AIR CANNON

3/09/07

Intelligent Payload:

↓

- Battery-powered
- Hall effect sensor to arm RF RX in barrel or reed switch
  - Prevent misfiring of other nearby units
  - ~~X~~-or use unique ID
- Must receive wireless trigger to inflate from cannon >
- Cannon to calculate timing & trigger payload as necessary
  - muzzle velocity
  - pressure (muzzle)
  - wind speed

* Internet control-
  - Web cam
  - Laser range finder
  - Servo control (pan left/right)

21ST CENTURY LIFEGUARD 9/18/07

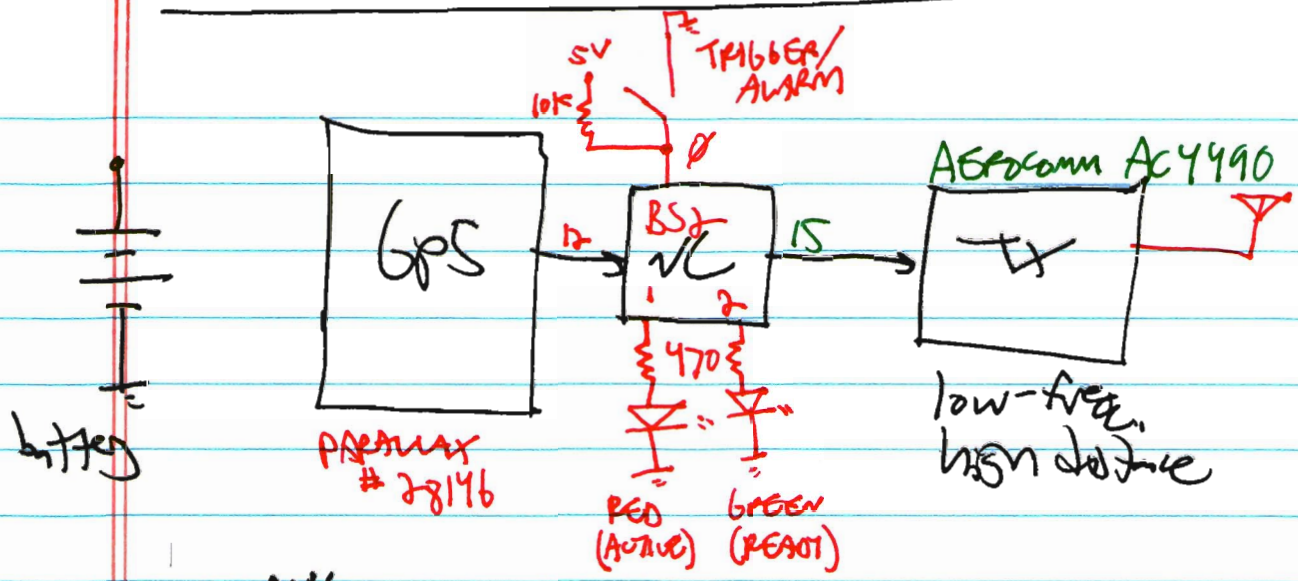
SMART PACKAGE

555 TIMER + DIGITAL POTENTIOMETER

↳ TRIGGER LIFE SAVER PACKAGE AT DESIRED TIME ABOVE WATER

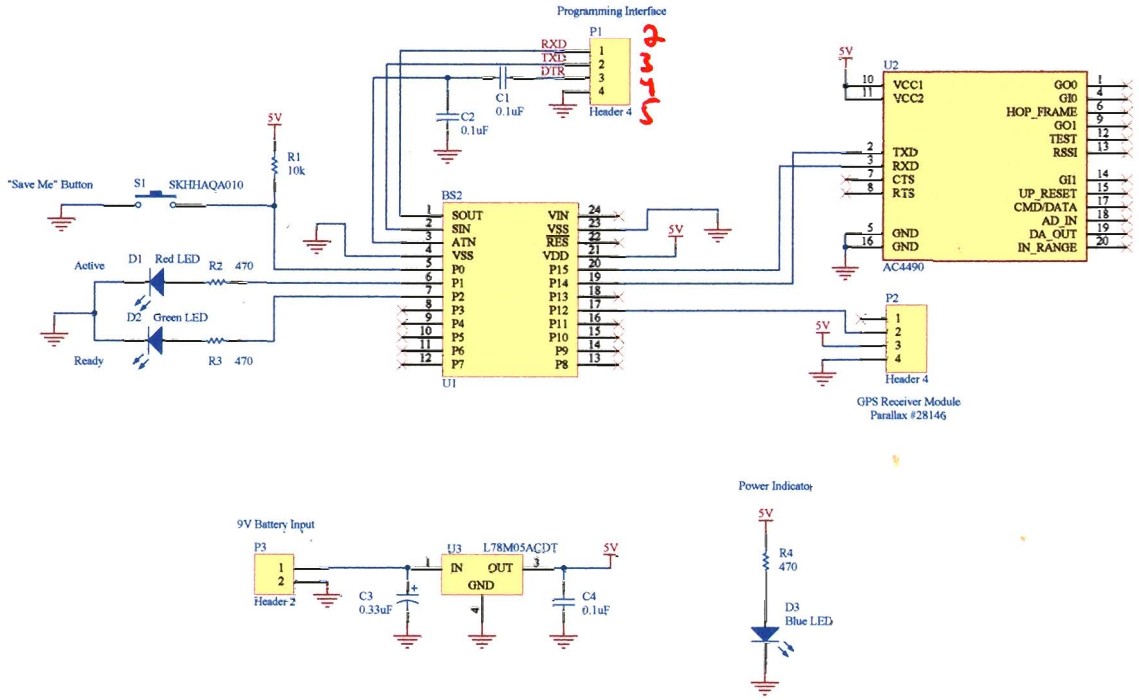
21st CENTURY LIFEGUARD - WRISTBAND

9/18/07



- ANY OFF THE SHELF "TRACKING" PRODUCTS?
- WATER-PROOF
- ANTENNA MUST BE ABOVE SALT-WATER

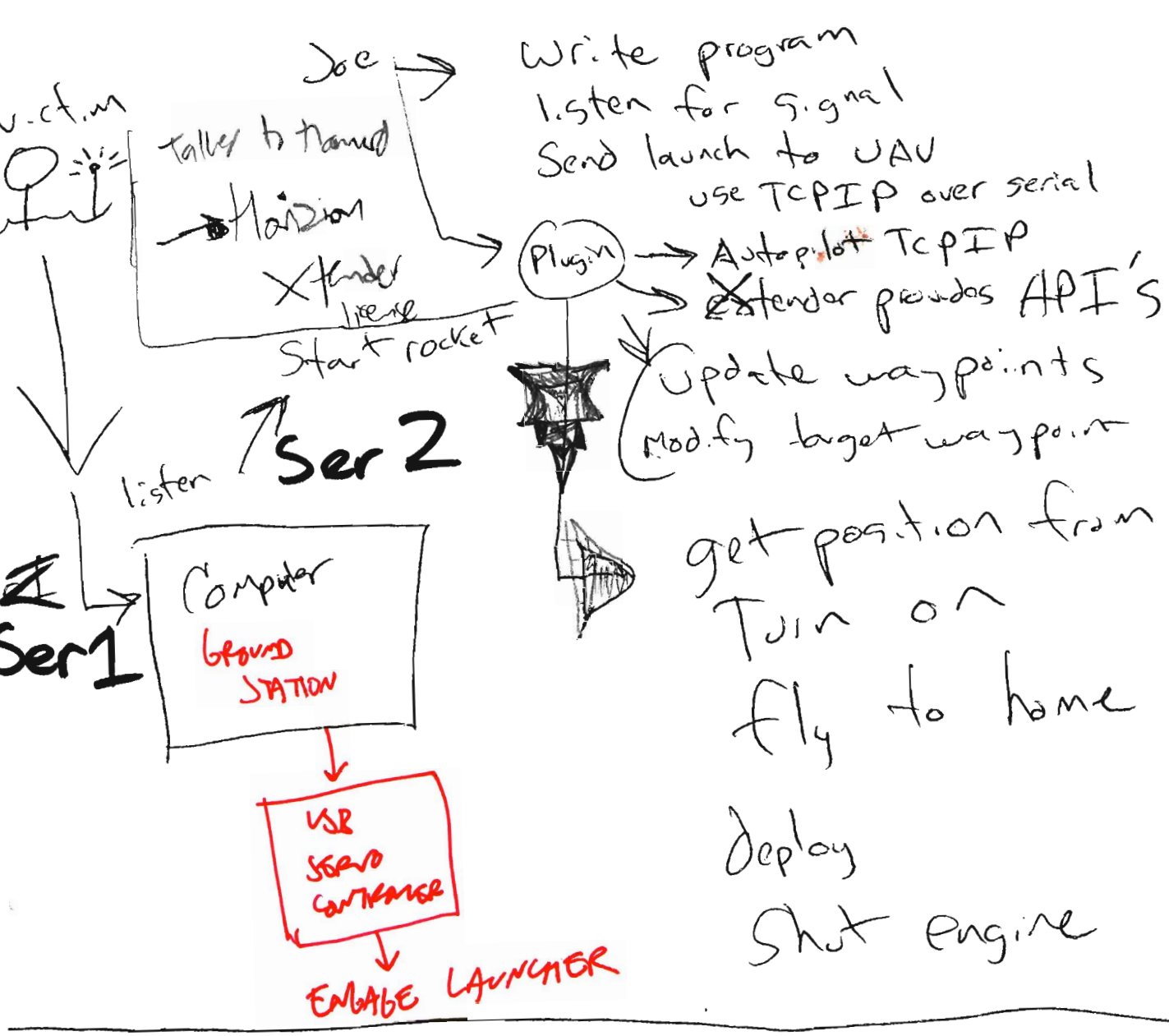
- AIRPLANE LAUNCHER TRIGGER - launch plane when emergency signal received
- DROP MECHANISM
- TARGETING



GRAND idea studio

Prototype This: 21st Century LSD: Wristband Transmitter

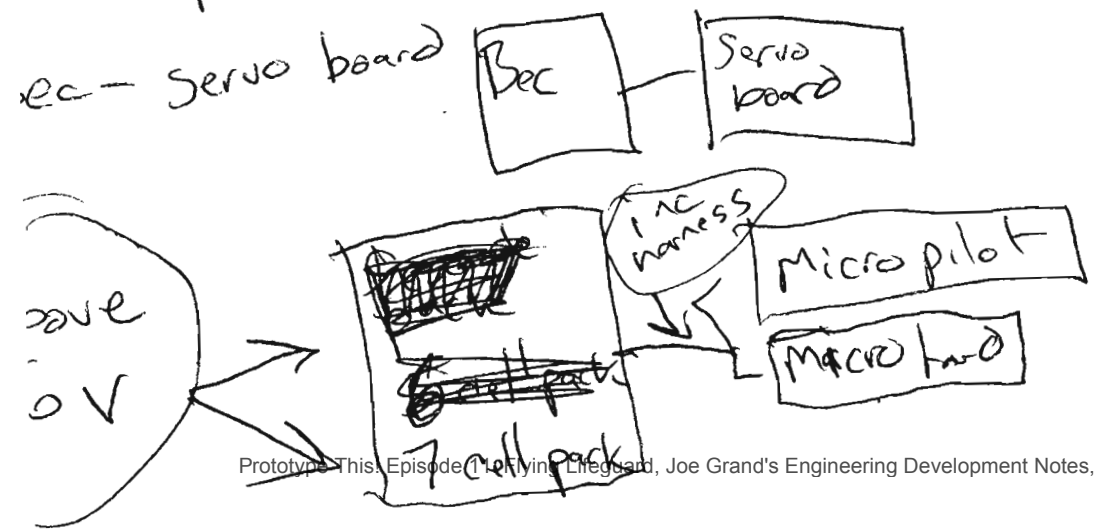
Size	FCSM No.	DWG No.	Rev
B	Sep. 28, 2007		
Scale	J. Grand	Sheet	



Speed Control - Setup .vrs editor
or servo sim.

Power

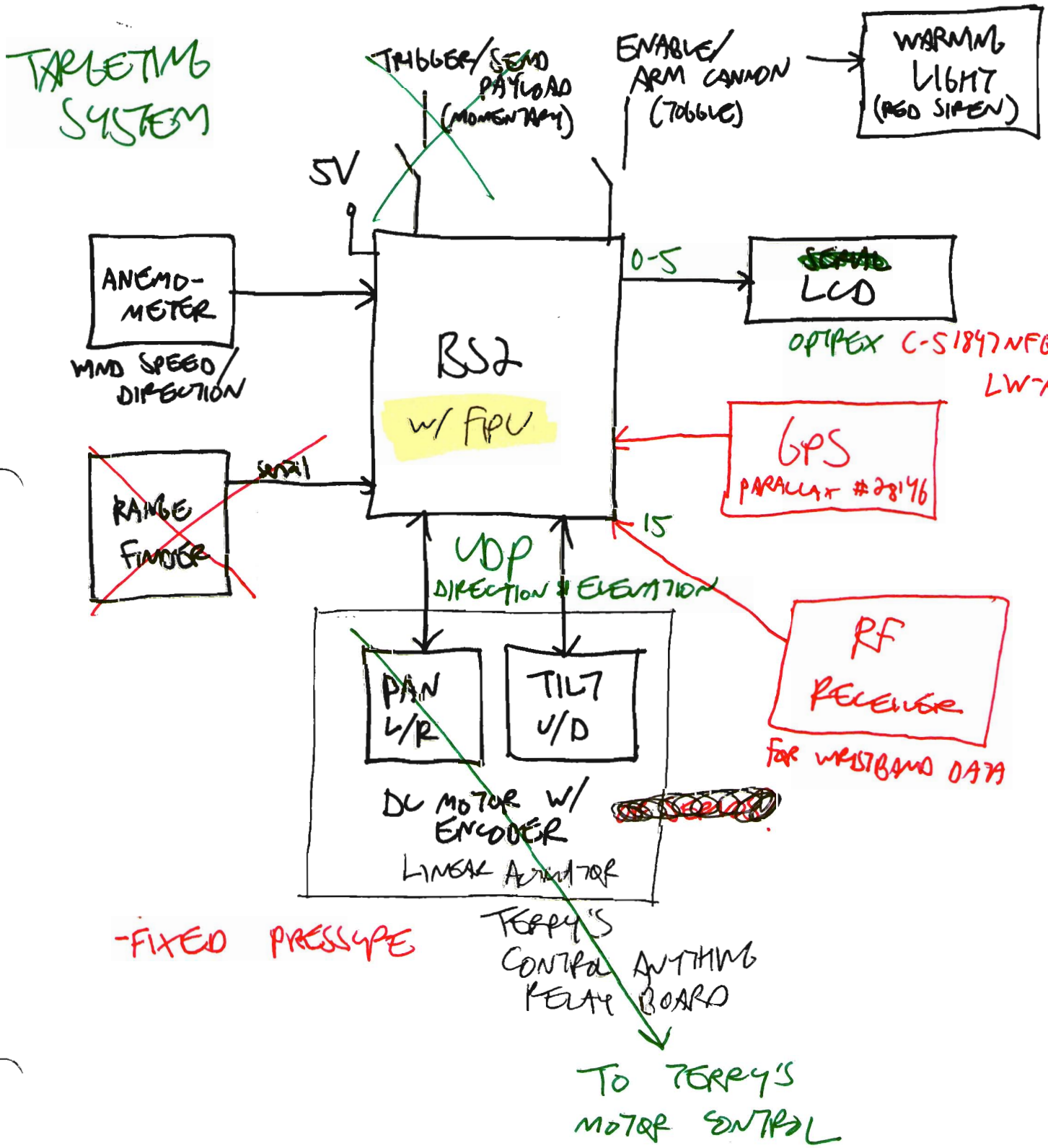
ec- servo board



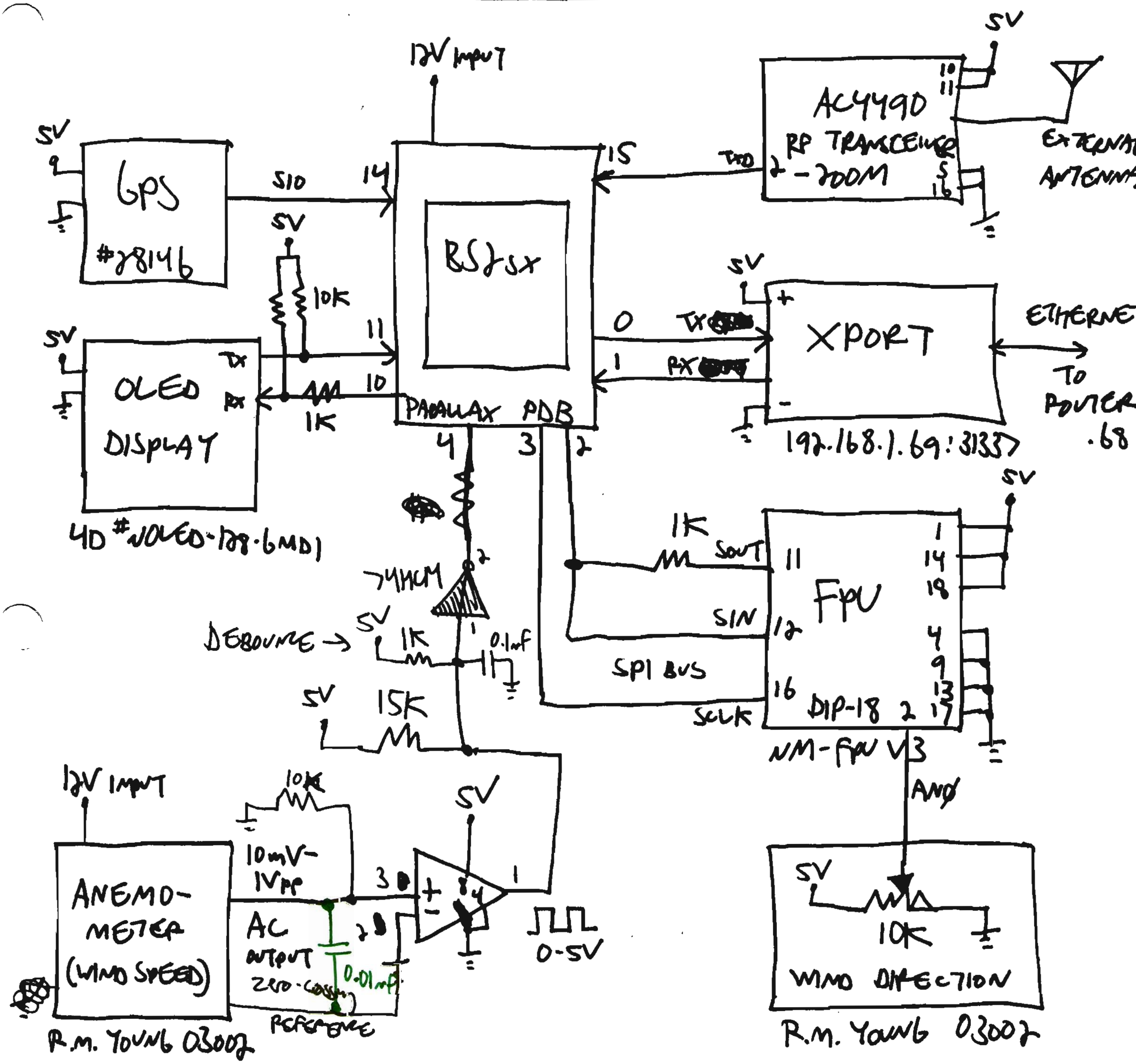
21ST CENTURY LIFESAVING CANNON

9.18.07

- KEEP ALL INTELLIGENCE IN BASE STATION/CANNON
- NO ELECTRONICS IN PAYLOAD FOR SIMPLICITY ?



JLSD CANNON TARGETING SYSTEM 10/2/07



- heavy plane - not climbing fast enough
→ - set 25-50 ft. instead of 200 ft.

→ 6ps ftr. once pr second - lag time x 6ps
by the time there is a position ftr, plane may be past it.
- live from previous waypoint to the next
waypoint - perpendicular line

~~waypoint~~ diameter - 10ft.
- 100ft. away
- ~~3~~ waypoint of target - verify in simulator
- wait climb to ~~100~~ 25ft. different line #s
- further away from launch
- 2 waypoint of launch point

- take autopilot a few seconds to turn the elevators
just up elevator at take-off

*→ - human would make adaptable than a small computer

dec. min → deg

→ deg = deg + $\frac{M.m}{60}$

M.m = D.d * 60

10/22/07 TRACY, CA

LAUNCH POINT: 37.682 ~~988~~ 910 — 37:40.9746

-121.3011 ~~60~~.42 — -121:18.06852

121.300952 50ft.
1 37.682926

TARGET point: 37.682855 — 37:40.9713

-121.301002 — -121:18.06012

2 121.300922 100ft.
37.683119

3 121.301009 150ft.
37.683098

- adjust waypoint in plug-in

→ error/delay in GPS receiver

- a couple of seconds

- they don't tell you

by manufacturer

part of the design

4 121.301144 150ft.
37.683160

5 121.301100 400ft.
37.683819

6 121.301100 250ft.
37.683413

test cluster center
-121.301003,
37.682432

7 121.301079 250ft.
37.683365

37.683268
-121.300995

North + ~~700~~ (30ft)

37.683320 — 37.683215

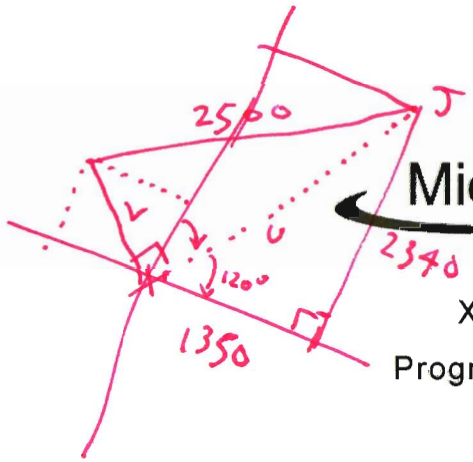
-121.300973 — 121.301095

~~pre-target~~ pre-target

missing waypoint (North)

~~37.682~~

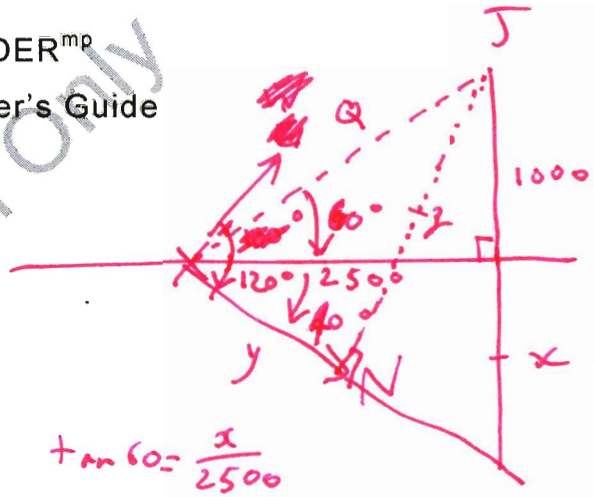
~~121.301010~~

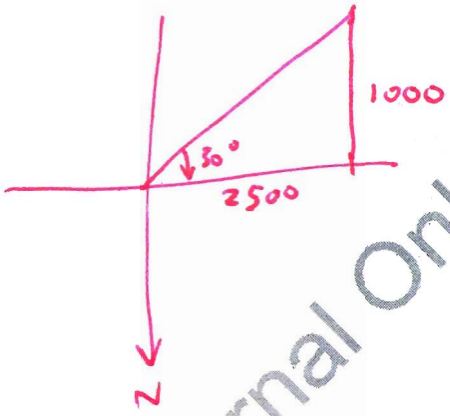


MicroPilot

XTENDER^{mp}

Programmer's Guide





$Q = \sqrt{1000^2 + 2500^2}$

$\doteq 2700$

$\sin 120 = \frac{z}{Q}$

$\Rightarrow z = Q \sin 120$

$\doteq$

$\tan 60 = \frac{x}{2500}$

$x = 2500 \tan 60$

$=$

$y = \sqrt{Q^2 - z^2}$

$\doteq$

$\doteq 1350$

$\doteq 2340$

37:53.861
-122:38.934

37.89768
-122.6489

37:53.8257
-122:37.7323

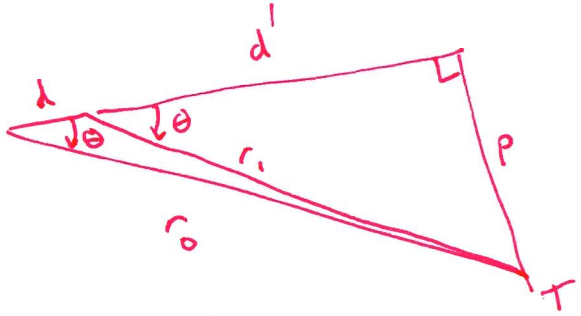
$\Rightarrow$ 37.89709
-122.62887

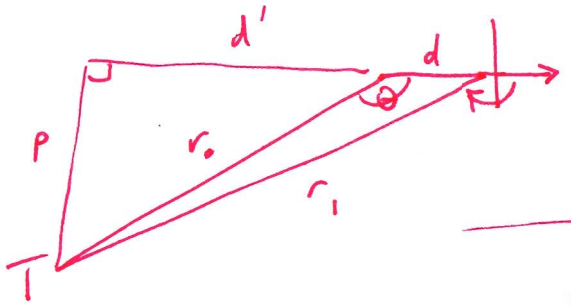
37:53.833
-122.38.9344

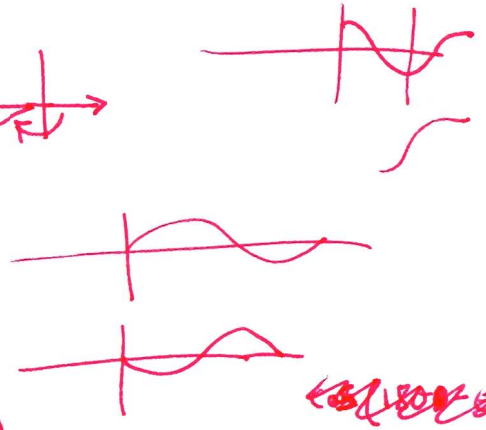
37.89712
-122.64892

$\sin\theta = \frac{p}{r_0} \Rightarrow p = r_0 \sin\theta$

2000 1300
2700 1500







$\sin\theta = \frac{p}{r_0}$

$\Rightarrow p = r_0 \sin\theta$

$r_0^2 = p^2 + (d+d')^2$

$\Rightarrow (d+d')^2 = r_0^2 - (r_0\sin\theta)^2$

$\Rightarrow d+d' = \sqrt{r_0^2 - (r_0\sin\theta)^2}$

$d' = \sqrt{r_0^2 - (r_0\sin\theta)^2} - d$

$r_1^2 = p^2 + (d')^2$

$= (r_0\sin\theta)^2 + \left(\sqrt{r_0^2 - (r_0\sin\theta)^2} - d\right)^2$

$r_1 = \sqrt{(r_0\sin\theta)^2 + \left(\sqrt{r_0^2 - (r_0\sin\theta)^2} - d\right)^2}$

$\cos\theta = \frac{r_1}{d'}$

$\Rightarrow r_1 = d'\cos\theta$

$p = r_1 \sin\theta$

$\sin(180-\theta) = \frac{p}{r_0}$

$\Rightarrow p = r_0 \sin(180-\theta)$

$r_1^2 = (d'+d)^2 + p^2$

$= (r_0\cos\theta + d)^2 + (r_0\sin\theta)^2$

$= (r_0\cos\theta + d)^2 + (r_0\sin\theta)^2$

$r_1 = \sqrt{(r_0\cos\theta + d)^2 + (r_0\sin\theta)^2}$

$-r_0\sin\theta$

$r_0^2 = (d')^2 + p^2$

$= (d')^2 + (r_0\sin\theta)^2$

$\Rightarrow d' = \sqrt{r_0^2 - (r_0\sin\theta)^2}$

$= \sqrt{r_0^2(1-\sin^2\theta)}$

$= \sqrt{r_0^2\cos^2\theta}$

$= r_0\cos\theta$

$d+d' = \sqrt{r_0^2 - (r_0\sin\theta)^2}$

$d' = \sqrt{r_0^2 - (r_0\sin\theta)^2} - d$

$r_1 = \cos\theta\left(\sqrt{r_0^2 - (r_0\sin\theta)^2} - d\right) = \cos\theta(r_0\cos\theta - d)$

$= r_0\cos^2\theta - d\cos\theta$

tell him it also happens w/ waistband

- look for change in GB heading or target bearing

flypoint in simulator

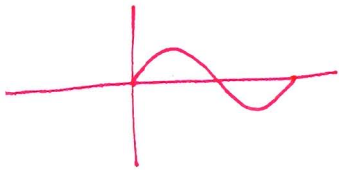
- jog relative to waypoint? Move waypoint?

Column(s)	Name	Description
50	body yaw dot	Yaw dot in body axis.
51	correction pitch	The pitch calculated from data other than the gyros and applied to the gyros to correct for drift.
52	correction roll	Roll calculated from data other than the gyros and applied to the gyros to correct for drift.
53	dPspeed	Desired airspeed. (Same as column 47)
54	x accelerometer	X accelerometer
55	dHeading	Desired heading
56	current heading	The heading calculated by the autopilot code.
57	hover offset x	The difference between actual and desired hover X coordinate.
58	hover offset y	The difference between actual and desired hover Y coordinate.
59	compass heading	The heading as calculated by the GPS
60	correction yaw	The pitch calculated from data other than the gyros and applied to the gyros to correct for drift.
61	yaw correction over time	
62	pitch correction over time	
63	FinServo 0	Fine servo value
64	FinServo 1	Fine servo value
65	FinServo 2	Fine servo value
66	FinServo 3	Fine servo value
67	FinServo 4	Fine servo value
68	FinServo 5	Fine servo value
69	FinServo 6	Fine servo value
70	FinServo 7	Fine servo value
71	tmpVals	Temporary values
72	tmpVals	Temporary values
73	tmpVals	Temporary values
74	tmpVals	Temporary values

offset
37.682797,
-121.30093)

37.68295
-121.3011

waypoint 10/24
37.682717
-121.300958



ROLL from HEADING:
→ I term - to
add in some P term as target approaches