PerformAIRE

Air Quality Computer

U.S. PATENT #5,509,295

**Invented and Manufactured
By**

ALTRONICS inc

High Performance Electronic Components

$\mathscr{P}$erform**AIRE** *FEATURES*

- Temperature Readout
- Relative Humidity Readout
- Absolute Barometric Pressure Readout
- Dew Point
- Vapor Pressure
- Air Density Ratio
- Horsepower Correction Factor
- Oxygen Sensor Readout (optional)
- Density Altitude Readout
- Oxygen Altitude Readout
- Remote Paging Capability (optional)
- 400 run data base
- Up to 10 separate data bases
- Sea level ET calculation
- Throttle stop ratio calculation
- ET to DA Ratio
- ET prediction
- Throttle stop prediction
- One run prediction
- Wind effect prediction
- Run completion
- Bad Run Detection
- Data and time stamp in data base
- Weather on Hold
- Manual weather input
- Automatic Last weather sample Hold
- View and delete runs
- 9V battery power
- Downloading Data Analysis software (optional)
- Battery low indication and power level
- Automatic power off

Press "MENU" key to turn unit on. Unit will automatically turn off after 2 minutes if no keys have been pressed.

GREETING MESSAGE
The PerformAIRE
By ALTRONICS
O2 EQUIPPED
VERSION 6.*

"O2 EQUIPPED" will only appear if the unit was purchased with an oxygen sensor.

DATA BASE #1
ET MODE Selected
Multiple Run Prediction
Wind Prediction Enabled

Second greeting message above will show the following info about the "Setup" of the unit: Data base, prediction mode, prediction type, and wind effect.

TAKING AIR SAMPLES

1. Place *Perform* **AIRE** in an area that will constantly expose it to the air you will be racing in (out side of trailer).
2. Do not place your hand or any other object near the air vent or black probe while *Perform* **AIRE** is in use.
3. Keep *Perform* **AIRE** out of direct sunlight.
4. Do not place *Perform* **AIRE** near soil or grass as it may pick up additional humidity.
5. Even though the *Perform* **AIRE**'s sensors can stabilize very quickly, residual heat left in the enclosure when the *Perform* **AIRE** is moved from one environment to another may take more time to dissipate.

Example: When you arrive at the track and take the *Perform* **AIRE** out of your 70-degree transporting vehicle and put it in the 90 degree outside air, you must let it sit for fifteen minutes before taking a reading. During this time the *Perform* **AIRE** enclosure and black probe will stabilize with the environment and allow it to take extremely accurate readings for the rest of the day. Allow time appropriately for differences in

temperature.   If the *Perform* **AIRE** is OXYGEN SENSOR equipped, allow twice as much time to stabilize.
UNIT DOES NOT NEED TO HAVE POWER ON IN ORDER TO STABILIZE!!!!!!!

6. Although the *Perform* **AIRE** is reasonably durable, it can be damaged if dropped or abused. Keep this in consideration when using and storing the *Perform* **AIRE**.
7. For best results only turn *Perform* **AIRE** on when taking a reading.

IMPORTANT
Units with oxygen sensors only:
When using a unit with an oxygen sensor that is set to Oxygen Altitude mode, the unit must remain stabile while in use. If movement has agitated the unit it must remain stable for 15 minutes before taking air samples. Unit does **not** need to have power on to stabilize!!!!

******Important******
It often takes a number of trips to the track to acquire the above-recommended data in order to produce accurate results. Because of this, we suggest using the following method until enough data has been acquired.

Gasoline burning engines:
A 200' rise in DA typically yields a 0.01sec slow down in ET and vice-versa for a drop in DA.

Alcohol burning engines:
A 400' rise in DA typically yields a 0.01sec slow down in ET and vice-versa for a drop in DA.

For TS racers:
Typically the TS ratio is 3:1. This means is takes 0.03sec in the timer to move the car 0.01sec. Use this information with the above DA change to set up your timer.

MENU/ON key - Turns unit **ON** and allows the unit to leave any current menu and return to the MAIN menu.

SCROLL key - used to view runs that have been stored in the data base.

CLEAR/OFF key – Turns unit **OFF** when pressed from MAIN menu and allows runs to be deleted from the data base and allows the user to reenter a value if the wrong key was pressed.

ENTER/HOLD key - must be pressed after keying in a value to confirm the value is correct. When pressed in CURRENT DATA mode the air sample is held in memory and can be used for data entry later on.

MENUS

MAIN MENU - When unit is turned on the MAIN menu automatically is displayed after the greeting message. The user can make of the six following choices at this point:

SAMPLE AIR	= 1
SET UP	= 2
RUN ENTRY	= 3
PREDICT	= 4

Hit the "MENU" key again and see:

DOWNLOAD	=5
SET CLOCK	=6
BAD RUNS	=7
AUTO POWER OFF	=8

Hit the "MENU" key again and see:

PAGER SETUP	=9 *
BATTERY CHECK	=0

* Paging Option in no longer available with portable 𝒫𝑒𝓇𝒻𝑜𝓇𝓂 AIRE systems.

Refer to Appendix for MENU chart

SAMPLE AIR

By pressing "1" from the MAIN menu the unit displays all the sampled air parameters and the PREDICTION in the following format:

DATE   TIME
TEMP   HUMIDITY
PRESSURE   OXYGEN (if equipped) / DEW POINT VAPOR PRESSURE
ALTITUDE/CF   PREDICTION (ET or TS)

Pressing the "ENTER" key while viewing current data will **HOLD** the data to be used for entering runs. The third and fourth line on the display will alternate from showing pressure and oxygen to dew point and vapor pressure and Altitude to Correction Factor (CF).

NOTE: Barometric Pressure

The Pressure reading is "Absolute", which means it will **NOT** agree with the weather channel or local forecast. This is due to the fact that the local forecast is gives a corrected pressure reading that is compensated back down to sea level. If you were to stand at your local airport and dig a hole down to sea level the *Perform* AIRE pressure reading would then agree with the local airport reading!

The PREDICTION Multiple Run Mode will be shown only after two runs in ET mode and three runs in TS mode have been stored in the selected data base. If less runs have been stored "*******" will appear in the place of the PREDICTION value.

SET UP

By pressing "2" from the MAIN menu the unit enters SET UP. Set up allows for configuring any one of the 10 data bases. Each data Base hold 40 runs.

The first menu appears...

Select Data Base
Yes = 1 No = 2

After selecting a data base you will be asked if you want to clear all the runs out of it:

CLEAR RUNS?
Yes = CLEAR   No = ANY KEY

You will now be asked if you want to rename it. Note: You can use the default name if you wish "Data Base #1".

To enter a new name use the "SCROLL" key to scroll the letter up or the CLEAR key to scroll down . When the letter is correct select Yes by pressing "1" and you will go on to the next letter. When all the letters have been selected press the "ENTER" key to save the name.

Continue?
Yes = 1 No = 2

After selecting a data base you can exit out of SETUP if you have already previously configured it and do not wish to make any changes.

After selecting a data base the following is displayed:

ET MODE   = 1
TS MODE   = 2
Press 1 OR 2

By pressing "1" sets the unit to the ET MODE. This means all runs added to the data base will be stored in the ET section and the PREDICTION will be an ET computed from the stored runs and the present ALTITUDE (DA or OA).

By pressing "2" sets the unit to the TS MODE (Throttle Stop Mode). This means all runs added to the data base will be stored in the TS section and the PREDICTION will be a TS or timer setting computed from the stored runs and the present ALTITUDE.

After pressing "2" another menu is displayed as follows:

<div align="center">

TS MODE SELECTED
index = 9.90
CHANGE?
YES = 1   NO = 2

</div>

If the user presses "1" the following will be displayed:

<div align="center">

ENTER INDEX

</div>

Now the user can enter an index, such as 8.90, then he must press the ENTER key.

<div align="center">

Select Method
For Prediction
Multiple Runs =1
One Run =2

</div>

Multiple Runs:

When the multiple run prediction method is selected, predictions are then calculated from the runs stored in the data base.

<div align="center">

Predict with
DA=1 OA=2
CF=3 VP=4

</div>

Now you must choose which weather variable to reference your prediction against. The standard is to use DA or OA (if the unit is oxygen sensor equipped), but you can select CF or VP if you wish.

One Run:

When One Run prediction method is selected you must set your base run and performance ratios.

<div align="center">

Set Base Run=1
Set Pred Value=2
View Values=3
Done =ENTER

</div>

Set Base Run:
Your base run data should be taken from a "good run" or your last "good run". You can update this data as you wish.

<div align="center">

Enter Base Run
DA=
ET=
Timer= (if in TS mode)

Temperature= (if fuel type=Alcohol)
Humidity= (if fuel type=Alcohol)

</div>

Set Pred Values:
Set Pred Values allows you to select your gas type and your DA to ET and TS to ET ratios.

<div align="center">

Select
Gas=1 Alcohol=2

</div>

Now you will be prompted to choose between preset ratios or allowed to enter custom ratios.

<div align="center">

Preset Ratios=1
Custom Ratios=2

</div>

Custom Ratios:

<div align="center">

Enter DA Ratio

</div>

Enter how many foot of Altitude it takes to move you vehicle 0.01sec in ET. (Ex: 150 means it takes 150'DA to make ET change 0.01sec)

<div align="center">

Enter TS Ratio

</div>

Enter ratio that it takes to move ET of vehicle 0.01 sec. (EX: 2 means it is a 2:1 ratio or takes two 0.02 to move car 0.01 in ET)

View Values:
Allows you to view your base values and ratios.

<div align="center">

Predict with
DA=1 OA=2
CF=3 VP=4

</div>

Now you must choose which weather variable to reference your prediction against.

Wind Prediction:
If you have chosen Multiple Run Prediction you will be prompted to select to use wind correction into you ET or TS predictions:

Predict w/Wind?
PRESS 1=Y 2=N

If you enable wind correction you will be prompted to select a vehicle type:

Select Car Type
Dragster=1
Door   =2
Roadster=3

Next you can adjust the wind effect.

Adjust Effect?
Press 1=Y 2=N

Wind factors have been programmed to correct prediction for wind based on speed and direction of wind. You can further adjust the amount of correction by selecting to Adjust Effect:

Enter Value
Default (5)
(1-10)=

Selecting <5 means you are lessening and >5 increasing the wind correction.

The information in this box is only relevant if your unit is OXYGEN SENSOR equipped.

After pressing the ENTER key (from above) the following will be displayed:

PREDICT WITH
DENSITY ALT = 1
OXYGEN ALT = 2
PRESS 1 or 2

If your unit has the optional oxygen sensor you can choose to predict your ET or TS value with density altitude or oxygen altitude.

The unit will compute and store the density altitude and oxygen altitude after every sample. This means that when you add a run to your data base, the unit will automatically store both altitudes.

This enables you switch between predicting with either altitude and seeing how your stored runs compared with each.

RUN ENTRY

By pressing "3" from the MAIN menu the unit displays the following:

> **VIEW/DELETE RUNS** = 1
> **ADD RUNS** = 2
>
> **TSR** = 3
> **or**
> **RATIO/SLET** = 3

"TSR" (throttle stop ratio) is only displayed if the unit in TS MODE and more then two runs has already been stored. Pressing "3" displays the throttle stop ratio.

"**RATIO/SLET**" is displayed only if the unit is in ET MODE and more then two runs have already been stored. Pressing 3 displays your SEA LEVEL ET and your ALT/ET ratio. Your ALT/ET ratio tells the amount of change in ET there is for every 100' of altitude change.

By pressing "1" you can view or delete runs you have already stored. Use the SCROLL key to view runs. If you want to delete a run you have scrolled to press the CLEAR key. By pressing the ENTER key when viewing a stored run it will show the Temperature, Humidity, and Pressure values stored for that run.

By pressing "2" the following ADD RUNS menu will be displayed:

> Store with->
> CURRENT = 1
> HELD = 2
> MANUAL = 3

You can store a run by using the current weather conditions by selecting 1, by using the "held" data that you saved by earlier by selecting 2, or by entering your own values by selecting 3.

After selecting 1 or 2 the following will be displayed:

Enter Run Info->
DA=1000 (Example)
1000' ET=
ET=
TS=

The DA or OA will already be loaded. You should enter a 1000' ET, a final
ET, and TS.   The 1000' ET is optional and is used for run completing. You do
not have to enter every run with a 1000' time in order to use run completing.
The TS will only be entered if the unit is in TS MODE.

To use run completing press the ENTER key when prompted for the final ET.

If manual entry is desired you must select number 3. After selecting 3 the
following is displayed.

ENTER AS
Altitude   =1
Temp, Hum, Press   =2
Press 1or 2

If 1 is selected you will have to key in the DA or OA value. If 2 is selected you
will have to enter the temperature, humidity, pressure, and oxygen values.
Then the DA or OA will be calculated.

Wind Correction:
If wind correction has been enabled you will be asked to enter the wind speed
and direction for each run entered.

Enter Wind Speed
MPH=

Enter Wind Dir
Head=1 Tail=2
CH=3 Ct=4 Cross=5

****HINT****

The easiest way to enter a run is by starting from the main menu and
pressing the keys 3, 2, 1, and ENTER. Now all you have to do is type in
your ET's and the run is stored.

RUN COMPLETION

In order use the run completion program effectively at least one previous run must be entered into a data base with a 1000' ET. To use run completion all you need to do is enter the 1000' et of the run you want to complete and then when it asks you to enter your final ET= simply press the ENTER key without any value. You will then see a *Run Completing!* message appear followed by ET=10.203 (example) your completed ET. This run will then be saved automatically and the main menu will be brought back, unless you are in TS mode, in which case, you will then be prompted to enter your TS.

1/8 Mile Tracks

Keep 1/8 mile and ¼ mile runs in separate data bases. You may want to name the data base appropriately.

If you run 1/8 mile and want to be able to use *run completion* you must enter in a 330' time when the unit prompts you to enter the 1000' time. In regards to entering your ET for a 1/8 mile track simply enter in the 1/8 mile time.

PREDICT

Depending on the mode the unit is in (ET MODE or TS MODE) by selecting "4" you can input any altitude and the corresponding ET or TS prediction will be displayed. You need to have two or three runs respectively in the data base before you will see the prediction.

Wind Correction:
If wind correction has been enabled you will be asked to enter the wind speed and direction for each run entered.

Enter Wind Speed
MPH=

Enter Wind Dir
Head=1 Tail=2
CH=3 Ct=4 Cross=5

DOWNLOAD

By pressing "5" you will begin downloading into a personal computer if you have purchased that option.

To install software:
Place DISK 1 in drive d:\ and run SETUP. Follow the instructions on the screen to finish installation.

1) **COMPORT** button - To download *Perform* **AIRE** connect supplied cable to unit and to serial port on back of computer. You can use serial port 1 or 2. You must make sure that you select a port that is not being used by another device such as a modem or you will get an error. (Cannot setup port, in use by another device).

2) **DOWNLOAD** button - Follow instructions on the screen to complete the download.

3) Once downloading is complete a data base info screen will pop up showing runs and various statistical parameters regarding your data. Some parameters may not be enabled depending on the setup of your *Perform* **AIRE** and the options your unit has. If you want to graph the data base you just downloaded, you first need to **reselect** the data base.

4) **SELECT DATA BASE** button – Allows you to load any previously downloaded database. A sample database is included (sample.dat).

5) **GRAPH DATA BASE** button – This feature generates a graph the plots out your runs in reference to your prediction line. Each run is show in Red or Blue depending on the mode your *Perform* **AIRE** is in and Bad Runs are shown in yellow. Bad Runs are runs that do fit well with your other runs. You can use your mouse to select any run and the data values for that run will be shown in ET and Altitude value boxes.

      A) **ZOOM** button – instructs you on how to use the zoom

6) Parameter definitions:

Entries:	Number of runs in database.
Mode:	Shows if database is set to Throttle stop or ET prediction.
Sea Level ET DA:	ET car will run at 0' density altitude.

Sea Level ET OA: ET car will run at 0' oxygen altitude.
(Optional)
Alt Ratio DA: Time in seconds ET will change with a
100' change in density altitude.
Alt Ratio OA: Time in seconds ET will change with a
100' change in oxygen altitude. (Optional)
TS Ratio DA: Time in seconds Throttle Stop will need to
change in order to change ET of car
0.01sec in density altitude.
TS Ratio OA: Time in seconds Throttle Stop will need to
change in order to change ET of car
0.01sec in oxygen altitude. (Optional)

SET CLOCK

By pressing "6" from the MAIN menu the unit will prompt you to enter the DATE and TIME.

BAD RUNS

By pressing "7' from the MAIN menu the unit will display any runs that do not "fit" with the rest of the data. These runs will not be removed; you will have to clear them out of the data base yourself.
Example:

Run #1:	Run #2	Run #3
DA = 1000	DA = 2000	DA = 1800
ET = 10.10	ET = 10.20	ET = 10.21

With these 3 runs in a data base BAD RUNS would display:
Run
3
does not fit.

The reason Run #3 does not fit is because the run should have been faster then Run #2 since it is 200'DA less in altitude.

It is now necessary for Run #3 to be removed from the data base. To do this you must use the View/Delete option in the Run Entry Menu and Clear out Run #3.

There may be times when multiple runs are shown that not to fit. When this occurs it is often useful to use the **downloading software** to help determine what is going wrong.

AUTO POWER OFF

By pressing "8" you will the following will be displayed.

<div align="center">

ENABLE   =1
DISABLE   =2
Press 1 or 2

</div>

ENABLE allows the unit to automatically shut off after 2 minutes.
DISABLE requires user to turn off unit by pressing CLEAR when in the MAIN MENU.

BATTERY CHECK

By pressing "0" you will the following will be displayed.

POWER=XX%

0 to 100% is displayed to show the amount of battery life left.

THE BATTERIES

A 9-volt battery powers the *Perform* **AIRE**. A fully charged (DURACELL or ENERGIZER) battery will operate the *Perform* **AIRE** for approx. 12 hours.

After approx. 12 hours of use the **LOW BATTERY** message will be displayed when you are sampling the air. At this time the battery must be replaced. Rechargeable batteries can be used.

MAKE SURE TO POWER UNIT DOWN BEFORE DISCONNECTING BATTERY!

Dead batteries will <u>not</u> cause loss of stored data, but you may lose the Date and Time.
Removal of batteries will <u>not</u> cause loss of stored data, but you may lose the Date and Time.

OPERATING LIMITATIONS

The *Perform* **AIRE** is designed to operate within the following atmospheric conditions.

TEMPERATURE: 0 to 50 degrees Celsius (32 to 122 degrees Fahrenheit)
HUMIDITY: 0 to 100%
BAROMETRIC PRESSURE: 23 inHg to 32 inHg.

STORAGE

Store the *Perform* AIRE at a temperature between 20 and 125 degrees Fahrenheit.

WARRANTY

The *Perform* AIRE by **ALTRONICS inc** is warranted for 1 Year against any defect in materials and workmanship from date of purchase. ALL WARRANTIES AND GUARANTEES ARE VOID if the *Perform* AIRE enclosure is opened (not including battery door).

ALTRONICS inc shall not be liable for injury, consequential, or other types of damages resulting from the use or misuse of the *Perform* AIRE

ABBREVIATIONS

DA	**Density Altitude**
OA	**Oxygen Altitude**
DP	**Dew Point degrees Fahrenheit**
VP	**Vapor Pressure (inHG) inches of Mercury**
ET	**Elapsed Time**
TS	**Throttle Stop**
SLET	**Sea Level ET**
ALT/ ET	**Ratio: change in ET for every 100' change in Altitude**
TSR	**Throttle Stop Ratio**
ADR	**Air Density Ratio**
CF	**Horsepower Correction Factor**

GUIDELINES FOR ACCURATE PREDICTIONS

For ET predicting it is recommended that 5 to 6 Good Runs be entered into a database and that there is a span of at least 1000' feet in DA or OA between the runs.

Ex: Typical Data
Run #1 1223' 10.20
Run #2 1301' 10.204
Run #3 1956' 10.236
Run #4 2000' 10.237
Run #5 2245' 10.249
Run #6 2269' 10.25

For TS predicting it is also recommended that 5 to 6 runs be entered into a database and that there is a span of at least 1000' feet in DA or OA between the runs. It is also recommended that there is some variance in the timer settings between the runs. In other words change the timer setting for at least 3 of the runs. The timer should be adjusted enough to cause up to a 0.30 second change in ET.
Often using a run with no timer works very well. Just enter the run with 0.0 sec for the timer.

Good Runs:
1. Altitude goes up, car loses performance/altitude goes down, car gains performance
2. 60' times consistent, no tire slip
3. Wind effects minimal, 30 mph front or tail winds are not present
The more Good Runs and the more altitude span the more accurate your predictions will be.

******Important******

It often takes a number of trips to the track to acquire the above-recommended data in order to produce accurate results. Because of this, we suggest using the following method until enough data has been acquired.

Gasoline burning engines:
A 200' rise in DA typically yields a 0.01sec slow down in ET and vice-versa for a drop in DA.

Alcohol burning engines:
A 400' rise in DA typically yields a 0.01sec slow down in ET and vice-versa for a drop in DA.

For TS racers:
Typically the TS ratio is 3:1. This means is takes 0.03sec in the timer to move the car 0.01sec. Use this information with the above DA change to set up your timer.

APPENDIX

MAIN MENU

1   **SAMPLE AIR**- View present weather conditions
2   **SETUP**
- **A. Select Data Base**
  - **a. Clear runs**
  - b. **Change Name**
- **B. Select ET or TS mode**
  - **a. Enter Index for TS mode**
- **C. Select DA or OA (optional)**
- **D. Select Multiple or One Run Predictions**
- **E. Select Wind Correction**
3   **RUN ENTRY- Enter/View/Delete runs in database**
- **A. View Delete**
- **B. Add Runs**
  - **a. CURRENT**
  - **b. HELD**
  - **c. MANUAL**
    - **i. Altitude**
    - ii. **Temp,Pres,Hum**
4   **PREDICT- Enter prediction mode**
- **A. CURRENT**
- **B. HELD**
- **C. MANUAL**
  - **a. Altitude**
  - **b. Temp,Pres,Hum**
5   **DOWNLOAD- Download data base into PC**
6   **SET CLOCK- Set Date and Time**
7   **SHOW BAD RUNS – Displays runs that do not fit**
8   **AUTO POWER OFF – Enable/Disable**
9   **PAGER SETUP**
- **A. Enable Pagers   =1**
  - **a. How Many?**
- **B. XMIT Time   =2**
  - **b. Enter Time(sec)=_**
- **C. XMIT DATABASES   =3**
  - **d. Multipage Y/N**
    - **i.   # of DB to XMIT=_**
10   **BATTERY CHECK**