REGITAR USA MOBILETRON

VR-COM02

VOLTAGE REGULATOR TESTER MANUAL

Applicable to the Voltage regulator test for
LIN Type, BSS Type, RVC Type

English
Español
Chinese

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1. The purpose of product design

1.1 Automatic identification in COM products:

Currently, different alternators with Voltage Regulator are made by various manufacturers and there are also even more different communication instruction IDs, different baud rates existing. The main design consideration for developing this tester is making sure customers would correctly install Voltage Regulator on the alternator.

1.2 Multi-function selection:

In addition to the main COM products, FORD RVC products can also work with this tester.

1.3 Variety of test options:

Variety of test options: The COM02 needs a power supply connected to the IG & GND terminal.. The tester will test and identify a regulator at the component level. It will also test the regulator when installed in the alternator on a generator/alternator load test bench.

1.4 Ease of use:

a. The test results are displayed directly on the LCD screen which is easier for users to read the information.

b. Software is updated via USB download file to facilitate the user operation

2. The description of product application function

2.1 Choose to test RVC or COM series products via SW1.

2.2 For COM series products, the tester automatically determines the COM TYPE of products.

2.3 Five different V settings (COM) and RC Duty (RVC) are available for manual test.

2.4 The tester works with the generator test machine to perform the manual or automatic test:

a. RVC products determine the C in signal according to the test machine, and then RC out point sends the square wave duty.

b. The tester automatically determines the COM type then performs automatic testing.

c. If the COM Type is known, then choose it on the tester to perform a manual or machine automatic test.

2.5 Test results can be displayed on the LCD screen, such as duty, VB voltage, factory code, Error code.

2.6 USB can be applied for software update settings.

3. Setting instructions of product function

3.1 Product appearance outline:

3.2 Panel switch operation:

a. **SW1:** Use SW1 to choose testing RVC or COM product.

b. **SW2:** Five different voltage setting are available to select by continuously pressing SW2 button.

- **RVC RC out% setting:** only available when C in has no square wave input and = Hi, initial value = 65%.
  Built-in 20%, 35%, 50%, 65%, 80% 5 square wave signal (Freq. = 125Hz).
  Continuously press this button will change the duty% as 1)65% - 2)50% - 3)35% - 4)20% - 5)85% - 6)65% ----.

- **COM V setting:** SW2 will be unavailable if apply auto identification of COM type. The initial value is 14.5V.
  Built-in, 11.5V, 12.5V, 13.5V, 14.5V and 15.5V write commands.
  Continuously press this button will change the V set as 1)15.5V - 2) 11.5V - 3) 12.5V - 4) 13.5V - 5) 14.5V - 6) 15.5V -
- Manually press SW2 to 14.5V or restart the tester to restore the initial value.

c. **SW3:** Select Find or Ready to test.

- **Find:** Find mode must be selected when COM Type of the product is unknown to allow the tester perform the COM Type detection test. After the COM type is identified then the tester will perform two things as below.
  -) Will display COM Type of the product and related test information on the LCD screen.
  -) Will memorize the signal group corresponding to this COM type to the EEPROM, the test box will send the corresponding signal group in memory mode and there is no need to re-search for identification. V setting can be changed via SW2.
- **Ready:** Select Ready mode when COM Type of the product is known. SW4 can be used to select the product signal group, so that the tester directly starts testing.
- Confirming by the above method, SW2 must not be used to change the setting of voltage under automatic generator test to avoid the difference between the test values. It will cause the test result to fail.

d. **SW4:** When Ready mode is selected via SW3, an appropriate COM Type signal group could be selected via SW4 for testing.

- Group A signal: BSS signal group, including Write and Read command signal transmission.
- Group B signal: LIN1.3 (Write ID = 29) signal group, including 9600bit / 19200bit / s Write and multiple Read signal are sent by COM terminal.
- Group C signal: LIN2.0 (Write ID = 29) signal group, including 9600bit / 19200bit / s Write and multiple Read signal are sent by COM terminal.
- Group D: LIN1.3 (Write ID = 20) signal group, including 9600bit / 19200bit / s Write and multiple Read signal are sent by COM terminal.
- Group E: LIN1.3 (Special V set) signal group, including 9600bit / 19200bit / s Write and multiple Read signal are sent by COM terminal. (V set data bit7~bit0)
- Group F: LIN2.0 (Special V set) signal group, including 9600bit / 19200bit / s Write and multiple Read signal are sent by COM terminal. (V set data bit7~bit0)

- Signal group in SW4 is selected by pressing and it repeats as A - B - C - D - E - F - A - B ----.

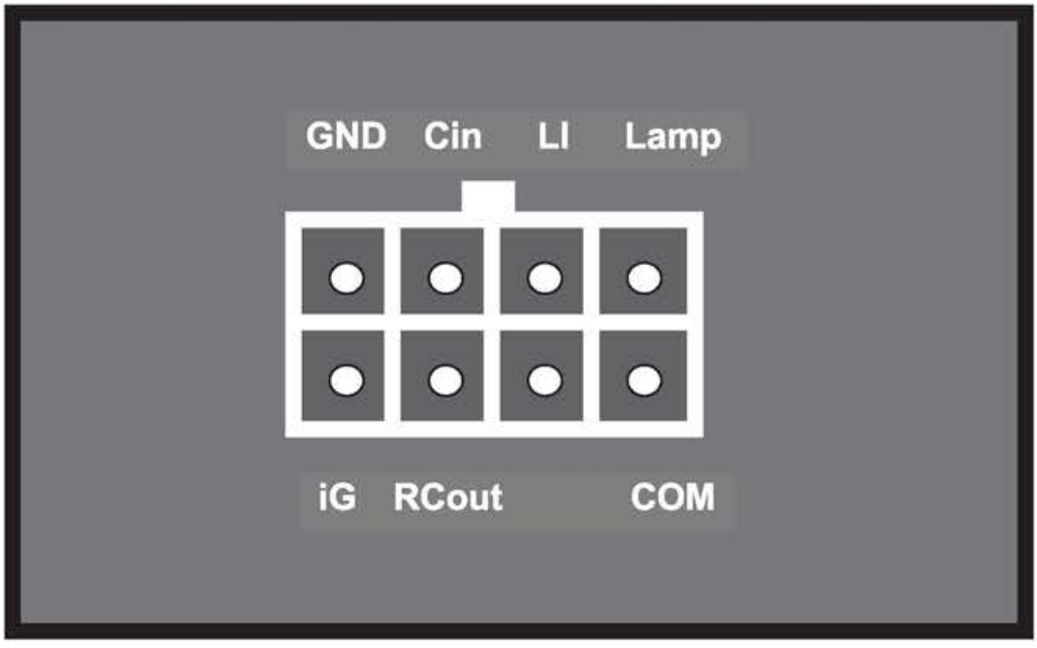
e. **RESET SW :**

- Power reset: When the tester has a crash or abnormal situation during testing, press this switch to restart.
- Program update: When the program file is into the USB slot, hold the SW2 and then press again SW2 to start the program updates.

4. Connector description

No.	Terminal	Volts	Function	External wiring
1	IG	8~20V	Power supply (+) input	Yellow
2	GND	0V	Power supply (-) input	Black
3	RCout	12V	Tester RVC signal output; square wave (125Hz) / 12V	Brown
4				
5	Cin	8~16V	Control signal input: Hi / Low (12V) or 125Hz square wave	White
6	LI	12V	RVC Field out duty monitor input	Blue
7	COM	8~16V	COM signal transmission: according to BSS / LIN communication protocol	Green
8	LAMP		Errors monitor indication.	Red

Connection diagram:



: Please refer to Figure 1 for the wire group

5. RVC product test settings:

This tester is designed for FORD RVC models, GM RVC, Denso PWM, Mitsubishi PWM can only test RVC function. The original traditional point C only has Hi / Low models, does not apply to this tester.

The input signal must be determined before performing the change on Duty (V setting). The priority of the C Terminal input signal and RC out as follows:

5.1 When input a 2Hz ~ 500Hz square wave signal, RC output depends on the input square wave signal.

5.2 When input voltage is Hi or Low, RC out performs a built-in 65% output at point C, and function of SW2 is available. RC out will change the output Duty by pressing SW2.

SW2 Number of presses	Default	1	2	3	4	5	6
RC out duty%	65%	80%	20%	35%	50%	65%	80%

Cycle changes as above.

5.3 When C is Low, RC out locks 20% of the output.

5.4 In the test, RC out duty, VB, LI (output Duty) will be displayed on the LCD screen.

5.5 R-COM02 does not connect the LI endpoint to the D & V FB endpoint.

6. COM product test settings:

The current communication protocol is divided into BSS and LIN

6.1 Before starting identifying COM type, test conditions must be set up to facilitate COM Type judgment.

a. VB <V setting, V setting initial setting at 14.5V, so VB must be <14.5V.

b. The speed of Ps must be set at normal operation condition. For example, if the minimum setting of the product is 800rpm, that is about 80Hz or higher, so the speed or frequency of Ps must be set to> 800rpm or> 80Hz. In order to correctly determine the COM Type, it can be set between 1200rpm and 3000rpm (120Hz ~ 300Hz). Dual Ps models can use VRT-10 to install the product and tester for testing.

c. Field current in principle does not require the analog load under static test while it varies by model. Some models will have Error code warning without the analog load. If apply the resistance to simulate the analog excitation coil, the resistance value is too low, the current will be relatively large. Watts reading must be guaranteed large enough to prevent the resistance from overheat burning.

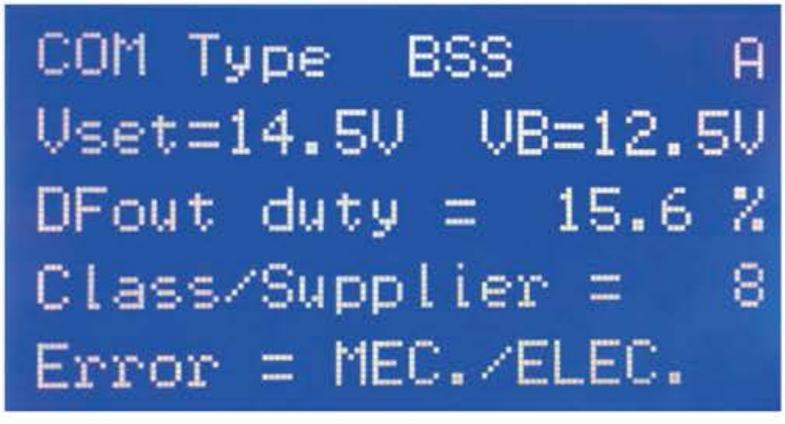
6.2 BSS is divided into BSS1, BSS2, BSS3 three types of products according to industry standards.

BSS1 = only detect the electrical aspects of the Error code;

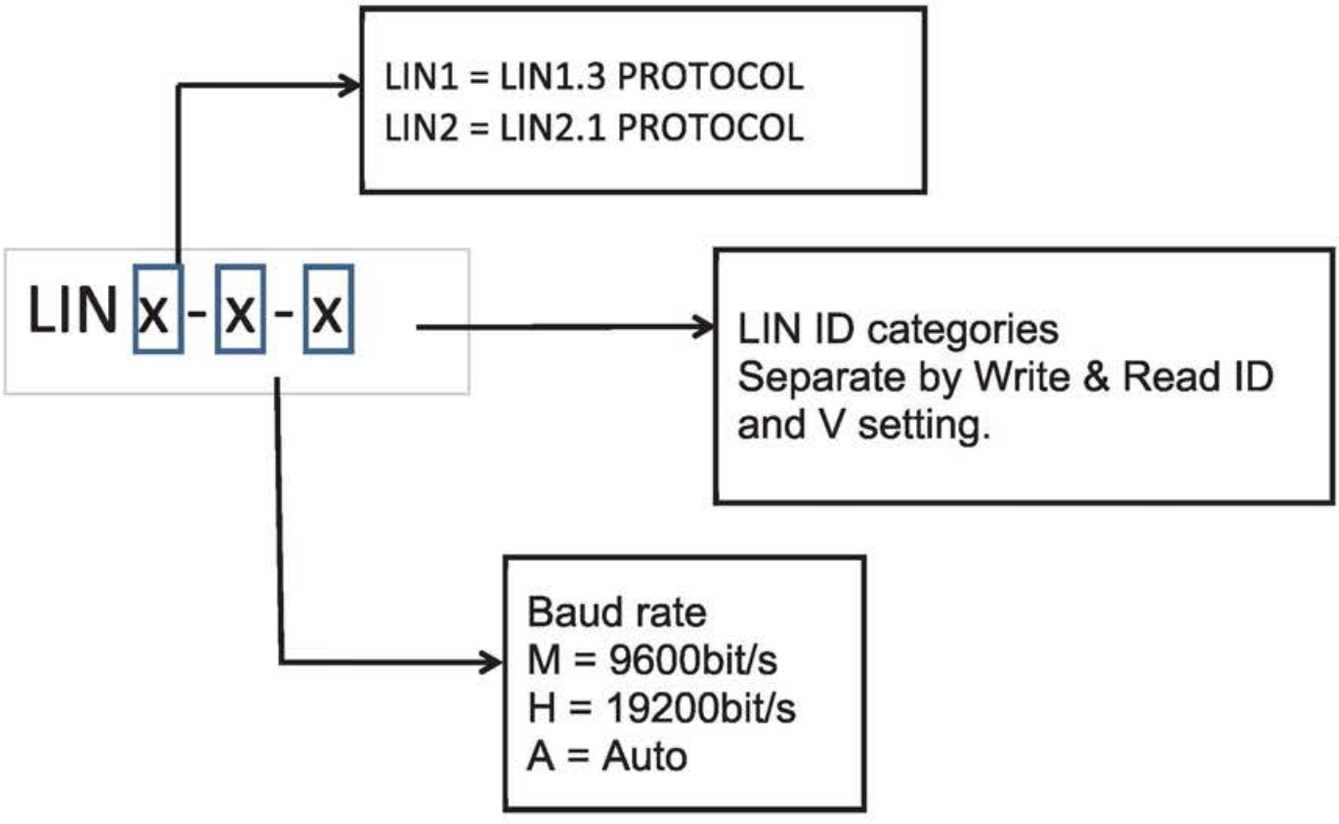
BSS2 = only detect the mechanical error code

BSS3 = Detect bot electrical and mechanical error code.

Our tester does not distinguish between categories, and directly display Error code items, such as MEC. Mechanical) or ELEC. (Electrical)



6.3 According to different baud rate, checksum, ID, LIN is divided into LIN1 and LIN2 product type.



6.4 Test Action Description:

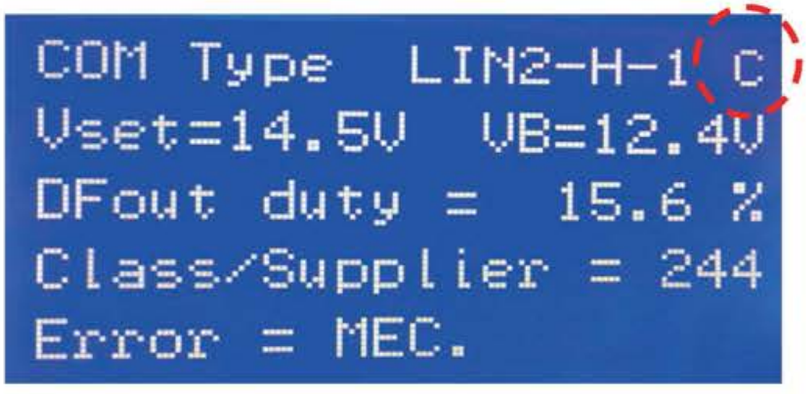
a. When testing a regulator that is unknown but believed to be a COM type (BSS or LIN) connect the regulator to the COM02 box. The COM02 when in this mode will first send a BSS signal, after receiving the signal the 2 way communication will confirm if the part is a BSS type regulator. If not then the COM02 will send out a LIN 1.3 signal the test sequence will continue until the correct test signal is completed. If the COM type product cannot be identified the COM02 box will display the word "None" on the screen.

b. When COM type is identified, the form, packet rate and category of LIN will be displayed on the LCD screen, also related information such as VB, F out duty, Supplier code, and Error code.

c. When Com type is known, switch to Ready mode via SW3, and then select the signal group via SW4. The tester will directly send regarding selected signal group for testing. The related information will also be displayed on the LCD screen.

d. If COM Type is identified by the tester or SW3 is changed to Ready mode, you can use SW2 to change the V set.

e. When the test is completed, the applied group of signals will be displayed in the upper right corner of the screen, such as "C" like below figure shown.

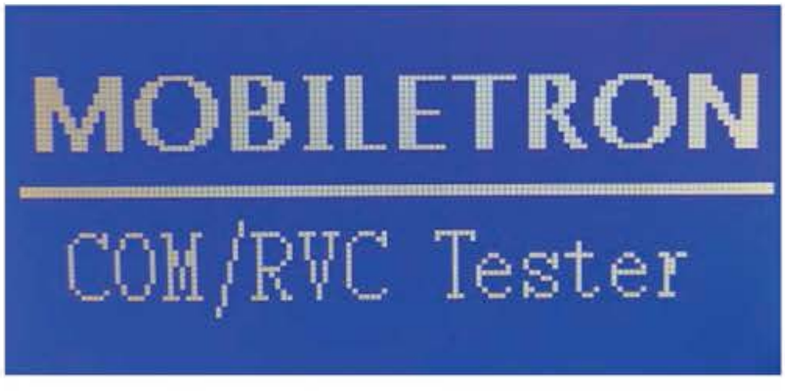


6.5 If test a different Type of product with a memory judgment in the tester, just connect the product wiring, turn on the power and start the test. There is no other action is required even if this is a new COM Type product. The tester will directly re-test to determine the COM Type.

7. Work Instruction :

Before power on the tester, please confirm the product to be tested is RVC or COM via SW1, and then start the test.

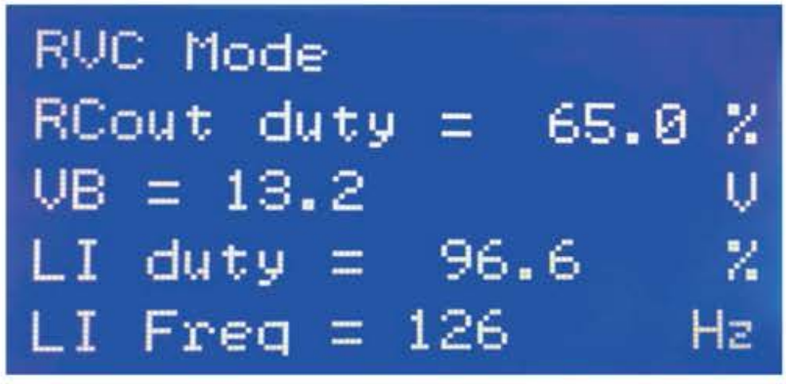
7.1 Power on, LCD shows as below.



After 1 second it will show selecting SW1 (RVC or COM) test interface.

7.2 Select RVC:

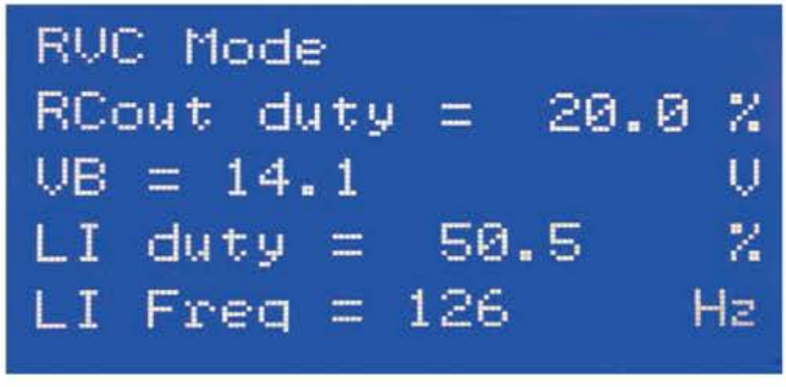
a. Start RVC initial interface:



Note : Built-in standard 12V square wave (Freq. = 125Hz) output.

b. Manual test on ALT-98 tester
Turn on the power after connection, the Hi initial setting of C terminal signal is 65%.

c. Press SW to change Duty %(20% ,35% ,50% ,65% ,80%) during manual test. Test result (example) :

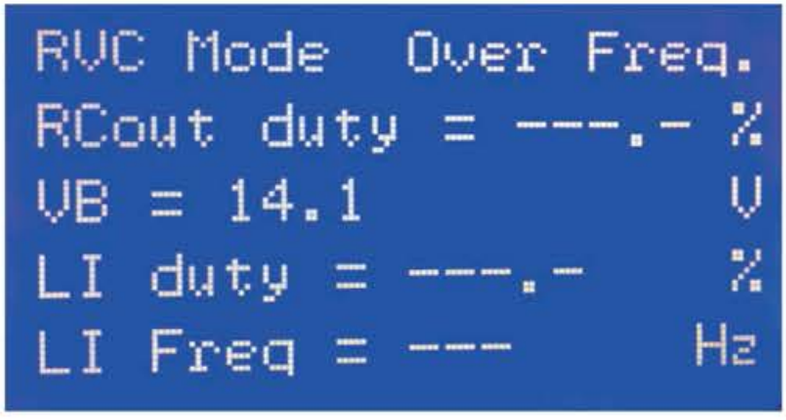


d. Application on the ALT98 load bench for automatic testing.
Add C point Hi / Low function. At the beginning of the test, point C is maintained at Hi. The tester RC out point will send a square wave signal duty = 65% 125Hz. If point C is switched to low, the RC out point will send out the duty = 20% 125Hz square wave signal. This function won't work if RC square wave frequency is not 125HZ. If RC signal is 7.5HZ then a dedicated test harness is required.(Shown in figure 2)

e. RVC's products need to be fitted with external test leads or Ford RVC plug test leads [please refer to Figures 3 and 4]

f. Apply VRT-10 for automatic testing
VRT10 will provide RC signal during the testing, RC out will be based on tester RC signal then output the same Duty square wave signal.

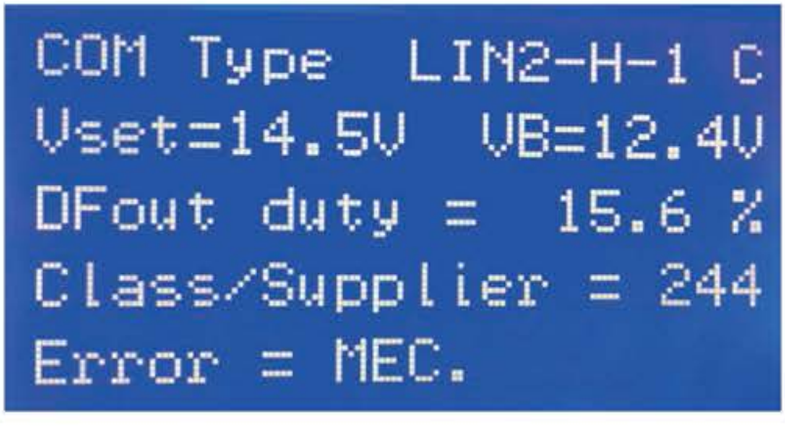
g. When the Cin input square wave frequency is out of the judgmental range (> = 500Hz), "Over Freq." will be displayed after the display RVC Mode. The RCout then stops outputting the square wave.
Illustration:



h. If the square wave frequency of the Cin input is <2Hz (T = 1S), it will only check Hi / Low corresponding 65% / 20% RCout output. (PS: If any abnormal conditions occur during the test, RCout = 1S 65% → → 1S 20% will repeat output). Theoretically the Cin signal cannot be lower than 2Hz.

7.3 COM test

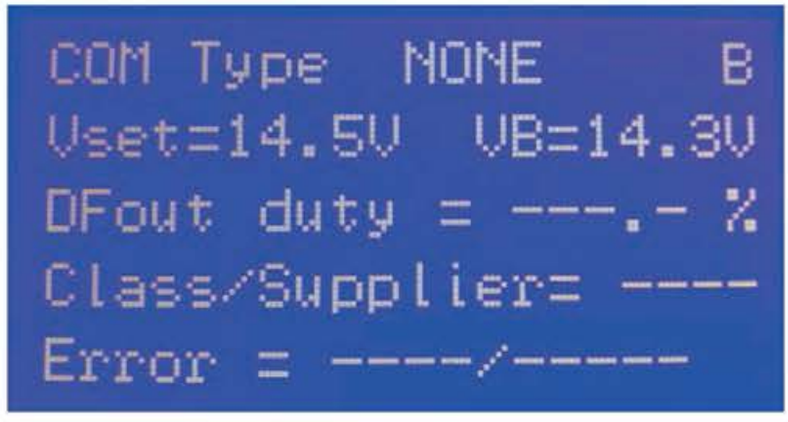
a. Start COM initial interface:



Receive information from the VR, its purpose is to determine the COM Type and interpret data corresponding to the information F out duty, V setting, VB voltage, etc, and displayed on the screen.

b. When the power is on, the tester will send out the COM signal for COM Type judgment during manual test.

- Message judgment process: After the BSS signal is sent then receives the feedback data from regulator, the tester will immediately compare and determine whether the product is BSS Type. If it is not BSS then immediately send LIN1.3 signal to compare again and so on until all the signals Transmission is completed. Otherwise the screen COM Type will show "NONE".



None indicates this product specification has not yet been included in the tester yet.

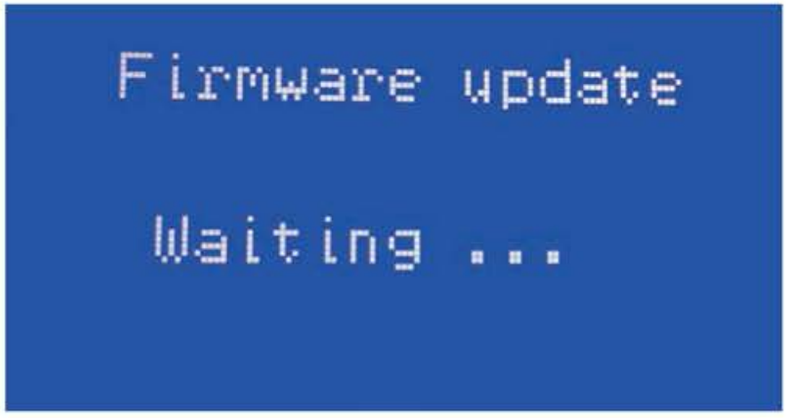
c. Switch V setting via SW2 during manual test, the first press V set = 15.5V, the second press V set = 12.5V --- the fifth press V set = 15.0V, the sixth V set = 15.5V and repeats.

d. Application on ALT-98 machine under automatic test:
- If the COM type is unknown the tester must learn the type before automatic testing can start. Once the tester has learned the type automatic testing can begin.
- If COM type model is known then switches SW3 to Ready mode, select the corresponding COM signal group for automatic testing via SW4.
- Application on the VRT-10 machine for automatic test:
- Test method is the same as ALT-98 test.

8. Program update mode

Download the program to the USB disc, and then insert the USB to the tester slot, pressSW2 before turn on the power. When the LCD screen appears "Firmware update waiting" words then release SW2, the tester is being updated. The tester will show test interface once the update is completed.

Illustration:



If the USB disk is abnormal or damaged or not inserted, the tester displays as below:

Once complete the update, the tester will automatically confirm the SW1 option into the test mode.

9. LIN Type categories :

TYPE	RM No.	Manufactory	OE. No.	Replace OE. No.	Made code	MOTOPLAT
LIN1-M-1	B379	BOSCH	F00M145379	F00M A45 212 , F00M 145 311 F00M 147 881 , F00M 147 937	88	LIN_1
LIN1-M-2	H2005194	DENSO	1042102420	GC6 3570	28	LIN_1
LIN1-M-3	-	DENSO	MS1042101731	3890	132	LIN_13
LIN1-M-4	B867	BOSCH	0272220867		88	LIN_18
LIN1-H-1	B092	BOSCH	F00M346092	F00M346092 , F00M 346 139 , F00M 346 044	40	LIN_2
LIN1-H-2	F756	VALEO	126600756A		76	LIN_11
LIN1-H-3	H2005198	DENSO	DAN1093	050291 3200KK , DAN1094 , 042641 13200KK	9	LIN_7
LIN1-H-4	B822	BOSCH	0272220822	B854	80	LIN_19
LIN1-H-5	H2005189	DENSO	GC4 3300		28	LIN_8
LIN1-A-1	V4291	VALEO	2604291	2543427 , 440199	25	LIN_2
LIN1-A-2	V0572	VALEO	2610264	2610572 (write data3[bit7:0] = V setting)	2	LIN_7
LIN1-A-3	H2005210	DENSO	IFX17540 / 7520	(write data1[bit7:0] = V setting)	50	LIN_6
LIN1-A-4	V8054	VALEO	2618054		33	LIN_15
LIN2-H-1	H2005190	DENSO	CG8 3970		244	LIN_5
LIN2-H-2	B827	BOSCH	0272220827		48	LIN_16
LIN2-A-1	H2009171	MITSUBISHI	A5TJ0191ZC	TWM130028	29	LIN_5
LIN2-A-2	H2009204	MITSUBISHI	311005R0004		29	LIN_5
LIN2-A-3	-	DENSO	CG9 3807	(write data1[bit7:0] = V setting)	0	LIN_5

NOTE: LIN1 = LIN1.3 , LIN2 = LIN2.0 ; M = 9600bit/s , H = 19200bit/s , A = AUTO , NO. = Machine Type categories.

Figure 1: External test wires

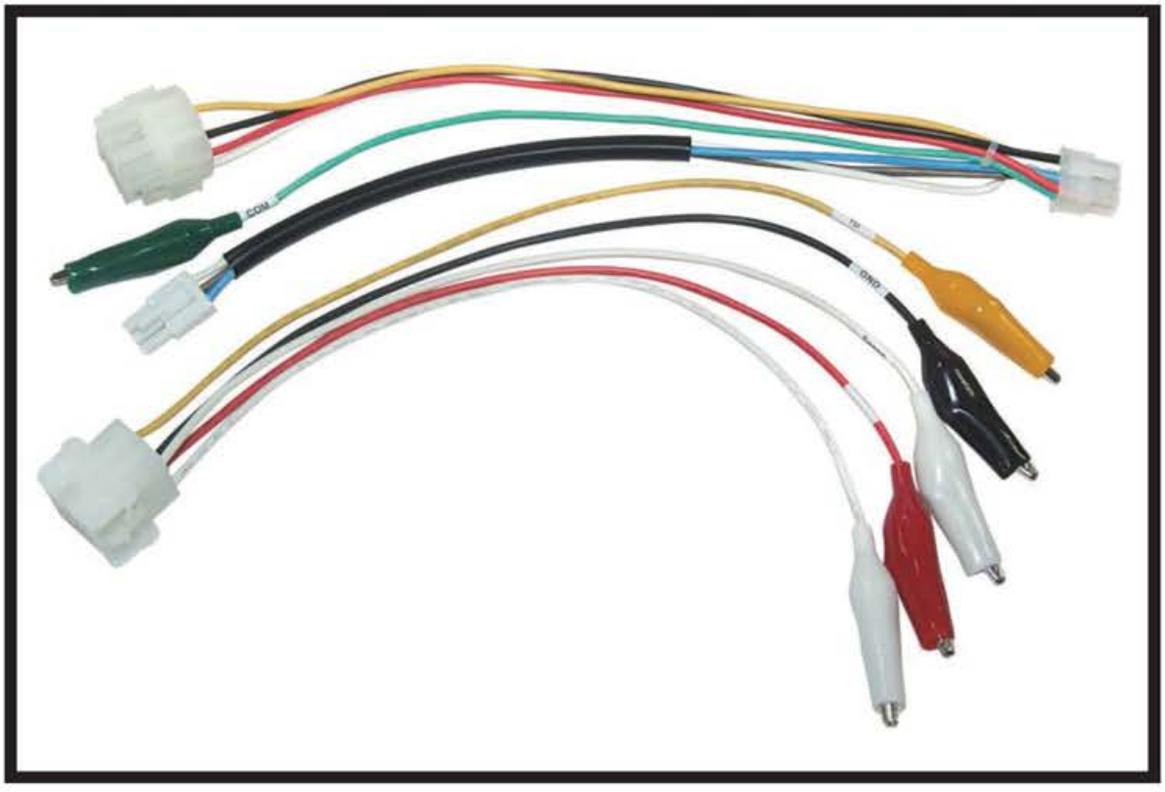


Figure 2: ALT-98 / VRT-10 Adapter Cable-1 (for test harness with 7.5HZ signal board)

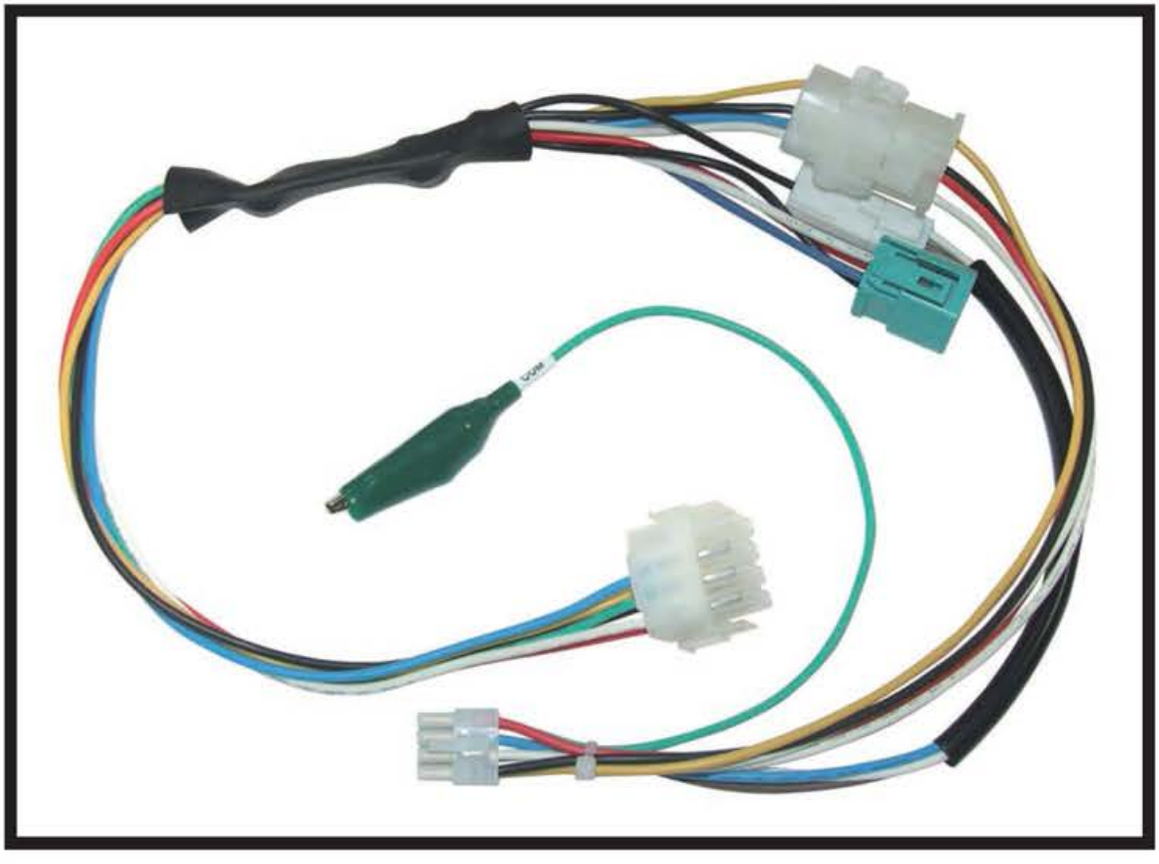


Figure 3: ALT-98 / VRT-10 Adapter Cable -2 (For Ford RVC Plug Test Leads)

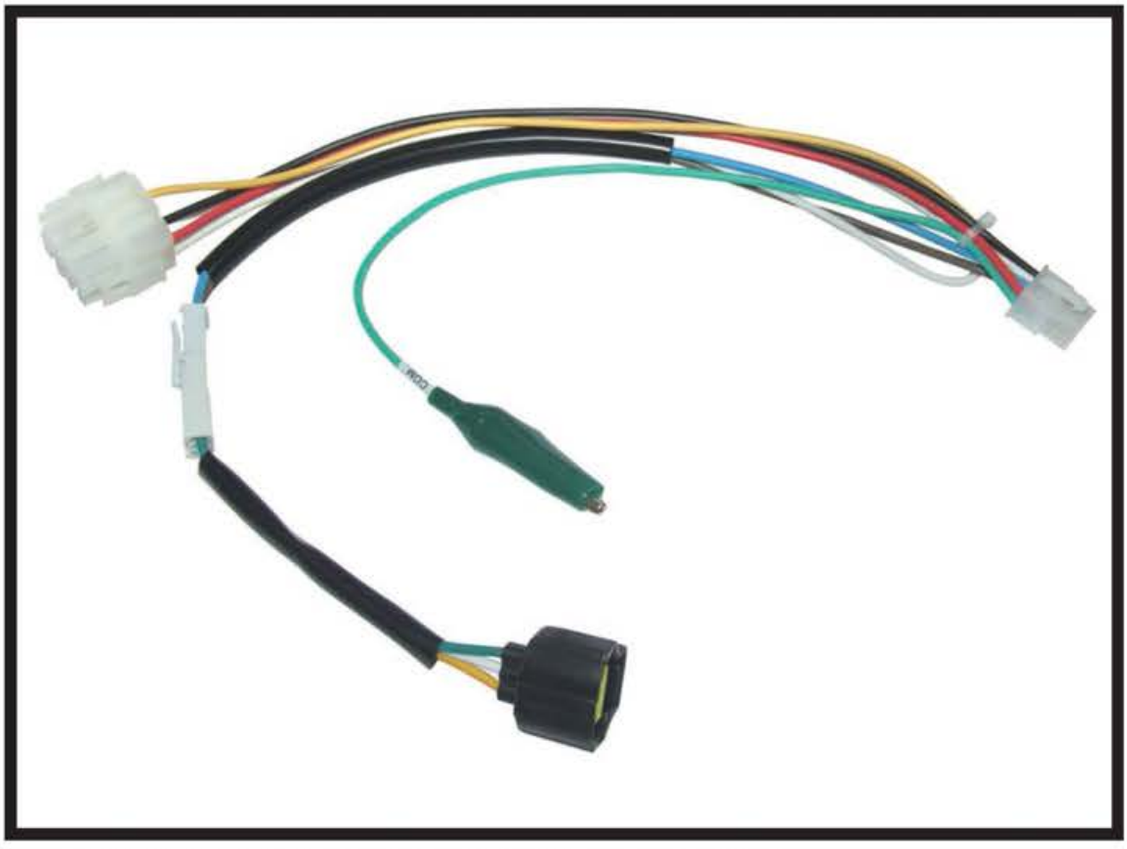
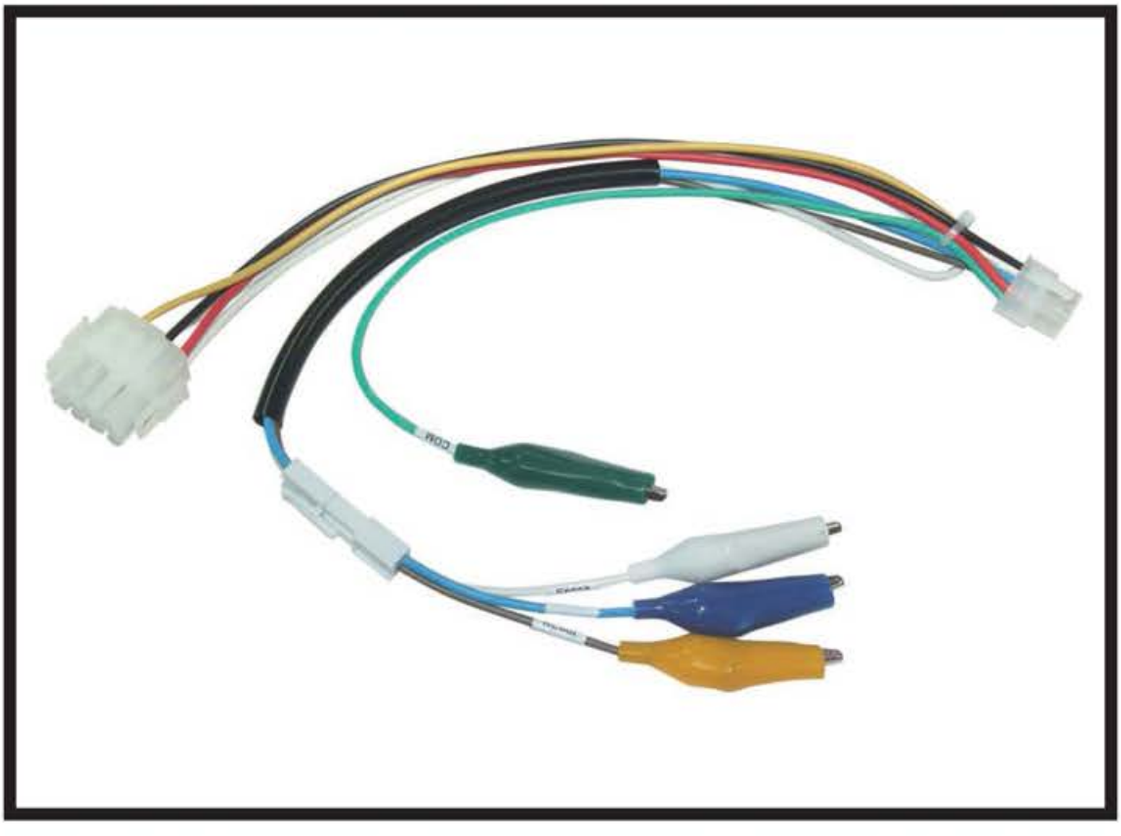


Figure 4: ALT-98 / VRT-10 Adapter Cable -3 (for RVC external cables)



Wiring methods between tester and VR type

Terminal / VR type	IG Yellow	RCout Brown	LI Blue	Ground Black	Lamp Red	COM Green	C in White
RVC	IG	RC	With LI type	GND	X	X	External signal to tester
C	IG	C	X	GND	X	X	
RLO	IG	RLO	X	GND	X	X	
BSS	IG	X	X	GND	Connect with test machine	COM	X
LIN1	IG	X	X	GND	Connect with test machine	COM	X
LIN2	IG	X	X	GND	Connect with test machine	COM	X

For the ALT-98 C point only have Hi / Low change, as long as the signal does not meet the frequency of 125Hz specification models, a separate signal test board of the wire group is required.

Voltage Regulator F, FR signals waveform can be measured by the oscilloscope.

Special Note:

1. When test Valeo product with dual Ps, the Error code is different when connect with single Ps and dual Ps.

   For example:
   Ps1 open, Error code = ELEC.; Ps2 open, Error code = ELEC.
   Ps1 and Ps2 open, Error code = MEC. / ELEC.
   The test decision display is based on the OE product. Specifically state here.

2. If simulating test Mitsubishi H2009-171 OE product, before testing must make sure that the negative signal of the Ps signal cannot be> 1.0V. Otherwise, the test result will be incorrect. The main reason is the design of the OE product itself. If Ps negative signal is too large and it will cause the square wave at LIN point resulting in LIN BUS signal mixed with this square wave, causing the signal is abnormal. Tester cannot identify the COM type.

3. RVC model test, GM RVC or RLO model products are not with LI feedback signal, it cannot be connected to the FR because the signal output is in different ways.

GLOSSARY

- ***A circuit**; regulator controls the voltage by switching the ground to the field circuit at a varying frequency. The opposite end of the field circuit is connected to system B+.*
- ***B circuit;** regulator controls the voltage by switching the positive connection to the field circuit at a varying frequency the opposite end of the field circuit is connected to the negative or ground side of the system.*
- ***C terminal;** active voltage the first generation of the C terminal regulators that allow the vehicles PCM to temporarily reduce the alternator output voltage under higher system loads. Honda was an early manufacturer that used this system. The COM02 tester does not support these earlier units for testing.*
- ***Power Supply;** the COM02 must have an external power supply to operate. The external power supply connects to the IGN. & GRD. Terminals of the COM02; typical supplies would be like the ones used in the WAI VRC1000 or D&V's VRT10. If using these types of tester as a power supply for the COM02 just use the positive and negative terminals of this type of tester to power the COM02. The COM02 needs to be able to read DC volts between 8 & 20 volts and a typical power rating would be 0.5 amps.*
- ***RVC;** remote control voltage, appeared on many different OEM charging systems like Ford, GM RVC, Denso PWM {"C"), Mitsubishi PWM (C) the COM02 will test and identify these type of regulators.*
- ***BSS;** COM system, the COM02 can test and identify the BSS type regulators used on many of the newer vehicles. BSS stands for "bit synchronous system interface. It is a fast two way communication system that can read and write communication packets between a PCM and a BSS regulator. At this point there are three versions of BSS and the COM02 can read them all.*
- ***LIN;** COM systems, the COM02 can test and identify five different LIN system regulators. LIN is a faster communication system then the BSS and is used on many of the newer vehicles. It is more precise then the BSS system and has more diagnostic capabilities. As new LIN systems appear on new vehicles the COM02 will keep you up with the new advances by offering update downloads.*

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VR-COM02

VOLTAGE REGULATOR TESTER MANUAL

Applicable to the Voltage regulator test for
LIN Type, BSS Type, RVC Type