

AMTS module is a system specially designed for manual transmission cars. It can also be used on automatic transmission cars just as a remote starter. It allows you to remote start your vehicle and runs the engine for a preset period of time. In the same time the system will ensure that the car is not in gear prior starting the engine.

AMTS module consists in two major subsystems: **NEUTRAL SAFETY** (for manual transmission cars) and **REMOTE STARTER**.

NEUTRAL SAFETY function is designed for ensure that the car will not start the engine as long the gear box is engaged. It does that by reading some signals from the car and following a strict procedure executed by the driver before living the car. It works as it's following:

- A. The driver is inside the car, the engine is running, the gear box lever is in neutral position, all the doors are closed, brake pedal is released, hand brake lever is down.
- B. Engage the brake pedal.
- C. While brake pedal is still engaged pull the hand brake lever.
- D. Release the brake pedal.
- E. Press the REMOTE START button on your remote control.

If the above procedure was executed correctly, the LIGHT OUPUT of the module will become active for 3 seconds. If the lights do not lit, you must repeat the procedure from point **B**.

- F. Now you can remove the key from the ignition switch and the engine must continue to run.
- G. After you get down from vehicle and close the door, the engine will stop. **AMTS** module is ready for your REMOTE START command.

If you open the door after you executed the procedure but the engine is not running, the procedure will be reset and no REMOTE START command will be executed until you do all the sequence again.

REMOTE STARTER function is able to start the engine only if **NEUTRAL SAFETY** function allows it (the procedure was executed correctly). For STARTER RELEASE it has two modes of operation: one is based on RPM (TACHO) reading the other one is based on VOLTAGE reading. The user can select witch mode will be operating using VALET button or using the dedicated **PC software** via communication cable. On both modes it will try to start the engine for three times. When RPM (TACHO) mode is selected, it is a must to "learn" the module with the idle RPM after the module installation on the car.

TECHNICAL SPECIFICATIONS

POWER SUPPLY:		max. +20VDC
CURRENT CONSUMPTION (without relays):	Operating (LED on)	7mA
	Sleep (LED on):	4mA
	One relay:	55mA +/- 10%
RELAY CONTACT RATED CARRYING CURRENT:	at 14VDC	20A
	at 30VDC	15A
REVERSE POLARITY PROTECTION on POWER SUPPLY		yes
MAXIMUM VOLTAGE on INPUTS (except RPM input)		20VDC
MAXIMUM VOLTAGE ON RPM INPUT:		800VDC
RPM (Tacho) LIMITS:		200 – 10000RPM
COMMUNICATION PORT		
SIGNALS LEVEL on Rx and Tx PINS:		3.3V
SPEED		57600 baud 8N1
EXTERNAL POWER SUPPLY:		4VDC-20VDC/min.10Ma

USER SETTABLE PARAMETERS

	Limits	Default setting
RPM	200-10000RPM	x
Adjust voltage level	up/down step: 32.25mV	0.387 V
Delay to crank time	01-99 s	02s
Maximum Cranking time	(01-99) *1/10s	40 * 1/10s
Wait before accessory time	01-99s	10s
Output pulse active time	1-9 s	5s

No. of output pulse	1-9	1
RUNNING TIME	01-99min	20min
Parking light mode	continuous/pulse	continuous
RS active Parking light pulses number	1-9	3
On and Off time for parking light pulse	(01s-99)*1/10s	8*1/10s

CONNECTORS DESCRIPTION

There are three connectors on AMTS module:

- **12 pin** connector = inputs or outputs for small signals named **CON1**
- **4 pin** connector for communication named **CON2**
- **6 pin** connector 20A inputs and outputs named **CON3**

CON1 -12pin connector

PIN NUMBER	FUNCTION	COLOUR
1	not connected	-
2	GROUND	BLACK
3	PULSE OUTPUT(-)	WHITE/BLUE
4	HAND BRAKE INPUT (-)	GREEN
5	SHUT DOWN (-) INPUT	BLUE/WHITE
6	START INPUT (-)	BLUE
7	KEY ENABLE OUTPUT (-)	ORANGE
8	DOOR SWITCH INPUT (-)	YELLOW
9	DOOR SWITCH INPUT(+)	WHITE/ORANGE
10	FOOTBRAKE INPUT (+)	WHITE/BROWN
11	IGNITION INPUT (+)	WHITE/GREEN
12	RPM SIGNAL INPUT	GREY

CON2 -4pin connector

PIN NUMBER	FUNCTION	COLOUR
1	+5VCC POWER SUPPLY INPUT	RED
2	Rx INPUT	BLUE
3	Tx OUTPUT	GREEN
4	GROUND	BLACK

CON3 -6pin 20Aconnector

PIN NUMBER	FUNCTION	COLOUR
1	+12Vdc PERMANENT 20A FUSED POWER SUPPLY INPUT	RED
2	+12Vdc PERMANENT 20A FUSED POWER SUPPLY INPUT	RED
3	IGNITION OUT NO 20A RELAY	BLUE
4	ACCESORY or IGNITION2 OUT NO 20A RELAY	GREEN
5	PARKING LIGHTS OUT NO 20A RELAY	BROWN
6	STARTER OUTPUT NO 20A RELAY	ORANGE

WARNING!

- **NO** is Normal Open CONTACT from on-board RELAY
- **+12VDC PERMANENT** means that the voltage ALWAYS MUST BE PRESENT
- The two main RED wires (CON3 pin1and pin2) are connected together inside the **AMTS** module. That`s way you must connect them on the same point on +12Vdc permanent. **Do not connect them on different points on the car!**
- Ground wire (CON1 pin2) must be connected on a strong ground on the car.
- All relays have common pin of their contacts internally connected to +12Vdc. So if you need a negative output, you have to put another relay which will be controlled by the on-board relay (the coil of the external relay will be connected between the **AMTS** output and GROUND).
- You must use external relay if you need to control loads which drawn more than 20A. When you check how much current you need make sure your accessory are on. Eg. air conditioner or defroster.

Wire description:

Con1 pin2: GROUND must be connected to a solid ground on the car.

Con1 pin3: PULSE OUTPUT (-) has an open collector transistor which can supply max.100mA.

It does not have a protection diode, so if you use it for controlling a relay you must be sure you connect a diode on the relay coil (respecting the polarity of the diode). PULSE OUTPUT became active (it has GROUND on it) after the engine was remote started and ACCESORY (IGNITION2) OUTPUT is active (about 4s). It is used to set on the defroster or air conditioner on cars that has a push button for controlling those. It is possible to set via **AMTS PC software** the number of pulses (1-9) and the length of pulse (1-9s).

Con1 pin4: HAND BRAKE INPUT (-) must have a ground when the hand brake lever is engaged.

Con1 pin5: SHUT DOWN INPUT (-) is an optional input which will not allow the engine to be remote started when it has a ground on it. It can be connected to a negative output of the alarm system which become active when the alarm is triggered or to an external switch to bypass the **AMTS** module when remote start is not needed. If it is not used, do not connect it.

Con1 pin6: START INPUT (-) must be connected to a negative output of the remote control receiver on the car on an auxiliary output. When you press the AUX button on your remote control his input must have a ground on it at least 200ms; it is also mandatory that ground must disappear after the remote control button has been released. Its function is to send start/stop command to the **AMTS** module.

Con1 pin7: KEY ENABLE OUTPUT (-) has an open collector transistor which can supply max.100mA.

It does not have a protection diode, so if you use it for controlling a relay you must be sure you connect a diode on the relay coil (respecting the polarity of the diode). KEY ENABLE OUTPUT is active (it has GROUND on it) when you send remote start command and the engine is ready to start. It become active 0.5s prior engine starting procedure is enabled and its function is to bypass the alarm system (if available) and to enable the RFID chip for car authentication. It stays active until the remote start procedure is off (by the user; running time has expired; the engine could not be started after 3 tries; etc.).

Con1 pin8: DOOR SWITCH INPUT (-) must be connected to the door pin switch only if you have a solid ground on it when you open the door. Let this wire unconnected and connect Con1 pin9 if you have +12Vdc on the switch when the door is open. **Never connect both wires!** (Con1 pin8 and Con1 pin9)

Con1 pin9: DOOR SWITCH INPUT (+) must be connected to the door pin switch only if you have a +12Vdc on it when you open the door. Let this wire unconnected and connect Con1 pin8 if you have ground (voltage < 0.3V) on the switch when the door is open. **Never connect both wires!** (Con1 pin8 and Con1 pin9)

Con1 pin10: FOOTBRAKE SWITCH INPUT (+) must be connected to the footbrake pedal switch. When the pedal is pressed you must have +12Vdc on this wire.

Con1 pin11: IGNITION INPUT (+) must be connected to the ignition wire. When the key is in the ignition position you must have +12Vdc on this wire.

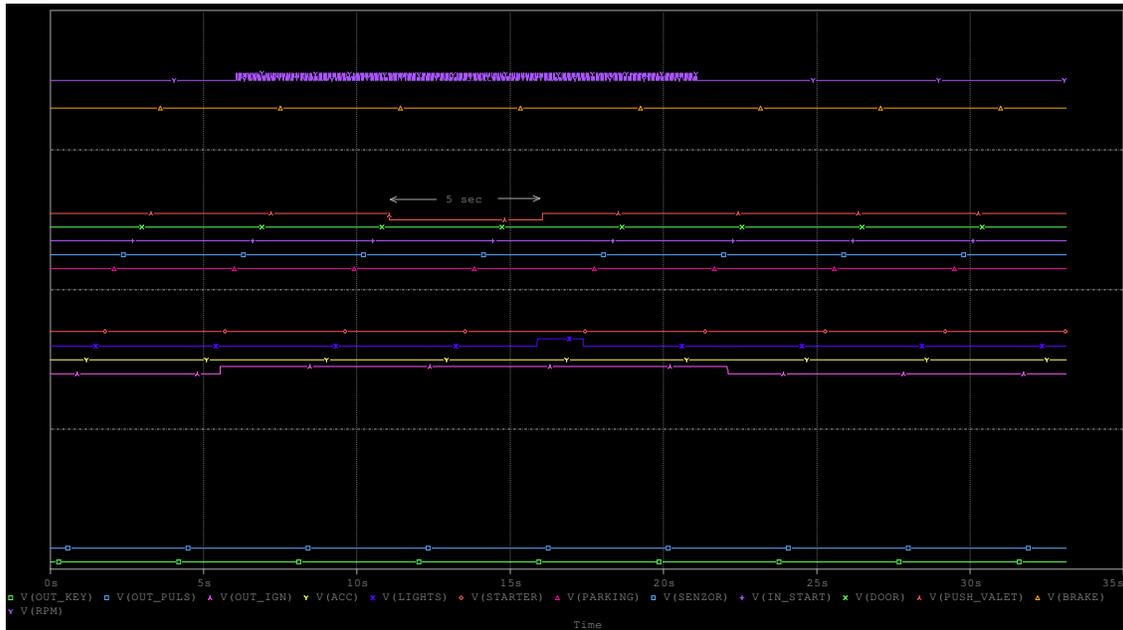
Con1 pin12: RPM (TACHO) INPUT must be connected to the RPM signal wire only if you use **AMTS** module in RPM mode. Let this wire unconnected if you set Voltage mode. It is possible to connect this wire directly on the injector of the car, but after this you must check the learned RPM using **AMTS PC software** and to be sure the RPM what was learned is real. (On some cars the signal on injector is much bigger than real RPM. Check another signal or switch to Voltage mode if this is the case. Do not use RPM mode if the value of RPM learned read by the **AMTS PC software** has big difference beside of RPM read by the car indicator!)

Con2 is used to connect **AMTS** module to the PC using a dedicated interface. **AMTS PC software** allows you to change the preprogrammed settings according to the car specific.

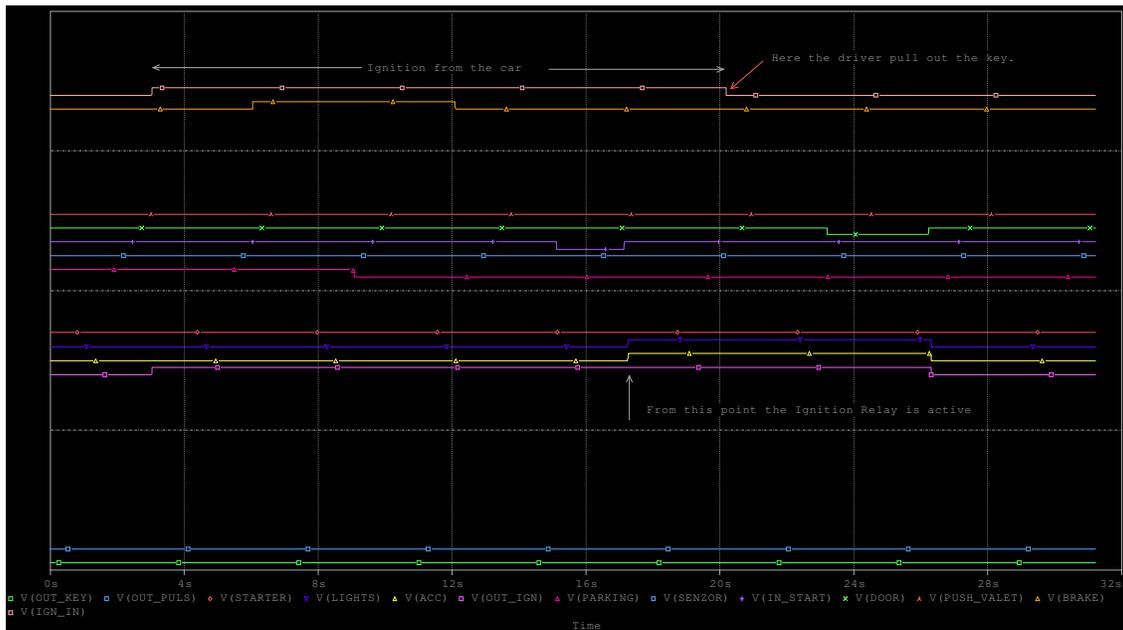
It also allows you to upgrade the firmware to a new revision via embedded bootloader.

Con3 is the max.20A outputs which command all the power modules on the car for remote start. Be aware of the fact that all the relays can drive a maximum load of 20A and all the relays have common pin internally connected to +12Vdc. Use external relays if you need to control bigger loads or the loads have negative input.

LEARNING NEW RPM GRAPH



PROCEDURE WITH ENSURE NEUTRAL SAFETY



REMOTE START THE ENGINE.

RPM learned = 800/min, cranking time = 4sec., running time = 2min., delay to crank = 2sec. First try RPM = 300/min; it cranks for twice cranking time 8sec. Second try RPM = 600/min, the starter stops but after 20sec RPM = 0. Third try RPM = 800/min and the engine is running for 2 min.

