

# CHARACTERISTICS

PARAMETER	MIN	TYP	MAX	UNITS
OPERATING VOLTAGE	9	12	18	VOLTS
OPERATING TEMPERATURE	-40		85	°C
SUPPLY CURRENT @12V IGNITION ON MODE		300		mA
SLEEP MODE		1		mA
COMPASS ACCURACY		+/- 5		DEGREES
COMPASS RESOLUTION			45	DEGREES
TEMPERATURE ACCURACY		+/- 1		°C
TEMPERATURE DISPLAY	-40		127	°F
	-40		53	°C



**AccuTech C/T**

**VFD COMPASS / OUTSIDE TEMPERATURE SYSTEM**

**FastCAL™ / SmartCAL™**

**With Ice Warning**



**OPERATION MANUAL**



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## COMPASS MODES OF OPERATION

Unit has two (2) buttons - MODE and °F/°C - which are used to change the unit between the various operating modes.

### IGNITION ON OPERATION:

Unit displays temperature and heading. Press the °F/°C button to toggle between displaying °F & °C. If the zone is set and the unit has calibrated itself, the heading will remain 'on' continuously. If the unit does not have a valid FastCAL™ or the zone has not been set, the word "CAL" will flash continuously. If this happens, clear the calibration memory, reset the zone and let the unit recalibrate itself. If the temperature reading is valid, the temperature display will remain 'on' continuously. If the temperature reading is invalid (due to an open or shorted temperature sensor), the temperature reading will not display (open), or 127 (shorted). If temperature goes above 127 °F, the display will stay at 127 °F until the temp comes down below 127 °F. Unit goes to SLEEP MODE when ignition is turned off.

### SLEEP MODE OPERATION:

Unit enters SLEEP MODE when ignition is turned off. The display is blank and the unit is in a LOW POWER MODE. Unit wakes from SLEEP MODE when the ignition is turned on, or enters CAMPING MODE when the °F/°C or the MODE button is pressed for three (3) seconds.

### CAMPING MODE OPERATION:

Unit enters CAMPING MODE after the °F/°C or MODE button is pressed for three (3) seconds while in SLEEP MODE. Unit displays temperature and heading for ten (10) seconds; the display stays 'on' if you continue to push either button and then returns to SLEEP MODE ten (10) seconds after the last button was pushed.

### NIGHTTIME DIMMING:

The display's brightness will be decreased by 50% when the vehicle headlamps are turned on.

## FEATURES

### ICE WARNING:

The ICE feature is designed to alert the driver when ice may be present on the road. The feature works as follows: When the temperature transitions from above 40 °F to below 37 °F, the ICE feature is enabled. The ICE feature loops through the following displays for 1 minute: "ICE" for 2 seconds, "outside temperature" for 2 seconds. After the 1 minute timeout expires, the ICE feature is disabled, and the unit returns to displaying the outside temperature. The ICE feature remains disabled until the temperature climbs above 40 °F. The ICE feature only works in ignition on mode. The feature is not present in camping mode. For the ICE feature to be enabled, the outside temperature must be above 40 °F. If the temperature is below 40 °F when ignition is turned on, it is assumed that the driver is already aware of the cold temperature.

### CONTINUOUS SELF CALIBRATION:

The self calibration is done in two phases: the first phase is FastCAL™ and the second phase is SmartCAL™. FastCAL™, as the name implies is an initial fast calibration routine. When the compass is first powered up and there are no calibration settings saved in its memory or after you have completed the procedure to erase the current calibration settings, the letters "CAL" will be flashing on the display. The compass is now in FastCAL™ mode. After you complete your first 90 degree turn the "CAL" letters will turn off and the compass will be accurate to within 1 cardinal point. The compass will remain in FastCAL™ mode until, under normal driving conditions; you have completed two or three circles. By this time the compass sensor will have taken multiple reads in every direction and will have gathered enough information about its environment to be fully calibrated. If the battery power is removed from the compass before it has completed the FastCAL™ routine, it will start FastCAL™ over the next time it is powered up. Turning ignition power on and off will not affect the FastCAL™ routine. After the FastCAL™ routine is completed the compass switches into the SmartCAL™ mode. SmartCAL™ is an ongoing, fine tuning of the calibration settings. In the SmartCAL™ mode, whenever the compass is operating in normal ignition on mode, it will continually take readings from the compass sensor and compare those readings to what it has saved in its calibration settings. The compass will use the new information it gathers to fine tune its calibration settings so it will be as accurate as possible, even when you travel in and out of areas where the earth's magnetic fields get stronger or weaker.

## COMPASS TROUBLE SHOOTING

Display won't turn on	Verify with a multi-meter that you have +12vdc Battery (constant) voltage on the Red wire, +12vdc Ignition hot (switched) voltage on the Orange wire, and that you have a good chassis ground on the Black wire on the 4-wire power harness. Check for a short circuit in the 3 wire compass sensor harness. If there is a short in the harness, unplugging the 3 wire harness from the display should let the display turn on.
Display won't dim with headlights	Verify with a multi-meter that you have +12vdc on the White wire of the 4-wire power harness when the headlights are turned on and zero volts when headlights are off.
"CAL" flashing	Unit has not acquired a FastCAL™ before the battery power was disconnected. Unit has not seen a 90° change in direction or the zone has not been set. Follow the calibration routine to set the zone and erase the previous calibration settings. Also see "Heading Flashes". If "Heading" is flashing, compass cannot calibrate itself.
Heading flashes	Check for a loose or bad connection in the compass sensor harness. See that the wires are snapped into the 3-pin housing securely, and check for a cut or broken wire in the harness.
No Temp Display *Or Flashing	See that the wires are snapped into the 2-pin housing securely, and check for a cut or broken wire in the harness. If no display a wire is open. If flashing 127 °F there is a short. Note: There is no display if probe is not used.
Temperature reading is inaccurate	Make sure the Temp sensor is mounted in a location away from heat sources. And where fresh air can blow over it as you drive. Try mounting sensor in new location.
Compass reading is inaccurate	Make sure you have the correct zone selected where you are located. Make sure the compass sensor is mounted with the text facing up and the arrows are facing the front of the vehicle. Make sure the compass sensor is mounted level, if the sensor is off level the compass reading will be off.

Note: The calibration settings should be erased after the unit is initially installed and you are ready to begin using the compass under normal driving conditions.

# INSTALLATION

1. Determine the desired location of the display unit.
2. Cut a 1-5/8"H x 3-7/16"W mounting hole.
3. Starting from the display unit opening, route the compass sensor and temperature sensor harnesses to where each sensor will be mounted. *When the wires are routed, keep them away from any high voltage wires which may be routed in the same area.*
4. Connect the 4-WAY POWER HARNESS into the vehicle electrical system; refer to figure 1-1 for color and function.
5. Plug the three harness connectors into the corresponding connectors on the back of the display unit.
6. Insert the unit into your opening, mount the display using four #6 pan head screws, then install the bezel.
7. Determine the best place to mount the temperature sensor - it must be in the flow of outside air and away from external heat sources.
8. Mount the temperature sensor using a #8 pan head self-taping screws.
9. Determine the best place to mount the compass sensor module. The compass sensor can be mounted up to 15 feet away from the display and should be mounted as far as possible from large, magnetic sources (i.e. large speakers, fans, blower motors, etc.). The compass sensor should be mounted in an interior location where it is protected from the elements. It is not weatherproof and cannot be mounted outside. It is acceptable to mount the sensor near fixed metallic components, such as brackets, frames, etc. When the compass calibrates itself, it will compensate for any interference from the surrounding metal components. The sensor box has text molded into the lid which reads "mount this surface up towards ceiling". When mounting the sensor, make certain the text is facing 'UP' and the arrows on the box top are facing toward the front of the vehicle - directly in line with the vehicles axis of travel down the road. Keep the sensor level wherever it is mounted - the closer it is to being level, the more accurate the reading.
10. Mount the compass sensor using two #8 self-taping screws.
11. Connect the compass sensor harness to the compass sensor.
12. Connect the temperature sensor harness to the temperature sensor.
13. Power the system up and follow the calibration routine [PAGE 3] to set the correct zone of operation and clear the compass calibration settings.
14. Review the section on compass modes of operation - and enjoy your new COMPASS & OUTSIDE TEMPERATURE SYSTEM!

## CALIBRATION:

The compass calibration settings must be cleared after its initial installation and anytime the compass sensor is replaced or relocated. To clear the settings, follow the calibration routine below. The calibration values are saved in EPROM memory, so it is not necessary to recalibrate if the battery is disconnected.

## CALIBRATION ROUTINE:

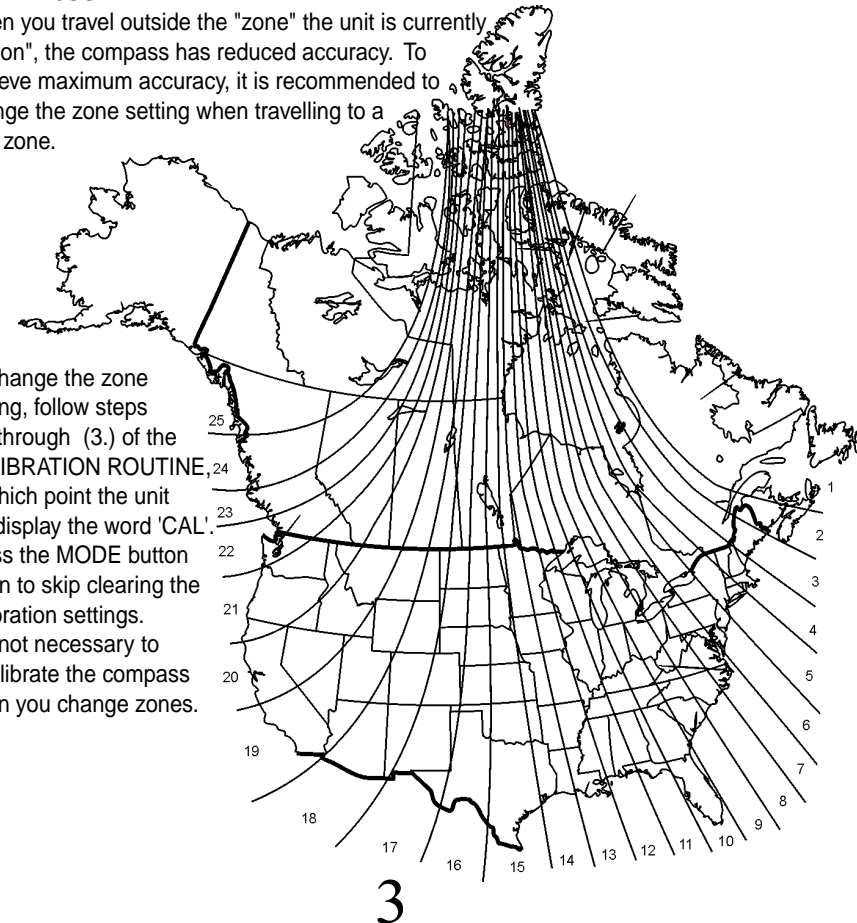
1. While in "Ignition On Mode" press the MODE button until the words 'ZONE' and 'CAL' appear (approximately ten (10) seconds). The unit will display the current zone.
2. Press the °F/°C button to increment the zone value.
3. Press the MODE button to store the zone value.
4. The unit now displays the word 'CAL'. Press the °F/°C button to erase the previously stored calibration settings. The display will return to normal ignition on operation mode and the word "CAL" will flash. The unit will calibrate itself as you drive the vehicle. The word "CAL" will flash until you make a 90 degree turn. At that time the display will stop flashing "CAL" and it will be accurate to within 1 cardinal point. After 2 or 3 full circles the unit will be fully calibrated.

## COMPASS ZONES

### ZONE ADJUSTMENT:

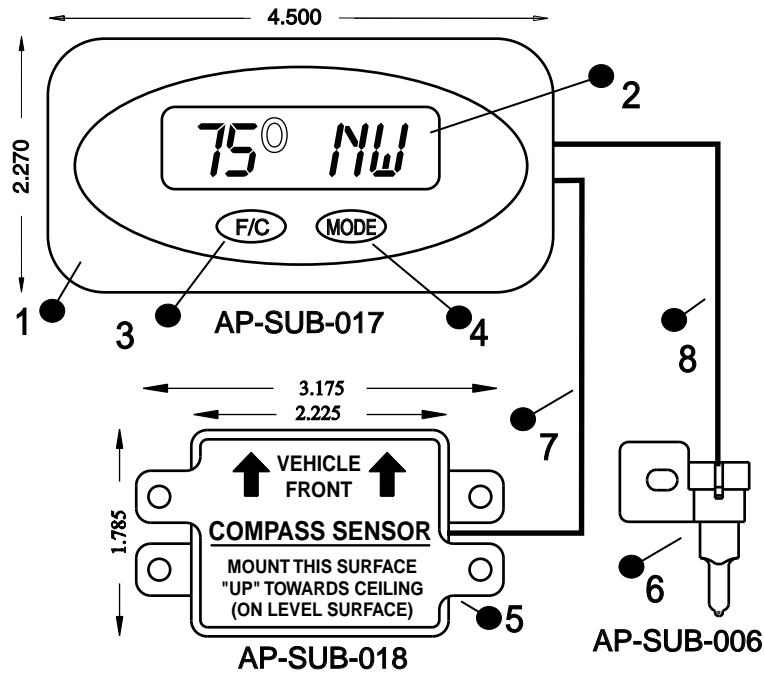
When you travel outside the "zone" the unit is currently set "on", the compass has reduced accuracy. To achieve maximum accuracy, it is recommended to change the zone setting when travelling to a new zone.

To change the zone setting, follow steps (1.) through (3.) of the CALIBRATION ROUTINE, at which point the unit will display the word 'CAL'. Press the MODE button again to skip clearing the calibration settings. It is not necessary to recalibrate the compass when you change zones.



# COMPONENT AND FEATURE DESCRIPTIONS

# SYSTEM INCLUDES



- 1 In dash or console mountable display panel with bezel to hide mounting screws.
- 2 Vacuum fluorescent display shows both:
  - A. Outside temperature in either degrees Fahrenheit (-40°F to 127°F) or degrees Celsius (-40°C to 53°C) "ICE" appears at 37 °F
  - B. Cardinal point heading - N, NE, E, SE, S, SW, W, NW
- 3 °F/°C button used to switch between Fahrenheit and Celsius, and in conjunction with the MODE button to change the unit between various operating modes.
- 4 MODE button used in conjunction with the °F/°C button to change the unit between various operating modes
- 5 Remote compass sensor module
- 6 Moisture-proof temperature sensor
- 7 3-wire compass sensor harness (15' AP-HRN-176) (10" AP-HRN-235)
- 8 2-wire temperature sensor harness (AP-HRN-234)

You should have:

- Compass display unit
- Remote mountable compass sensor module
- Moisture proof outside temperature sensor module
- 4-wire power harness (see fig. 1-1)
- 3-wire compass sensor harness
- 2-wire temperature sensor harness
- Operation manual

FIGURE 1-1

WIRE COLOR	CIRCUIT	PIN #
RED	BATTERY	1
ORANGE	IGNITION	2
WHITE	HEADLAMP	3
BLACK	GROUND	4

Choose a location:

These guidelines should be followed when selecting a place to mount each of the system components.

Display unit:

The display unit can be mounted in the dash, in an overhead or center console. When mounted, the display should be easily viewed by the driver.

Temperature Sensor:

The temperature sensor should be mounted on the exterior of the vehicle, away from heat sources, in a location up to 15 feet from the display unit which would receive outside air flow. The front of the vehicle (grill area) receives good air flow. Radiated heat from the road surface can affect the temperature reading. If possible mount sensor 1 to 2 feet above the road surface, above the bumper, or other surface that may help shield the sensor from radiated road or engine heat.

Compass Sensor:

The compass sensor can be mounted up to 15 feet away from the display and should be mounted as far as possible from magnetic sources (i.e. speakers, fans, blower motors, etc.). The compass sensor should be mounted in an interior location where it is protected from the elements. It is not weatherproof and cannot be mounted outside. It is acceptable to mount the sensor near fixed metallic components, such as brackets, frames, etc. When the compass calibrates itself, it will compensate for any interference from the surrounding metal components. The sensor box has text molded into its lid which reads "mount this surface up towards ceiling". When mounting the sensor, make certain the text is facing 'UP' and the arrows on the box top are facing toward the front of the vehicle - directly in line with the vehicles axis of travel down the road. Keep the sensor level wherever it is mounted - the closer it is to being level, the more accurate the reading.