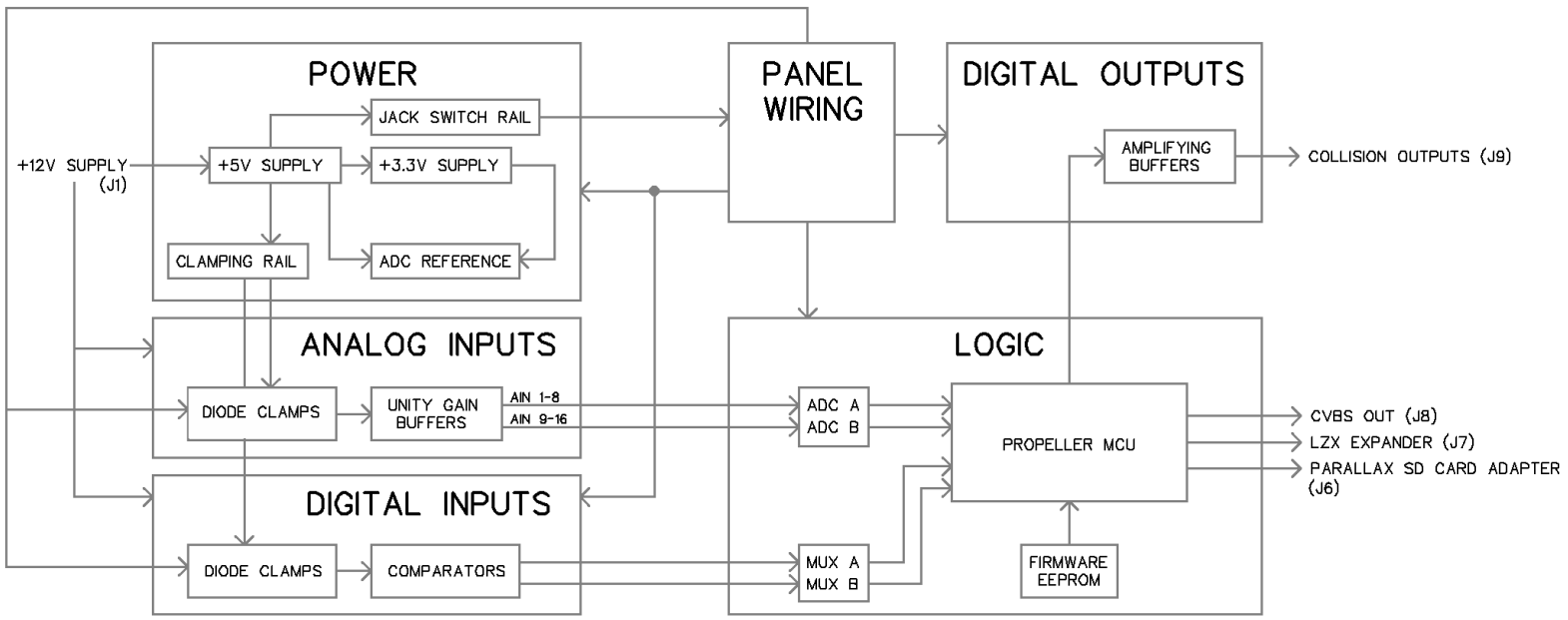
MING MECCA WORLD CORE

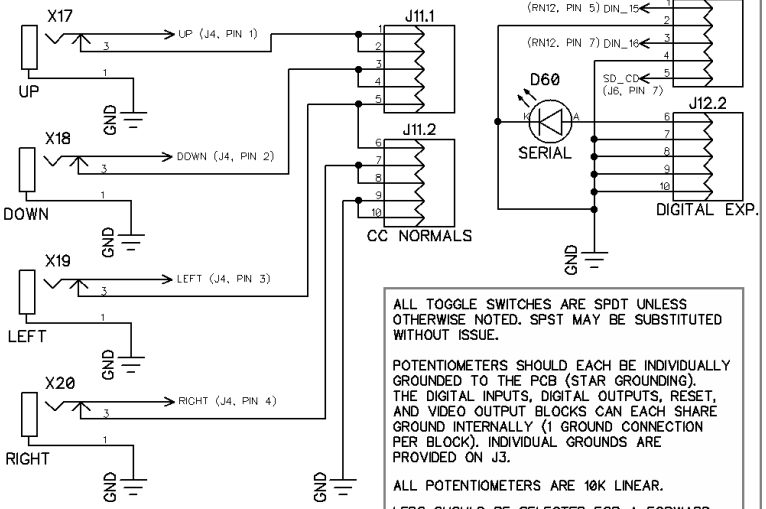
DESIGNED BY JORDAN BARTEE IN PROVIDENCE, RI, WINTER 2013

BLOCK DIAGRAM



special stage systems

PANEL WIRING



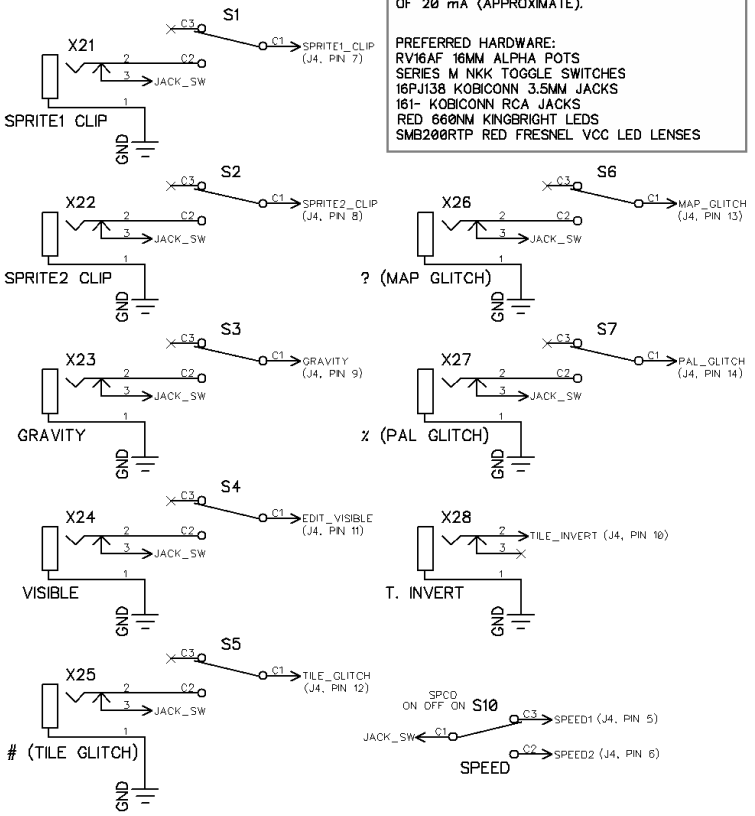
ALL TOGGLE SWITCHES ARE SPDT UNLESS OTHERWISE NOTED. SPST MAY BE SUBSTITUTED WITHOUT ISSUE.

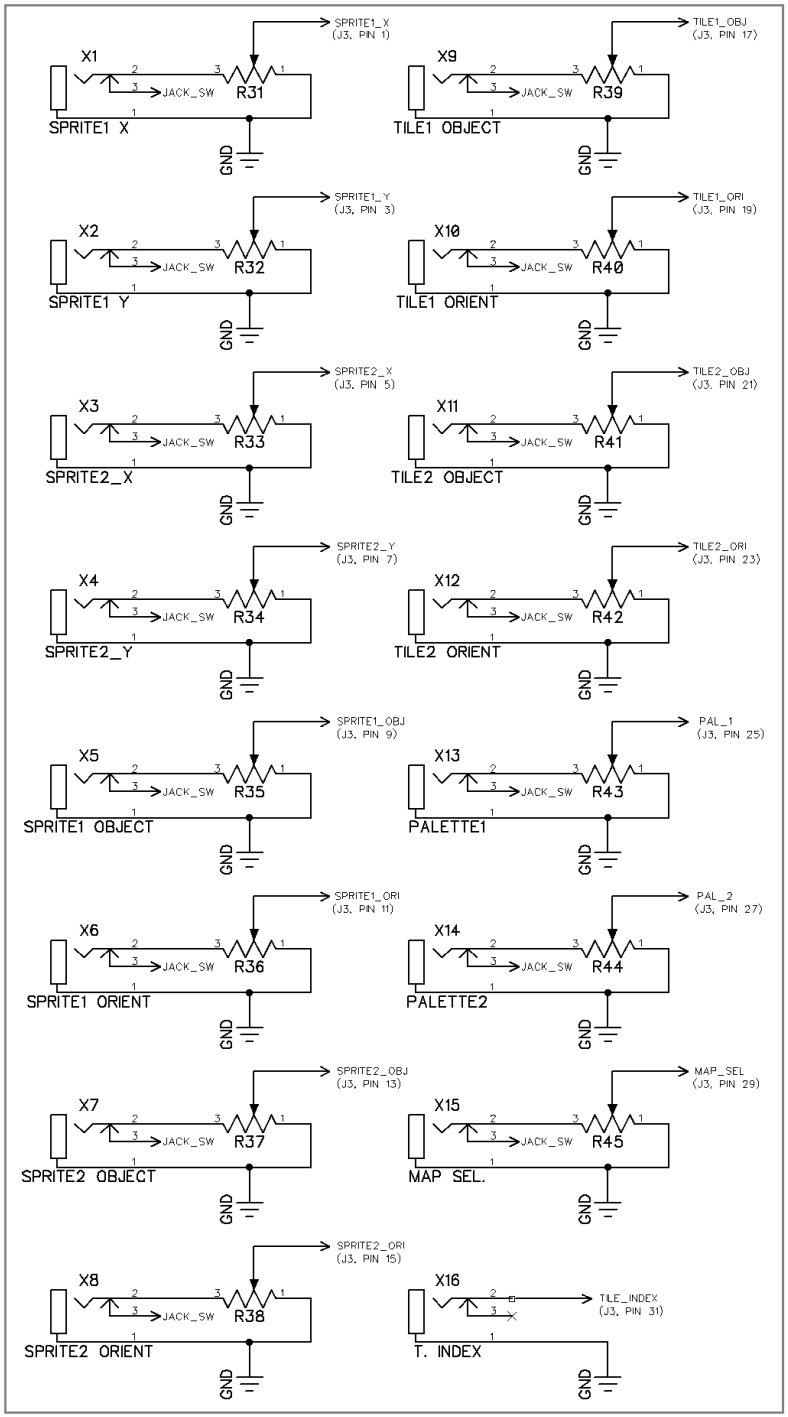
POTENTIOMETERS SHOULD EACH BE INDIVIDUALLY GROUNDED TO THE PCB (STAR GROUNDING). THE DIGITAL INPUTS, DIGITAL OUTPUTS, RESET, AND VIDEO OUTPUT BLOCKS CAN EACH SHARE GROUND INTERNALLY (1 GROUND CONNECTION PER BLOCK). INDIVIDUAL GROUNDS ARE PROVIDED ON J3.

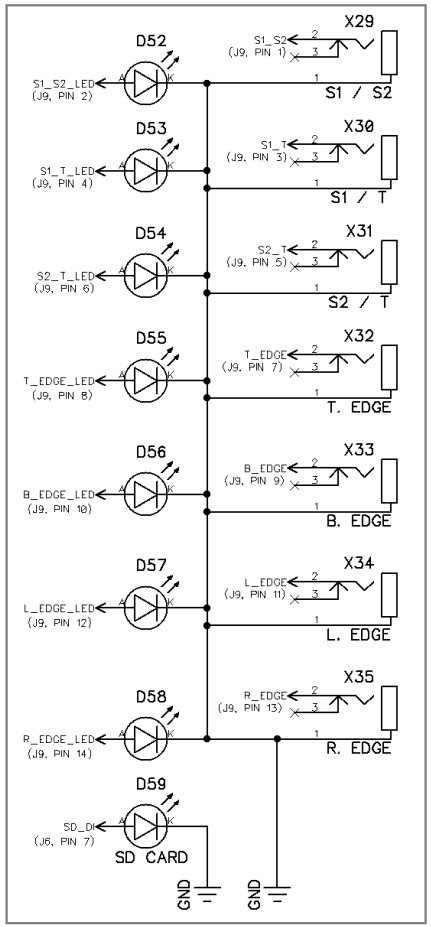
ALL POTENTIOMETERS ARE 10K LINEAR.

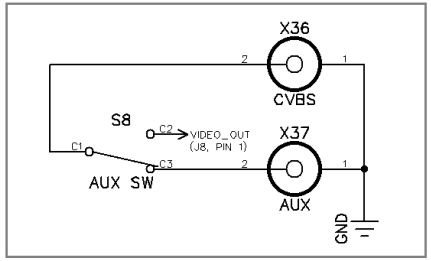
LEDS SHOULD BE SELECTED FOR A FORWARD VOLTAGE OF 2.5V AND A FORWARD CURRENT OF 20 mA (APPROXIMATE).

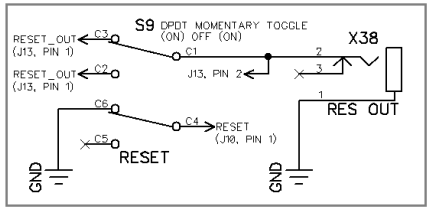
PREFERRED HARDWARE:
RV16AF 16MM ALPHA POTS
SERIES M NKK TOGGLE SWITCHES
16PJ138 KOBICONN 3.5MM JACKS
161- KOBICONN RCA JACKS
RED 660NM KINGBRIGHT LEDS
SMB200RTP RED FRESNEL VCC LED LENSES











POWER

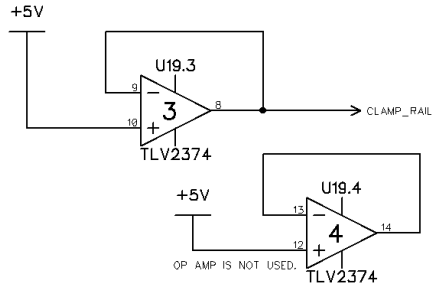
THE 7805 AND 7833 REGULATORS SHOULD BE HEATSUNK AND RATED FOR AT LEAST 200 mA EACH.

ALL CAPACITORS ARE CERAMIC EXCEPT WHERE NOTED.

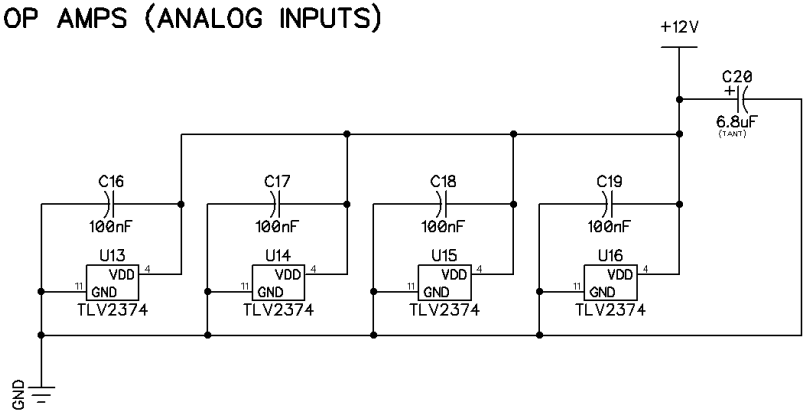
IN ADDITION TO THE MAIN PSU, SCHEMATICS ARE ALSO SHOWN FOR THE OP AMP AND COMPARATOR SUPPLIES, ADC REFERENCE, JACK SWITCH RAIL, AND PROTECTION DIODE CLAMPING RAIL. THE ABSOLUTE MINIMUM DECOUPLING CONFIGURATION IS SHOWN, CONSISTING OF A SINGLE 100nF CERAMIC CAPACITOR PER IC AND A 6.8uF TANTALUM CAPACITOR PER IC BLOCK. ALL ICS IN EACH BLOCK SHOULD BE GROUPED CLOSELY TOGETHER SINCE THEY SHARE THE TANTALUM CAPACITOR. ADDITIONAL DECOUPLING MAY BE NECESSARY DEPENDING ON PCB DESIGN.

GROUND PINS 5 AND 6 ON POWER CONNECTOR J1 ARE INTENTIONALLY LEFT UNCONNECTED TO PREVENT DAMAGING SHORTS FROM OCCURING IF J1 IS CONNECTED BACKWARDS DUE TO USER ERROR. PINS 1, 2, AND 13 - 15 ARE ALSO LEFT UNCONNECTED.

CLAMPING RAIL



OP AMPS (ANALOG INPUTS)



12V SUPPLY

MULTIPLEXERS U7, U8
COMPARATORS U9 - U12
OP AMPS U13 - U19

5V SUPPLY

ADCS U5, U6

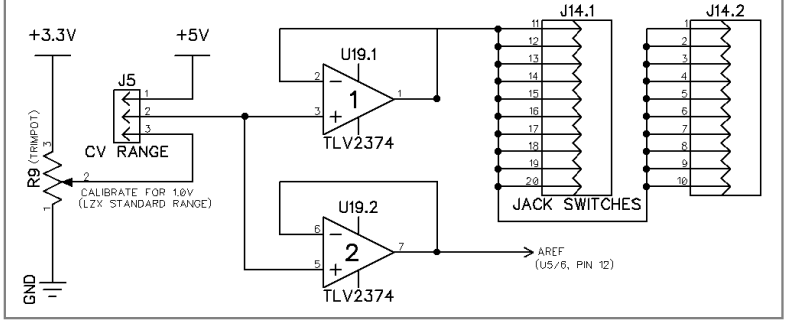
3.3V SUPPLY

PROPELLER U3
EEPROM U4
SD CARD ADAPTER

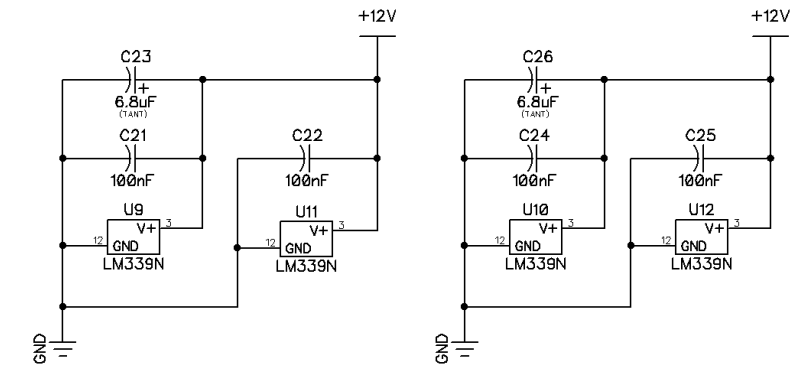
TOTAL CURRENT CONSUMPTION

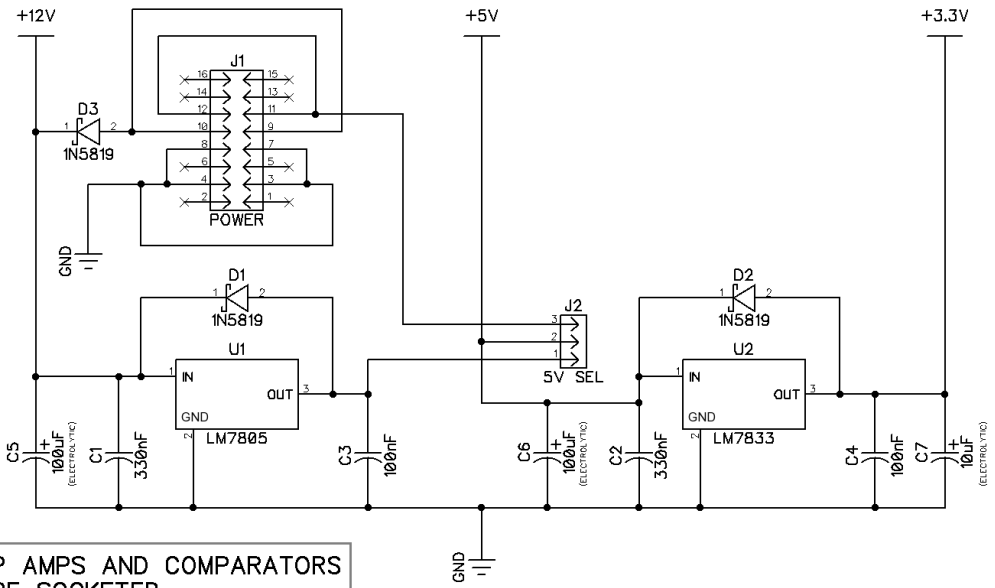
APPROX. 216 mA

ADC REFERENCE, JACK SWITCH RAIL



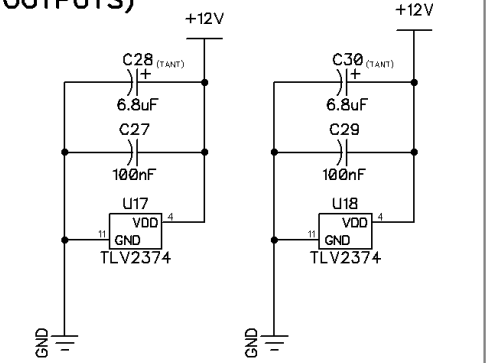
COMPARATORS (DIGITAL INPUTS)



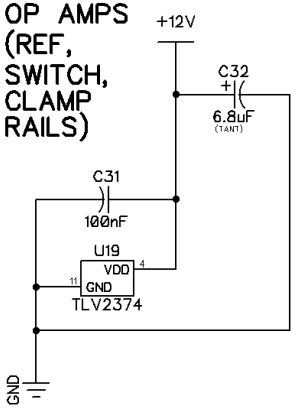


OP AMPS AND COMPARATORS ARE SOCKETED.

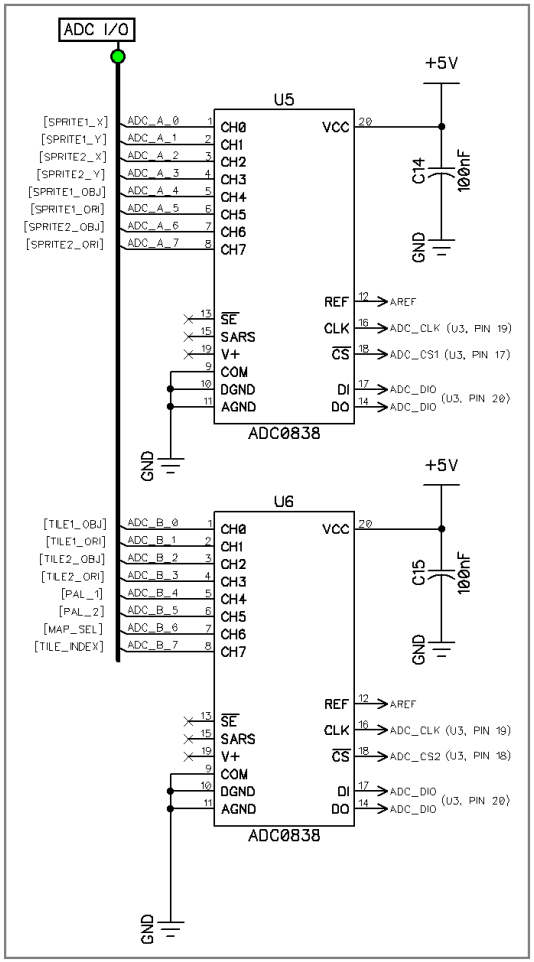
OP AMPS (DIGITAL OUTPUTS)

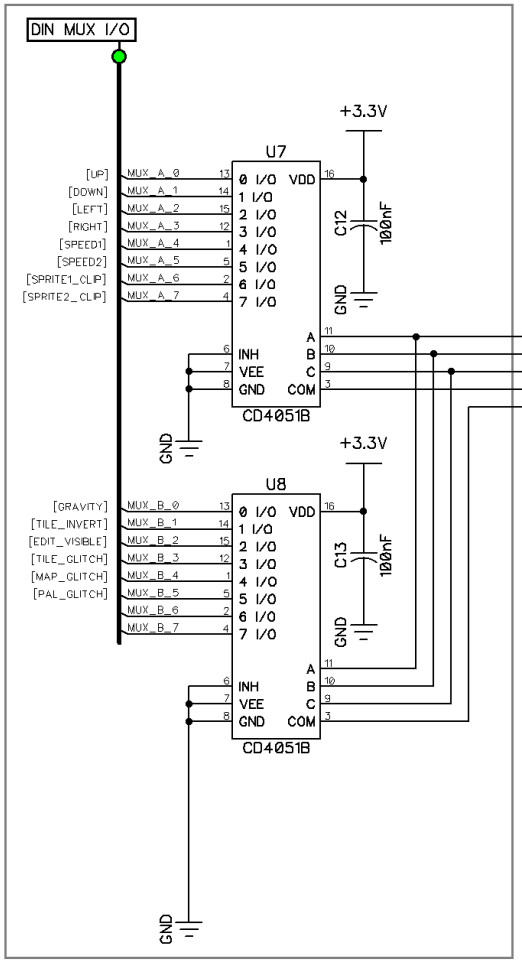


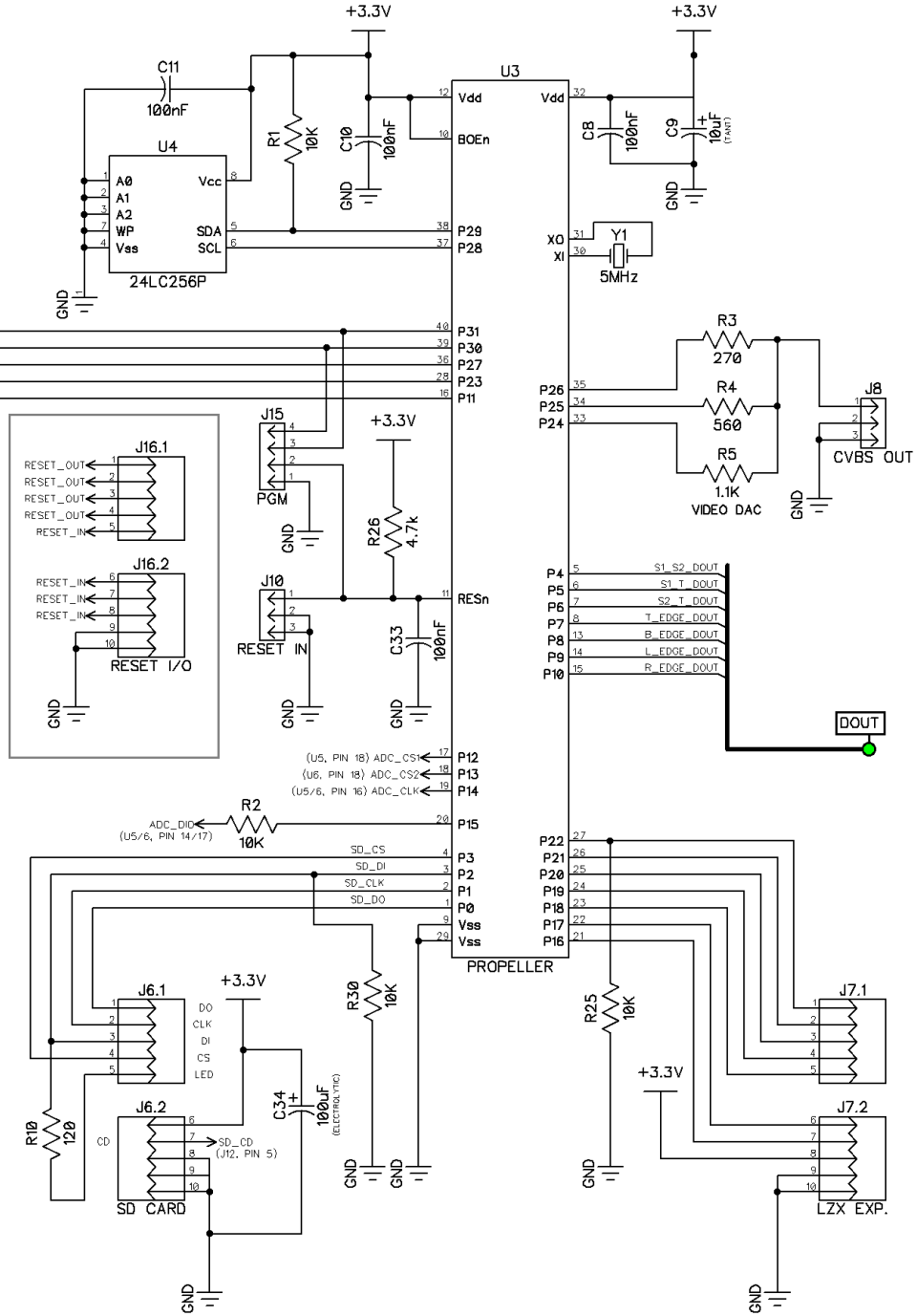
OP AMPS (REF, SWITCH, CLAMP RAILS)



LOGIC







ALL RESISTORS ARE 5% TOLERANCE EXCEPT FOR R3 - R5, WHICH ARE 1% OR BETTER.

ALL CAPACITORS ARE CERAMIC EXCEPT WHERE NOTED.

ADC AND MUX I/O BUS SIGNALS HAVE THEIR CORRESPONDING J3 AND J4 NAMES WRITTEN IN BRACKETS.

THE PROPELLER'S RESn INPUT IS EXTREMELY SENSITIVE TO FLUCTUATIONS ON VSS AS WELL AS STRAY EMI. IN ADDITION TO THE CERAMIC DECOUPLING CAPACITOR C32, RESn IS TIED TO EXTERNAL PULL-UP RESISTOR R28. DEPENDING ON THE PCB DESIGN AND OPERATING ENVIRONMENT, R28 MAY NEED TO BE STIFFER. 2.2K OR 1K ARE VALID SUBSTITUTIONS IF SPORADIC RESETS OCCUR.

THE PROPELLER PLUG HEADER J15 SHOULD BE PLACED AS CLOSE AS POSSIBLE TO THE PROPELLER'S RESn INPUT (PIN 11) IN ORDER TO REDUCE LOADING AND INTERFERENCE.

THE 100uF ELECTROLYTIC CAPACITOR ACROSS J6'S SUPPLY STABILIZES POWER WHEN INSERTING OR REMOVING AN SD CARD. IT SHOULD BE PLACED DIRECTLY AT THE POINT OF LOAD, PERHAPS EVEN SOLDERED DIRECTLY TO THE PARALLAX SD CARD ADAPTER BOARD DEPENDING ON THE DESIGN.

THE VIDEO OUTPUT DAC AT R3 - R5 ASSUMES A STANDARD 75 OHM LOAD AND IS CALIBRATED TO GENERATE A 0-1V SIGNAL RANGE.

ALL ICS ON THIS SHEET ARE SOCKETED.

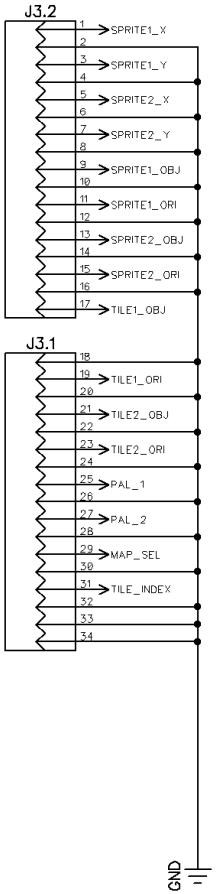
ANALOG INPUTS

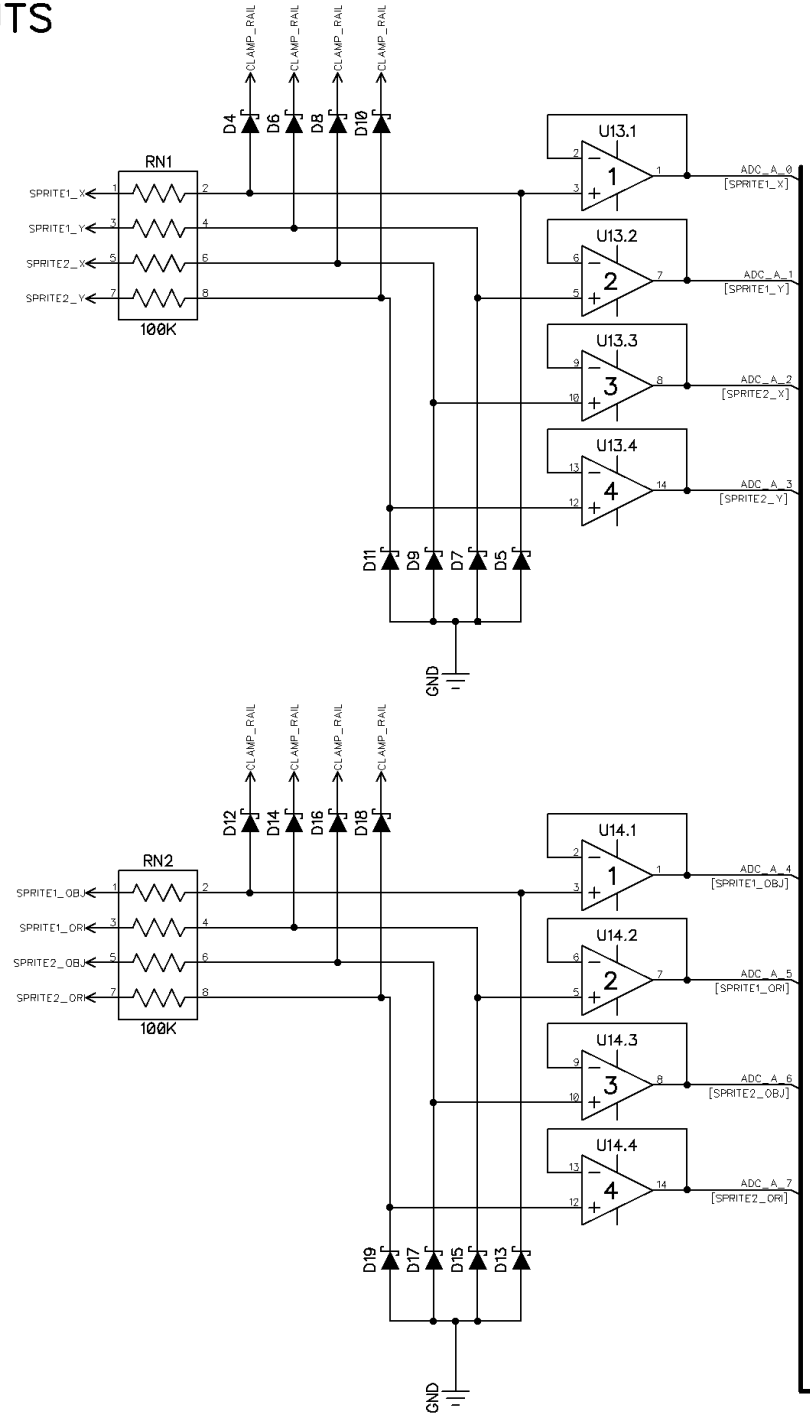
ALL OP AMPS ARE TLV2374. SEE POWER SHEET FOR SUPPLY AND DECOUPLING INFORMATION.

ALL RESISTOR NETWORKS ARE 5% TOLERANCE.

ALL DIODES ARE BAT85S.

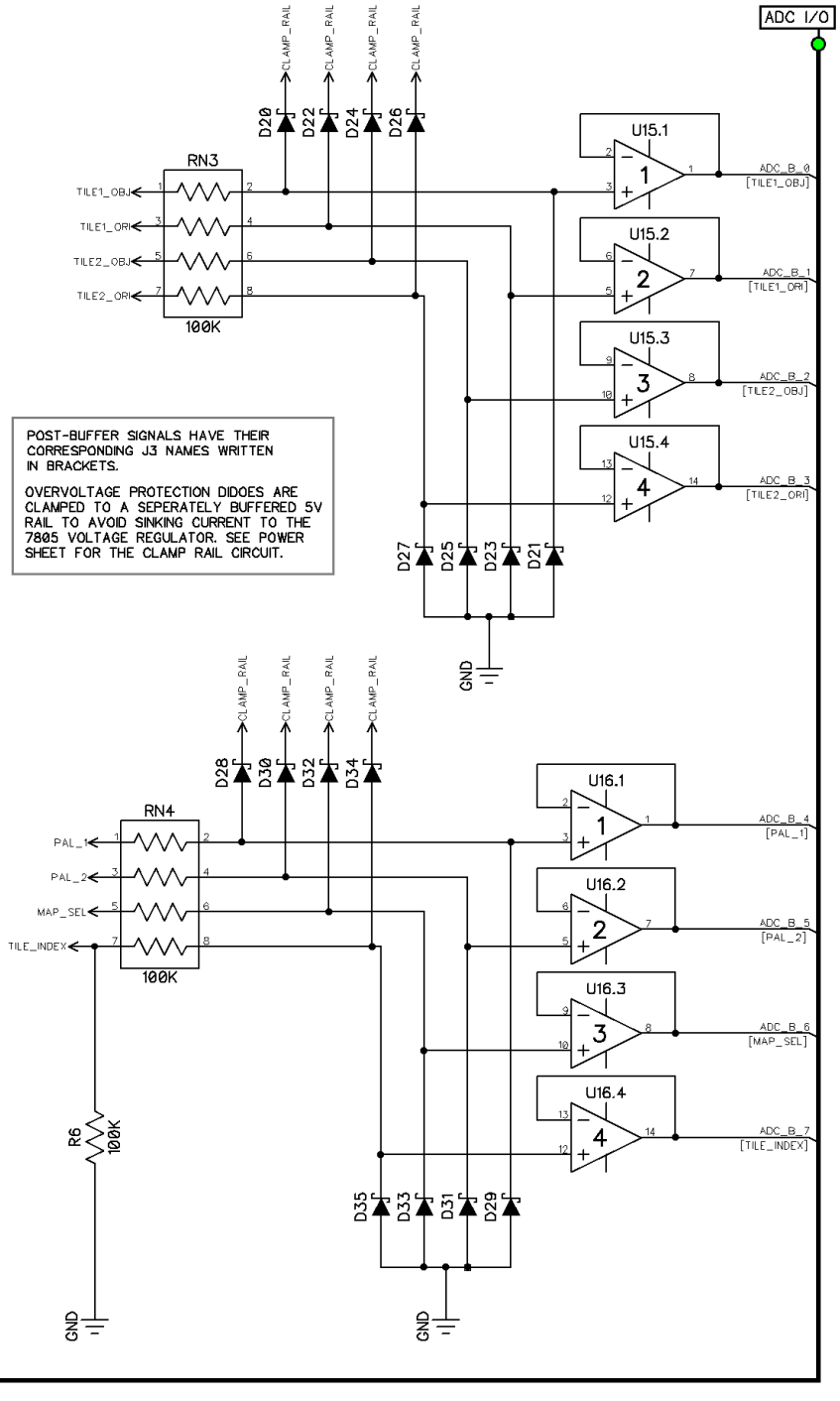
INPUTS (FROM PANEL)



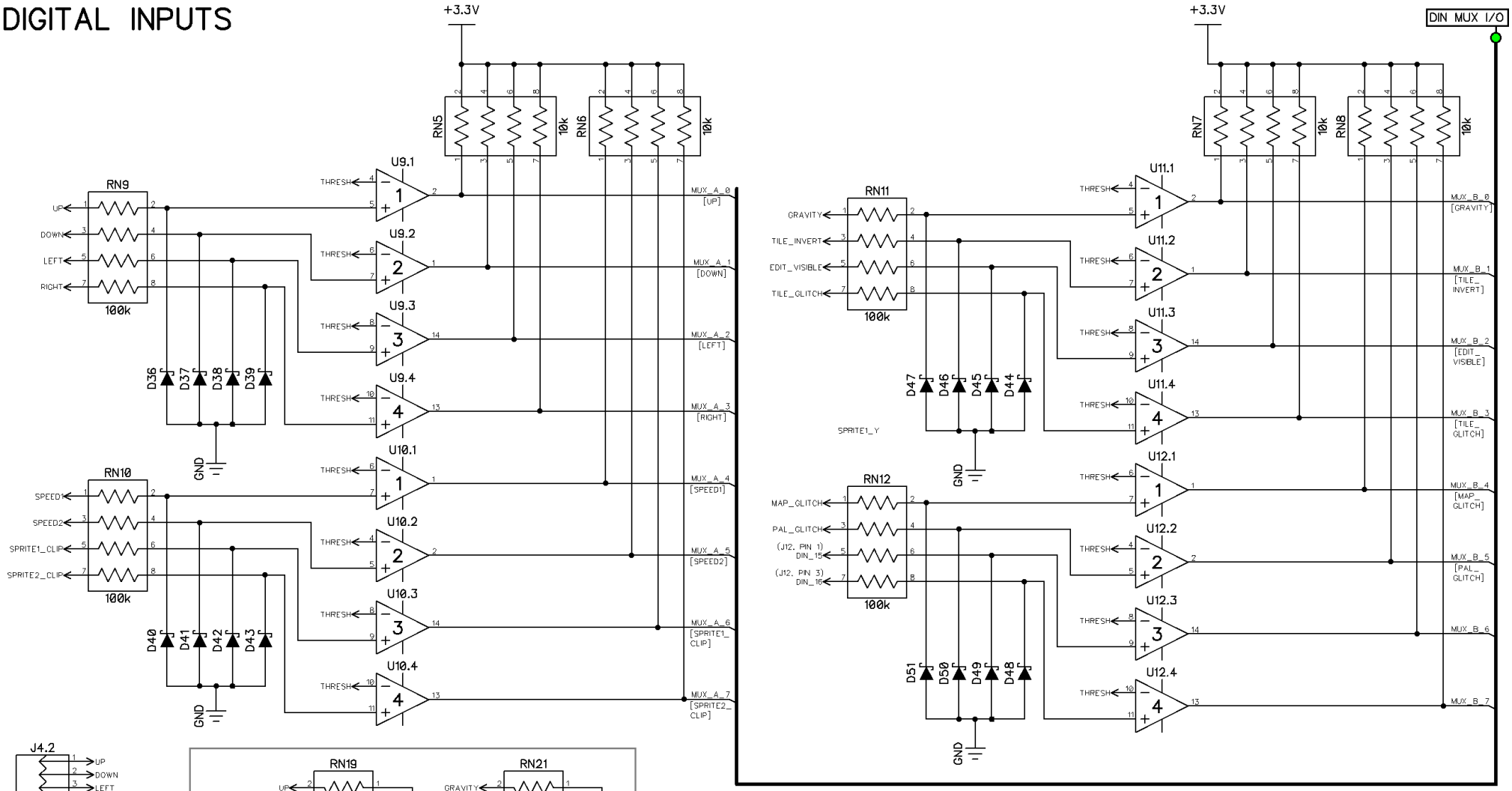


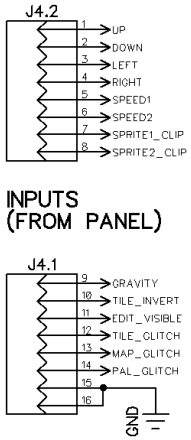
POST-BUFFER SIGNALS HAVE THEIR CORRESPONDING J3 NAMES WRITTEN IN BRACKETS.

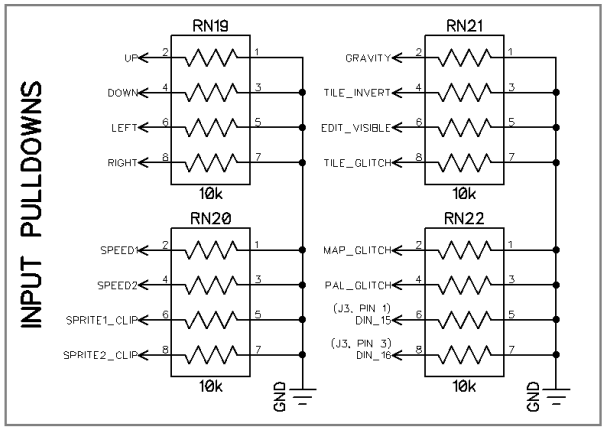
OVERVOLTAGE PROTECTION DIDOES ARE CLAMPED TO A SEPERATELY BUFFERED 5V RAIL TO AVOID SINKING CURRENT TO THE 7805 VOLTAGE REGULATOR. SEE POWER SHEET FOR THE CLAMP RAIL CIRCUIT.

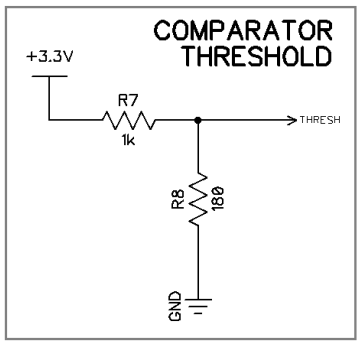


DIGITAL INPUTS









INPUT PULLDOWN RESISTORS ARE INSERTED UPSTREAM OF 100K SERIES RESISTORS
ALL RESISTOR NETWORKS ARE 5% TOLERANCE.
POST-BUFFER SIGNALS HAVE THEIR CORRESPONDING J4 NAMES WRITTEN IN BRACKETS.
ALL COMPARATORS ARE LM339N. SEE POWER SHEET FOR SUPPLY AND DECOUPLING INFORMATION.
ALL DIODES ARE BAT85S.
COMPARATOR THRESHOLDS ARE HELD AT 0.5V AS SET BY THE R7/R8 VOLTAGE DIVIDER.
R7 AND R8 ARE 1% TOLERANCE OR BETTER.
R26 AND R27 ARE 5% TOLERANCE.

DIGITAL OUTPUTS