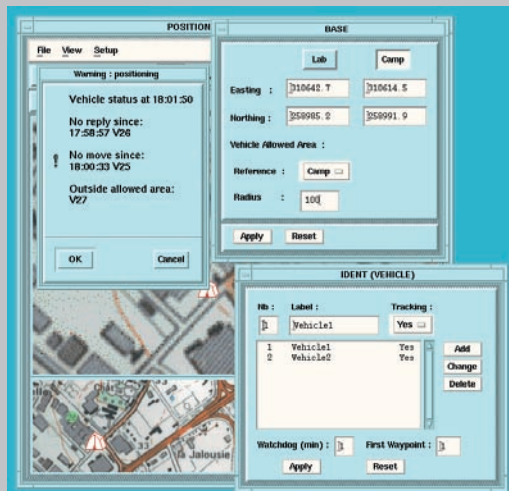
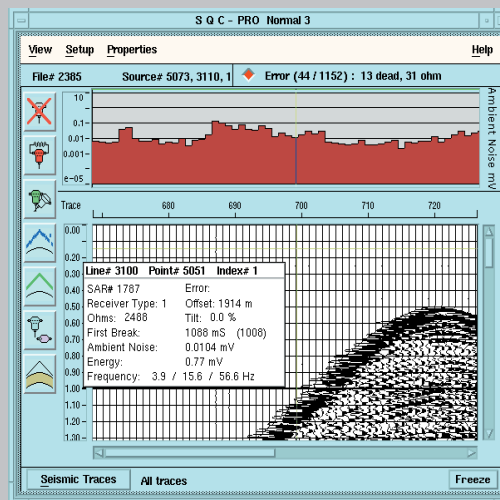


SN388 New Features

Summer 1999



SN388 Software Release 8.4



SQC-Pro Release 1.2



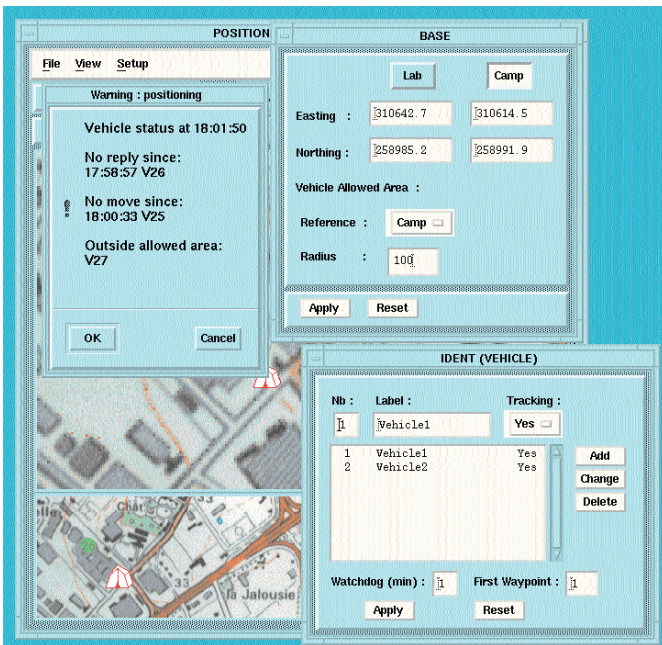
VE432 Release 3.0



CoPilot



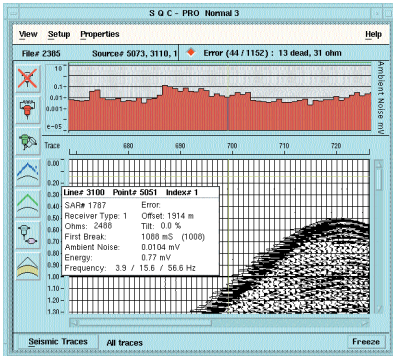
SN388 Software Release 8.4



- Remote access of the SN388 : CoPilot.
- Installation procedure of the Solaris 2.5.1 patches for the year 2000 compliance.
- Shot sequence controlled by vibrator fleet navigation.
- Increased capacity :
 - up to 20000 receiver points
 - up to 9600 channels
 - up to 3600 absolute spreads
 - up to 1200 SU6-Rs
- SEG D Header additional information :
 - date in year 2000 compliant format
 - slip-sweep* operations indicator
 - Northing, Easting and elevation of source and receiver points
- Using source and receiver positions to apply AGC on trace plots.
- Alarm management for vehicle tracking :
 - when a vehicle fails to move within the allowed time
 - when a vehicle leaves the allowed area



SQC-Pro Release 1.2



- Trace energy and ambient noise values displayed in mV.
- Trace display with automatic scale.
- Detailed QC data of any trace just one click away.
- Runs on Ultra-5 Station.
- Theoretical First Break calculation and display.
- Trace display depending on the selected option :
 - errors only
 - traces with particular receiver types
 - all traces
- Hyperbolic analysis window.
- Colour-coded seismic trace display.

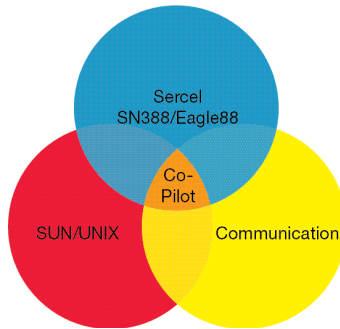
VE432 Release 3.0

- DSD Network
 - allows automatic starting of the acquisition as soon as all vibrators in a fleet are ready.
- Fleet Navigation
 - after having acquired the geographical location of the fleet the SN388 selects the corresponding shot point from its operation table and shoots it automatically.
 - fleet location displayed before acquisition
- DPG slave option
 - starts acquisition on a remote recording system.
- Enhanced sweep definition
 - unlimited variety of user-defined sweeps
 - log sweep programmed with a resolution of 0.1 dB
- Programmable DSD radio levels
- Programmable delay between the end of a sweep and automatic base-plate lift-up.
- Additional QC tests
 - GPS test on DSD display
 - pressure sensor switch on Husky palmtop computer.
- Shorter extended QC messages to save time on radio.
- Programmed sweeps, displayed on Husky palmtop computer.

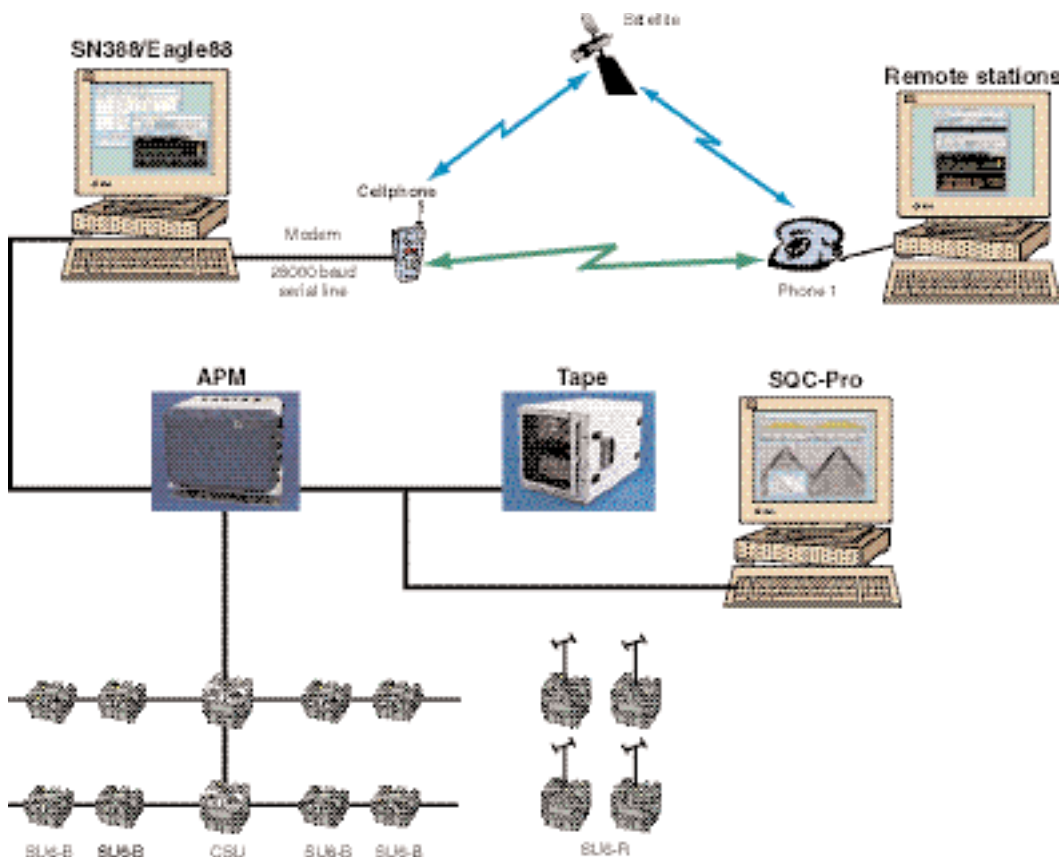


CoPilot

Remote Access of the SN388/Eagle88 System



- Remote Technical Support
- Remote Control
- Remote Monitoring
- Global access for Quality Assurance



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SN388

Specifications

RECORDING SPECIFICATIONS

Drive and Media	Up to 6 drives (simultaneous and or alternate mode)
CD490-E (single or dual drive)	36 track IBM 3490E cartridge
Format	SEG-D demultiplexed, 4 byte per sample. (SEG-D, Rev. 1)

HUMAN COMPUTER INTERFACE (HCI)

Main Workstations	Laptop or desktop with high-resolution colour monitor.
Software	fully integrated operating and application software including : Operating system : Unix™ X-window system : X11™ Window environment : MOTIF™
Additional Graphic Colour Display	Extra monitors or workstations
Maximum Number of Stations	5
Maximum Number of Screens per Station	3

CENTRAL CONTROL UNIT (CCU)

Maximum Number of Channels	38400 @ 4 ms
	28800 @ 3 ms
	19200 @ 2 ms
	9600 @ 1 ms
	4800 @ 0.5 ms (on request)
Maximum Number of Active Channels per Line	1200 @ 4 ms
	900 @ 3 ms
	600 @ 2 ms
	300 @ 1 ms
	150 @ 0.5 ms (on request)
Maximum Number of Lines per 1200 CH Module	: 254
Start of Acquisition (from T ₀)	: < 20 ms

TM : UNIX is a registered trademark of UNIX system laboratories. OSF/MOTIF is a registered trademark of Open Software Foundation.

Maximum Record Length (APM or PAM)	99 s @ 4 ms 96 s @ 3 ms 64 s @ 2 ms 32 s @ 1 ms 16 s @ 0.5ms (on request)
Maximum Number of 1200 CH Modules	16
Sampling Interval	1, 2, 3, 4 ms (0.25, 0.5 ms on request)
Maximum Acquisition Length (APM)	128 s @ 4 ms 96 s @ 3 ms 64 s @ 2 ms 32 s @ 1 ms 16 s @ 0.5 ms (on request)
Sampling Skew	True synchronous sampling
Gain Setting	Cable only : G0 G1 G2 0 12 24 dB Combined cable and RF : G1 G2 12 24 dB (0 dB full scale = 1600 mV RMS)

ACQUISITION AND PROCESSING MODULE (APM)

Processing Capabilities	<ul style="list-style-type: none"> • Correlation before or after stack • Stack only • Diversity stack with single or multiple windows • Spike editing : zeroing or clipping • Simultaneous dual-source operation • Slip sweep
Maximum Number of Channels	2400 @ 4 ms 1800 @ 3 ms 1200 @ 2 ms 600 @ 1 ms 300 @ 0.5 ms

PORTABLE ACQUISITION MODULE (PAM)

Maximum Number of Channels	2400 @ 4 ms 1800 @ 3 ms 1200 @ 2 ms 600 @ 1 ms 300 @ 0.5 ms
----------------------------	-------------------------------------------------------------------------



CCU TEST PROCESSING CAPABILITIES

Instrument Test	<ul style="list-style-type: none"> • noise & offset • distortion & dynamic range • impulse response • crosstalk (SU6 only)
Field Test	<ul style="list-style-type: none"> • battery voltage • field noise • resistance • tilt test • crosstalk (SU6 only) • leakage
Play-back and Monitoring	<ul style="list-style-type: none"> • Versatile hard copy output on plotter. • Fixed gain, Linear gain or AGC • Low-cut filter from 10 Hz to Nyquist frequency in 1-Hz steps • High-cut filter from 30 Hz to Nyquist frequency in 1-Hz steps • Notch filter from 30 Hz to Nyquist frequency in 1-Hz steps
QC Processing	<ul style="list-style-type: none"> • Real time seismic analysis (SQC - PRO) • Real time vibroseis quality control (VQC)

PHYSICAL SPECIFICATIONS

LAPTOP WORKSTATION

Power	
Operating Power Voltage	92 to 264 VAC
Power Consumption	55 W
Environmental	
Operating Temperature	40° to + 104°F (4° to + 40°C)
Storage Temperature	- 4° to + 140°F (- 20° to + 60°C)
Humidity	5-90 % non-condensing
Dimensions and weight	
Size(HxWxD)	2.3 in x 12.8 in x 11.7 in (58 mm x 326 mm x 296 mm)
Weight	7.5 lbs (3.4 kg)

DESKTOP WORKSTATION

Power	
Operating Power Voltage	100 - 240 VAC 47/63 Hz
Power Consumption	200 W
Environmental	
Operating temperature	4° to + 95°F (5° to + 35°C)
Storage temperature	- 4° to + 140°F (- 20° to + 60°C)
Humidity	20-80 % non-condensing
Dimensions and weight	
Size (HxWxD)	4.3 in x 17.2 in x 16.7 in (109.5 mm x 436 mm x 424 mm)
Weight	39.7 lbs (18 kg)

COLOUR MONITOR 21"

Power	
Operating Power Voltage	100 - 240 VAC 50/60 Hz
Power Consumption	160 W
Environmental	
Operating temperature	4° to + 95°F (5° to + 35°C)
Storage temperature	- 4° to + 140°F (- 20° to + 60°C)
Humidity	5-90 % non-condensing
Dimensions and weight	
Size (HxWxD)	19.7 in x 19.9 in x 18.9 in (500.3 mm x 502.5 mm x 476.5 mm)
Weight	68.5 lbs (31.0 kg)

APM

Power	
Operating Voltage	110 - 220 VAC 50/60 Hz
Power Consumption	520 W
Environmental	
Operating temperature	32° to + 104°F (0° to + 40°C)
Storage temperature	- 40° to + 158°F (- 40° to + 70°C)
Humidity	10 - 90% non-condensing
Dimensions and weight	
Size (HxWxD)	15.2 in x 22 in x 20.4 in (385 mm x 560 mm x 518 mm)
Weight	81.4 lbs (37 kg)

PAM	
Power	
Operating Power Voltage	10.5 to 15 VDC
Power Consumption	160 W
Environmental	
Operating temperature	32° to + 104°F (0° to + 40°C)
Storage temperature	- 40° to + 158°F (- 40° to + 70°C)
Humidity	waterproof case
Dimensions and weight	
Size (HxWxD)	16.5 in x 13.8 in x 23.5 in (420 mm x 350 mm x 598 mm)
Weight	48.4 lbs (22 kg)

TAPE DRIVE (CD 490E)	
Functional	
Media	3490E Type 1/2" cartridge
Format	IBM 36 track 3490E interchange
Maximum Trace Length	64 s @ 2 ms or equivalent
Power	
Operating Voltage	110V - 220 VAC 50/60 Hz
Consumption	single drive 150 W dual drive 300 W Idle 120 W
Environmental	
Operating Temperature	50° to + 104°F (10° to 40°C)
Storage Temperature	(without tape) - 40° to +140°F (- 40° to + 60°C)
Humidity	20-80% non-condensing
Dimensions and weights	
Size with lid (HxWxD)	13.1 in x 13.1 in x 23.2 in (332 mm x 332 mm x 590 mm)
Weights	52.8 lbs (24 kg) (single drive) 77 lbs (35 kg) (dual drive)

LINE TESTER (LT 388)	
Functions	<ul style="list-style-type: none"> • Look on Line or Transverse • Form line and transmission • Check CSU/PSU batteries • Receiver group testing
Power	
Operating Power Voltage	12 VDC
Power Consumption	12 W (typical, operation mode)
Environmental	
Operating Temperature	14° to +113°F (- 10° to + 45°C)
Storage Temperature	- 22° to + 158°F (- 30° to + 70°C) (To - 40°C with display upgrade kit)
Humidity	waterproof case
Dimensions and weight	
Size (HxWxD)	13.4 in x 11 in x 5.9 in (340 mm x 280 mm x 150 mm)
Weight	24.2 lbs (11 kg)

TEST AND MAINTENANCE SYSTEM (TMS 388)	
Functions	<ul style="list-style-type: none"> • Transmission test • Remote control test • Noise and offset • Distortion • Crosstalk (SU6 only) • Common mode rejection • Power consumption
Power	
Operating Voltage	110 V - 220 VAC 50/60Hz
Power Consumption	155 W
Environmental	
Operating temperature	32° to + 104°F (0° to + 40°C)
Storage temperature	- 40° to + 158°F (- 40° to + 70°C)
Humidity	5 - 90 % non-condensing
Dimensions and weight	
Size (HxWxD)	15.7 in x 12.2 in x 7.5 in (400 mm x 310 mm x 190 mm)
Weight	55 lbs (25 kg)

STATION UNITS SPECIFICATIONS

GENERAL

Input Characteristics

Input Impedance

Differential Mode	$R = 20 \text{ kW//C} = 77 \text{ nF}$
Common Mode	$R = 5 \text{ kW//C} = 44 \text{ nF}$

Common Mode

rejection > 90 dB

Seismic Channel Performance

Dynamic Range

- Total System
 - 137 dB (3 - 800 Hz)
 - 140 dB (3 - 400 Hz)
 - 144 dB (3 - 125 Hz)
- Instantaneous Dynamic Range (S/N) 120 dB

Offset

@ 1, 2, 3, 4 ms sampling rate

- @ G0 (0 dB) < 1.6 μV RMS
- @ G1 (12 dB) < 400 nV RMS
- @ G2 (24 dB) < 200 nV RMS

@ 0.5 ms sampling rate

- @ G0 (0 dB) < 3.2 μV
- @ G1 (12 dB) < 0.8 μV
- @ G2 (24 dB) < 0.4 μV

Channel-to-channel Similarity

Impulse Response Quadratic Error

- @ 1, 2, 3, 4 ms < 1%
- @ 0.5 ms < 1.5%

Crossfeed Isolation

- 1 channel SU : not applicable
- 6 channel SU : > 95 dB

Word Size

24 bits

Receiver Group Interval :

Long Range Cable : SU-1 : up to 80 m (110 m on request)
 SU-6 : up to 110 m
 Medium Range Cable : SU-1 : up to 55 m
 SU-6 : up to 70 m

PSU Spacing

@ 1, 2, 3, 4 ms sample rate

- # of channels : • SU-1, SU1-UL, SU1-ULS : 32-96
- SU-6 : 42-120

Maximum Linear Input Signal

Differential Mode

- @ G0 (0 dB) 1.6 V RMS
- @ G1 (12 dB) 400 mV RMS
- @ G2 (24 dB) 100 mV RMS

Common Mode

5 V pp

Noise (max. from 3 Hz to Nyquist Freq.)

@ 1, 2, 3, 4 ms sampling rate :

- @ G0 (0 dB) < 1.6 μV RMS
- @ G1 (12 dB) < 400 nV RMS
- @ G2 (24 dB) < 200 nV RMS

@ 0.5 ms sampling rate

- @ G0 (0 dB) < 3.2 μV RMS
- @ G1 (12 dB) < 800 nV RMS
- @ G2 (24 dB) < 400 nV RMS

Distortion (all gains)

0.0001 % typical
 0.0003% maximum

High-cut filter

- Linear Phase or Minimum Phase
- Cut-Off Frequencies (Hz)

SR (ms)	0.5 FN	0.8 FN
0.5	500	800
1	250	400
2	125	200
3	83.3	133.3
4	62.5	100

- Aliasing ($F_{in} > \text{Nyquist Freq}$) : < - 120 dB

SU BUILT-IN TEST CAPABILITIES

Pulse Levels	L0 = + 1.414 V L1 = + 353.6 mV L2 = + 88.4 mV
Pulse Duration	@ 0.5, 1, 2, 3, 4 ms sampling rate One sample interval
Sine Waves	Diff. Mode Levels : L0 = 1.552 V RMS L1 = 388 mV RMS L2 = 97 mV RMS
Frequencies	9.77 Hz 19.53 Hz 39.06 Hz 78.12 Hz 156.20 Hz 312.50 Hz 625.00 Hz
Distortion	0.0001 % typical

PHYSICAL SPECIFICATIONS

Power	Operating Power Voltage : 15 to 50 VDC
	Power Consumption (typical)
	Operation Mode (per channel)
	• 1-channel SU : 330 mW
	• 6-channel SU : 240 mW
	Test Mode (per channel)
	• 1-channel SU : 450 mW
	• 6-channel SU : 260 mW
Environmental	
	Operating Temperature - 40° to + 158°F (- 40° to + 70°C)
	Storage Temperature - 40° to + 158°F (- 40° to + 70°C)
	Humidity waterproof case
Water Depth for Submersible Units.	
	• SU1-ULS : up to 30 m
	• PSU6/S, SU6/S, PSU/S, PSU1S, CSU1S, CSU/S : up to 15 m

Dimensions and weights

Size (HxWxD)	
SU1 & SU6	4.8 in x 8.5 in x 8.5 in (122 mm x 217 mm x 217 mm)
PSU6, CSU1S & CSU	8 in x 8.5 in x 8.5 in (204 mm x 217 mm x 217 mm)
PSU1S & PSU	4.9 in x 8.5 in x 8.5 in (125 mm x 217 mm x 217 mm)
SU1-UL	2.7 in x 4.8 in x 8.9 in (68 mm x 123 mm x 226 mm)
SU1-ULS	3.5 in x 5.9 in x 11.1 in (89 mm x 150 mm x 282 mm)
Weights	
SU	1 channel SU : 8.25 lbs (3.75 kg) 6 channel SU : 8.5 lbs (3.85 kg)
PSU6, CSU1S & CSU	14.30 lbs (6.5 kg)
PSU1S & PSU	8.80 lbs (4 kg)
SU1-UL	3.10 lbs (1.4 kg)
SU1-ULS	4.60 lbs (2.1 kg)

CABLES SPECIFICATIONS (TYPICAL VALUES)

Line Cable

Diameter : 0.43 in (11 mm)

Weight

1-channel

- 8.4 lbs (3.8 kg) @ 180 ft (55 m) receiver spacing
- 22 lbs (10 kg) @ 262 ft (80 m) receiver spacing

6-channel SU

- 66 lbs (30 kg) @ 180 ft (55 m) receiver spacing
- 136.4 lbs (62 kg) @ 262 ft (80 m) receiver spacing
(if continuous cable)

Transverse Cable

Diameter 0.35 in (9 mm)

Weight 16.5 lbs (7.5 kg) for 328 ft (100 m)

Length up to 875 yards (800 m)

Extension (detour) Cable

Diameter 0.35 in (9 mm)

Weight 15.4 lbs (7 kg) for 328 ft (100 m)

Length up to 875 yards (800 m)