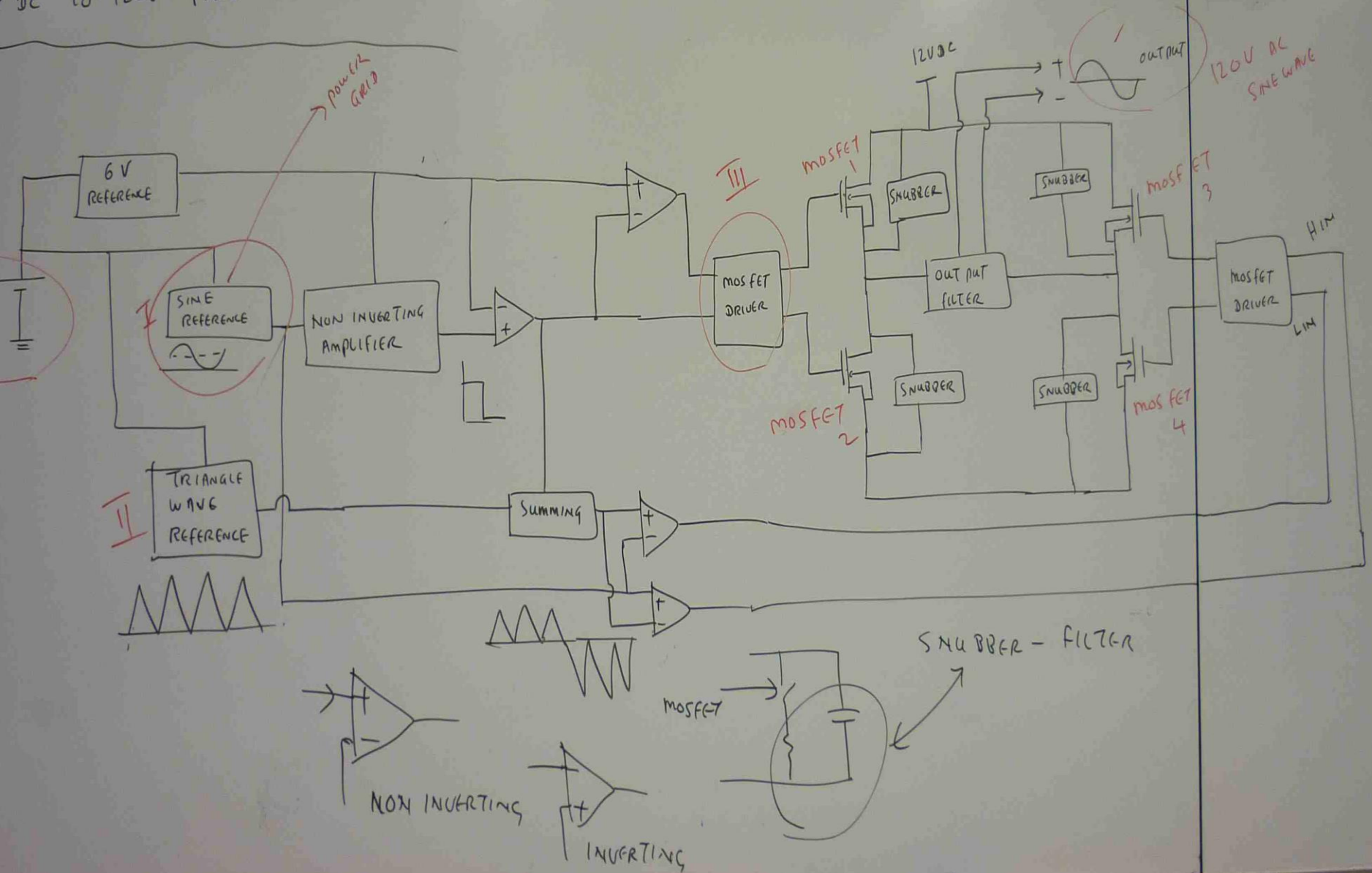
SD PIN - CONTROLS THE SHUT DOWN OF THE DEVICE

VCC PIN IS FED WITH 12V

VCC = SUPPLY VOLTAGE 12V

V_F = FORWARD VOLTAGE 1-3V

DC TO 120V PURE SINE WAVE INVERTER

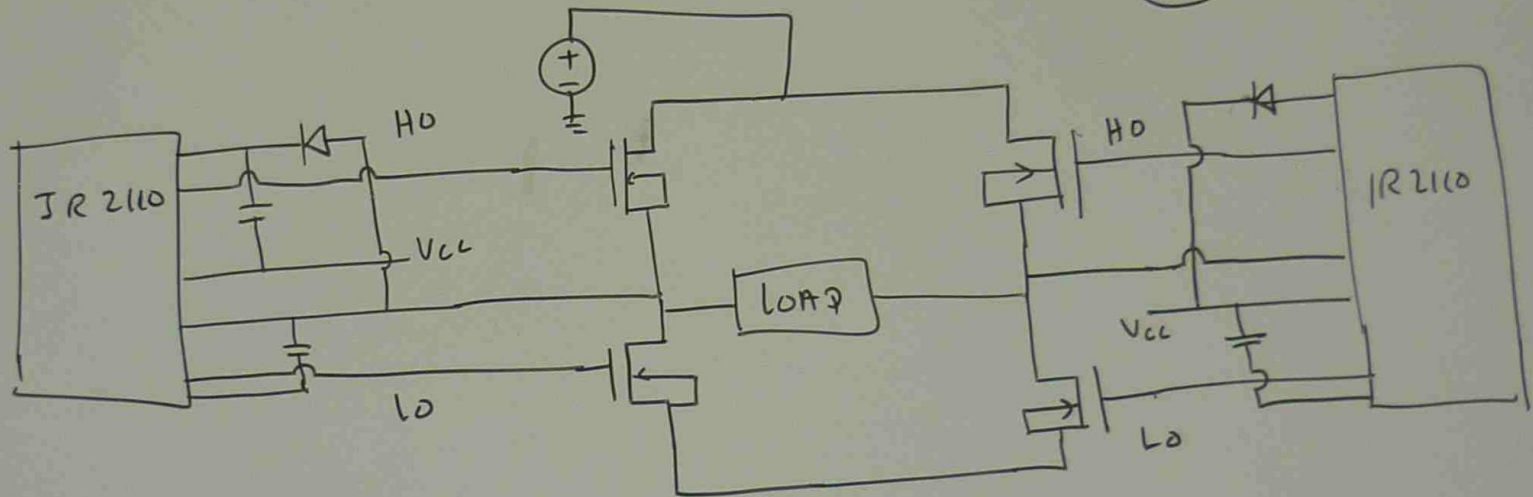
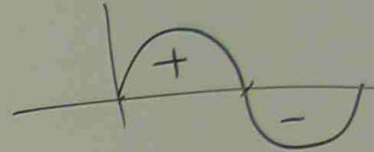


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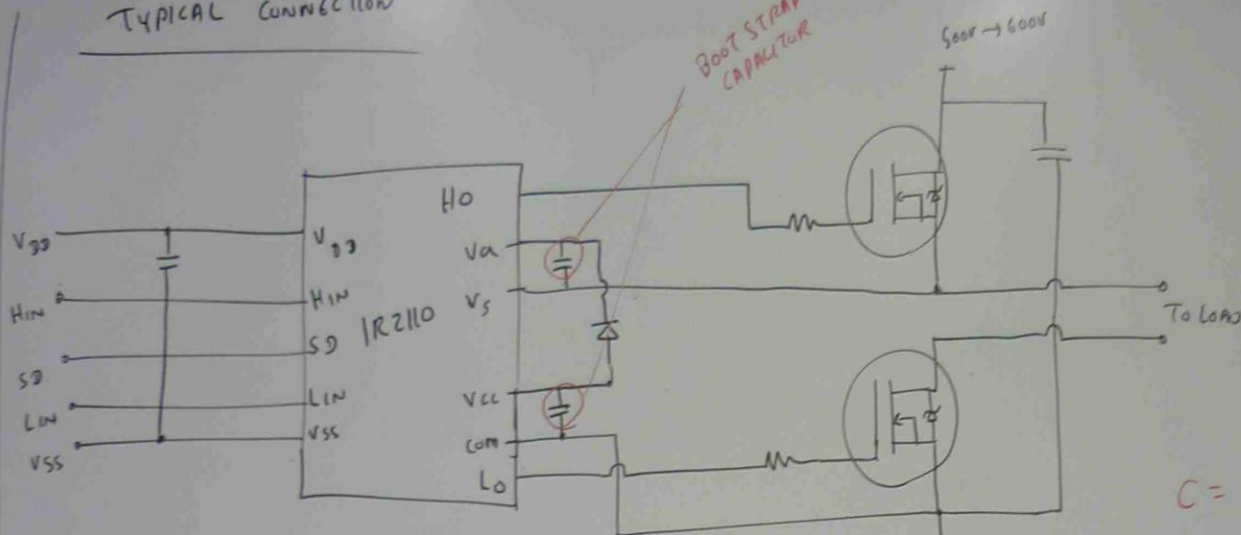
THE USE OF FOUR MOSFET SWITCHES ARE ARRANGED IN H BRIDGE CONFIGURATION

IR 2110 MOSFET DRIVER IS UTILIZED.



CAN SUPPLY 500V AT 2A

TYPICAL CONNECTION



OPERATION OF IR2110 DEVICE WILL BE CONTROLLED THROUGH

GENERATES PWM SIGNAL.

PWM SIGNAL WILL BE FED TO HIN & LIN SIMULTANEOUSLY.

IF INTERNAL LOGIC DETECTS A LOGIC HIGH, HO PIN WILL BE DRIVEN

SD PIN - CONTROLS THE SHUT DOWN OF THE DEVICE

VCC PIN IS FED WITH 12V

V_{CC} = SUPPLY VOLTAGE 12V f = FREQUENCY (50Hz/60Hz)

V_F = FORWARD VOLTAGE 1.3V V_{DS} = VOLTAGE DROP 1.5V

$I_{CB(LEAK)}$ = LEAKAGE CURRENT
250 μ A

Q_g = GATE CHARGE 110nC

I_{GB} = QUIESCENT CURRENT 230 μ A

Q_{ZS} = LEVEL SHIFT CHARGE 5nC

$$C = \frac{2 \left[2Q_g + \frac{I_{GB(max)}}{f} + Q_{ZS} \frac{I_{CHS(LEAK)}}{f} \right]}{V_{CC} - V_F - V_{DS} - V_{MIN}}$$

$$V_{CC} - V_F - V_{DS} - V_{MIN}$$

$$= 2 \mu F \text{ FOR } 60 \text{ Hz}$$

$$= 51 \text{ mF FOR } 50 \text{ Hz}$$