# DBBUILD – *ADDING NEW SENSOR AND DATALOGGERS*

ANTELOPE USERS GROUP MEETING

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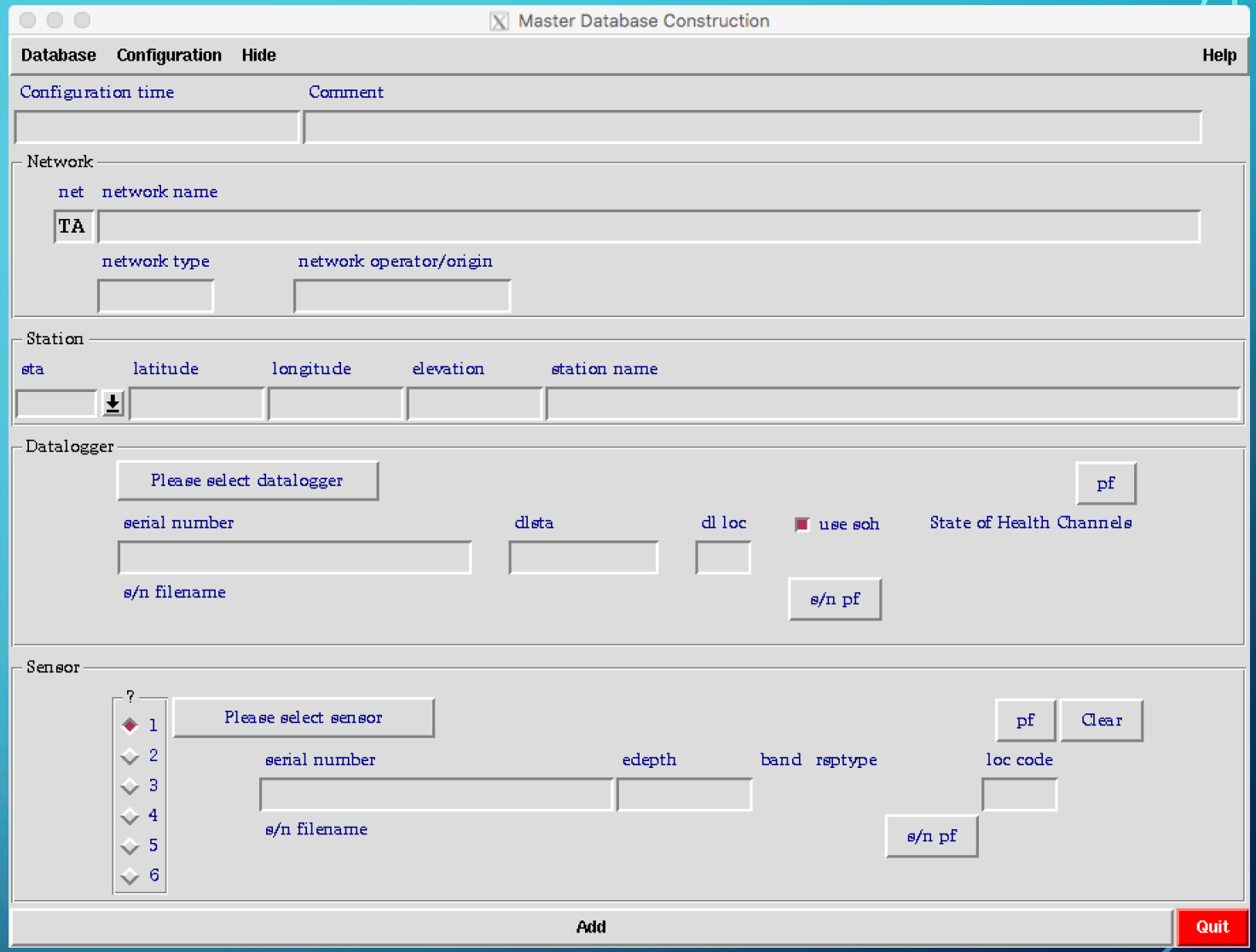
JENNIFER EAKINS

# DBBUILD GUI

- Graphical interface to help construct metadata database (dbmaster)
- Accesses user contributed sensor and datalogger information
- Additional sensors or dataloggers can be added

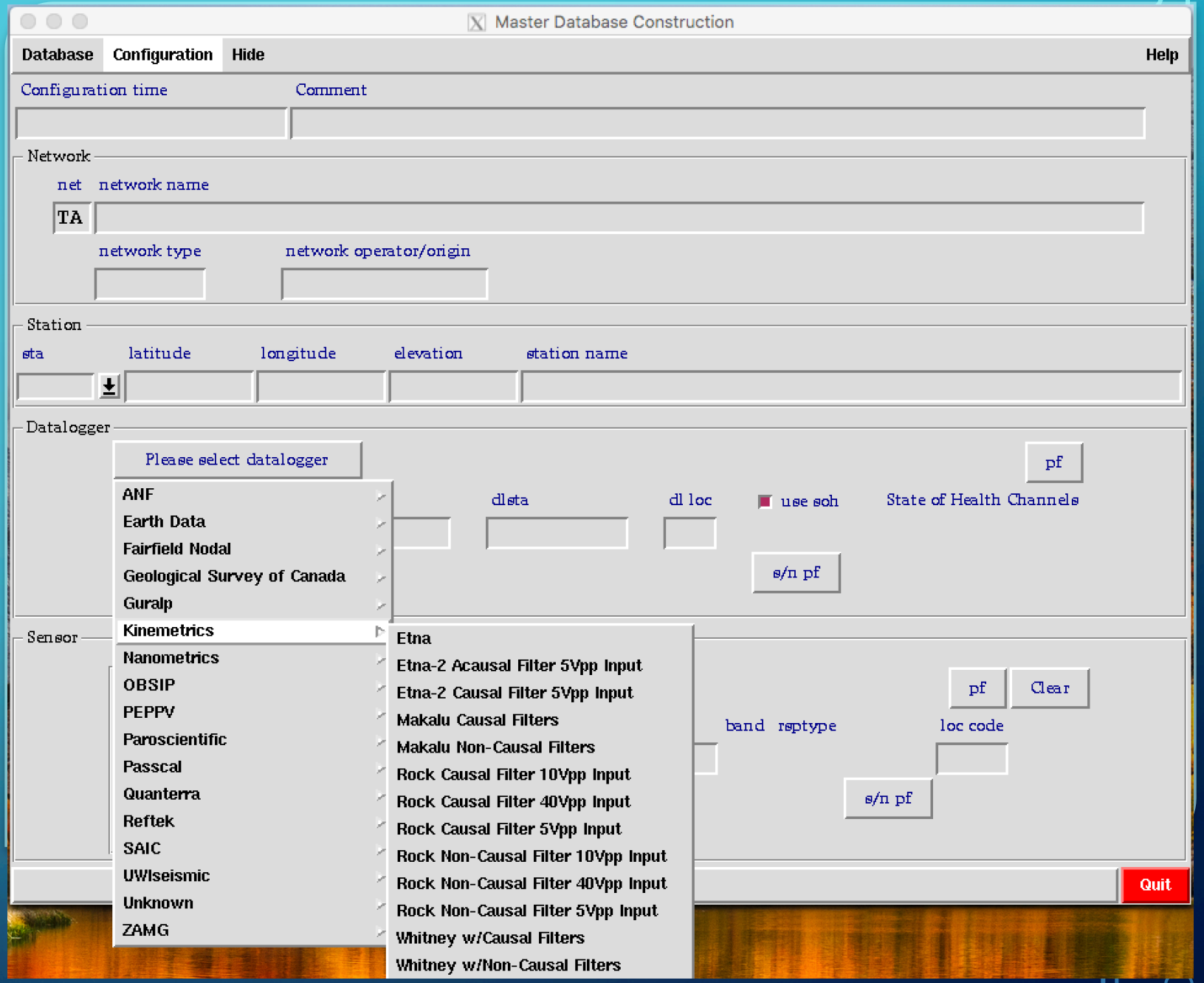
# INITIAL WINDOW

- Every sensor or datalogger change gets a configuration time
- Network info stays the same
- Station information will vary
- Datalogger and sensor types can be specified and serial numbers (and additional info) are required



# DATALOGGER LIST

- Grouped by manufacturer
- Individual datalogger types
- If your particular datalogger is not listed, you will need to construct it



# EXAMPLE: STS-6 SENSOR

STS-6 sensor information is not available

- Gather data sheet from manufacturer
- Confirm data sheet has all information: sensitivity, sample rates, poles and zeroes
- For missing information, contact the manufacturer

SEISMIC INSTRUMENTATION

## STS-6A

### 360s Borehole Seismometer

New Ultra-High Performance Broadband Seismometer of the STS Family

In the 1980's researchers Streckeisen, Steim and Wielandt established standards for digital very broadband (VBB) seismic recording and the Streckeisen STS-1/VBB family of products was introduced to seismological research worldwide. The principles of VBB seismometry have defined research instrumentation since then.

The Streckeisen STS family have set the world standard for broad-band seismometers for over 40 years. The legendary STS-1 and STS-2 surface sensors were followed in 2010 by the STS-2.5, and in 2014, the STS-5A expanded this family with a Borehole sensor system of equal performance and reliability.

Based on Streckeisen's field proven sensor technology the new STS-6A is designed to meet the latest USGS requirements for replacing the aging seismometers in the Global Seismographic Network (GSN) – the standard instrumentation for global research. The STS-6A for the first time combines ultra-low frequency and high-dynamic-range coverage across the entire teleseismic and regional frequency bands in a single instrument. The ability to deploy such an instrument in a quiet deep borehole environment opens previously untapped research opportunities.

The sensor provides a motorized gimbal system for in situ leveling and a direct interface to the Quanterra Q330 family of recording systems for control of both the sensor and gimbal systems. It is integrated within a cylindrical 6.0" downhole package, which includes magnetic shielding for operation at high latitudes.

No intervening "host box" is required. Remote control of advanced functions is supported through a bi-directional RS-422 serial interface. The serial interface is not required for typical operation. The sensor package and cabling have been designed to tolerate continuous immersion at depths of 300 meters.

The gimbal system is powered only during sensor deployment, removal or periodic re-leveling "in situ." When not in use, the gimbal and the internal controller are automatically de-powered completely.

#### FEATURES

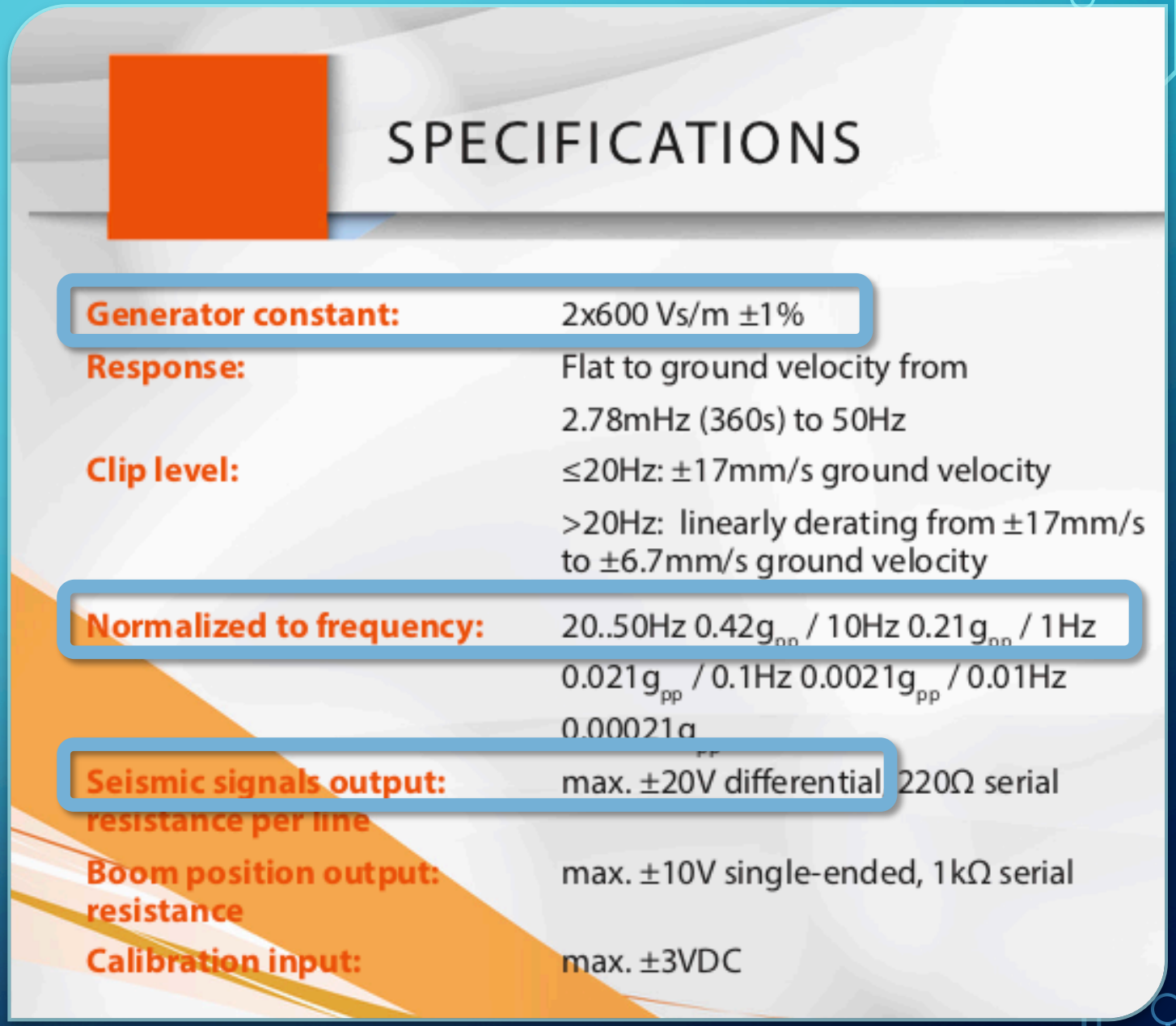
- STS-1 observatory-class ultra-low-noise performance in a borehole
- Automatic levelling system compensates for up to 5 deg tilt
- More than *double* the clip level of the STS-1. Low gain for highest dynamic range
- Bandwidth extends to 50Hz - far above the STS-1 with low noise
- Thermal and magnetic shielding for ultra-low-frequency performance
- Guaranteed orthogonal 3-axis outputs

#### SPECIFICATIONS

| | |
|---|---|
| **Generator constant:** | 2x600 Vs/m ±1% |
| **Response:** | Flat to ground velocity from 2.78mHz (360s) to 50Hz |
| **Clip level:** | ≤20Hz: ±17mm/s ground velocity<br>>20Hz: linearly derating from ±17mm/s to ±6.7mm/s ground velocity |
| **Normalized to frequency:** | 20..50Hz 0.42$g_{pp}$ / 10Hz 0.21$g_{pp}$ / 1Hz 0.021$g_{pp}$ / 0.1Hz 0.0021$g_{pp}$ / 0.01Hz 0.00021$g_{pp}$ |
| **Seismic signals output: resistance per line** | max. ±20V differential, 220Ω serial |
| **Boom position output: resistance** | max. ±10V single-ended, 1kΩ serial |
| **Calibration input:** | max. ±3VDC |
| **Control inputs:** | 3...30VDC, 0.5mA, galvanically isolated |
| **Communication:** | RS-422, galvanically isolated |
| **Operating temperature:** | -20°C to 70°C (guaranteed), 40°C to 70°C (functional) |
| **Humidity:** | 0-100% RH |
| **Enclosure rating:** | Stainless steel, exceeds IP69 |
| **Various:** | RoHS and CE Compliant |
| **Size:** | Diameter 6.0" (153 mm), Length 24.0" (610 mm) |
| **Weight:** | 30kg |

# EXAMPLE: STS-6 SENSOR

- Poles and zeroes not available – need to email manufacturer
- Generator constant = Sensitivity (convert to nm/s) in sts6.pf
- Normalization frequency = in sts6 (poles&zeroes??)
- Seismic signal output = ??



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| **Seismic signals output:** | max. ±20V differential 220Ω serial resistance per line |
| **Boom position output:** | max. ±10V single-ended, 1kΩ serial resistance |
| **Calibration input:** | max. ±3VDC |

$ANTELOPE/contrib/data/instruments/sensors/sts6.pf

```
originator      Jennifer Eakins, UCSD
last_modified   2018-08-28

#
#

category        Streckeisen
configuration   STS-6

info    &Literal{
Derived from https://kinemetrics.com/wp-content/uploads/2017/04/datasheet-360s
er-sts6a-kinemetrics-streckeisen.pdf
}

description     Streckeisen STS-6
dfile   sts6

rsptype                 V       # velocity instrument
band                    b       # broad band
short_period_sensor     no      # Sets first character of SEED channel code
sensor_type_code        H       # 2nd character in SEED channel code
```

Where did you find the data sheet?

Unique description and name of response file

$ANTELOPE/contrib/data/instruments/sensors/sts6.pf

```
atype           sensor
sensitivity     12e-7
iunits          nm/s
ounits          V

orientations    &Tbl{
Z       0       0
N       0       90
E       90      90
}

response        &datafile(responses/sts6)

caldrive        c
active          yes
calgen          1
cal2rsp         1
calper          1
```

Sensitivity constant from data sheet

Response (poles&zeroes) file to create

$ANTELOPE/contrib/data/responses/sts6

```
# if any questions about values
# contact Streckeisen representative
#
# STS-6    2.78E-03 hz seimometer
# Normalized response relative to velocity
# All poles and zeroes in radians/sec
# 1                   type
# 3                   num of zeroes
# 7                   num of poles
# 0.0                 input sample interval
# 1                   decim factor
# 3.60e+10            normalization facto
# 1.0                 gain
# sensitivity  1200 v/m/sec
3.60e+10
7               Poles
-0.3700E-01   0.3700E-01    0.0000E+00    0.0000E+00
-0.3700E-01   -.3700E-01    0.0000E+00    0.0000E+00
-0.9739E+01   0.0000E+00    0.0000E+00    0.0000E+00
-0.2199E+03   0.1382E+03    0.0000E+00    0.0000E+00
-0.2199E+03   -.1382E+03    0.0000E+00    0.0000E+00
-0.2199E+03   0.6849E+03    0.0000E+00
-0.2199E+03   -.6849E+03    0.0000E+00
3               Zeros
 0.0000E+00   0.0000E+00    0.0000E+00    0.0000E+00
 0.0000E+00   0.0000E+00    0.0000E+00    0.0000E+00
 0.9425E+01   0.0000E+00    0.0000E+00    0.0000E+00
```

Name and response values

Generator Constant

Normalized to 1 (evalresp)

Poles and zeroes from email request