

Insurors Service Bureau  
P.O. Box 546  
Greenville, RI 02828

isb@macconnect.com  
edmccabe@cox.net

401 233 8126  
401 233 8128 fax

### FACTORY ELECTRONIC SECURITY SYSTEMS - thru 3/09

Electronic security systems utilized by American vehicle manufacturers fall into three categories. Two of which utilize special ignition keys:

**VATS** - GM pioneered passive, key-based automotive security with their introduction of the (Pass-KEY I) theft deterrent system with the 1986 Corvette. Versions I & II are commonly known as VATS (Vehicle Anti Theft System) after its original nomenclature. PASS-KEY II is still in use in the Corvette as of '04 but the other GM top of the line GM vehicles were equipped with the PASS-KEY III transponder system beginning with the 2002 models.

The VATS system utilized a resistor with one of 14 ohm values mounted in the shank of an extra-long ignition key as an essential component in a low voltage electronic circuit and module which controlled the engine's starter and fuel injection systems. When two contacts at the threshold of the ignition lock's keyway complete a circuit with the key's resistor when the lock was in the ON position, if the resistance value of the resistor matched the value which had been burned into the nonvolatile memory of the PassKey module (or a section of the ECM in the case the Corvette) the first time the vehicle was started at the factory, then the engine could be started. Attempts to start a VATS equipped vehicle with a key with the incorrect resistor value resulted a 2.5 - 4 minute delay before another start attempt could be made. The system incorporated passive get home circuitry which bypassed the VATS circuitry if a fault occurred after the engine had been started with the correct resistance key.

The VATS system proved to be so effective in reducing vehicle theft that none of the GM vehicles formerly occupying the top 10 theft list remained on the list after being equipped with the VATS system in 1979 & 80.

**Transponder** - Key based security - A transponder is a benign electronic device implanted in the head of a key which remains dormant until awakened by energy derived from its close proximity to an induction coil/antenna at the threshold of a vehicle's ignition lock. When a transponder becomes energized by the ignition lock being turned ON, it transmits a unique alfa/numeric identity code back to the antenna coil and the on-board computer - for comparison with values stored in the computer's memory. If the RF transmission from the transponder is an exact match then the engine can be started.

Programming and/or cloning of transponder equipped keys varies greatly between transponder manufacturers and vehicle models. Transponders are either preprogrammed with a permanent identity or programmable.

Transponder based security systems were first introduced in American cars in 1996 by Ford with their PATS 1 system.

**PassLock (GM)** - Passlock is an all-electronic theft deterrent system which shuts off fuel delivery if the vehicle's Ignition Lock or Starter Switch is tampered with or changed in any way that alters the lock's ability to be rotated smoothly or deliver a low voltage (R-code) produced by the locks rotation. The Saturn Ion, the Chevrolet Colorado & GMC Canyon pickups and the 2005 Cobalt & Pontiac Pursuit rely on the Ignition switch - not the lock.

Passlock disables fuel delivery if the vehicle's regular starting sequence deviates in time or voltage drop from its initial start-up at the factory.

Vehicles equipped with Passlock utilize a standard 10 cut ignition key but have special ignition lock and starter switch and a Passlock (IPC) module within the instrument cluster.

GM installed Passlock security in the Cavalier Z24, Sunbird GT, Grand Am, Skylark and Achieva - midyear 95 and equipped all models of these mid-size (N model code) vehicles in '96. Use of Passlock continues to the present in these vehicles has been adopted as standard equipment in all GM trucks since '98 except for the Luv and Tracker models.

The all-electronic system is based on an interface between the Passlock lock cylinder which contains a Hall Effect sensor and a magnet, a module in the Instrument Panel Cluster (IPC) which reads and accepts or rejects a voltage drop (R-Code) transmitted to it when the lock cylinder is released from the crank position to ON, a Passlock ignition/starter switch which transmits a "smart sense" signal to the IPC to signal the beginning of a start event and a Go or No/Go output to the vehicle's Power Control Module (PCM).

The IPC is programmed with the R-code of the lock cylinder upon initial start-up at the factory or after module replacement during service.

The Saturn Ion and vehicles with the electronic steering column rely on the Ignition switch.

## **OVERVIEW OF TRANSPONDER SYSTEMS - as of 2/20/06**

**Acura/Honda** - Megamos system:

Cloning - Existing keys can be cloned by a dealer or a locksmith using after-market T-Code, Strattec or Jet Smart Clone equipment.

New key programing - Only a dealer can program a new key with a proprietary PGM tester and a PIN code. Reprogramming wipes out the original - the car cannot be started with its original key after being reprogrammed.

Emergency start procedure - There is an emergency starting procedure which requires a Immobilizer Brake Code, a 5 digit number which is VIN specific and available only through Honda through a return call to a phone number previously registered with Honda - dealers and verified, registered locksmiths only.

With a working mechanical key available, the 5 code numbers are entered into the vehicle's computer with the ignition On by pressing the brake pedal, hand brake on Civic & Prelude, and releasing it the number of times for each number.

Acura models equipped with transponder security:

CL - 98 - 2002 - standard - cloning & programming possible  
Integra - 2000 -2001 - cloning & programming possible  
MDX - all since 2001 model - cloning possible 01 - 06 MDX but all can be programmed  
NSX - all since 96 model - cloning & programming possible  
RL - all since 96 model - cloning & programming through 04 but dealer only after  
RSX - all since 2002 - cloning and programming possible  
TL - all since 99 model - no cloning possible after the 2003 TL  
TSX - all 2004 - 2007 - no cloning possible & only dealer equipment can program  
RDX - 2007 - 2008 - no cloning possible but can be programmed  
MDX & RSX keys can be cloned using clonable transponder key blanks

Honda models equipped with transponder security:

Accord - all since '98	Prelude - all since '97
Civic - all since 2001	Odyssey - all since '98
Insight - all since 2000	S2000 - all since 2000
CR-V - all since 2002	Pilot - standard since 2003
CRX - all since '98	Del Sol - all since '98
Element - all since '03	Ridgeline - all standard equipment
Insight - all	Fit - all have transponder security

**Audi/VW** - Megamos or Philips Crypto system with High Security key.

Cloning - Existing keys can be cloned by a dealer or a locksmith using after-market STLM equipment or the TCL-1, Code Seeker, MVP or T-Code programmers.

New Key programming - A dealer can program a new key with a proprietary VAG tester and a PIN code. Reprogramming wipes out the original - the car cannot be started with its original key after being reprogrammed. All models except A8 & S8 from 2003 can be programmed with aftermarket equipment if the PIN code is available - but PIN codes can only be obtained directly from Audi/VW through a phone connection through dealership diagnostic equipment.

Emergency start procedure - There is an emergency starting procedure which requires a correctly cut high security key and a "Secret Number" PIN which is VIN specific and available only through VW / Audi.

With a working mechanical key available, the PIN digits are entered into the vehicle's computer with the ignition On by a procedure utilizing the vehicle's clock setting adjuster and its Trip Odometer.

Audi models equipped with transponder security:

All Audi vehicles except A4 & S4 since 2001  
A4 & S4 since mid 2002 - early 2002 models do not have Transponder System.

VW models equipped with transponder security:

Passat, Golf, Beetle, Jetta, GTI and Cabrio since 2000  
Eurovan since '01.  
Phaeton - all - dealer only programming with PIN  
R32 - all  
Touareg - all - dealer only programming with PIN

**BMW** - Philips rolling code system with High Security key.

Cloning - Dealer only with a special password and DIS or MoDic dealer-only equipment.  
Ten keys programmed at factory, 4 delivered with car and 6 available through BMW parts.

New key programming - Dealer only with special equipment and special VIN specific password.

Emergency starting procedure - none.

All BMW vehicles since 1/95 equipped with transponder security with a major enhancement in '98.

**GM** - three security systems currently in use: Pass-Key III (PK3) (transponder based) system by Megamos, PASS-KEY II (VATS - key mounted resistor) and Passlock which uses a standard key.

Cloning of keys for Pass-Key III - Possible with on board computer if a preprogrammed key is available. A Dealer or Locksmith with special equipment, including Jet Smart Clone equipment, also can clone a key for the Pass-Key III system.

The 2000 & 2001 Cadillac Catera's transponder key is non-clonable. The 97-99 can be cloned with special equipment from the after-market including the ASP TCL-1.

Transponder equipped 2004 GM vehicles which have no "Theft" indicator lights (example 04 Grand Prix) can be reprogrammed using the on-board computer and a conforming blank with a 30 minute procedure using the ignition lock for three consecutive 10 minute ON periods. The system will be erased and only the new key will be programmed.

Whenever a GM transponder equipped vehicle has a 2 as the starting number of its VIN, or if the vehicle is manufactured for export out of the US, the electronics will usually require different programming procedure than the standard on-board programming unless there are two programmed transponder keys available.

Emergency starting procedure - none.

Since 2001 most GM trucks with automatic transmissions and some passenger cars do not have a locking steering wheel system

GM passenger cars / trucks equipped with PK 3 or 3+C transponder security:

**Cadillac** - DeVille since 2000, CTS since '03, Catera since '99, Seville since '98 - SRX & DTS - all, SRX has PK3+ from '04 - on board (OB) programmable but keys cannot be cloned by aftermarket tools, STS '05 OB & Tech 2 programmable. The Escalade has been equipped with PK3+C transponder security since 2007

The XLR sportscar has its own remote-actuated keyless ignition & door locking system - no ignition or door locks. No cloning except OB or dealer Tech 2

The STS & XLR - PROX keyless entry & start system & a key backup - Tech 2 or OB

**Corvette** - keyless system since 05 - VATS prior

**Buick** - LeSabre, Park Avenue & Ultra since 2000, LaCrosse since 05, Rendezvous since 02, Terraza since 05, all Lucerne

**Chevrolet** - Venture from '99, Malibu from '04 (PK3 +) system, Uplander from '05 HHR & Cobalt from 06. The Aveo has optional PK3 security - very rare. 07 Avalanche, Silverado, Suburban & Tahoe have PK3+C transponder security 06 & up Monte Carlo & Impala have PK3+C transponder security

**GMC** - All Arcadia & the 07 & up Sierra & Yukon have PK3+C transponder security

Hummer - 2008 H2 has PK3+ transponder security

Oldsmobile- Silhouette since '99. Aurora since 2001

**Pontiac** - Bonneville & Gran Prix since 2000, Montana since '99 and all Aztec, G6 from '05, G5 & Torrent from 07, all Solstice, GTO - Australian transponder system & 2 track sidewinder key - On Board programmable system. All G8. 08 Vibe - optional

**Saturn** - all Aura, Relay, Sky & Outlook & the 08 Astra have PK3+ security

GM vehicles equipped with PASSLOCK (not a transponder system - uses a standard key):

Astro & Express vans - since '98, XUV & Canyon & Colorado from '04 (ign switch based)

Buick - Rainier since '04, Skylark since 96

Cadillac -Escalade, ESV & EXT from '99 to 06

Cavalier - Passlock since '96 - since 95 1/2 ib Z24 model  
Impala - Passlock from 2000 to 05  
Malibu - Passlock from '97 to 03, Cobalt & Pontiac Pursuit 2005 only (ign based)  
Monte Carlo - Passlock from 2000 to 05  
Equinox & Express van

Oldsmobile Alero - Passlock since '99 - Acheiva since 96

Pontiac Sunfire - Passlock since 95 1/2 in GT with 4speed auto trans - all Sunfires from 96  
Pontiac Grand AM - Passlock since '96  
Pontiac Torrent SUV - all equipped with Passlock

Saturn L300 - 2004, Saturn Vue 2004, ION from '03 (ignition switch based)

GM passenger cars equipped with PASS-Key II (VATS - resistor based system)

**Buick** - Century from '97 1/2, LeSabre '92 - '99, Regal 94 - 04, Roadmaster & S/W  
'94 - '96, Reatta & Riviera from '90, Park Avenue & Ultra '91 - '96. The 92 & 93  
Roadmaster also equipped with M.A.T.S mechanical security type column

**Cadillac** - Allante '89 - '93, Concours & DeVille '91 - '99, Fleetwood '91 -  
'95, Eldorado '90 - '02, Seville '89 - '97

**Corvette** - VATS equipped from '86 - 04 - keyless since

**Camaro** - VATS equipped from '89 - '02

**Chevrolet** - Caprice & Impala - VATS equipped 95 & 96 & Passlock from 2000 - 06  
Lumina - Sedan & Coupe - VATS equipped 94 - 2000. Lumina van not so equipped  
Monte Carlo was equipped with VATS from '94 - '99 and Passlock from 2000 - 06

**Oldsmobile** Aurora was equipped with VATS from '95 - '99

Oldsmobile Cutlass Supreme '94 - '97, Tornado '90 - '92, 98 Regency '91 - 96

Oldsmobile Regency VATS '98, Olds 88, 88 Royal & LSS VATS '92 - '99

**Pontiac** - Bonneville '92 - '99, Firebird from '88 GTA - the rest from '89 - '02, Grand  
Prix '94 - '96

GM trucks equipped with PASSLOCK: Blazer, Safari van, Equinox, Express van, the  
Pontiac Torrent and and all full size GM trucks and the Chevrolet S-10 have been  
equipped with Passlock from 1998 to the present. All Trailblazers & Envoys, the Buick Rainier,  
Cadillac Escalade SUV, Oldsmobile Bravada, the Chevrolet SSR, Avalanche SUV and  
Colorado pickup - equipped with Passlock to the present. The 07 Escalade has PK3+C  
security.

Since 2001 most GM trucks with automatic transmissions do not have a locking steering  
wheel system

**Hummer** - No transponder security thru 05

**Chrysler** - Texas Instruments system (Sentry Key) with read-write transponder keys.

Cloning - possible with on board computer and the availability of two preprogrammed keys.

New key programming - dealer with proprietary DRB system or after-market Dart scanner if the vehicle's 4 digit PIN code - on the factory invoice and available to dealer - available.

Emergency starting procedure - none

Chrysler vehicles with transponder security generally have a tan or grey key bow AS OF THE 2007 MODEL  
(WITH THE POSSIBLE E  
THE GREY BOW TRANSPON

**Chrysler** passenger cars equipped with Sentry Key as standard equipment:

New Yorker - standard since '99  
Pacifica - tan bow -standard from 04, all Crossfire  
Sebring 2 door - standard since '01, Sebring 4 door standard since 07, convertible 08  
Town & Country & Voyager - tan bow- std from 04  
LHS - standard since '99 300M - standard since '99  
Neon ES - standard since 2000 300 & 300C - standard from 2005  
Aspen - tan bow - all standard PT Cruiser - standard from 06

Sentry Key Optional:

Concorde - *optional* since '98  
Cirrus - *optional* since '99  
Sebring 4 door - *optional* since 2001  
Sebring - convertible optional from '98 - 07 Standard 08  
Town & Country & Voyager - *optional* from 2001 -2003  
PT Cruiser - *optional* from 2001 to 2005, standard since 2006

**Dodge** passenger cars equipped with Sentry Key:

All Charger, Challenger & Avenger - tan bow - standard equipment  
Magnum - tan bow - from '05 standard equipment  
Neon /STR4 - "ES" standard since 2000, optional on others from 05  
Nitro from 2007 - standard  
Stratus 2 door - *optional* '98 - '00, standard from 2001 on  
Stratus 4 door - *optional* since 2001  
Intrepid - *optional* since 98  
Caravan & Grand Caravan - tan bow - *optional* 2001 - 2007, standard 08 models  
Caliber - all standard

**Dodge Trucks** equipped with Sentry Key:

Durango - tan bow -*optional* from 01 -05 standard from 06  
Dakota - tan bow - *optional* from 01 -  
Ram 1500 pickup - *optional* from 2002 - 05, standard from 06 model  
Ram SRT-10 pickup & 09 Journey standard  
Ram Laramie - 15/25/3500 standard

Sprinter - all transponder equipped & have a high security (Mercedes) lock

**Plymouth** - Sentry Key system same as Chrysler & Dodge

Neon ES - standard since 2000

Breeze - *optional* since 99

Voyager - *optional* since 2001-- - tan bow- std from 04

**Ford Motor Company** - PATS 1 & 2 systems by Texas Instruments - cars & some trucks since 1996

PATS 1 system:

Cloning - possible with on board computer and the availability of one preprogrammed key or with Jet Smart Clone equipment.

New key programming - 30 minute procedure with conforming blank transponder key using on board computer.

Emergency starting procedure - none.

Ford passenger cars equipped with PATS 1 - security system:

Taurus w V/6 engine - standard 96 - 97 w PATS 2 from '98

Contour w V/6 - standard from 97 through 02/98 then PATS 2

Mustang '96 - models with 8 & 10 cut locks & all 97s w PATS 2 from '98 on

Expedition 97 & 98

PATS 2 system instituted in 1998:

Key cloning - possible with vehicle's on-board computer and two preprogrammed keys, and with Jet Smart Clone equipment. The Jet cloning machine can copy PATS 1 & 2 fixed value transponder keys

New key programming - possible with NGS tester and software card and with the TCL-1 and T-Code programmer from ASP. This is a \$6000.00 (with all software) hand held unit manufactured by Hickok and available to the after-market. Requires a conforming transponder blank key and access to the vehicles OBD2 plug under the dash. Ten to 15 minute procedure. New key programming which was possible only with dealer's New Generation Star Tester until mid 2003 when \$6000.00 T-Code programmers from the after-market became available. All protocols have a 10 minute access delay and 2 second cycling procedure which requires a correctly cut transponder key to actuate the the lock. MVP, Codeseeker, T-Code or NGS equipment now functional with 10 minute wait and correctly cut blank key.

Emergency starting procedure - none.

**Passenger cars** equipped with PATS 2:

Contour w V/6 - those manufactured since 3/98 - optional  
Mercury Mistique w V/6 - manufactured since 3/98 - optional  
Crown Victoria & Mercury Marquis - from 98 on  
Taurus & Mercury Sable V/6 - optional 98 - 03 - most V/6 have, standard from 04 on  
Mustang - all from 98 - PATS 1 in 97  
T-Bird - all  
Focus - all since 2000\*  
500 - all

Fusion & Flex - all  
Ford GT - all

### **Trucks & SUVs** equipped with PATS 2:

Ranger pickup w V/6 - from 99 - 2004 - The 2005 base model not equipped  
F150 series pickup - from 99 on (HD pickup not equipped)  
Windstar - all from 99  
Expedition & Lincoln Navigator - all from 2000  
Explorer & Mazda Navajo - all from 98  
Sport Trac - all from 98  
Escape - 2001 on  
Excursion - 2000 on  
Freestar, Freestyle & Edge - all  
Freestyle - all  
E series (vans) not equipped with PATS security until 08 when it became optional

Ranger & Mazda pickup - optional 01 - 06 all shipped with trans key, standard from 07

\* (03 Focus models with 2.3L PZEV engine (eighth VIN digit is "Z") use the new CAN system which can only be programmed with a WDS (a dealer only device) or with T-Code with a CAN system update)

**HUMMER** - 03 - 07 H2 - Passlock, 08 H2 PK3 transponder. The 06 - 08 H3 - passlock

**HYUNDAI** - No Hyundai through 2005 was equipped with Transponder security.

The 2007 Accent, Elantra, Entourage, Santa Fe & 08 Tiburon have optional transponder security. The Azera (high security key) & Veracruz (PROX opt) have standard Transponder

**INFINITY** - Megamos and Texas Instruments transponder security systems (NATS). Programming can be carried out by the use of a T-Code or a Consult2 device. A maximum of 5 different transponder keys can be stored in the NATS (Nissan Anti-Theft System) Immobilizer. Cloning possible with Jet Smart Clone equipment. Models equipped with the Tech Package have no ignition key and are serviceable only by dealer.

G20 - Transponder security standard - 2000 - 02  
G35 - standard since 2003 some 05 models have Tech

Package - no ignition lock and remote needed to open doors and start engine  
FX35/FX45 & EX35 - Transponder security standard since 2003 some 05 models have  
Tech Package - no ignition lock and remote needed to open doors and start engine  
I30 & I35 - Transponder security standard from 1999  
M35, M45 & Q45 - Transponder security standard  
M - all 05 are equipped with Tech package - no ignition key - Dealer only programming  
QX4 & QX 45 Transponder security standard from '99/2  
QX56 , I30 & I35- same as Maxima - transponder standard, G37 (PROX) standard

**ISUZU** - Since 2003 the Axiom & Rodeo have had a Megamos transponder based system which must be programmed with a dealer Tech2 diagnostic device. A security code is also required for programming. The vehicle is delivered with a small card "Car Pass" which has the VIN, the mechanical key code and the security code on it. If the card is lost the Immobilizer Control Unit must be replaced and a new security code created with the use of the Tech2 tool. The Control Unit is located behind the dash to the right of the steering column - below the instrument cluster.

The Ascender SUV and the i280 & i350 pickups are equipped with Passlock security (GM)

**JAGUAR** - Megamos & TI systems. The S type is on the same platform as the Lincoln "LS" - all Jaguar models since '91 have high security ignition locks for which keys are available only from a dealer

S-TYPE - from 2003 no cloning & transponder system serviced by dealer only  
S-TYPE - 2000 -02 no cloning but can be programmed with T-Code of NGS if two factory keys are available

X-TYPE - 2002 -03 no cloning & transponder system serviced by dealer only

XJ & XK - from 2000 no cloning & transponder system serviced by dealer only  
98 - 99 - cloning possible with jet EDT-1 or ILCO RW2 dealer only programming  
XK - all equipped 2007 is keyless

**Jeep** - Sentry Key system same as Chrysler & Dodge manufactured by TI

Commandeer - with tan bow all transponder equipped  
Grand Cherokee - *optional* in '98. Standard - tan bow- from '99 to present  
Cherokee - *optional* from '98 to 2001  
Wrangler, Comanche, CJ5, CJ7 & Wagoneer - *optional* from '96 to present  
Liberty - *optional* from '02 to the present but w/tan bow - standard  
Scrambler pickup - transponder security optional

**KIA** - Amanti - High security key & transponder, 07 & up Sedona optional transponder

Canada models of Rio & Rio5, 04 - 06 Sedona, Sorento & Spectra & Sportage from 05  
have transponder security

**LAND ROVER** - Philips transponder system - dealer service only.

Range Rover - '03 - '05 has a high security ignition lock & dealer only Transponder  
Freelander - equipped with transponder security from 03

Discovery & LR2 & LR3 - equipped with transponder security from 03

Range Rover from 2000 - 2002 and the Discovery from 2000 to the present use an engine immobilizer system which is activated by the remote control PLIP key as part of the factory security system. The engine immobilizer system can be de-activated with mechanical key in a door lock. There is no transponder chip in the remote.

Cloning transponder keys - dealer only. A maximum of 5 different Transponder key values can be stored in the ECU memory

No emergency start procedure

**LINCOLN** - PATS 1 & PATS 2 systems from Texas Instruments & Motorola

PATS 1 system:

Cloning of key possible with vehicle's on-board computer and the availability of one preprogrammed, correctly-cut key or Jet Smart Clone equipment.

New key programming - 45 minute procedure with conforming blank transponder key using on board computer. Can also be done in 10 minutes with dealer's N G S Tester.

Emergency starting procedure - none.

PATS 1 equipped vehicles:

- 97 Mark VIII
- 98 Navigator

PATS 2 - can have one of 5 software protocols - PATS reg, PCM, HEC, VIC & SCIL

Cloning - possible with vehicle's on-board computer and the availability of two preprogrammed, correctly cut keys, T-Code or Jet Smart Clone equipment.

New key programming - possible only with dealer's New Generation Star Tester until mid 2003 when \$6000.00 T-Code programmers from the after-market became available. All protocols have a 10 minute access delay and 2 second On-Off cycling procedure which requires a correctly cut transponder key to actuate the lock.

Emergency starting procedure - none

PATS 2 equipped vehicles:

- Town Car - 98 - 02 models have HEC protocol. 2003 models have PCM protocol
- Continental - 98 on with VIC protocol
- Mark series including LT - 98 on with SCIL protocol

LS - 2000 on with VIC protocol  
Blackwood - all have HEC protocol  
Navigator - 98 PATS reg protocol, 2000 - 02 HEC protocol, 2003 PCM protocol  
Aviator - all have PCM protocol systems  
Zephyr, MKX, MKZ - all transponder equipped with CAN protocol

## **MERCURY** - Texas Instruments PATS 1 & 2 transponder systems

### PATS 1

Cloning - possible with on-board computer and the availability of one preprogrammed key or Jet Smart Clone equipment.

New key programming - 45 minute procedure with conforming blank transponder key using on board computer & 1 conforming key (PATS 1). PAYS 2 requires 2 conforming keys for on board programming of a new correctly cut key. Can also be done in 10 minutes with dealer's New Generation Star Tester, MVP, Codeseeker, T-Code or NGS equipment.

Emergency starting procedure - none.

PATS 1 equipped Mercury models:

Mystique '97 - 2/98 with 2.5 V/6 - then PATS 2  
Sable '96 & '97 with 2.5 V/6 & SHO - then PATS 2

PATS 2 transponder security system with PATS & PCM protocol

Cloning - possible with on-board computer and the availability of two preprogrammed keys or T-Code or Jet Smart Clone equipment.

New key programming - possible only with dealer's New Generation Star Tester until mid 2003 when \$6000.00 T-Code programmers from the after-market became available. All protocols have a 10 minute access delay and 2 second cycling procedure which requires a correctly cut transponder key to actuate the the lock. MVP, Codeseeker, T-Code or NGS equipment now functional with 10 minute wait and correctly cut blank key.

Emergency start procedure - none.

PATS 2 equipped Mercury models:

Sable - '96 - '03 V/6 equipped only. All equipped since 04.  
Cougar - all since 99 with PCM protocol  
Grand Marquis - all since 98 with PATS protocol through 2002 - PCM since  
Marauder - all have PCM protocol  
Mountaineer - all since 98 had PATS protocol through 7/24/00 then PCM since  
Mariner - all - CAN protocol  
Mystique - '97 - 02/98 only V/6 equipped - from 3/98 all are equipped  
Montego - all - CAN protocol

Monterey - all - PCM protocol  
Milan - all transponder equipped  
Mystake (same as Contour) - optional from 97 - 2000 common on V/6

**MAZDA** - Megamos and Texas Instruments and B series trucks use PATS 2.

Cloning - possible with on board computer and conforming factory blank with special "codeword" available only to dealer through Mazda's National Hotline. You must have the serial number of the Immobilizer unit to get the codeword from the dealer. The immobilizer module is mounted under the dash above the brake pedal. Jet Smart Clone equipment reportedly can clone factory keys.

Factory keys for the '98 & '99 models can be cloned with after-market equipment.

New key programming - can be done on board using a complex 9 step procedure, a conforming factory transponder key and the code word.

Emergency starting procedure - none.

Mazda vehicles equipped with transponder security:

- 626 - LX & ES *with V/6 engine* - 98 to present - transponder security is standard
- 626 - LX w 4 cylinder engine - 98 to present - transponder security *optional*
- Miata - 2000 to present - all have transponder security as standard equipment
- Mazda 3 & 6 - all have transponder security as standard equipment
- MPV ES model - transponder security standard from 2000
- B series Mazda Cab Plus SE & 4SE trucks from '99 use PATS 2 (Ford) - optional
- Tribute - optional transponder security 01 - 05 , standard equipment from 2006
- Navajo trucks - same as Ford Explorer - PATS transponder security since 96
- Tribute - standard transponder security since 2001
- RX8 - all have transponder security as standard equipment (PROX optional)
- CX7 & CX9 - all have PROX transponder security as standard equipment
- 3, 5 & 6 - all have transponder security as standard equipment (PROX option in 6)

**MERCEDES** - Philips rolling code with High Security key & Smart key D.A.S. system.

1998 and up C & E class Mercedes & 2000 & up S class use an electromagnetic ignition (smartkey) which utilizes insertion of the remote itself instead of a key. The system, which is called D.A.S. (Drive Authorization System), has 8 transponder values predetermined at the factory

Cloning - Dealer only service - with factory order.

New key programing - Dealer only. Operation after replacement of any part of the system requires a special One-Way-Master key be obtained from the factory by VIN.

Emergency starting procedure - none.

All Mercedes vehicles since 1997 have read & write transponder based security. Specific models of the C,E, M & S class are keyless

**MINI COOPER** - All Minis since 2003 equipped with Philips transponder security and high security ignition lock. Dealer only service.

**MITSUBISHI** - Texas Instruments transponder system

Cloning - possible with after-market MUT Tester and model specific PIN code. All Diamante's have the same code, all Galants, etc. The TCL-1 and T-Code programmers are able to clone keys and produce a new key from the ECM but the PIN code is still required.

New key programming - possible with MUT Tester and model specific PIN code.

Emergency starting procedure - possible to start with a conforming regular key and a special Emergency Start Brake Code given to the owner on delivery and available to only the owner from the dealer on presentation of the Immobilizer 8 digit serial number located in one of several places on the vehicle.

Mitsubishi vehicles equipped with transponder system:

Diamante - standard from 2000

Eclipse & Eclipse Spyder - standard from 2000

Endeavor - all have a transponder system

Galant - standard from 2000

Lance & Lancer OZ - optional transponder system Lancer standard in 08

Lancer Evolution - all from 2003 have a transponder system (PROX standard in 08)

Lancer - Ralliart - standard equipment

Montero Sport - standard from 2000

Montero - standard from 2001

Outlander SUV - all have a transponder system (PROX optional)

Raider - transponder standard with remote head key from 06

**NISSAN** - Megamos and Texas Instruments transponder security systems (NATS)

Cloning - only the '99 Maxima could be cloned with after-market equipment but the 2000 and up models can be cloned with a TCL-1 or Jet Smart Clone equipment programmers and the PIN code or with Jet Smart Clone equipment.

New key programming - originally possible only with dealer's "Consult" equipment and NATS software card. Since the 2000 model new keys reportedly can be programmed with the TCL-1 and T-Code programmers and a PIN code which is the same for all US models through 2002 and is identified in the TCL-1 users manual!

Armada - all have transponder security (PROX optional in 08)

Altima - transponder security standard since 2000

Maxima - transponder security standard since 99  
Sentra - *optional* since 2000 on SE 2.0, SE-R & GXE models, standard from 06 all  
Stanza - transponder security *optional* since 2000 on SE 2.0, SE-R & GXE models  
Xterra SUV - transponder security *optional and rare from 02 - 04 optional* since 05  
Frontier pickup - transponder security *optional and rare* since 2002  
Murano SUV - all have transponder security (PROX optional)  
Pathfinder SUV - transponder security standard since 99  
Pathfinder Armada SUV - standard in all  
Quest - standard in all since 2000  
Titan - transponder security optional since 2004  
350Z - transponder security standard  
Roque & Versa - transponder standard with PROX optional

**PORSCHE** - Megamos transponder system with high security internal 2 track key. A supplied wallet key is equipped with a transponder.

No cloning - keys only available through dealer by VIN - dealer only service with PIN code 911 & 912:- standard since 99 Boxter & Cayenne - standard on all

**SAAB** - Megamos with high security console-mounted lock.

Some keys from early models could be cloned with dealer equipment (Tech 2 with Saab software cartridge) and the availability of an already programmed key.

The ECM can hold up to 4 registered keys but must be replaced ( \$800.00) when all four slots are full or no keys are available.

A Saab dealer can obtain replacement keys (high security) from the factory by submitting a specific VIN to the factory cutting center. A key blank cut to the correct specifications for the VIN is furnished to a dealer without the transponder-containing section of its 2-piece head. A dealer can supply and program a blank transponder to the vehicle's ECU with proprietary Tech 2 equipment.

New key programming - possible only with a TECH 2 device after replacement of the car's Twice Module (\$795.00).

Emergency starting procedure - none.

Models with transponder security:

All 9-3 & 9-5 Saabs since '99.

The 2005 92X, a re-badged Subaru Impreza, is not equipped with with transponder security

**SCION** - TC is the only model with transponder security - standard in this model since 05

## **SUBARU** - No Subaru equipped with transponder security through 2004

2005 Impreza - WRX & STi have transponders since 06 - all have in 08  
2005 Outback - 2.5Xt & 3.0R have transponder security - all have from 07  
2005 Forrester - 2.5 XT (only) standard transponder - all have in 09  
2005 Legacy - 2.5GT/LTD - standard transponder - all have from 06  
B9 Tribeca & Tribeca - from 2006 has transponder security standard

## **SUZUKI**

Forenza - optional Daewoo transponder system - rare . Dealer only for key blanks  
2007 Grand Vitara - smart pass system optional - not a transponder  
2007 XL7 - PK3+C transponder security standard

**TOYOTA & LEXUS** - Texas Instruments system built into the main engine control unit (ECU) until 2003 models when it became a separate unit. This is a closed system which is accessible only with a master key for the specific vehicle. The ECU can hold up to 7 master & 3 valet keys but if no registered master key is available the ECU must be replaced - \$1000 to \$1500 without keys + \$800 in labor & keys. Toyota & Lexus will supply a new ECU (once) for an original owner who has lost keys but will not absorb the \$800 labor & key cost. Locksmith equipment to reflash proms is available and now able to perform through the OBD II interface.

Cloning - onboard capability with a master key required and an elaborate procedure involving the brake and gas pedals.

New key programming - dealer only. Models prior to 2001 require replacement of the ECU. Models with V/8 engines from 2001 up can be programmed by dealer using two proprietary computer units.

Neff's Safe Lock & Security, 1039 Christian Street, Lancaster, PA 17602 (800-860-5225) reportedly has the ability to reprogram '98 - 2000 Toyota & Lexus ECM's and offers overnight service and instructions for programming blanks he provides if a door lock is submitted along with your ECM. An article by Bill Neff explaining the specifics of ECU programming was published in the 7/04 Locksmith Ledger magazine.

In October of 2001, Platinum, an automotive electronics company at 1616 McDonald Avenue, Brooklyn, New York 11230 released a device that reportedly can reprogram a Lexus ECU to accept new keys like a replacement ECU - 718-339-0099.

National Auto Lock, 142 Hazelwood Drive, South San Francisco, CA 94080, 800-860-5454 indicate that they are able to reprogram the Lexus ECM.

## **T-Code Programs** - Lexus And Toyota

As of 4/04 ASP's T-Code has the ability to program all Lexus and Toyota vehicles that formerly required the Toyota scan tool to add or originate keys.

All vehicles using a 32-bit processor with immobilizer circuit built in the ECU and the newer systems that utilize the separate immobilizer ECU can be reset on all models and keys added where available. Remote programming and wireless programming are included for many models (see application chart).

All functions are done through the OBD-II Port so you don't need to remove any modules. Absolutely NO PassCode, PinCode or SeedCode is needed on any model with this software

Note some 1998-2003 models that are on the older system use a 16-bit processor which can't be reset with the T-Code or Toyota dealer tool. You will still need to have a good EPROM reflasher to service these models. This program became available March 1/04 for the locksmith price of \$975.

Emergency starting procedure - none.

It would be prudent to obtain the keys on all theft claims involving optional Immobilizer availability as on rare occasions 4-cylinder models have been found to be equipped with an Immobilizer system - contrary to published specifications.

Toyota vehicles equipped with transponder system:

- Corolla - from 2005 standard equipment - not even option in prior years
- Avalon - *optional* since 98 standard equipment since 05 with (PROX optional)
- Avalon Ltd - keyless system for entry only - transponder from 05
- MR2 - all equipped with transponder security since 2000
- Highlander 2001 - 07 optional - became standard equipment in 08 (PROX optional )
- Prius - all equipped with transponder security since 2001
- 4Runner - *optional* from 1999 - 2002 - standard equipment since 2003 model
- Land Cruiser - all have transponder security since 98 model (PROX optional in 08)
- RAV4 - optional transponder security from 2000 very rare - standard from 07 on Ltd
- Sequoia - all equipped with transponder security since 2001
- Sienna - *optional* from 98 - 03 - standard equipment from 04 model on
- Solara - *optional* from '99 - 06 - Standard equipment from 07 model on
- Camry - 98 optl on V/6 models 1/03 became opt on 4 cyl - 07 standard on all
- Matrix - from 2005 standard equipment on all
- Tacoma pickup - 2005 Transponder system became optional & remains so
- Yaris - transponder security optional
- Tundra - no transponder system available thru 06 - became standard in 07
- FJ Cruiser - standard in 08

Lexus - vehicles equipped with Transponder security:

- ES300 - standard from 98
- ES330 - standard from '04
- ES 350 all equipped
- GS300, GS 350, GS400 - standard from 01
- GS430 - standard from 2001
- GX470 - 2003 standard
- GS450h - standard with PROX
- GS460 standard

All IS models equipped with transponder security  
LS400 - standard from 97  
LX470 & 570- standard  
RX300 - standard since 99  
SC300 & 400 - all since 98  
2007 ES, GS,IS,LS - Keyless security  
LS430 - standard from 2001 PROX optional  
LS 460/600 - standard with PROX option  
RX330, 350 & 400h - all standard  
SC430 - all since 2002

**VOLVO** - Megamos rolling code system.

All models equipped with transponder security since '99 - none previously.  
Cloning - dealer only with factory key blank and a VIN-specific PIN code.  
New key programming - dealer only with factory key blank and VIN-specific PIN code.  
Emergency starting procedure - none.

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Transponder Overview has been prepared and updated as of 4/12/09 by Edward D McCabe from the best available reference material and data identified through ISB investigations. The material is thought to be accurate, but is subject to change as idiosyncrasies are identified and new equipment released. Please report any discrepancies or questions to edmcabec@cox.net or 401 233-8126.

We recommend that all keys for a vehicle be obtained from owners of vehicles involved in theft claims for use in testing and positive identification of transponder systems, and that claims be evaluated on all available evidence - not solely on the presence of a transponder system. As in any investigation, motive is the main factor and is an essential element of any defense.

Edward D. McCabe

References:  
AutoSmart 2002 & 2003 & 2005 & 2008 manuals  
Guide to Transponders 2003 - Hyde  
Locksmith Ledger  
National Locksmith  
ISB reference library