UNITED STATES

DEPARTMENT OF THE INTERIOR

GEOLOGICAL SURVEY

Instructions for use of U.S. Geological Survey standard field note summary form for visit to remote seismograph station.

Prepared by Wes Hall

Open-File Report 90-625

345 Middlefield Road

Menlo Park, California 94025

1990

Table of Contents

INTRODUCTION

GENERAL - The purpose of the field note is to report on a site visit in a standardized manner. The form consists of a summary of station parameters and a description of the activities of the technician while at the site. The field note is the primary document from which the status of the station is determined. Because other records are derived from this document, it is important that the field note be complete and accurate.

U. S. Geological Survey

Branch of Seismology

Station _____ Freq _____ Date (GMT) _____

VCO/Amp Type _____ VCO S/N _____ Cal S/N _____ Atten _____

Seis Type L4 S/N _____ S _____ T _____

Battery Voltages (circle if changed) Type _____ Voltage _____

VCO + _____ - _____ +1.35 _____ Cal Relay _____

Freq Found _____ + Dev _____ - Dev _____

VCO/Sys Load _____ VCO/600 Ω Load _____ Seismic Background Level _____

External Cal 10 uv_____ 100 uv_____ 1000 uv_____ Sw off_____ GMT_____

Attenuation during Calibration _____ Time of Jam _____ Jam Count _____

Component or Station 1_____ 2_____ 3_____ 4_____ 5_____ 6_____ 7_____ 8_____

Sum Amp Input Freq (Hz) 1_____ 2_____ 3_____ 4_____ 5_____ 6_____ 7_____ 8_____

Sum Amp Input Lvl (dB) 1_____ 2_____ 3_____ 4_____ 5_____ 6_____ 7_____ 8_____

Output level _____ (volts p-p)

Transmit Frequency _____ Receive site _____ Azimuth _____

Input Level _____ Power Forward _____ SWR _____

Reason For Visit _____

Action Taken _____

_____

_____

_____

Access Info _____

_____

_____

Remarks _____

_____

Departure Time (GMT) _____ Field Tech _____

J312 FIELD NOTE SUMMARY

Station: USGS seismograph station code name. Example - PGHZ

Freq: Frequency of VCO unit

Date (GMT): Date of actual visit (GMT). Add 7hours for PDT, add 8 hours for PST

VCO/Amp Type: J312XX

VCO S/N: Serial number obtained from preamp board

Cal S/N: Serial number obtained from calibrator PC board

Atten: Attenuation setting obtained from dial on face plate (no changes in attenuation settings are allowed without prior permission)

Seis Type: *L4*

S/N: Seismometer serial number (obtained from seismometer case or label located on VCO container)

S: Shunt damping resistor value (obtained from label located on VCO container)

T: Series damping resistor value (obtained from label located on VCO container)

Type: Type of power used at site (solar, lithium, air cell, power supply, gel cell)

Voltage: Voltage reading of power source (if solar power, disconnect panel before making measurement)

VCO +: Voltage measured between common and +5 on V02L board

VCO -: Voltage measured between common and -5 on V02L board

+1.35: Voltage measured on calibrator at 1.35v test points

Cal Relay: Voltage measured between common and +9 test points on calibrator board (measured voltage should be 7.3 volts)

Freq Found: Frequency measured at "OUT" test points on V02L board (record frequency as found before any adjustment is made)

+Dev: Frequency measured at "OUT" test points on V02L board when +4.05v is applied between common and "MON" test jack. (frequency measured should be the *center frequency* plus 105hz)

-Dev: Frequency measured at "OUT" test points on V02L board when -4.05v is applied between common and "MON" test jack. (frequency measured should be the *center frequency* minus 105hz) note: *center frequency* +/-60hz for 400hz VCO's

VCO/Sys Load: VCO output level measured at "OUT" terminals of barrier strip located on face plate. Output lines are connected to telco drop, input, transmitter input or summing amplifier input.

VCO/600 ohm Load: VCO output measured at "OUT" terminals of barrier strip located on face plate. Output lines are disconnected from the barrier strip and replaced with a external 600 ohm resistor (measured in db's with a high impedance meter)

Seismic Background Level: Signal level measured between MON jack and ground. Seismometer is connected and the attenuator is set to station setting. (measured in RMS with a high impedance meter)

External Cal 10uv, 100uv, 1000uv: Disconnect seismometer input and insert a external 6hz sine wave. Refer to *Seismic Test Unit* operating instructions for procedure (pg 9).

Sw off: Signal level measured between MON jack and ground with calibrator switch in the off position. (< 6mv RMS with a high impedance meter)

GMT: GMT time of external calibration.

Attenuation During Calibration: attenuation setting of VCO/AMP during external calibration.

Time of Jam: GMT time of *JAM*

Jam Count: Refer to *Seismic Test Unit* operating instructions and procedures (pg 10).

Component or Station: Station code name. Example - PGHZ

Sum Amp Input Freq (Hz): Component or station input frequency

Sum Amp Input Level: Component or station input level (db for single station input, pk-pk for multiplex signal input)

Output Level: VCO output level. Measurements are recorded in db for single component frequency and pk-pk for multi-frequencies (sum amp output level).

Transmit Frequency: Frequency of transmitter if used. Example - RF5 or 165.809Mhz

Receive site: Station receiving telemetered signal

Azimuth: Direction of transmitter station in its relationship to receive site.Use 360 degree magnetic compass with proper declination for true north.

Input Level: Output level of VCO for a single component site (measured in db). Output level of summing amp output for multi-componentsite (measured in pk-pk).

Forward Power: Forward power level of transmitter measured in milliwatts.

SWR: Ratio of forward power to reflected power (<1.5)

Reason For Visit: Example - no carrier signal from station

Action Taken: Action taken to repair malfunction of remote site. Example - replaced *VCO* J312ML s/n 123 with *VCO* J312ML s/n 438

Access info: Any additional information not on station maps or that will help with future access.

Remarks: Additional information

Departure Time: GMT time that technician departs from site

Field Tech: Name of technician and all observers

J412H FIELD NOTE SUMMARY

Station: USGS seismograph station code name. Example - PGHZ

Freq: Frequency of VCO unit

Date (GMT): Date of actual visit (GMT). Add 7hours for PDT, add 8 hours for PST

VCO/Amp Type: J412H

VCO S/N: Serial number obtained from preamp/calibrator (main board)

Cal S/N: N/A

Atten: Attenuation setting obtained from dial on face plate. (no changes in attenuation settings are allowed without prior permission)

Seis Type: L4

S/N: Seismometer serial number (obtained from seismometer case or label located on VCO container)

S: Shunt damping resistor value (obtained from label located on VCO container)

T: Series damping resistor value (obtained from label located on VCO container)

Type: Type of power used at site (solar, lithium, air cell, power supply, gel cell)

Voltage: Voltage reading of power source (if solar power, disconnect panel before making measurement)

VCO +: Voltage measured between common and +5 test points on dc-dc converter board (between white and red leads)

VCO -: Voltage measured between common and -5 test points on dc-dc converter board (between white and black leads)

+1.35: Voltage measured on main PC board at 1.35v test points

Cal Relay: Voltage measured between common and +5 test points on dc-dc converter board (between white and blue leads)

Freq Found: Frequency measured at "VCO OUT" test points on main PC board (record frequency as found before any adjustment is made)

+ Dev: Frequency measured at "VCO OUT" test points on main PC board when +4.05v is applied between common and "MON" test jack. (frequency measured should be the *center frequency* plus 105hz)

-Dev: Frequency measured at "VCO OUT" test points on main PC board when -4.05v is applied between common and "MON" test jack. frequency measured should be the *center frequency* minus 105hz) note: *center frequency* +/-60hz for 400hz VCO's

VCO/Sys Load: VCO output level measured at "OUT" terminals of barrier strip located on face plate. Output lines are connected to telco drop input, transmitter input or summing amplifier input.

VCO/600 ohm Load: VCO output measured at "OUT" terminals of barrier strip located on face plate. Output lines are disconnected from the barrier strip and replaced with a external 600 ohm resistor. (measured in db's with a high impedance meter)

Seismic Background Level: Signal level measured between MON jack and ground. Seismometer is connected and the attenuator is set to station setting. (measured in RMS with a high impedance meter)

External Cal 10uv, 100uv, 1000uv: Disconnect seismometer input and insert a external 6hz sine wave. Refer to *Seismic Test Unit* operating instructions for procedure (pg 9)

Sw off: Signal level measured between MON jack and ground with calibrator switch in the off position. (< 6mv RMS with a high impedance meter)

GMT: GMT time of external calibration.

Attenuation During Calibration: attenuation setting of VCO/AMP during external calibration.

Time of Jam: GMT time of *JAM*

Jam Count: Refer to *Seismic Test Unit* operating instructions and procedures (pg10)

Component or Station: Station code name. Example - PGHZ

Sum Amp Input Freq (Hz): Component or station input frequency

Sum Amp Input Level: Component or station input level (db for single station input, pk-pk for multiplex signal input)

Output Level: VCO output level. Measurements are recorded in db for single component frequency and pk-pk for multi-frequencies (sum amp output).

Transmit Frequency: Frequency of transmitter if used. Example - RF5 or 165.809Mhz

Receive site: Station receiving telemetered signal

Azimuth: Direction of transmitter station in its relationship to receive site. Use 360 degree magnetic compass with proper declination for true north.

Input Level: Output level of VCO for a single component site (measured in db). Output level of summing amp output for multi-component site (measured in pk-pk).

Forward Power: Forward power level of transmitter measured in milliwatts.

SWR: Ratio of forward power to reflected power (<1.5)

Reason For Visit: Example - no carrier signal from station

Action Taken: Action taken to repair malfunction of remote site. example - replaced *VCO* J412H s/n 123 with *VCO* J412H s/n 438

Access info: Any additional information not on station maps or that will help with future access.

Remarks: Additional information

Departure Time: GMT time that technician departs from site

Field Tech: Name of technician and all observers

J512A FIELD NOTE SUMMARY

Station: USGS seismograph station code name. Example - PGHZ

Freq: Frequency of VCO unit

Date (GMT): Date of actual visit (GMT). Add 7hours for PDT, add 8 hours for PST

VCO/Amp Type: J512A

VCO S/N: Serial number obtained from preamp/calibrator (main board)

Cal S/N: N/A

Atten: Attenuation setting obtained from dial on face plate. (no changes in attenuation settings are allowed without prior permission)

Seis Type: L4

S/N: Seismometer serial number (obtained from seismometer case or label located on VCO container)

S: Shunt damping resistor value (obtained from label located on VCO container)

T: Series damping resistor value (obtained from label located on VCO container)

Type: Type of power used at site (solar, lithium, air cell, power supply, gel cell)

Voltage: Voltage reading of power source (if solar power, disconnect panel before making measurement)

VCO +: Voltage measured between common and +5 test points on VCO board.

VCO -: Voltage measured between common and +5 test points on VCO board.

+1.35: Voltage measured on main PC board at 1.35v test points

Cal Relay: Voltage measured between common and +5 test points on main PC board.

Freq Found: Frequency measured at "VCO OUT" test points on main PC board (record frequency as found before any adjustment is made)

+ Dev: Frequency measured at "VCO OUT" test points on main PC board when+4.05v is applied between common and "MON" test jack. (frequency measured should be the *center frequency* plus 105hz)

-Dev: Frequency measured at "VCO OUT" test points on main PC board when -4.05v is applied between common and "MON" test jack. Frequency measured should be the *center frequency* minus105hz). note: *center frequency* +/-60hz for 400hz VCO's

VCO/Sys Load: VCO output level measured at "OUT" terminals of barrier strip located on face plate. Output lines are connected to telco drop input, transmitter input or summing amplifier input.

VCO/600 ohm Load: VCO output measured at "OUT" terminals of barrier strip located on face plate. Output lines are disconnected from the barrier strip and replaced with a external 600 ohm resistor. (measured in db's with a high impedance meter)

Seismic Background Level: Signal level measured between MON jack and ground. Seismometer is connected and the attenuator is set to station setting. (measured in RMS with a high impedance meter)

External Cal 10uv, 100uv, 1000uv: Disconnect seismometer input and insert a external 6hz sine wave. Refer to *Seismic Test Unit* operating instructions for procedure (pg 9).

Sw off: Signal level measured between MON jack and ground with calibrator switch in the off position. (< 6mv RMS with a high impedance meter)

GMT: GMT time of external calibration.

Attenuation During Calibration: attenuation setting of VCO/AMP during external calibration.

Time of Jam: GMT time of *JAM*

Jam Count: Refer to *Seismic Test Unit* operating instructions and procedures (pg 10).

Component or Station: Station code name. Example - PGHZ

Sum Amp Input Freq (Hz): Component or station input frequency

Sum Amp Input Level: Component or station input level (db for single station input, pk-pk for multiplex signal input)

Output Level: VCO output level. Measurements are recorded in db for single component frequency and pk-pk for multi-frequencies (sum amp output).

Transmit Frequency: Frequency of transmitter if used. Example - RF5 or 165.809Mhz

Receive site: Station receiving telemetered signal

Azimuth: Direction of transmitter station in its relationship to receive site. Use 360 degree magnetic compass with proper declination for true north.

Input Level: Output level of VCO for a single component site (measured in db). Output level of summing amp output for multi-component site (measured in pk-pk).

Forward Power: Forward power level of transmitter measured in milliwatts.

SWR: Ratio of forward power to reflected power (<1.5)

Reason For Visit: Example - no carrier signal from station

Action Taken: Action taken to repair malfunction of remote site. example - replaced *VCO* J512A s/n 123 with *VCO* J512A s/n 438

Access info: Any additional information not on station maps or that will help with future access.

Remarks: Additional information

Departure Time: GMT time that technician departs from site

Field Tech: Name of technician and all observers

SEISMIC TEST UNIT OPERATION

I. CALIBRATOR

A. CONTROLS AND INDICATORS

1. On-Off Switch....Controls DC power to the sine calibrator section.
2. Selector Switch....Controls the selection of calibrator outputs which consist of 10, 100, and 1000uv, Hz sine wave and plus and minus precision 4.05 vdc.
3. Monitor Test Points....Provides an output monitor provision for any calibration selection. May also be used to transfer outputs for direct use.

B. OPERATION

1. J412 & J512 VCO Sine Wave Calibration....The sine calibration is used in connection with the J4 interface unit. Connect the interface cable to the unit under test. Switch on Calibrator power, Switch on interface "CAL"switch, and select the desired cal volt option. The calibration signal will be applied to the VCO preamp. Monitor the VCO analog output at the monitor test points on the interface unit with select switch on "PREAMP".

   Comparative values for proper preamplifier gain are provided below. This is the analog signal measured on the AC volts function of a Phillips 2503 multimeter.

VCO attenuator setting	18db (J512)	18db (J412)
10uv calibration	55mv	40mv
100uv calibration	.5v	.4v
1000uv calibration	3.8v (clipping)	2.8v (clipping)

2. J312 VCO Sine Wave Calibration....The operation is identical to that of the other VCO types except that calibrator outputs are applied to the input points near the S & T resistors directly from the Calibrator Test Points.

3. VCO Sensitivity Calibration....Use external test leads to apply the plus and minus 4.05 volts from the calibrator to the monitor test point (VCO input) and common of the VCO. Measure the FM frequency and adjust the deviation controls to plus and minus 105 Hz of center frequency. This procedure applies to J312, J412 and J512 VCO's.

II. JAMMER

A. CONTROLS AND INDICATORS

1. Thumbwheel Switch Bank....Provides a visual indication and selects the count to be jammed.
2. Output Connector....Used with the interface cable for J312 VCO's only.
3. Jam Switch....Initiates the "JAM" from the test unit to the VCO.
4. LED....Provides a visual display of VCO calibrator timing.
5. Clock Switch....Selects clock functions. Used when resetting clock functions.
6. Set Switch....Sets clock functions. Used when resetting clock functions.

B. JAMMER OPERATION

1. Clock....The clock is a time reference used to help accurately compute the proper number of pulses to be set into the jammer. It does not affect test unit operations in any way. It is provided merely as an accurate time reference for calibrator setting and can be reset using a USGS master clock.

2. VCO Calibrator Time Set....The J312, J412H, J512A calibrator is designed to start a calibration sequence once every 24 hours from the time it is reset. Therefore, in order to have the calibration occur at a given time of day other than when it is was turned on, the calibrator must be reset and then have additional pulses jammed into it so that it will start the calibration in less than 24 hours.

   The chart provided on the bottom of the test unit shows trigger pulse values for a 1200 GMT calibration. The operator must compute the required value from the chart based on the time jaming ocurs. Consider the computation for a jam at 1714 hours.

17 hours equals	11605 pulses
10 minutes equals	110 pulses
4 minutes equals	44 pulses
	11759 is the number to set on the switch bank.

   This will provide a calibration at 1200 GMT daily. Note: Always select a jam time several minutes ahead of actual time. This will give the operator time to set up the controls.

   Connect the interface cable from the J4 interface unit to the VCO. Turn the interface "JAM" switch on. Timing will now appear on the LED. Monitor the time and during the 1713th minute, at approximately 55 seconds, depress the "SET" switch to accomplish the JAM. If you watch the LED timing light you should see the jam pulses pass over to the VCO.

   VCO's of different frequencies are normally set to calibrate at different times

   Frequency Correction for 400, 680, 1020 Hz VCO's.....+1366 pulses (1000 GMT)
   Frequency Correction for 1360, 1700, 2040 hz VCO's....+683 pulses (1100 GMT)
   Frequency Correction for 2380, 2720, 3060 hz VCO's.....+0 pulses (1200 GMT)

   The J412 and J512 VCO's will run a calibration sequence immediately after the jam with any set number greater than 8192. This is merely a function of the set circuitry, however, the calibration can be monitored with an oscilloscope at the monitor test points of the Interface Unit with the selector on "PREAMP".

   Finally, to prevent possible noise spikes from affecting the calibration set, turn off the Interface Jam Switch before removing the interface cable from the VCO.

III. J4 INTERFACE UNIT

A. CONTROLS AND INDICATORS

1. Selector Switch....When used with the Monitor Test Points, provides the ability to measure VCO voltages and monitor analog signal out of the VCO preamplifier.
2. Jam Switch....Connects VCO and calibrator Jammer through Interface cable.
3. Cal Switch....Connects the sine wave calibrator output to the VCO via the interface cable.
4. Output Connector....Used with the J412 and J512 Interface cables only.

B. OPERATION (INTERFACE UNIT)

This unit interfaces the calibrator and jammer sections of the test box to J412/J512 VCO's. It also provides Monitor test points for monitoring VCO voltages and preamplifier signal. Actual operation is described in the Calibrator and Jammer sections.

IV. LEVEL TESTER

A. CONTROLS AND INDICATORS

1. Seis Monitor Test Points....External connection to seismometer.
2. Meter Monitor Test Points....External connection to DC Voltmeter.
3. Polarity Switch....Reverses the DC current applied to the seismometer.
4. Test Switch....A push-button switch to apply, hold and release DC current.

B. OPERATION

Connect the Seismometer cable to the Seis Test Points. Connect a DC Voltmeter to the Meter Monitor Test Points. Apply the DC current to the seismometer in both the positive and negative directions. Level the seismometer until the positive and negative voltages are equal. Note: The meter deflection is momentary due to the velocity type seismometer.

V. FREQUENCY COUNTER

This is a standard LCD counter designed to accommodate signals in the 30mv to 15v range. Test points are provided for external cables.

VI. CARE OF THE SEISMIC TEST UNIT

1. Most problems encountered with this unit are due to broken internal wiring....a result of rough handling in the field. The unit was designed to be housed (and transported) in a foam padded Zero instrument case. It is strongly recommended that this or a similar case be used.
2. All units are powered by internal batteries which are readily accessible for checks and changes. It is recommended that the clock battery be replaced only as a maintenance function. Special attention to turning off Calibrator and Counter switches when not in use will assured long battery life. Switch guards are provided for clock switches because depression of these switches by packing material will quickly consume batteries.
3. Protect the Test Unit from abnormal heat when in the field and when possible, avoid direct sunlight on the liquid crystal displays.

MINIMUM REQUIREMENTS FOR EACH SITE VISIT

1. notify land owner before site visit when required
2. *Field Notes* complete, any discrepencies noted.
3. connections and spade lugs soldered
4. *jam set* and *jam sequence* good on all units
5. correct *vco* output levels
6. assigned attenuation setting
7. vco terminal strip screws tightened
8. condulet bushings ok
9. instrumentation sealed and watertight
10. land line in good condition and buried if possible, splices soldered and taped.
11. site area cleaned (electrical tape, SP-4 not being used, ty-raps, paper, wire, etc)

12. antenna post stable and vertical
13. antenna correct orientation
14. antenna conncections taped
15. antenna transmission lines ok
16. SWR <1.5
17. load test on solar battery ok
18. fluid level of solar battery ok. If low check current drain of vco and radio.
19. corrosion on battery terminals removed and corrosion spray applied
20. solar panel surfaced cleaned, bird protector installed if required
22. tub locked and secured
23. all gates locked
24. update site maps if needed
25. turn in field notes to Charles Diass immediately upon return to home station.