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U. S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
NATIONAL WEATHER SERVICE

OFFICE NOTE 127

An Interactive Minicomputer Program to
Calculate Wind Information from Grid-Point Data

Frederick G. Shuman
National Meteorological Center

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General Description

The program, WWFGS52, will enable you to obtain quickly and easily wind information from data at grid points. Its advantages for such a job over use of our large computers are that turn-around is virtually instantaneous, and you will not be cluttering up the large systems with small jobs. Its advantages over use of a small calculator are that less manual keying is involved, and your output is printed in standard format for use with available overlays. The run whose output is shown as Appendix A required only 16 minutes, according to the printed clock at the beginning and end. The 16 minutes include manual input of 105 data.

For jobs with large amounts of input, it is not a good alternative to our large computer systems, because all input must be manually keyed in. Dimensions of input arrays are limited to 15x26 (IxJ).

WWFGS52 was written for data in regular grids on polar stereographic projections, although it could rather easily be modified for other projections. Internally stored are all parameters for the 65x65 6L PE grid and the 53x45 LFM grid. You can use it for other grids, however, by supplying I and J at the pole, longitude of the I-axis, latitude of true projection, and the grid interval.

The program provides two options, one for geostrophic wind, the other for wind itself. Input for the geostrophic wind is an array of height (Z) in meters, and output is U, V, wind direction relative to both the J-axis and north, wind speed, and latitude (+ for N, - for S) and longitude (+ for E, - for W) of the centers of grid squares.

Input for the wind itself is U and V. Output is wind direction relative to both the J-axis and north, wind speed, and latitude and longitude of grid points. The program will ask for U and V in m/sec, but any units may be used. Output is in 1/10 of the input units, although labeled "decimeters per second." Similarly, input Z need not be in meters, but if not, output will be mislabeled. For example, if Z is in feet, output will be in 1/10 of a foot per second, although labeled "decimeters per second." Wind direction, latitude, and longitude, of course, are unaffected by the units used in input arrays.

All inputs are also printed out and, as with other outputs, in standard formats for use with available overlays. Distance between printed points on the page is 1/2 inch (map scale 1:30,000,000 for 6L PE, 1:15,000,000 for LFM). After printout of input, opportunity is given for corrections.

A listing of WWFGS52 is available on request as Appendix B.

Running the Program

First, a few words about input and correction of typographical errors. An input item or line is not accepted until you press the RETURN key. This is true of your commands as well as input data. During input, you may backspace and rekey at any time before stroking RETURN. Backspacing is done with CTRL H (hold CTRL down while stroking H). You may also erase from memory the entire line of input, before stroking RETURN, with CTRL X. Besides erasing a line of input, CTRL X prints a backslash (\) and returns the carriage. After CTRL X you may rekey your line of input. IRIS will automatically erase a line of input after you stroke RETURN, if you have made some obvious error such as using an illegal character, or such as providing more or less information than required. It will indicate it has done so by printing a backslash (\). You may rekey your line of input after an automatic erase.

On the TI-700 terminal you will find four red switches under the cover. They must be set:

Speed: LO
Duplex: FULL
Parity: EVEN
Line feed: 1

On the back of the NOVATION INC box the two switches must be set to FULL and, of course, ON.

Appendix A is a copy of the page printed by the TI-700 during a run of WWFGS52. It should prove helpful in understanding what follows. I have added underlining to all inputs.

The program is stored in the IRIS system on a NOVA computer in Gramax Building. To call up IRIS, dial 427-8185 (if busy, other lines are available). When you hear a high-pitched clear tone, put the headset in the cradle and press ESC key. Then when requested, enter account ID (see A1 Snow), and press RETURN key. IRIS will next stop in control mode (indicated by the character "#").

If you want high-speed printing, key in

P O R T (space) (port #) (space) D E L A Y (space) 5

RETURN

CTRL C (hold CTRL down while keying C)

B A U D (space) 3 0 0

(Port # must be that which has been assigned by IRIS for the run. See Appendix A.) Then change switch setting under TI-700 cover to HI, and press RETURN key. IRIS will again stop in control mode.

Now, with IRIS in control mode, call WWFGS52 with the key sequence

B A S I C

RETURN

N E W

RETURN

CTRL C (hold CTRL down while keying C)

B A S I C (space) W W F G S 5 2

RETURN

Then start the run by keying in R U N

WWFGS52 will then ask for options. Besides the two basic options, $Q = 1$ for geostrophic wind and $Q = 2$ for wind itself, you can change options, without restarting, from 1 to 2 or 2 to 1 with $Q = 3$. With $Q = -1$ or any other negative number ($Q < 0$), it will repeat, giving you a duplicate printout. On a repeat you will have another opportunity to correct or otherwise to change the input data. Remember that you must stroke RETURN following an input item.

If you input 0(zero) for Q , the program will end normally. You can abort the program at any time, however, with the ESC key. Both the normal end and the abort destroys the input data, but not the program. You can restart by keying in R U N

After Q (1, 2, or 3) is keyed in, WWFGS52 will instruct you on how and when to input your data, will proceed with the calculations, and will stop after requesting a new option. If you are finished, key in 0 (zero).

When you are finished, sign off by keying in

CTRL C (hold CTRL down while keying C)

B Y E

RETURN

Appendix A. The page-print from a run of WWFGS52. Underlining has been added to all inputs.

WELCOME TO IRIS!!

ACCOUNT ID ? 1 PORT #3² GROUP 4 USER G APR 26, 1976 9:36:02

TIME LEFT: CPU: NO LIMIT CONNECT: NO LIMIT

72 DISC BLOCKS IN USE OUT OF 500 ALLOTTED ON UNIT #0

CALL 301/427-7394 FOR FILE RESTORATION!!

#PORT 3² DELAY 5

#BAUD 3000r

#BASIC

NEW

#BASIC WWFGS52

RUN

ARE YOUR DATA IN THE GL PE GRID? ANSWER 0 FOR NO, 1 FOR YES. 0 LINES?

I&J AT POLE ARE 27.00 49.0 LONGITUDE OF I AXIS IS -15.0E

? IS TRUE AT 60.00 GRID INTERVAL IS 190.500 KM

IF 0=1, CALCULATE GEOSTROPHIC WIND ONLY.

IF 0=0, END.

IF 0=2, CALCULATE WIND ONLY.

IF 0<0, REPEAT.

IF 0=3, CHANGE OPTIONS, KEEPING ARRAY DIMENSIONS AND LOCATION.

0=1

J0 IS BOUNDING LEFT I, I9 RIGHT I, J0 LOWER J, AND J9 UPPER J.

I0=3 I9=14 J0=15 J9=19

YOU MUST GIVE ALL INPUT ARRAYS FROM LEFT TO RIGHT, ROW-BY-ROW, BEGINNING WITH THE BOTTOM ROW. SEPARATE THE ELEMENTS IN THE ROWS WITH COMMAS. NO COMMA SHOULD FOLLOW THE LAST ELEMENT IN A ROW, INSTEAD RETURN THE CARRIAGE.

NOW, INPUT Z IN METERS.

93347, 93324, 93304, 9290, 9284, 9285, 9292

93322, 9290, 9260, 9238, 9227, 9227, 9235

93307, 9269, 9230, 9197, 9177, 9172, 9179

9293, 9260, 9216, 9173, 9141, 9125, 9127

9293, 9255, 9210, 9160, 9115, 9086, 9079

¹ IRIS does not reveal account ID.

² These two numbers must agree.

2 IN METERS.

| J | I= | 8 | 9 | 10 | 11 | 12 | 13 | 14 |
|----|----|--------|-------|-------|-------|-------|-------|------|
| 19 | | +9293+ | 9255+ | 9210+ | 9160+ | 9115+ | 9086+ | 9079 |
| 18 | | +9299+ | 9260+ | 9216+ | 9173+ | 9141+ | 9125+ | 9127 |
| 17 | | +9307+ | 9269+ | 9230+ | 9197+ | 9177+ | 9172+ | 9179 |
| 16 | | +9322+ | 9290+ | 9260+ | 9233+ | 9227+ | 9227+ | 9235 |
| 15 | | +9347+ | 9324+ | 9304+ | 9290+ | 9284+ | 9285+ | 9292 |

ANY CORRECTIONS? ANSWER 0 FOR NO, 1 FOR YES. 0

GEOSTROPHIC U & V IN DECIMETERS PER SECOND.

| J | I= | 8.5 | 9.5 | 10.5 | 11.5 | 12.5 | 13.5 |
|------|----|------|------|------|------|------|------|
| 18.5 | + | 47+ | 46+ | 77+ | 155+ | 253+ | 331 |
| | - | 331- | 372- | 379- | 306- | 175- | 19 |
| 17.5 | + | 77+ | 101+ | 162+ | 250+ | 333+ | 395 |
| | - | 347- | 364- | 325- | 217- | 86+ | 36 |
| 16.5 | + | 171+ | 235+ | 319+ | 399+ | 450+ | 465 |
| | - | 332- | 318- | 247- | 136- | 21+ | 63 |
| 15.5 | + | 295+ | 379+ | 454+ | 503+ | 513+ | 507 |
| | - | 275- | 243- | 170- | 78+ | 5+ | 66 |

GEOSTROPHIC WIND DIRECTION IN DEGREES RIGHT OF UNIT J-VECTOR AND ALSO E OF N,
 & SPEED IN DECIMETERS PER SECOND.

J I= 8.5 9.5 10.5 11.5 12.5 13.5

| | | | | | | |
|------|--------|------|------|------|------|-----|
| 18.5 | 3- | 7- | 12- | 27- | 55- | 87 |
| | + 321+ | 323+ | 320+ | 306+ | 279+ | 249 |
| | + 335+ | 375+ | 387+ | 343+ | 307+ | 332 |
| 17.5 | 12- | 15- | 27- | 49- | 76- | 95 |
| | + 317+ | 315+ | 306+ | 285+ | 259+ | 242 |
| | + 356+ | 373+ | 363+ | 331+ | 349+ | 397 |
| 16.5 | 27- | 36- | 52- | 71- | 87- | 98 |
| | + 383+ | 295+ | 281+ | 263+ | 249+ | 240 |
| | + 373+ | 396+ | 403+ | 421+ | 450+ | 469 |
| 15.5 | 47- | 57- | 69- | 81- | 90- | 97 |
| | + 284+ | 275+ | 264+ | 254+ | 246+ | 241 |
| | + 489+ | 450+ | 435+ | 509+ | 518+ | 511 |

LATITUDE AND LONGITUDE IN TENTHS OF DEGREES.

J I= 8.5 9.5 10.5 11.5 12.5 13.5

| | | | | | | |
|------|--------|-------|-------|-------|-------|------|
| 18.5 | + 305+ | 312+ | 319+ | 325+ | 332+ | 338 |
| | -1362- | 1348- | 1334- | 1319- | 1304- | 1289 |
| 17.5 | + 293+ | 300+ | 307+ | 313+ | 319+ | 325 |
| | -1354- | 1341- | 1326- | 1312- | 1297- | 1282 |
| 16.5 | + 281+ | 288+ | 294+ | 300+ | 306+ | 312 |
| | -1347- | 1333- | 1319- | 1305- | 1290- | 1276 |
| 15.5 | + 270+ | 276+ | 282+ | 288+ | 294+ | 299 |
| | -1339- | 1326- | 1312- | 1298- | 1284- | 1269 |

IF Q=1, CALCULATE GEOSTROPHIC WIND ONLY. IF Q=0, END.
 IF Q=2, CALCULATE WIND ONLY. IF Q<0, REPEAT.
 IF Q=3, CHANGE OPTIONS, KEEPING ARRAY DIMENSIONS AND LOCATION.

Q=3
 Q=2

YOU MUST GIVE ALL INPUT ARRAYS FROM LEFT TO RIGHT, ROW-BY-ROW, BEGINNING WITH THE BOTTOM ROW. SEPARATE THE ELEMENTS IN THE ROWS WITH COMMAS. NO COMMA SHOULD FOLLOW THE LAST ELEMENT IN A ROW, INSTEAD RETURN THE CARRIAGE.

NOW, INPUT U IN M/SEC.

17, 24, 30, 35, 38, 41, 41
10, 23, 16, 24, 30, 35, 37
7, 10, -4, 5, 14, 22, 23, 32
7, 11, -7, -1, 7, 15, 22, 27
7, 6, -5, -2, 4, 11, 17, 23

NOW, INPUT V IN M/SEC.

7, 14, -11, -8, -4, -1, 2, 5
7, 22, -19, -14, -8, -3, 1, 6
7, 30, -27, -22, -16, -10, -3, 4
7, 34, -34, -31, -26, -19, -9, 1
7, 34, -37, -33, -36, -29, -16, -2

U & V IN DECIMETERS PER SECOND.

| J | I= | 8 | 9 | 10 | 11 | 12 | 13 | 14 |
|----|--------|------|------|------|------|------|------|-----|
| 19 | -- | 60- | 50- | 20+ | 40+ | 110+ | 170+ | 230 |
| | -- | 340- | 370- | 380- | 360- | 280- | 160- | 20 |
| 18 | -- | 110- | 70- | 10+ | 70+ | 150+ | 220+ | 270 |
| | -- | 340- | 340- | 310- | 260- | 190- | 90+ | 10 |
| 17 | -- | 100- | 40+ | 50+ | 140+ | 220+ | 290+ | 320 |
| | -- | 380- | 270- | 220- | 160- | 100- | 30+ | 40 |
| 16 | * 0+ | 380+ | 160+ | 240+ | 300+ | 350+ | 370 | |
| | -- | 220- | 190- | 140- | 80- | 30+ | 10+ | 60 |
| 15 | * 170+ | 240+ | 300+ | 350+ | 380+ | 410+ | 410 | |
| | -- | 140- | 110- | 80- | 40- | 10+ | 20+ | 50 |

ANY CORRECTIONS? ANSWER 0 FOR NO, 1 FOR YES. 1

IN U? 1 I=3 J=16 UC 9, 16 =3

IN U? 0

IN V? 0

U & V IN DECIMETERS PER SECOND.

| J | I= | 8 | 9 | 10 | 11 | 12 | 13 | 14 |
|----|----|------|------|------|------|------|------|-----|
| 19 | - | 60- | 50- | 20+ | 40+ | 110+ | 170+ | 230 |
| | - | 340- | 370- | 380- | 360- | 280- | 160- | 20 |
| 18 | - | 110- | 70- | 10+ | 70+ | 150+ | 220+ | 270 |
| | - | 340- | 340- | 310- | 260- | 190- | 90+ | 10 |
| 17 | - | 100- | 40+ | 50+ | 140+ | 220+ | 290+ | 320 |
| | - | 300- | 270- | 220- | 160- | 100- | 30+ | 40 |
| 16 | + | 0+ | 80+ | 160+ | 240+ | 300+ | 350+ | 370 |
| | - | 220- | 190- | 140- | 80- | 30+ | 10+ | 60 |
| 15 | + | 170+ | 240+ | 300+ | 350+ | 380+ | 410+ | 410 |
| | - | 140- | 110- | 80- | 40- | 10+ | 20+ | 50 |

ANY CORRECTIONS? ANSWER 0 FOR NO, 1 FOR YES. 0

WIND DIRECTION IN DEGREES RIGHT OF UNIT J-VECTOR AND ALSO E OF N,
& SPEED IN DECIMETERS PER SECOND.

| J | I= | 8 | 9 | 10 | 11 | 12 | 13 | 14 |
|----|----|------|------|------|------|------|------|-----|
| 19 | + | 10+ | 8+ | 3- | 6- | 21- | 47- | 85 |
| | + | 330+ | 337+ | 333+ | 326+ | 312+ | 288+ | 252 |
| | + | 345+ | 373+ | 381+ | 362+ | 301+ | 233+ | 231 |
| 18 | + | 18+ | 12+ | 2- | 15- | 38- | 68- | 92 |
| | + | 346+ | 341+ | 333+ | 318+ | 296+ | 268+ | 245 |
| | + | 357+ | 347+ | 319+ | 269+ | 242+ | 238+ | 270 |
| 17 | + | 18+ | 8- | 13- | 41- | 66- | 84- | 97 |
| | + | 348+ | 339+ | 319+ | 292+ | 269+ | 252+ | 241 |
| | + | 316+ | 273+ | 226+ | 213+ | 242+ | 292+ | 322 |
| 16 | + | 0- | 23- | 49- | 72- | 84- | 92- | 99 |
| | + | 330+ | 309+ | 284+ | 263+ | 251+ | 245+ | 239 |
| | + | 220+ | 206+ | 213+ | 253+ | 301+ | 350+ | 375 |
| 15 | - | 51- | 65- | 75- | 83- | 88- | 93- | 97 |
| | + | 230+ | 267+ | 258+ | 251+ | 248+ | 245+ | 242 |
| | + | 220+ | 264+ | 310+ | 352+ | 380+ | 410+ | 413 |

