



TechPro

Bulletin

FORD VEHICLE COMPUTER RELEARN PROCEDURES

Performing repairs or service on any of the following may require you to initiate a computer relearn procedure in order to restore proper vehicle operation:

- **Anti-theft control module (PATS)**
- **Battery replacement**
- **Battery cables**
- **Crankshaft Position Sensor**
- **Flywheel**
- **Fuel Filter**
- **Fuel Injectors**
- **Fuel Pump**
- **Harmonic Balancer**
- **Idle Speed Controller**
- **Ignition keys**
- **Ignition Lock Cylinder**
- **Instrument Cluster replacement (certain vehicles)**
- **Powertrain Control Computer**
- **Powertrain Control Computer reprogramming**
- **Oxygen Sensor**
- **Transmission**

Here are some helpful tips to perform a system relearn based upon the particular repair that you have performed. This section will provide a brief summary of what steps that will need to be taken. The following sections will deal with the specific systems (Anti-theft and Power-train) and the procedures necessary to restore proper vehicle operation.

REMINDER: When replacing any component, make sure to disconnect the negative battery cable before you begin. Also, it is just as important to make sure that the ignition switch is in the "Off" position when you re-connect the battery. Failure to do this will prevent the proper initialization from taking place and could possibly damage the electronic components that you are replacing. Also,

please keep in mind that when servicing any power-train or body control modules, including re-flashing, some vehicles may lose their stored radio security code. Make sure that you obtain that code from the customer before working on the vehicle.

POWER-TRAIN CONTROL COMPUTER REPLACEMENT

All computers supplied by us are already "flashed" or reprogrammed, which means the replacement computer has the most up-to-date information for that particular vehicle, and cannot be used on another vehicle. This pertains only to OBD II computers, which are used on 1996 and later vehicles. There may be some exceptions to that rule, but the most accurate way to determine if the computer can be reprogrammed is by the number of terminals or pins that it has. If the computer has at least 104 pins, then it can be reprogrammed. Relearn procedures involve: Anti-theft Initialization (most vehicles), Barometric Pressure Value check, Crankshaft Position Sensor Profile Correction, Idle Speed Control, and Diagnostic Monitor operation. When replacing a vehicle's PCM it is always a good practice to disconnect the battery's negative cable before you begin.

POWER-TRAIN CONTROL COMPUTER REPROGRAMMING

If diagnostics reveal that a reprogram or re-flash is necessary, relearn procedures involve: Anti-theft Initialization (most vehicles), Barometric Pressure Value check, Crankshaft Position Sensor Profile Correction, Idle speed control, and Diagnostic Monitor operation. Please keep in mind that when programming Powertrain &/or Body Control Modules, some vehicles may lose their stored radio code.

ANTI-THEFT CONTROL MODULE (PATS) , INSTRUMENT CLUSTER (CERTAIN VEHICLES), IGNITION KEYS

Depending on the vehicle, if the Anti-theft module, or the instrument cluster that contains the anti-theft module is replaced, then an Anti-theft initialization must be performed. Also, if the ignition lock cylinder is replaced which uses new keys, or, additional keys are needed with the existing ignition lock cylinder, then a key relearn must be performed, otherwise the vehicle will not start with the new key(s). When replacing a PATS module, regardless of where it is located, it is always a good practice to disconnect the negative battery cable before you begin.

BATTERY OR BATTERY CABLE(S)

Any time the battery is disconnected, the Keep Alive Memory (KAM) is erased. This means that any learned values that the PCM has stored for adaptive systems such as idle and fuel trim will have to be relearned in order to achieve optimum driveability and vehicle performance. This can be achieved by performing the idle relearn first, and then driving the vehicle as you normally would on a test drive, making sure that everything is operating properly.

CRANKSHAFT, ENGINE, CRANKSHAFT POSITION SENSOR, FLYWHEEL, & HARMONIC BALANCER

If any of the above items are replaced, then a Crankshaft Profile Correction relearn is necessary.

FUEL FILTER, FUEL INJECTORS, FUEL PUMP, IDLE SPEED CONTROLLER, OXYGEN SENSOR, & TRANSMISSION

If any of the above items are: cleaned, replaced, or serviced, it is necessary to perform an Adaptive Memory relearn. If the Idle Speed Controller is serviced, then an Idle relearn is necessary.

FORD ANTI-THEFT RELEARN PROCEDURES

The Ford Passive Anti-theft System (which we will refer to as: PATS) uses a special programmable key which has a transponder embedded in its head. The transponder contains radio frequency generating electronics which signal must be identified by the PATS module in order for the vehicle to start. This signal is transmitted to the PATS module via the transceiver which is a device mounted in the steering column around the ignition lock assembly. The PATS module stores the identifiable ignition key codes that are programmed into a non-volatile memory. This means that the codes cannot be erased unless certain procedures are followed.

When you insert the key into the lock cylinder and turn the key to the run or start position, the PATS control module “requests” the key code signal by supplying power and a carrier signal to the transceiver which turns the transponder inside of the ignition key on. When the key is energized, it transmits its identification code to the transceiver which then sends the coded key signal to the PATS control module. If the PATS module recognizes the key code, it then transmits a signal to the Power-train computer (PCM) to enable fuel pump and fuel injector operation. Some systems also use a separate starter relay in order to prevent engine cranking unless a correct key code signal is received.

Ford uses five variations of PATS systems. To simplify matters, there are really only three different *types* of systems due to the hardware that’s actually used on the vehicle.

All of the systems use: a transponder key, a transceiver which is mounted in the steering column at the ignition lock, and a PCM. The difference between the systems is where the PATS module is located. The first system uses a separate PATS module with a PCM. The second type has the PATS module located inside of the instrument

cluster or the Steering Column Ignition/Lighting Module. The third type has the PATS module built into the PCM. The reason Ford identifies the five different types is due to the minimum number of keys that are required to be programmed before the vehicle will start, and the maximum number of keys that can be programmed into a particular system. Keep in mind that if the maximum number of keys for a particular system has been programmed into the PATS memory, no additional keys can be programmed into that system unless you erase all previous keys programmed into the system’s memory. Depending upon the system, a scan tool may be necessary to accomplish this. Also, depending on what component of the system is replaced, a different relearn or initialization process is necessary.

In order to properly identify the system that a vehicle uses, please refer to the PATS System Identification chart. *

REMEMBER- These procedures are for ANTI-THEFT relearn or initialization ONLY. The PCM relearn procedures will be covered later in this tech tip.

Barometric Pressure Reference Table

Barometric Pressure [in Hg]	Barometric Pressure [kPa]	BARO/MAP PID [Hz]	Altitude above sea level [ft]
3.5	11.8	89.3	
5	16.9	92.8	
10	33.8	104.6	
15	50.7	117.0	14,000
20	67.5	129.6	10,000
21	70.9	132.5	9,000
22	74.3	135.4	8,000
23	77.7	138.3	7,000
24	81.1	141.1	6,000
25	84.4	144.0	5,000
26	87.8	146.9	4,000
27	91.2	149.8	3,000
28	94.6	152.8	2,000
29	97.9	155.8	1,000
30	101.3	158.9	0 (sea level)
31	104.7	162.0	
31.875	107.7	164.7	

PATS System Identification Chart

Make	Vehicle	Model Year	PATS Type System	Max Keys	Minimum Keys Required	Starter Interrupt Present	Requires Parameter Reset	Theft Indicator Flashes at Ignition OFF
FORD	Contour (V6 Only)	98	A	16	1	Y	N	Y
		98 (2/2/98 Build or Later) - 00	E	8	2	Y	N	Y
	Crown Victoria	98-02	B	8	2	N	Y	Y
		03-04	E	8	2 or 3	Y	N	Y
	Escape	01-04	E	8	2	Y	N	Y
	Excursion	00-04	B	8	2	N	Y	Y
	Expedition	97-98	A	16	1	N	N	N
		99-02	C	8	2	N	Y	Y
		03-04	E	8	2	Y	N	Y
	Explorer (4dr)	98-01	B	8	2	N	Y	Y
		02-04	E	8	2	Y	N	Y
	Explorer (2dr/sport)	98-01 (Before 7/24/00)	B	8	2	N	Y	Y
		01 (7/24/00 Build or Later) - 03	E	8	2	Y	N	Y
	Explorer Sport Trac	01 (Before 7/24/00)	B	8	2	N	Y	Y
		01 (7/24/00 Build or Later) - 04	E	8	2	Y	N	Y
	F-150 Classic	99-04	C	8	2	N	Y	Y
	F-150 Harley Davidson	01-03	C	8	2	N	Y	Y
	F-150	04	E	8	2	Y	N	Y
	F-250 (Under 8500 #GVW)	99-00	C	8	2	N	Y	Y
	Focus	00-04	E	8	2	Y	N	Y
	Freestar	04	E	8	2	Y	N	Y
	Mustang	96-97	A	16	1	N	N	N
		98	B	8	2	N	Y	Y
99-04		C	8	2	N	Y	Y	
Ranger (3.0L & 4.0L Only)	99-00	B	8	2	Y	Y	Y	
Ranger (2.3L, 3.0L & 4.0L)	01-04	E	8	2	Y	N	Y	
Taurus (Duratec Only, 3.0L DOHC)	96-97	A	16	1	N	N	N	
Taurus (All Engines)	98-99	B	8	2	Y	Y	Y	
	00-04	E	8	2	Y	N	Y	
Thunderbird	02-04	C	8	2	Y	Y	N	
Windstar	99-00	C	8	2	Y	Y	Y	
	01-03	E	8	2	Y	N	Y	
LINCOLN	Aviator	03-04	E	8	2	Y	N	Y
	Blackwood	02-03	C	8	2	N	Y	Y
	Continental	98-02	C	8	2	N	Y	Y
	LS	00-04	C	8	2	Y	Y	N
	Mark VIII	97-98	D	16	2	Y	N	N
	Navigator	98	A	16	1	N	N	N
		99-02	C	8	2	N	Y	Y
03-04		E	8	2	Y	N	Y	
MERCURY	Cougar	99-02	E	8	2	Y	N	Y
	Grand Marquis	98-02	B	8	2	N	Y	Y
		03-04	E	8	2 or 3	Y	N	Y
	Marauder	03	E	8	2 or 3	Y	N	Y
	Monterey	04	E	8	2	Y	N	Y
	Mountaineer (4 dr)	98-01	B	8	2	N	Y	Y
			E	8	2	Y	N	Y
	Mystique (V6 Only)	98	A	16	1	Y	N	Y
		98 (2/2/98 Build or Later)-00	E	8	2	Y	N	Y
Sable (Duratec Only, 3.0L DOHC)	96-97	A	16	1	N	N	N	
	98-99	B	8	2	Y	Y	Y	
Sable (All Engines)	00-04	E	8	2	Y	N	Y	

SYSTEM "A"

This system has a maximum program capacity of 16 keys.

PCM REPLACEMENT OR REPROGRAMMING

No special procedures are required.

PATS CONTROL MODULE REPLACEMENT

After installing the new module, cycle the ignition key to the "On" position. After the security light turns off, the key is programmed. To program additional keys: see Spare Key Programming.

SPARE KEY PROGRAMMING

A scan tool is not needed to program additional keys, however, it can be used to erase previously programmed keys. This system requires at least one previously programmed key in order to program any additional keys. Just place any previously programmed key into the ignition cylinder and turn the cylinder to the "Run" position. Return the key to the off position. Within 15 seconds of doing this, remove the key, place an un-programmed key into the cylinder, turning the cylinder to the "Run" position. At this point the security light on the dash should turn off in approximately 2 seconds. After the light turns off, the new key is programmed into memory and will start the car. Repeat this process for any additional keys. This system has a capacity for 16 keys to be programmed into the PATS module.

IGNITION LOCK CYLINDER REPLACEMENT

Replacement of the ignition lock cylinder will require you to make one of two choices. If you have the new cylinder coded to the cut of the old key, then no key programming is necessary because the PATS module will recognize the existing key chip. If you replace the ignition cylinder with one that uses new keys, then a new key relearn is necessary.

NEW IGNITION KEY PROGRAMMING

You can use this procedure for one of two situations. First, if you have replaced the ignition lock cylinder that uses new keys and the original keys will not work with the new cylinder. Or, all of the existing keys have been lost and you need to program a replacement key to start the car.

In either situation, once you perform either of the next two procedures, all of the keys that were currently stored in the PATS module's memory will be erased. This means that if you want to use them again, a Spare Key Relearn must be performed after the new keys have been programmed.

PROCEDURE WITH A SCAN TOOL

If you have a scan tool that has PATS programming capability, then insert the new key into the ignition lock cylinder and rotate the key to the "On" position. Following the scan tool's instructions, enter into the "ERASE ON" function. This process will take a minimum of 8 minutes to complete. When the process is completed, turn the ignition switch to the "Off" position and then back to the "On" position in order to program the new key into the PATS memory. If you have to program any additional keys, just use the Spare Key Programming procedure.

PROCEDURE WITHOUT A SCAN TOOL

If you do not have a scan tool with PATS programming capability, then you can use the following procedure. Just insert the new key into the lock cylinder and turn the cylinder to the "Run" position. After you do this, the "Theft" indicator light will begin to flash. It will take approximately 15 minutes for the light to stop flashing. Within 5 minutes after the light has stopped flashing, Turn the ignition switch to the "Off" position for one second, and then back to the "Run" position. After doing this, the "Theft" indicator light will begin flashing again for another 15 minutes. When the light stops flashing for the second time, turn the key to the "Off" position for one second, and then back to the "On" position for the third and final time. The "Theft" light will flash for another 15 minutes. After the third time, which will be approximately 45 minutes from the start of the process, the PATS control module will have erased any of the keys that were programmed into its memory, while programming the new key that you have just used into its memory. This key will now start the car. Any additional keys can now be programmed using the Spare Key Programming procedure.

SYSTEM "B"

This system has a maximum program capacity of 8 keys.

PCM REPLACEMENT (scan tool required)

After installing the replacement PCM, an Anti-theft initialization must be performed using a scan tool with PATS capability. Follow the scan tool manufacturer's instructions to enter the PATS functions. Usually there's a 10 minute delay when accessing the SECURITY function. Select the PARAMETER RESET function. After you have made the selection, return to the main menu, then turn the ignition key to the "Off" position. Next, disconnect the scan tool from the diagnostic connector. Cycle the ignition key from the "Off" position to the "Run" position for a total of 5 times, making sure that each time that you cycle the key that it stays in the "Run" position for at least 3 seconds, and in the off position for at least 2 seconds. This process will initialize the PCM/PATS module communication. When this process is completed, the next time that you turn the key to the "On" position, the "Theft" light (If the vehicle has one) will turn off after 3 seconds, and the vehicle can now be started.

PCM REPROGRAMMING

No special procedures are required.

PATS CONTROL MODULE REPLACEMENT (scan tool required)

Replacement of the PATS control module requires an Anti-theft initialization using a scan tool with PATS capability. The steps are exactly the same as the PCM replacement except that after you disconnect the scan tool, you must then wait 10 seconds. After waiting, you must cycle 2 keys in the ignition cylinder from the "Off" position to the "Run" position, holding each key in the "Run" position for at least 3 seconds before returning to the "Off" position.

Two keys must be programmed, otherwise, the vehicle will not start, and you will not be able to perform any of the Spare Key programming procedures described below.

After the second key has been cycled, the vehicle should start. If the vehicle does not start, repeat the key cycling process again. If after repeating this process the vehicle still does not start, you must perform a KEEP ALIVE MEMORY RESET with your scan tool.

Keep in mind that if you do reset the Keep Alive Memory, you must perform an idle control relearn before driving the vehicle. It is also advisable that you test drive the

vehicle before returning it to the customer, so that all of the other adaptive parameters in the PCM's memory can be relearned.

You can access this function by entering into the PCM functions from the scan tool menu. Next select the ACTIVE COMMANDS function. After performing the reset, exit this function and disconnect the scan tool. After waiting 10 seconds, cycle the ignition switch from "Off" to the "Run" position 3 times, each time leaving the switch in the "Run" position for at least three seconds before returning to the "Off" position.

These steps will initialize the PATS module and the PCM. The next time that you rotate the ignition switch to the "On" position, the "Theft" indicator (If the vehicle has one) should turn off after three seconds and the vehicle should start.

SPARE KEY PROGRAMMING

The spare key programming function on this system requires that there must be at least 2 keys already programmed into the system. If 2 programmed keys are not available, or are lost, then you must use a scan tool to program any additional keys. If keys are lost, or not in the owner's possession, then you can erase all of the programmed key codes with a scan tool that has PATS capability.

PROCEDURE WITH A SCAN TOOL

If you do not have 2 keys that have been previously programmed into the PATS memory in your possession, then a scan tool must be used in order to program any additional keys.

If you have a scan tool with PATS programming capability, insert an un-programmed key into the ignition lock and turn the ignition switch to the "On" position. Follow the Scan tool's instructions to enter the KEY CODE PROGRAM function in the SECURITY menu. Remember, there is a 10 minute delay when accessing the SECURITY menu. Next, return to the main menu. If you would like to program any additional keys (up to a maximum of 8 keys), then repeat this process with the next un-programmed key. If you are finished programming keys, then disconnect the scan tool and wait for 10 seconds. The key is now programmed. Turn the key to the "Off" position. Next, verify that the vehicle starts with the new key(s).

PROCEDURE WITHOUT A SCAN TOOL

In order to program any additional keys into this PATS system, you must have 2 of the keys that have already been programmed into

the system in your possession before you begin.

First, insert the first programmed key into the ignition cylinder and rotate the ignition switch to the "Run" position for 3 seconds. Turn the ignition switch to the "Off" position and remove the first key. Within 5 seconds of turning the ignition switch off, insert the second programmed key into the cylinder, and turn the ignition switch to the "Run" position for 3 seconds. Next, turn the ignition switch to the "Off" position and remove the second key. Within 10 seconds of turning the ignition switch off, insert an un-programmed key into the cylinder and turn the ignition switch to the "Run" position for 1 second. The new key is now programmed and should start the vehicle. If you need to program any additional keys, then you must repeat this entire procedure for each un-programmed key.

IGNITION LOCK CYLINDER REPLACEMENT

Replacement of the ignition lock cylinder will require you to make one of two choices. If you have the new cylinder coded to the cut of the old key, then no key programming is necessary because the PATS module will recognize the existing key chip. If you replace the ignition cylinder with one that uses new keys, then a new key relearn is necessary.

NEW IGNITION KEY PROGRAMMING (scan tool required)

This procedure requires the use of a scan tool with PATS capability.

You must use the erase function if you are replacing the ignition lock cylinder that uses different cut keys. Keep in mind that the vehicle will not start until at least 2 keys have been programmed into the system once the key codes have been erased. This also means that any previously programmed keys that did start the car will no longer have that ability once the IGNITION KEY CODE ERASE function has been completed. In order to do this, you must access the SECURITY function of your scan tool. Remember, there usually is a 10 minute wait in order to enter this function. Select the IGNITION KEY CODE ERASE function. Turn the ignition switch to the "Off" position and then disconnect the scan tool. Next, insert the first key to be programmed into the lock cylinder and turn the ignition switch to the "Run" position for 3 seconds. Turn the switch to the "Off" position. Repeat this procedure for the second key. Once the second key is programmed, the vehicle should start and you should be able to program any spare keys into the system.

SYSTEM “C”

This system has a maximum program capacity of 8 keys.

In this system, the PATS module is built into the instrument cluster. It functions in the exact manner as the systems using a separate PATS module.

PCM REPLACEMENT (scan tool required)

After installing the replacement PCM, an Anti-theft initialization must be performed using a scan tool with PATS capability. Follow the scan tool manufacturer's instructions to enter the PATS functions, except with this system, depending on what vehicle it is, you may not see PATS. You will probably see VIC (Virtual Image Cluster Module), HEC (Hybrid Electronic Cluster), or ICM (Instrument Cluster Module). That's because the PATS module is located in the instrument cluster, and, depending on the vehicle, Ford has a different name for the instrument cluster. Entering into the SECURITY function, there is usually a 10 minute delay for security reasons.

Next select the PARAMETER RESET function. After you have made the selection, return to the main menu and turn the ignition key to the “Off” position. Next, disconnect the scan tool. Now cycle the ignition key from the “Off” position to the “Run” position for a total of 5 times, making sure that each time that you cycle the key that it stays in the “Run” position for at least 3 seconds, and in the “Off” position for at least 2 seconds. This will initialize the PCM/PATS module communication. When this process is completed, the next time you turn the key to the “On” position, the “Theft” light will turn off after 3 seconds and the vehicle can now be started.

NOTE: When replacing the PCM on a 2000-2001 Lincoln LS with a V6 and manual transmission, you must also perform a PARAMETER RESET to the steering column lock module. Follow your scan tool manufacturer's instructions for this procedure.

STEERING COLUMN LOCK ACTUATOR REPLACEMENT (scan tool required)

When replacing the steering lock actuator on any vehicle, or the PCM on 2000-2001 Lincoln LS with a V6 and manual transmission, you must perform a PARAMETER RESET to the steering column lock module. This requires a scan tool with PATS capability. The steering column lock actuator will only allow communication with a scan tool after the module has been activated.

To activate the module, make sure that the ignition key is not in the ignition cylinder. Open the driver's door. By opening the driver's door, the module will stay activated for 30 minutes. The following must be completed within that 30 minutes. Connect the scan tool. Select SCLM (Steering Column Lock Module). Next, select ENTER SECURITY. There is usually a 10 minute wait before the next menu appears. Select PARAMETER RESET. Insert the ignition key and turn the switch to the “Run” position. Next, select ICM (Instrument Column Module). Select ENTER SECURITY ACCESS from the menu, and wait 10 minutes for access. When the menu appears, select RESET SCLM PARAMETER. Disconnect the scan tool and turn the ignition key to the “Off” position. Now remove the key, and place it back into the ignition switch and return the switch to the “Run” position. Finally, turn the ignition switch to the “Off” position and remove the key. The reset procedure is complete.

PCM REPROGRAMMING

No special procedures are required.

INSTRUMENT CLUSTER REPLACEMENT - PATS MODULE (scan tool required)

The PATS module is also located inside of the instrument cluster. So, whatever the reason for replacement, the following procedure must be performed. Replacement of the PATS control module requires an Anti-theft initialization using a scan tool with PATS capability. Remember, depending on what the vehicle is, you may not see the PATS function. You may see: VIC, HEC, or ICM. Enter into the SECURITY function. There will be the usual 10 minute delay. Select the PARAMETER RESET function. Return to the main menu

and turn the ignition key to the “Off” position. The steps are exactly the same as the PCM replacement, except that after you disconnect the scan tool, you must then wait 10 seconds. After waiting, you must cycle 2 keys in the ignition cylinder from the “Off” position to the “Run” position, holding each key in the “Run” position for at least 3 seconds before returning to the “Off” position. **Two keys must be programmed, otherwise, the vehicle will not start, and you will not be able to perform any of the Spare Key programming procedures described below.** After the second key has been cycled, the vehicle should start. If the vehicle does not start, repeat the key cycling process again. If after repeating this process the vehicle still does not start, you must perform a KEEP ALIVE MEMORY RESET with your scan tool. **Keep in mind that if you do reset the Keep Alive Memory, you must perform an idle control relearn before driving the vehicle. It is also advisable that you test drive the vehicle before returning it to the customer, so that all of the other adaptive parameters in the PCM's memory can be relearned.**

You can access this function by entering into the PCM functions from the scan tool menu. Next select the ACTIVE COMMANDS menu. After performing the reset, exit this function and disconnect the scan tool. After waiting 10 seconds, cycle the ignition switch from “Off” to the “Run” position 3 times, each time leaving the switch in the “Run” position for at least three seconds before returning to the “Off” position.

These steps will initialize the PATS module and the PCM. The next time that you rotate the ignition switch to the “On” position, the “Theft” indicator should turn off after three seconds and the vehicle should start.

SPARE KEY PROGRAMMING

Refer to System “B”. Keep in mind that when using a scan tool for any key programming functions, depending on the vehicle, PATS may be referred to as : HEC, ICM, or VIC.

IGNITION LOCK CYLINDER REPLACEMENT- see “New Ignition Key Programming System B”.

SYSTEM “D”

This system has a maximum program capacity of 16 keys.

This system is a very unique system in that the PATS module is actually contained inside of the Steering Column Ignition/Lighting Module (SCIL). It is also limited to the 1997-1998 Lincoln Mark VIII.

PCM REPLACEMENT OR REPROGRAMMING

No special procedures are required.

PATS CONTROL MODULE/ STEERING COLUMN IGNITION/LIGHTING MODULE PCM/PATS

Module initialization is a very simple procedure where a scan tool is not needed. The only requirement is that 2 keys must be programmed into the PATS memory in order for the vehicle to start. After installing the new module, cycle the first key in the ignition switch to the “Run” position for 1 second. Turn the switch to the “Off” position. Remove the first key, and insert a second key into the ignition cylinder. As with the first key, turn the switch to the “Run” position for 1 second. Turn the switch to the “off” position. The module is now initialized and both keys are now programmed into the PATS memory. The vehicle should start with either key.

SPARE KEY PROGRAMMING **See Spare Key Programming System “A”.**

A scan tool cannot be used to program additional keys. However, it can be used to erase keys that have been programmed into the PATS/SCIL memory. This system has a capacity for 8 keys to be programmed into the PATS module.

IGNITION LOCK CYLINDER REPLACEMENT

Replacement of the ignition lock cylinder will require you to make one of two choices. If you have the new cylinder coded to the cut of the old key, then no key programming is necessary because the PATS/SCIL module will recognize the existing key chip. If you replace the ignition cylinder with one that uses new keys, then a new key relearn is necessary.

NEW IGNITION KEY PROGRAMMING

You can use this procedure for one of two situations. First, if you have replaced the ignition lock cylinder that uses new keys and the original keys will not work with the new cylinder. Or, all or most of the existing keys have been lost and you need to program a replacement key to start the car.

In either situation, once you perform either of the next two procedures, all of the keys that were currently stored in the PATS module’s memory will be erased. This means that if you want to use them again, a Spare Key Relearn must be performed after the new keys have been programmed. Remember, this system must have two keys programmed into the PATS/SCIL module in order for the vehicle to start.

PROCEDURE WITH A SCAN TOOL

If you have a scan tool that has PATS/SCIL programming capability, then insert a key into the ignition lock cylinder and rotate the ignition switch to the “On” position. Following the scan tool’s instructions, enter into the “ERASE ON” function. If the key that you are using is a programmed key, then the erase process will take approximately 3 seconds. If you are using a new un-programmed key, then this process will take a minimum of 8 minutes to complete. When the process is completed, turn the ignition switch to the “Off” position. Disconnect the scan tool. Now turn the ignition switch to the “Run” position to program the first key into the PATS/SCIL memory. Turn the switch to the

“Off” position. Remove that key and within 15 seconds of removing that key, insert the second key to be programmed and turn the ignition switch to the “On” position. The second key is now programmed, and either key should start the vehicle. If you have to program any additional keys, refer to the Spare Key programming procedure.

PROCEDURE WITHOUT A SCAN TOOL

If you do not have a scan tool with PATS/SCIL programming capability, then you can use the following procedure. Just insert the new key into the lock cylinder and turn the cylinder to the “Run” position. After you do this, the “Theft” indicator light will begin to flash. It will take approximately 15 minutes for the light to stop flashing. Within 5 minutes after the light has stopped flashing, Turn the ignition switch to the “Off” position for one second, and then back to the “Run” position. After doing this, the “Theft” indicator light will begin flashing again for another 15 minutes. When the light stops flashing for the second time, turn the key to the “Off” position for one second, and then back to the “On” position for the third and final time. The “Theft” light will flash for another 15 minutes. After the third time, which will be approximately 45 minutes from the start of the process, the PATS control module will have erased any of the keys that were programmed into its memory, while programming the new key that you have just used into its memory. In order for the vehicle to be started, you must program a second key. Any additional keys can now be programmed using the Spare Key Programming procedure. You cannot use a scan tool to program additional keys with this system.

SYSTEM “E”

This system has a maximum program capacity of 8 keys.

In this system, the PATS feature is incorporated into the PCM. It functions exactly as the other systems that use a separate PATS module.

PCM REPLACEMENT (scan tool required)

After installing the replacement PCM, a scan tool with PATS capability is required to erase all of the keys that were previously programmed into the PATS memory, and to begin programming of the existing keys for the vehicle.

As with the other systems, with the

ignition switch in the “On” position, access the SECURITY function. After the 10 minute wait, select the KEY CODE ERASE function. Do not perform any other functions at this time. Next, turn the ignition switch off and disconnect the scan tool. Now, turn the ignition switch back to the “On” position for at least 2 seconds. Remove that key and insert a second key into the ignition lock and cycle that key for a minimum of 2 seconds. After the second key has been cycled, either key will start the vehicle. If there are any other keys to be programmed, see the Spare Key Programming procedure.

PCM REPROGRAMMING

No special procedures are required.

PATS CONTROL MODULE REPLACEMENT

The PATS module is contained in the PCM on this system. See PCM replacement.

SPARE KEY PROGRAMMING

see Spare Key Programming system “B”

IGNITION LOCK CYLINDER REPLACEMENT

see system “B”

NEW IGNITION KEY PROGRAMMING

see system “B”

THIS ENDS THE FORD ANTI-THEFT SYSTEM RELEARN PROCEDURES

FORD POWERTRAIN RELEARN PROCEDURES

As we stated at the beginning of this article, replacement or servicing of some components required a system relearn. Here is an explanation of those relearn procedures.

BAROMETRIC PRESSURE VALUE CHECK

Barometric pressure has a dramatic effect on the PCM’s calibration for fuel delivery and ignition timing. Since the PCM uses this value as a starting point, it’s a good practice to check this value with your scan tool just to make sure that the PCM is interpreting this information properly. Refer to the Barometric Pressure Reference table on page 2. Based on your particular altitude, you should see the appropriate value on the chart. If you do not, then you must determine what the problem may be before you proceed any further. Refer to the Barometric Pressure Reference Table.

CRANKSHAFT POSITION SENSOR PROFILE CORRECTION

In order to relearn this profile correction factor, the vehicle must be driven through 3 deceleration periods from 60 to 40 MPH with no braking. This must be completed before the misfire monitor will be fully operational.

IDLE SPEED CONTROL RELEARN

Ideally, the idle speed control relearn should be the first step performed before the vehicle is driven. In order to perform the idle control relearn, complete the following:

1. Safely block the drive wheels and let the engine idle for 15 minutes.
2. Idle the vehicle in **Neutral** with the air conditioning/defroster **OFF** for 2 minutes.
3. Idle the vehicle in **Neutral** with the air conditioning/defroster **ON** for 2 minutes.
4. Idle the vehicle in **Drive** with the air conditioning/defroster **OFF** for 2 minutes.
5. Idle the vehicle in **Neutral** with the air conditioning/defroster **ON** for 2 minutes.

The idle relearn is complete.

DIAGNOSTIC MONITOR OPERATION VERIFICATION

If you had to replace or re-program a PCM, as well as replace any part for a problem or fault code, it is a good idea to make sure that the diagnostic monitor for that particular system has completed its test by road testing the vehicle in such a manner that will satisfy the diagnostic monitor’s condition for testing that system and not setting another fault code, before you return the vehicle to the customer.

RESETTING KEEP ALIVE MEMORY (KAM)

You can reset the Keep Alive memory by disconnecting the battery’s negative cable for a minimum of 5 minutes. Resetting the memory will clear any learned values that the PCM has stored for adaptive strategy such as fuel trim, idle adjustments, and transmission operation. This will require that you road test the vehicle after performing an idle relearn, so that the PCM can implement its adaptive strategy and operate normally when you return the vehicle to the customer. The PCM has the ability to adapt closed-loop control to changing operating conditions such as: altitude, engine wear, and fuel quality in order to improve control of the air-fuel ratio, ignition timing, idle RPM, and transmission shift control. If you do not drive the vehicle, initially, it may operate differently until it adapts to the specific conditions and driving habits of the driver.

Keep in mind that resetting the memory will also clear the Crankshaft Profile Correction. It’s a good idea to reset the Keep Alive Memory whenever you replace or service: fuel filter, fuel pump, fuel injectors, harmonic balancer, idle speed controller, oxygen sensor, and transmission.

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