

APAds Air Conditioning Protection and Control System

Technical Help Frequently Asked Questions

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A. WHAT APAds DOES / HOW IT WORKS

1. What is APAds doing for me?

APAds prolongs the life of your air conditioning system components and reduces A/C maintenance costs. The APAds system:

- Prevents rapid cycling of the compressor clutch due to high- or low-pressure conditions.
- Prevents rapid cycling of the engine fan at idle.
- Prevents compressor clutch from slipping due to low voltage.
- Relieves stress on starting system by holding A/C off for 15 seconds upon start-up.
- Lubricates A/C compressor and components year-around by cycling clutch for 15 seconds at start-up.
- Shows fault code indicators of potential problems with A/C system to aid in troubleshooting.

2. Why doesn't my A/C (clutch) turn on when I turn on the vehicle?

This is "Start Delay," which keeps the A/C off for 15 seconds after power up. This relieves stress on the starting system by assuring it doesn't have to crank the A/C compressor, too.

3. How are A/C systems different? What is CCOT? TXV?

CCOT (Cycling Clutch Orifice Tube) uses an Orifice Tube/Screen or restrictor tube to meter liquid refrigerant into the evaporator. The CCOT system operates by spraying liquid refrigerant into the evaporator tubes, where it expands, turns into a gas, absorbs heat. The A/C compressor is cycled on and off as necessary by the low pressure switch.

CCOT systems also use an accumulator instead of a receiver drier for refrigerant storage. You will find this system on passenger vehicles, Ford/Sterling, GMC trucks and Peterbilt trucks.

TXV (thermal expansion valve) systems use an expansion valve to change the state of the refrigerant from a high pressure gas to a low pressure liquid into the evaporator. The A/C compressor is cycled on and off as necessary by the thermostat (T-STAT). You will find this system on Volvo, Mack, Kenworth, Navistar, Freightliner and Western Star.

4. Why don't we use pin position #6 in the 6-pin connector? Can I use it?

We have 10 possible slots between the two Deutsch connectors, we only need to use nine of the slots. Number six is the slot we do not use.

B. READING BLINK CODES

1. How do I reset the module to cancel the blink codes?

Cycle the ignition 4 times, one second on/one second off (Mack vehicles: one second on/five seconds off).

2. I have 4 red blink codes. What do I do?

This code indicates a wiring fault. You will get this fault code if any of the following occurs:

- a. A pressure switch is disconnected from the control module
- b. A connector to either pressure switch is not seated correctly
- c. A break in the harness between the control unit and either pressure switch
- d. Use of a pressure switch not made for the APAds system.

After checking the wiring, reset the control module by cycling ignition four times as described above. If the module does not reset after a few tries and all wiring has been confirmed as OK, replace the control module.

3. I've tried to fix this 4 blink problem. It works for a while, and then goes back to 4 blink code.

Refer to question B2. If the system is operating normally for a period of time, the problem is likely an intermittent wiring issue.

4. System & module seem to work fine in the shop. Out on the road, the A/C cuts out. 3 blink code.

A three-blink code is generated by a break in the electrical connection between the output of the control module and the air conditioning compressor clutch. An apparently intermittent symptom can be caused by the following:

- a. A partial break in the wiring between the module and the clutch.
- b. A poor ground connection for a single-wire clutch.
- c. High or variable impedance (resistance) in the A/C compressor clutch
- d. A voltage regulator that allows voltage fluctuations of more than two volts

These problems are more common with single-wired clutches. We recommend that an external ground wire be added from the body of the compressor to the ground post of the alternator.

5. I have a fast green blink code. What should I do?

This indicates that the control module is sensing less than 11.0 volts. Check the module unit by checking the voltage between pins 2 and 4 (CM-813) or pins C and F (CM-814) when the module is connected to power. If voltage reads less than 11.0 volts, the batteries need to be checked. If the voltage is above 12.0 volts, the control module may need to be replaced.

6. I have a blink code. I reset the module and the blink code comes right back.

This is probably an indication that the A/C system is experiencing a recurring problem. Check the blink codes and follow the troubleshooting flow chart to identify any system problem. If no problems are found, the control module may need to be replaced.

C. MISCELLANEOUS TROUBLESHOOTING QUESTIONS

1. How do I reset the module?

Cycle the ignition 4 times, one second on/one second off. (Mack vehicles: one second on/five seconds off).

2. I replaced the low-pressure switch, and the charge level is fine. I still get a low-pressure blink code.

Has the control unit been reset?

3. The clutch isn't getting any power. What do I do?

More information is needed. What are the LEDs showing?

4. I've tried to fix this. It works for a while, and then goes back to 4 blink code

Refer to question B2. If the system is operating normally for a period of time, the problem is likely an intermittent wiring issue.

5. I replaced the low-pressure switch with a Texas Instruments switch. The system still won't work.

The APAds system will only operate with Index pressure switches designed for the APAds system. They contain an internal resistor, which allows APAds to detect open wire faults. Without this resistor, other pressure switches appear as open or shorted wire faults to APAds.

6. I disconnect the wire from the module to the clutch, and I read no voltage at the connector on APAds harness end.

The unit is designed to have a load on the output. If you try to check the output voltage with it disconnected from the clutch, no load will be present and a fault could occur.

7. What scale (range) do I set my ohmmeter on to check the impedance?

Use the Ohms scale. Impedance is similar to resistance.

8. **What does "VBAT" refer to on the troubleshooting diagrams?**
Vehicle battery voltage

D. FAN OPERATION & SYMPTOMS

1. The engine fan doesn't come on.

The APAds control unit sends a signal to the ECM to turn on the engine fan when the high pressure switch switches. This brings the A/C system pressure down to a proper operating level.

If the fan is not coming on when it should, disconnect the six pin (CM-813) or the 10 pin (CM-814) connector. If the fan comes on, the problem is in the control unit. If the engine fan doesn't turn on the problem is either the engine ECM or the fan clutch solenoid valve.

2. The fan is always on.

The APAds control unit sends a signal to the ECM to turn on the engine fan when the high pressure switch switches. This brings the A/C system pressure down to a proper operating level. Troubleshoot in the following sequence:

- a. With the ignition switch OFF, disconnect the six pin (CM-813) or the 10 pin (CM-814) connector. Run a ground wire to pin 3 on a CM-813, or pin G on a CM-814. Turn the vehicle on. If the engine fan is running, the problem is NOT the control module.
- b. If the engine fan stays off, check the resistance of the high pressure switch. If the reading is not around 2.49k Ω , replace the pressure switch and recheck. If the pressure switch resistance does read about 2.49k Ω (OK), replace the control module.

3. Why does my engine fan turn on when I first start up the vehicle (or about 15 seconds later)?

If the engine fan turns after 15 seconds and the A/C compressor clutch doesn't engage, the problem is that the high pressure switch has failed in the open position.

4. Why does the fan stay on so long?

To prevent rapid cycling of the fan clutch at idle, and thereby increase the life of the fan clutch.

E. PART NUMBER IDENTIFICATION & CROSS-REFERENCE

1. I can't tell whether I have an APAds CM-813 or CM-814 module.

The CM-813 has gray Deutsch connectors. The CM-814 has a black ten pin Metri Pack connector. The label also indicates the type of control unit you have.

2. What's the difference between ECM and STD versions of APAds? Is one better than the other?

The STD (standard) version will control the period of time the engine fan is due to high air conditioning head pressure. The ECM version defers the fan timing control to the engine control module (ECM). The two cannot be interchanged without affecting the period of time the engine fan stays on. One is not better than the other -- it is only a matter of preference by the OEM.

3. Why can't I use a Texas Instruments pressure switch as a replacement?

The APAds system will only operate with Index pressure switches designed for the APAds system. They contain an internal resistor, which allows APAds to detect open wire faults. Without this resistor, other pressure switches appear as open or shorted wire faults to APAds.

4. I have an 8042103. Can I use an 8042105 instead?

The difference between the two modules is the fan timing. The 8042103 will control the period of time the engine fan is on due to high air conditioning head pressure. The 8042105 will defer the fan timing to the engine ECM. The two cannot be interchanged without affecting the period of time the engine fan stays on.

5. I have a Peterbilt. Which APAds unit do I use?

The correct module is the 8042123 (CM-816). This unit uses a different low pressure switch and the settings in the control unit are slightly different.

6. I took off a CM-813. Can I replace it with a CM-814?

No, the connectors are different and the output to the clutch is different.

7. What's the difference between CM-813 and CM-816? Are they interchangeable?

The CM-813 is designed for TXV systems, the CM-816 is designed for CCOT systems. They are not interchangeable.

8. I have pressure switch #X, can I use pressure switch #Y?

Index Part No.	Pressure Setting	Customer Part No.	Interchangeable with:
8040135	300/260	-	8040147, 8040151, 8040177
8042136	34/10	-	8040148, 8040152, 8040178, 8040189
8040147	300/260	Volvo 3939317	8040135, 8040151, 8040177
8040148	34/10	Volvo 3939316	8040136, 8040152, 8040178, 8040189
8040151	300/260	Freightliner	
8040152	34/10	Freightliner	
8040169	34/12	-	-
8040170	34/12	-	-
8040171	365/300	-	-
8040172	365/300	-	-
8040177	300/260	-	8040135, 8040147, 8040151
8040178	34/10	-	8040136, 8040148, 8040152, 8040189
8040189	34/8	-	-
8040193	365/300	-	-
8040194	47/25.5	For CCOT systems	-

Index Part No.	Pressure Setting	Customer Part No.	Interchangeable with:
8040210	365/300	-	-
8040279	365/270	-	-
8040304	34/4	Volvo 20437760	-
8040308	335/245	Mack 1MR3594M	-

9. What APAds module part numbers are interchangeable, if any?

Index P/N	Type	Fan Setting	Customer P/N	Interchangeable with:
8042103	CM-813	Standard	-	8042106
8042105	CM-813	ECM	-	8042107, 8042121
8042106	CM-813	Standard	Volvo 3939314	8042103
8042107	CM-813	ECM	Volvo 3939313	8042105, 8042121
8072108	CM-813	30 Second	Volvo 3939315	-
8042114	CM-812	None	-	8042124
8042121	CM-813	ECM	Mack	8042105, 8042107
8042123	CM-816	Standard	CCOT Ford, Sterling and Peterbilt	-
8042124	CM-812	VF/DD*	-	8042114
8042132	CM-814	Standard	Volvo 20357742	-
8042133	CM-814	30 Second	Volvo 20357741	-

*VF/DD = Viscous Fan Clutch or Direct Drive Fan. APAds gives no fan timing output.

G. K7 FAN TIMER KIT

1. How do I install manual override for a K7 kit?

(The K7 kit was the predecessor to APAds, and can be found on some older truck models).

Harness part number 8038028 needs to be purchased. It is plugged in-between the K7 kit harness and the solenoid valve. The loose end with the boot goes to one end of a toggle switch, the other end of the toggle switch goes to a switched 12 volt power source.