



TW-5

Low Level Navigation Standardization

CHART PREPARATION

1. TAPE THE CHARTS TOGETHER
2. CHUM OBSTACLES
3. CHUM AIRSPACES
4. CUT CHARTS DOWN TO SIZE
5. PLACE MARGINAL INFORMATION ON CHART
6. PLACE ROUTE, NAME AND DATE ON CHART
7. LAMINATE CHART (IF APPLICABLE)
8. USE PFPS TO PLOT ROUTE OF FLIGHT
9. USE PFPS TO PLOT LL-NAV ROUTE
10. PLOT ROUTE CHECKPOINTS (CPs)
11. PLOT MAP CHANGEOVER POINTS (MCPs)
12. CONNECT CHECKPOINTS
13. LABEL CPs/MCPs
14. PLOT BINGO CHECKPOINT & BINGO INFORMATION
15. PLACE DOGHOUSES ON CHART

TAPE THE CHARTS TOGETHER

- MATCH LAT/LONG or GRIDS
 - JogAir – Lat/Long
 - 1:50,000 – Grids
- MATCH UP TERRAIN FEATURES
- USE CLEAR SCOTCH TAPE

CHUM OBSTACLES

- POWER LINES

USE FINE TIP RED MARKER & STRAIGHT-EDGE



- TOWERS

USE ULTRA-FINE TIP RED MARKER OR
BALLPOINT PEN

LABEL ALTITUDE IN AGL AT BASE



CHUM AIRSPACES

- USE VFR SECTIONAL
- PLACE RESTRICTED/NO-FLY AREAS

USE RED FINE/ULTRA-FINE TIPPED MARKER
LABEL WITH NAME OF AIRSPACE & ALTITUDE



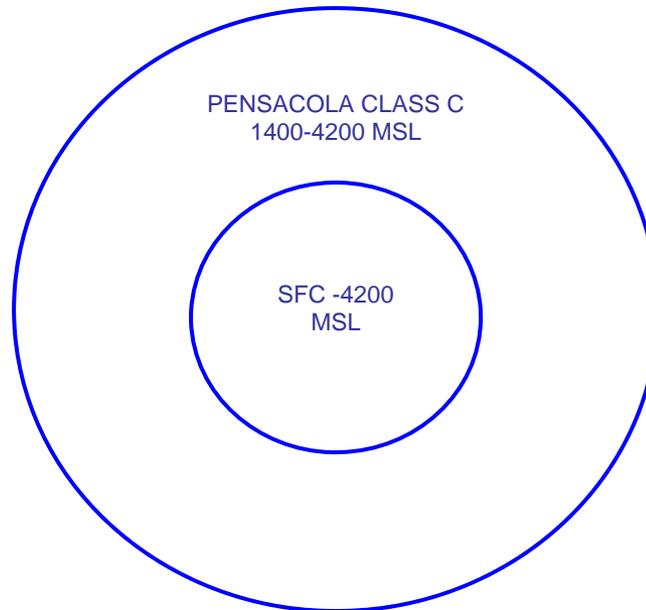
CHUM AIRSPACES

- **PLACE AIRSPACES ON CHART**

USE VFR SECTIONAL

USE ULTRA-FINE TIPPED BLUE MARKER

LABEL THE AIRSPACE WITH NAME AND ALTITUDE





WRITING CLASS "C"
1800-4200' MSL

SFC-1100
DUEY
DUEY
DUEY

R-2115 A
SFC-UNLTD

SFC-1100
MSL

PENSACOLA
CLASS "C"
PENSACOLA BAY
1100-4200' MSL

Fort Pickens
STATE PARK
SFC-1100' MSL

SHERMAN CLASS "C"
1100-4200' MSL

R-2115 C
8500-UNLTD

G U L F O F M E X I

OR SUBSURFACE NAVIGATION
GREEN ROUTE

SCALE 1:250,000

CUT CHART DOWN TO SIZE

- JogAir's should NOT be trimmed down if only using Pensacola JogAir except for marginal information. If adding Andulusia JogAir, trim area north of Brewton & Florala.
- 1:50,000 leave approximately 6grids (3-4 miles beyond checkpoints for border).

Additional considerations:

Save all marginal information.

Trim charts so that grid or lat/long information is left on chart edges.

Place Marginal Information on Chart

JogAir

Front

Scale

Route CP Information from RWOP, pg. A-7.

Back – All other marginal information.

1:50,000

Front

Scale

Magnetic Deviation lined up with N-S gridlines

Route CP Information from RWOP, pg. A-7.

Back – All other marginal information

Note

Individual chart information, grid conversion information and adjoining sheet information shall be on the back of each chart.

Note

If there is a discrepancy between two (2) maps datum when putting a chart together, use the most current datum (ie. Dixie (updated 1983) & Crestview (updated 1998) use Crestview).

PLACE NAME ON CHART

- CHARTS SHALL BE LABELLED WITH THE FOLLOWING INFORMATION:

ROUTE NAME

“PREPARED BY...”

DATE

Considerations:

FOR JOGAIR, USE GREEN ROUTE

PLACE ON FRONT OF THE CHART

PLACE IN LOCATION THAT DOES NOT COVER IMPORTANT INFORMATION/TERRAIN FEATURES

LAMINATE CHART (IF APPLICABLE)

- WORKING TO OBTAIN A LAMINATOR
- ENABLE SNA'S TO REUSE JOGAIR'S AND PURPLE ROUTE (MORE COST EFFECTIVE).
- IF NO LAMINATOR, GO TO NEXT STEP

USE PFPS TO PLOT ROUTE OF FLIGHT

- PLOT THE FOLLOWING:
 1. NASWF TO ROUTE.
 2. ROUTE FROM FIRST TO LAST CP.
 3. LAST CP ON ROUTE TO NOLF.
 4. NOLF TO NASWF
- USE RWOP FOR APPROPRIATE COURSE RULES.
- USE 100KTS
- PRINT ONE (1) COPY.
- USE TO FIND GOOD MCP
- USE TO CALCULATE BINGO CHECKPOINT & ASSIST WITH BRIEF

USE PFPS TO PLOT LL-NAV ROUTE

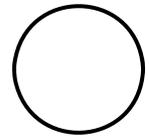
- START WITH FIRST CP ON ROUTE
- ENDS WITH LAST CP ON ROUTE
- CALCULATES TIMING FOR ROUTE
- USE 90KTS.
- USE INFORMATION TO FILL IN DOGHOUSES (STEP #15)
- PRINT OUT TWO (2) COPIES & BRING TO BRIEF (1 COPY FOR IP)

PLOT ROUTE CHECKPOINTS (CPs)

SYMBOLOLOGY

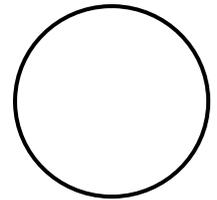
Course Rules Checkpoint

Black circle – size of a dime



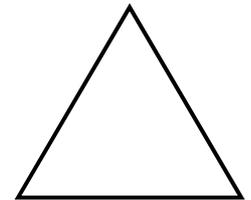
LL Navigation Route Checkpoint

Black circle – size of a nickel



Landing Zone

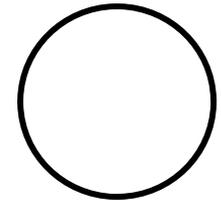
Black triangle



PLOT MAP CHANGEOVER POINTS (MCPs)

SYMBOLOLOGY

MAP CHANGEOVER POINTS



MCP

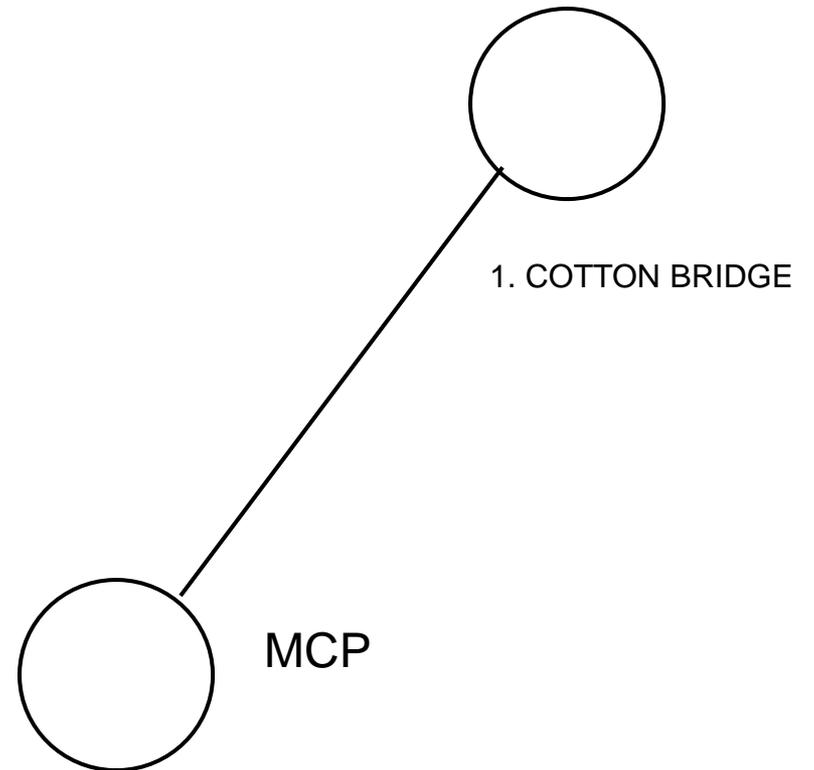
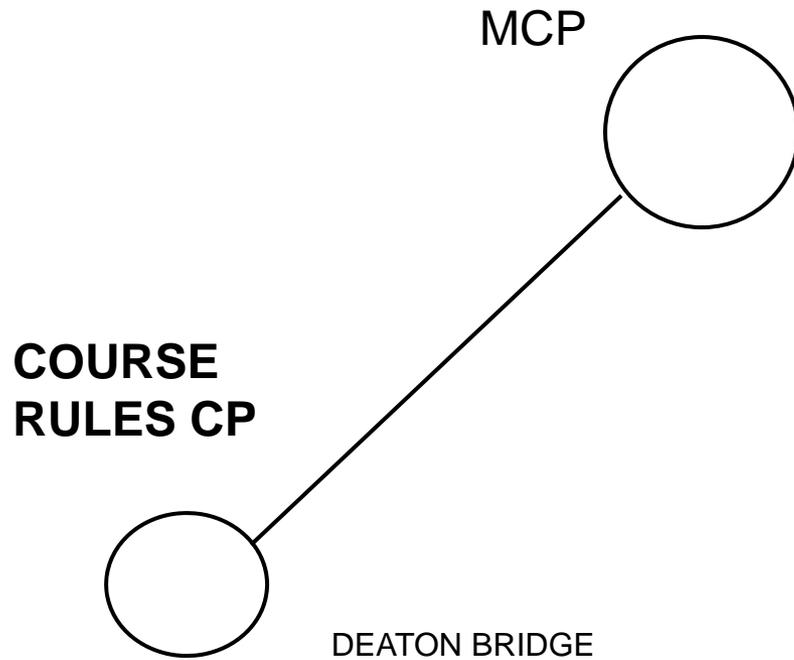
CONNECT & LABEL CHECKPOINTS

STEPS 12 & 13

- USE A FINE TIPPED BLACK MARKER & STRAIGHTEDGE
- CHECKPOINTS TO THE ROUTE ARE LABELLED WITH ONLY THE NAME
- ROUTE CHECKPOINTS ARE LABELLED WITH APPROPRIATE NUMBER AND BRIEF DESCRIPTION

CONNECT & LABEL CHECKPOINTS STEPS 12 & 13

ROUTE CP



PLOT BINGO CP & BINGO INFORMATION STEP 14

- BINGO IS CALCULATED FROM FARTHEST ROUTE CHECKPOINT TO NEAREST COURSE RULES POINT FOR A LOCATION WHERE FUEL IS AVAILABLE IN ORDER TO LAND WITH NATOPS MINIMUM FUEL USING MAXIMUM RANGE AIRSPEED (NATOPS CHAPTER 26, APPROXIMATELY 115KIAS).

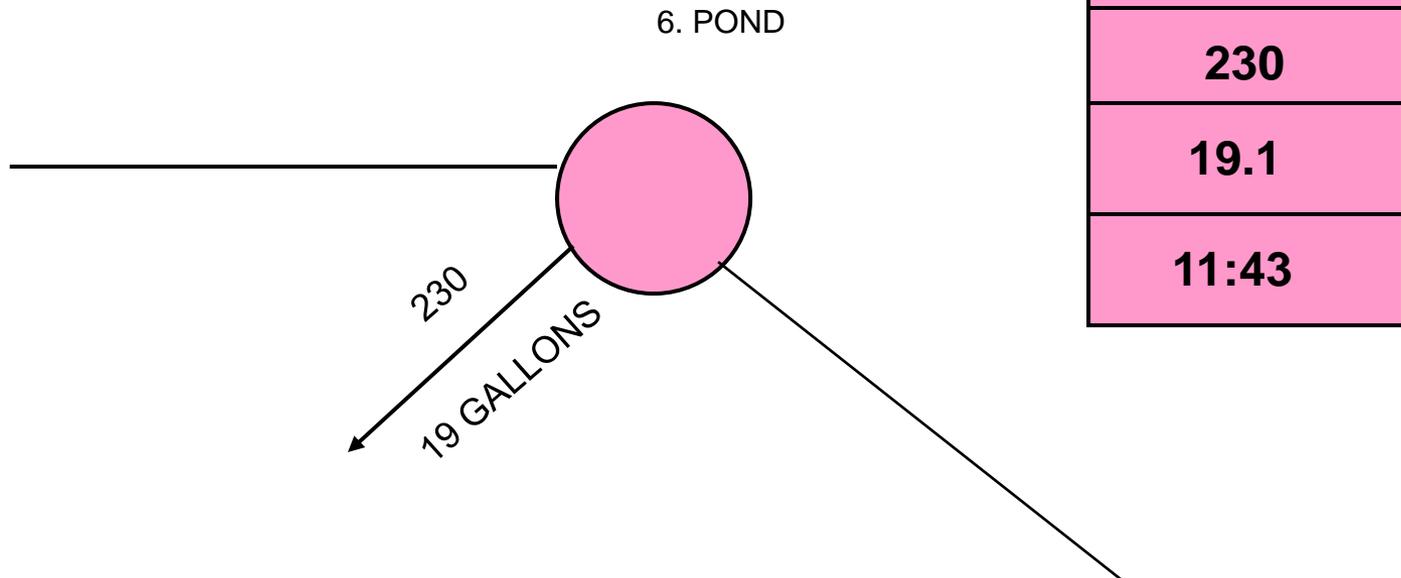
EXAMPLE – ORANGE/PURPLE ROUTE – PT. JUNIPER (NASWF)

GREEN ROUTE – WELCOME STATION OR

TRIANGLE FACTORY (SITE 8)

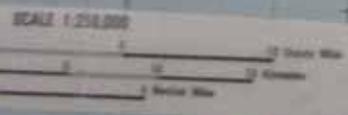
- USE ARROW FROM BINGO CHECKPOINT WITH HEADING ON TOP OF ARROW AND BINGO FUEL ON BOTTOM
- PLACE BOX NEXT TO BINGO CHECKPOINT WITH NAME OF FIRST POINT ON COURSE RULE, HEADING TO THAT POINT, DISTANCE AND TIME.
- USE PINK HIGHLIGHTER TO COLOR IN CHECKPOINT AND BOX IF NOT HIGHLIGHTING CHART.

PLOT BINGO CP & BINGO INFORMATION STEP 14 SYMBOLOLOGY





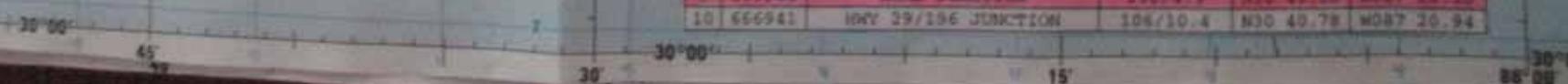
F M E X I C O



NOT TO BE USED FOR SURFACE OR SUBSURFACE NAVIGATION

CP	GRID	DESCRIPTION	NBY (60X)	LATITUDE	LONGITUDE
1	492150	MCDAVID INTERSECTION	54/14.3	N30 53.10	W087 19.18
2	581130	ROAD JUNCTION	38/9.3	N30 50.99	W087 26.20
3	517171	RAILROAD/ROAD JUNCTION	13/9.9	N30 53.15	W087 30.33
4	487098	PIPELINE/ROAD JUNCTION	010/10.0	N30 51.50	W087 34.57
5	337149	ROAD JUNCTION	319/11.5	N30 52.00	W087 41.47
6	333099	PIPELINE JUNCTION	307/9.8	N30 49.21	W087 41.88
7	338924	BRIDGE	235/6.1	N30 49.83	W087 48.27
8	443988	BRIDGE	265/2.0	N30 36.33	W087 32.83
9	569905	ROAD JUNCTION	130/4.9	N30 40.30	W087 28.30
10	666941	HWY 39/196 JUNCTION	106/10.4	N30 40.78	W087 30.94

WITH PARALLEL



BLACKWATER RIVER STATE FOREST T. SANDRIT

2 ROAD TUNNELS

COTYAN BRIDGE

O. BRIDGE

M 190

M 104

SCALE 1:50,000



Informational text block on the right side of the map.

Informational text block on the right side of the map.

Informational text block on the right side of the map.

Informational text block on the right side of the map.



PLACE DOGHOUSES ON CHART

STEP 15

- **INFORMATION IN DOGHOUSE SHOULD INCLUDE:**

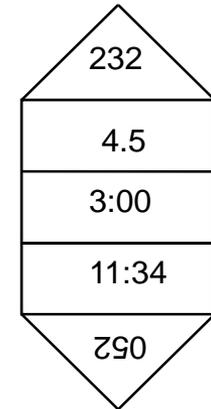
MAGNETIC HEADING

DISTANCE

LEG TIME

TOTAL TIME

REVERSE MAGNETIC HEADING



- **CONSIDERATIONS**

ONLY FOR ROUTE CHECKPOINTS

(NOT COURSE RULES CHECKPOINTS)

USE INFORMATION FROM PFPS

PLACE ON CHART NOT COVERING IMPORTANT

FEATURES & NOT TOO CLOSE TO ROUTE



NOT TO BE USED FOR SURFACE OR SUBSURFACE NAVIGATION

03

GREEN ROUTE
PREPARED BY:
22 SEPTEMBER 08

Additional Considerations:

- Neatness is important.
 - Use a straightedge and stencil
 - Messy charts can be an SA detractor in a chaotic situation.
- Prepare the chart for worst possible conditions
 - ie. Low Light Level NVG's
- Each student prepares their chart
 - Chart preparation forces a certain amount of map study
 - “Chop your own wood. It'll warm you twice.”

Additional Considerations (cont.)

1. Instructor should take chart upon completion of flight.
Exception: Green Route Charts (JogAir)
 - Green Route Forward – Use for N4504/5
 - Green route Reverse – Use for N4504/5Consideration eliminated if lamination is possible.
2. Orange Route uses only 1:50,000 Charts.
RWOP course rules checkpoints (Pts Cypress, Juniper, Fish, etc) are on 1:50,000.

Execution

1. Timing

Leg time should be kept on 24hour clock

Total time should be kept on ADF timer

2. Use of GPS -

If Pilot-side (SNA) Annunciator Panel in NAV2 for groundspeed information, NAV2 selector on RMI shall be in ADF mode.

3. Steers should be to clockcodes, not headings.

PAC responsibilities – Obstacle Avoidance & Aircraft Control = Outside

PNAC responsibilities – Navigation & Monitor Instruments =

Inside/Outside

Low Level Navigation Technique

Recommend 6T's

1. T = Time

When checkpoint is in sight,

Reset the sweep hand on the 24hour clock

Inform the PAC CP insight and next direction of turn.

“CP1 is the Cotton Bridge which is at 12 O’Clock. At the Cotton Bridge, we will be coming left to 10 O’Clock.”

2. T = Turn

When at the checkpoint, allow the PAC to turn to the appropriate clockcode. If the turn is to the right, do not forget to clear the aircraft right.

“Come right to two 10 O’Clock. Clear right.”

Once the PAC has rolled out, refine the heading. Use a terrain/manmade feature for a steerpoint.

“Come easy left, roll out. Steer down the right side of the catfish ponds.”

Low Level Navigation Techniques

3. T = Time

Once rolled out on heading,

Start the sweep hand timer on 24-hour clock for leg time.

Note total time on ADF clock & compare to calculated total time.

4. T = Transition

Advise PAC as to status of timing and if there is a need to change airspeed in order to make calculated time.

Go down, slow down. Change frequency, change squawk.

5. T = Twist

Twist the back up heading in the HSI and compare with calculated heading.

6. T = Talk

Give the back up heading and talk the PAC through the route.

PAC makes traffic call along the route.

“The backup heading is 230. At the one minute mark, we should see a north-south improved surface road running from the 11 O’Clock to the 5 O’Clock position on the aircraft.”

Debrief

- SNA route brief “debriefed” in brief.
- Brief execution phase should be conducted as close as possible to end of the flight.
- Have thick skin.

QUESTIONS?