



NSG 500C / NSG 506 C

EMC test system for automotive electronics

The number of electrical and electronic units and sub-systems currently being incorporated into modern vehicles is growing rapidly, and the complexity of the individual units is rising relentlessly. In consequence, the value of on-board electronics is also increasing as a proportion of the cost of a vehicle as a whole.

Voltage spikes, some of which can contain high energy levels, can occur on the vehicle's supply lines under normal operating conditions, especially during switching operations, but also under exceptional conditions. Any of the sub-systems can be the source of interference and can certainly be the victim of such.

Whereas previous electronic units were used mainly for controlling convenience functions, today however, electronic systems are taking over ever more of the primary functions that affect safety and operational efficiency. Guaranteeing freedom from disturbance by electromagnetic interference thus literally becomes a matter of life and death.

The situation will become even more critical in the foreseeable future with the increasing use of micro-processors and especially the growing tendency towards using multiplex techniques.

The investigations prescribed are not just limited to tests in a finished vehicle, but are rather more concerned with the tests that must be carried out on the individual components and systems before they are installed.

Modern automotive electronics must be EMC-tested!

International Standards Committees, such as ISO, DIN, SAE, JASO, etc. have set out and published appropriate test recommendations. In addition, many vehicle manufacturers have laid down their own specifications and, in turn, have drawn up agreements for appropriate acceptance procedures for their suppliers.

With the NSG 500C and NSG 506C series of instruments, SCHAFFNER provides a compact test set for carrying out the required tests. In some respects, the parameters of the pulses produced by the instruments considerably exceed the requirements called for in the Standards so that other specifications can be fulfilled, too. The test specifications for 24V vehicle supplies are also covered to a great extent.

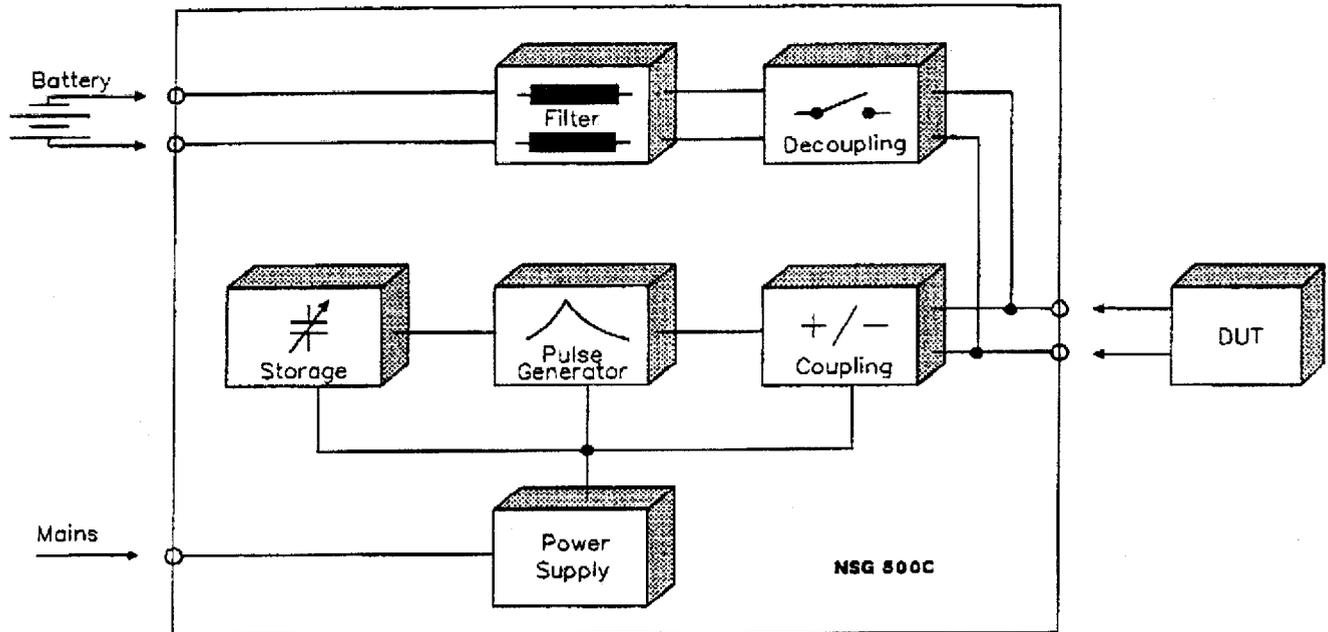
The interference generators are constructed as stackable table-top units; by adding the necessary mounting flanges they can also be installed in a 19" rack.

Various options and add-ons expand the application field still further.



Interference Generator NSG 500 C

Block diagram of the NSG 500C



The NSG 500C unit contains two generators in a compact form; one for the microsecond pulse range (pulses 1 and 2) and the other for the fast pulse bursts in the nanosecond range (pulses 3a and 3b), together with a common control section.

The rise time, pulse width and amplitude of the pulses 1 and 2 can be varied within wide limits. Facilities are provided to connect external impedances to match the generator to the conditions such as are to be found in a vehicle's supply system.

The pulse bursts, 3a and 3b, can be set in amplitude and polarity to suit the test specification.

The front panel is equipped with a presettable counter which enables automatic tests to be carried out for a predetermined time or number of cycles. Triggering can be set for manual or external operation and a trigger output is provided to drive an oscilloscope.

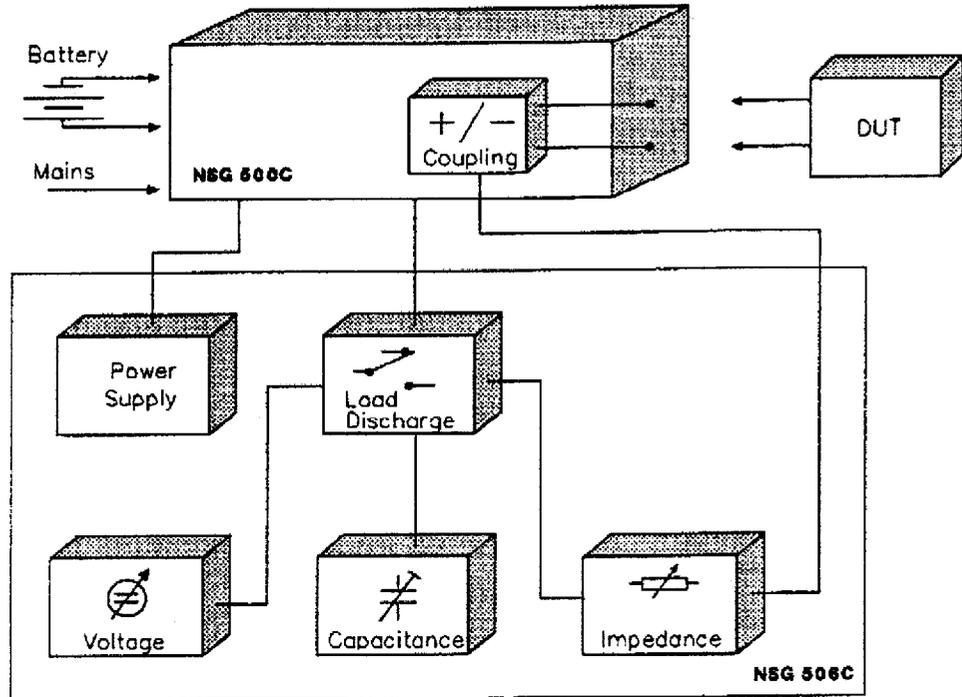
Devices can be tested that draw up to 25A continuous load currents.

Dampening of the interference pulses by the supply source is prevented by a built-in network.

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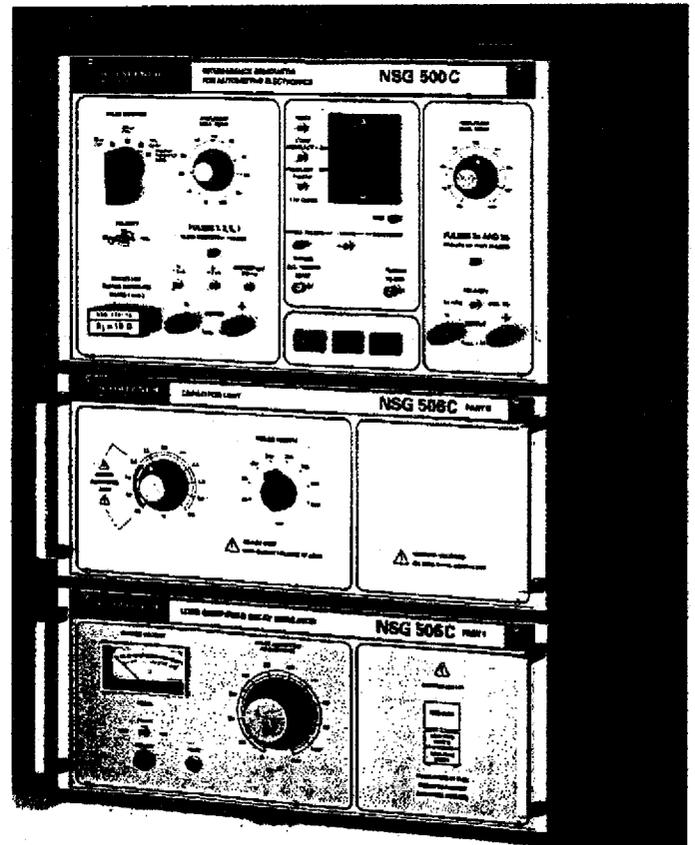
Load dump/Field decay Generator NSG 506C

Block diagram of the NSG 506C



The two-part Generator, Type NSG 506C, has been designed as an auxiliary unit for the NSG 500C and enables the production of high energy pulses (pulses 5 and 7).

The two auxiliary units contain the necessary energy storage capacitors, the charging circuit and an impedance matching network. Control (pulse triggering), powering of the device under test and pulse injection are all carried out by the basic generator, NSG 500C.



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7.4 Technical specifications

Mains input	220 Vac, 50/60 Hz
Power consumption	500 VA (NSG 506C)
Operating mode	Manually triggered single pulses (Pulse 5, Load dump)
EUT supply	12 to 30 Vdc (battery)
EUT current	25 A max. (circuit-breaker)
Connections	Universal sockets
Dimensions	Width: 177 mm (7" approx.) Height: 76 mm (3" approx.) Depth: 294 mm (11.6" approx.)
Weight	2.4 kg (5.3 lbs) approx.

7.5 Maintenance

Maintenance work may only be carried out by qualified service personnel.

Before opening the instrument, disconnect both the mains supply and the EUT battery supply. Disconnect any auxiliary instruments.

A 9V battery is incorporated in the unit to supply the control circuit. This has to be exchanged in the event of no trigger pulses being generated. The battery is accessible once the cover of the instrument has been removed.

The unit contains no further items that are of interest to the user so far as operating or adjustments are concerned.

In the event of the unit not operating correctly, it should be returned to a SCHAFFNER Service Center together with a description of the fault.

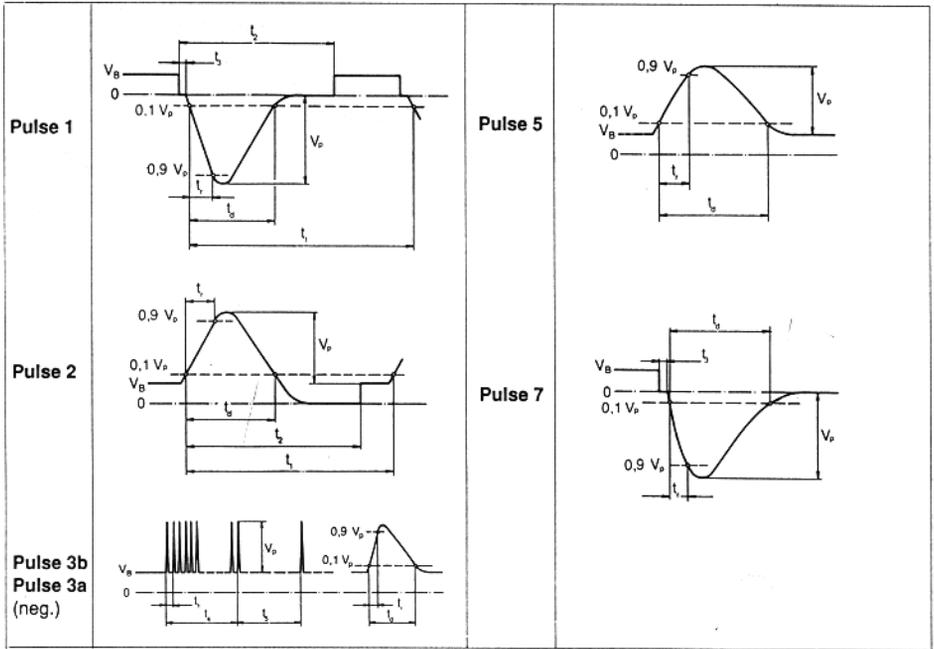
8 Pulse data

Technical specifications: NSG 500C/506C and those called for in the Standards

Pulse	Parameter	NSG 500C	By way of comparison			
			ISO 12V ISO DP 7637/1	ISO 24V ISO DP 7637/2	SAE J1113	DIN 40839-T3
1	V_s	-30 to -300 V	0 to -100 V	0 to -200 V	0 to -100 V	0 to -30 V
	t_r	1/2/3/4 μ s	1 μ s	3 μ s	80 V/ μ s	1 μ s
	t_d	50/200 μ s / 2ms	2 ms	2 ms	2 ms	2 ms
	t_1	0.5/5 s	> 0.5 < 5 s	> 0.5 < 5 s	> 0.5 < 5 s	> 0.5 < 5 s
	t_2	200 ms	200 ms	200 ms	200 ms	200 ms
	t_3	$\leq 100 \mu$ s	$\leq 100 \mu$ s	$\leq 100 \mu$ s	$\leq 100 \mu$ s	$\leq 100 \mu$ s
	Ri	4/10/20/30/40/50 Ohm	10 Ohm	10 to 50 Ohm	10 Ohm	10 Ohm
2	V_s	+30 to +300 V	0 to +100 V	0 to +200 V	0 to +100 V	0 to +30 V
	t_r	1/2/3/4 μ s	1 μ s	1 μ s	80 V/ μ s	1 μ s
	t_d	50/200 μ s / 2ms	50 μ s	50 μ s	50 to 200 μ s	50 μ s
	t_1	0.5/5 s	> 0.5 < 5 s	> 0.5 < 5 s	> 0.5 < 5 s	> 0.5 < 5 s
	t_2	200 ms	200 ms	200 ms	200 ms	200 ms
	t_3	$\leq 100 \mu$ s	$\leq 100 \mu$ s	$\leq 100 \mu$ s	$\leq 100 \mu$ s	$\leq 100 \mu$ s
	Ri	4/10/20/30/40/50 Ohm	10 Ohm	10 to 50 Ohm	10 Ohm	10 Ohm
3a 3b	V_s	± 40 to ± 200 V	0 to -150 V 0 to +100 V	0 to ± 200 V	0 to -150 V 0 to +100 V	0 to -60 V 0 to +40 V
	t_r	5 ns	5 ns	5 ns	2.4×10^4 V/ μ s	5 ns
	t_d	100 ns	100 ns	100 ns	100 ns	100 ns
	t_1	100 μ s	100 μ s	100 μ s	100 μ s	100 μ s
	t_4	10 ms	10 ms	10 ms	10 ms	10 ms
	t_5	90 ms	90 ms	90 ms	90 ms	90 ms
	Ri	50 Ohms	50 Ohms	50 Ohms	50 Ohms	50 Ohms
5	V_s	NSG 506C 0 to +200 V	+26.5 to +86.5 V	+70 to +200 V	+25 to +120 V	
	t_r	> 5 < 10 ms (70 μ s) ¹⁾	> 5 < 10 ms	10 ms	> 5 < 10 ms	
	t_d	40/100/150/200/300/ 350/400/500 ms	40 to 400 ms	100 to 350 ms	40 to 400 ms	
	Ri	0.5 to 5.5 Ohms	0.5 to 4 Ohms	1 to 8 Ohms	0.5 to 4 Ohms	
7	V_s	0 to -200 V	0 to -80 V		-25 to -120 V	
	t_r	> 5 < 10 ms (70 μ s) ¹⁾	> 5 < 10 ms		> 5 < 10 ms	
	t_d	40/100/150/200/300/ 350/400/500 ms	100 ms		100 ms	
	t_3	≤ 100 ms	$\leq 100 \mu$ s		$\leq 100 \mu$ s	
	Ri	8.7 to 13.7 Ohms	10 Ohms		10 Ohms	

1) t_r can be set to 70 μ s for special applications by altering a link inside the unit.

9 Definitions of the pulse form



NSG 500C

Mains input	110/220/240 Vac 50/60Hz
Power consumption	50 VA
Operating modes	Single pulses or bursts Manual or external triggering
	Repetitive pulses or bursts Repetition frequency according to pulse type
Test duration	Settable with built-in preselection counter for defined time or number of pulses: 1 - 99999 secs or 1 - 99999 pulses
External trigger	TTL input. 0=true also suitable for a momentary push-button
CRO trigger	triggeroutput + 10V, Tr 1.5 μ s
DUT supply voltage	12 - 30 Vdc
DUT supply current	25 A max. (circuit breaker)
DUT connection	Universal connector sockets
Dimensions	WxHxD 435x280x350 mm (17" x 11" x 14" approx.)
Weight	16 - 20 Kg (35 - 44 lbs) approx.

NSG 506C

Power supply	220Vac (from NSG 500C)
Power consumption	500 VA
Storage capacitor	47'000 μ F
Energy	940 Joule max.
Pulse triggering	controlled via the NSG 500C manuel external trigger automatic (pulse interval 5secs)
Pulse interval	5 secs min.
Dimensions	WxHxD 435x380x350 mm (17" x 15" x 14" approx.) (part 1 and 2)
Weight	36 kg approx. (79 lbs) (part 1 and 2)

Ordering information

Type	Mains supply	Country	Mains connector
NSG 500C-01	220V, 50/60Hz	D/A/S/NL/I/N/SF/etc	Schuko
NSG 500C-02	220V, 50/60Hz	CH	Typ 12
NSG 500C-04	110V, 50/60Hz	USA/CAN/etc.	498/13UL/CSA
NSG 500C-05	240V, 50/60Hz	GB	BS 1363
NSG 506C	Supplied from the NSG 500C	All	

Accessories (included)

Mains cable
Operating instructions
Additional resistors for instrument matching $R_i = 4 \Omega$
10 Ω
20 Ω
30 Ω
40 Ω
50 Ω

Options

CDN 500 Coupling clamp to ISO and DIN specifications
MD 500 Measurement adapter with BNC connector and 100:1 attenuator

Further instruments for testing automotive electronics

NSG 417 Electronic switch for checking of interference emission
NSG 432 ESD-Generator
NSG 500B/11 Interference simulator as per GM internal standards

Changes without notice

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