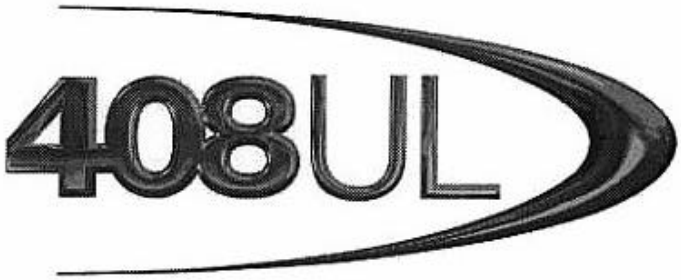
Exhibit C-Operators Manual



Installation Manual

V5.0

0311400

April 2001

Remote Eagle Module (REM)

The REM connects to the Left or Right Transverse connector of an LAUX, or a 408UL control module or another REM. It interfaces a radio cell with a wireline telemetry section or with the CM408 or 408XL. It is used to control the digitizer units (SU6-R) in a radio cell and retrieve the seismic data from it.

12 VDC power supply input

XDEV

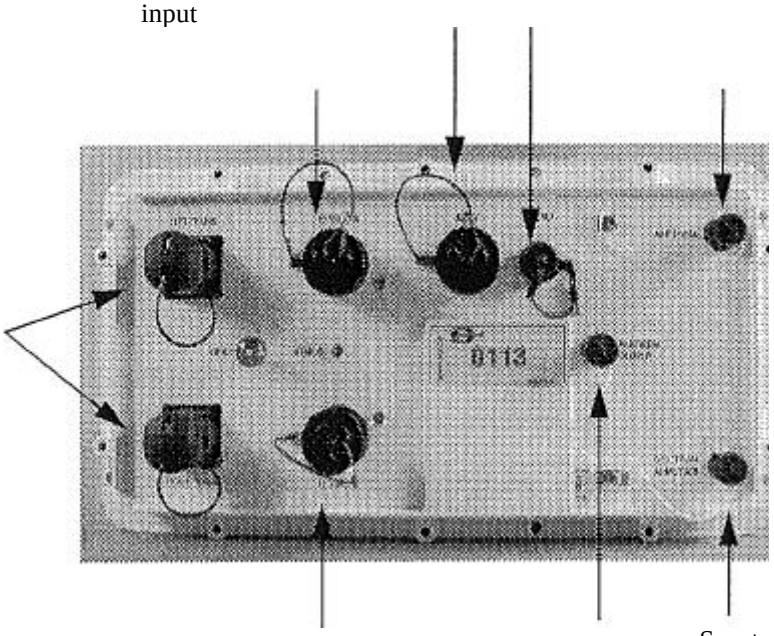
Audio

RF Power output to antenna

Transverse connectors

12 VDC power supply input

Multi-REM output



Spectrum analyzer

Main specifications of the REM:

- Operates from 12 VDC (a standard 12 V battery).
- Data reception rate: 400 kbit/s.
- 16 000 sample buffer per channel; acquisition capacity: 32 s@2 1T2S.
- Transmit/receive frequencies: 216 to 230 MHz in 50-kHz steps;

l0 W RF output~ power (rain);
One REM in each RF cell (1 retrieve frequency);
Up to six REMs can be used on one antenna;
Maximum number of REMs in a network: 16;
Typical range: 16 to 24 km (10 to 15 miles).

The REM has a built-in signal strength meter used to monitor the RF Spectrum on the HCI workstation, and an output for connection to an external spectrum analyzer with a finer resolution. The signal available on the Spectrum Analyzer output is picked up at the antenna with a 20 dB gain.

Preamplifier

If a preamplifier is used between the antenna and the Antenna connector on a REM, then the REM Layout Setup on the HCI workstation must let the REM supply a 12 V DC voltage to the preamplifier over the antenna downlead in receive mode.

If any filter is used that does not relay DC voltage, then a DC Block must be used to supply power to the preamplifier.

SU6-R

The SU6-R is a six-channel field digitizer unit used in radio telemetry cells. It uses a radio link to communicate with a REM. All the SU6-Rs are completely independent and can coyer any type of field.
In the event of obstruction along an RF radio path to the REM, a simple wire telemetry link can be used in place of the RF link.

The SU6-R uses a small, light-weight, ragged aluminum package for reliability and reduced transportation effort.
Its main features are the following:

- A rechargeable nickel-cadmium 0NJ-Cad) battery pack.
- Analog-filter-free and ideal seismic response. Taking advantage of the large dynamic range and the very low distortion of the SU6-Rs 24-bit-stream A/D converter, the seismic channels are free from any analog filters. With this design, idem seismic response with linear phase shift is achieved, as undesirable phase shifts and temperature drifts otherwise associated with analog components are eliminated. Also, no filter setting is required at the field level, which precludes any unrecoverable error that might otherwise arise from incorrect filter settings.

- A low distortion built-in test generator is integrated into every SU6-R, in order to performance a remote check of the complete acquisition performance, at full specification, from the central control unit without any external oscillator.

- Internal memory that allows simultaneous collection and retrieval of seismic data. Shot stacking may also be performed by the SU6-R.
- Each field unit is assigned to a specific frequency upon deployment by the control unit.

NOTE: The SU6-R is fully compatible with SERCEL-OPSEIS SARs.

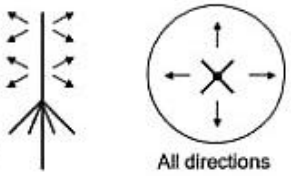
SU6-R Antenna

On each SU6-R two types of antenna can be connected according to the type of field.

- OMNI antenna

  This antenna is an omnidirectional antenna. Its length will determine its range.

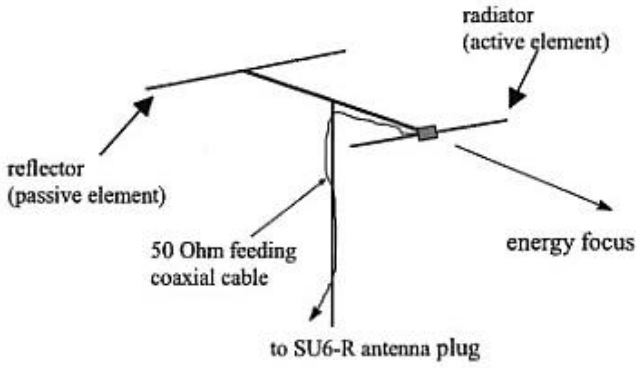
  This antenna is suitable for water, hills or areas with a lot of trees.



- YAGI antenna

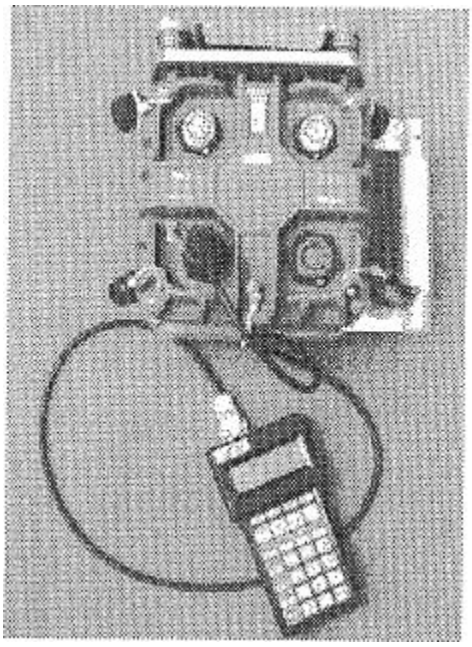
  This antenna is a 2-element antenna. One element is driven and one is reflective. Its range is between 12 and 14 miles (18 to 24 km).

  This antenna is suitable for flat, open areas and areas with fewer trees.



2-element vertical yagi antenna

FDPA (Field Deployment aid)



The FDPA is a small hand-held terminal that allows you to program, monitor and test certain aspects of the setup for an SU6-R. Typically the checks are performed at the time of physical SU6-R deployment in order to speed up deployment.

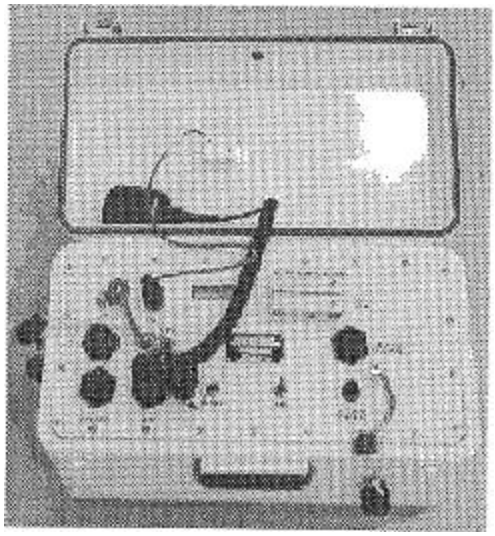
The FDPA activates the SU6-Rs power-up self-test, can evaluate cable leakage and continuity tests, and assign the SU6-R address and SU6-R wire-line function.

The FDPA receives its power from the connected SU6-R. The test results are displayed on a 4-line, 20-column LCD screen.

Multi-frequency RF Blaster

The RF Blaster Unit, is a portable, internally battery-powered unit the shooter uses 'to initiate shot point operations.

The RF Blaster sends and receives commands, and transmits data to the central control unit via its own RF transceiver.

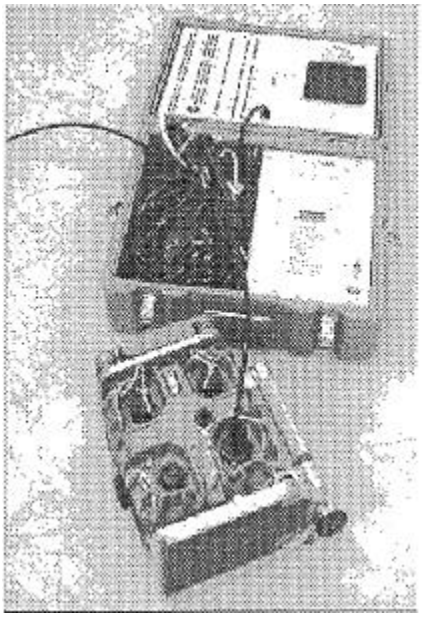


Battery charger

It's a portable 8-hour charger designed to simultaneously charge 1 to 36 SU6-Rs.

There are 6 charging cables. Each cable can charge up to six SU6-R units.

LED circuits provide a visual indication of the charging process. Since each of the chargers is fully automatic, a battery can be connected to or disconnected from the charger independently of the others. A battery does not have to be fully discharged



before it can be connected to the charger.

Power Unit Capacity Tester.

The Power Unit Capacity Tester (PUCT) can perform capacity testing on SU6-R Power Units to verify their performance before use on the field. It's basically a capacity tester with control circuitry to improve operation. It lets a user view the test and status results.

The PUCT can also help rejuvenate battery packs suffering from "voltage depression".

FST II (Field SU6-R Tester)

The FST II Tester is a PC-based device that performs diagnostic testing and calibration on the SU6-R. It is used for performance checks and therefore troubleshooting on an SU6-R.

RF Tester

The RF Tester performs diagnostic testing and troubleshooting on the RF unit and SU6-R transceivers. This unit also allows final calibration to be checked prior to putting transceivers into operation in the field.

LC Tester

The LC Tester is used to test Leakage and Continuity.

WLR

When terrain or distance causes a weakened signal, making clear communication with the REM difficult, a Wireline Repeater (WLR) can be used. A WLR extends the range of communications between SU6-Rs and the REM up to 1500 m. It is inserted into the line in the same way as a field acquisition unit but does not contain seismic acquisition circuits.

Connecting REMs

Minimum distance requirements

In order not to overload the receiving stage in REMs and SU6-Rs, the following minimum distances are required:

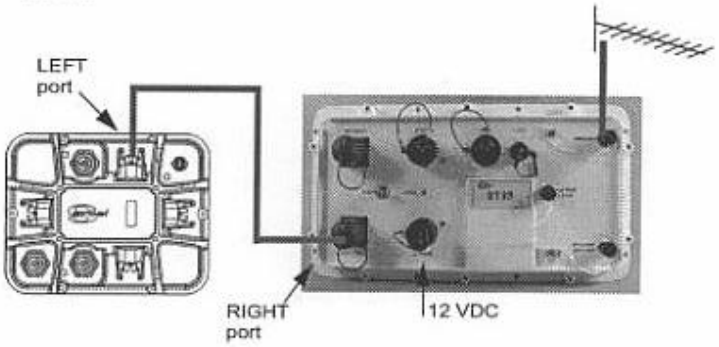
between REM and SU6-R:	100 m (300 ft);
between REMs:	300 m (1000 ft);
between SU6-Rs:	100 m (300 ft).

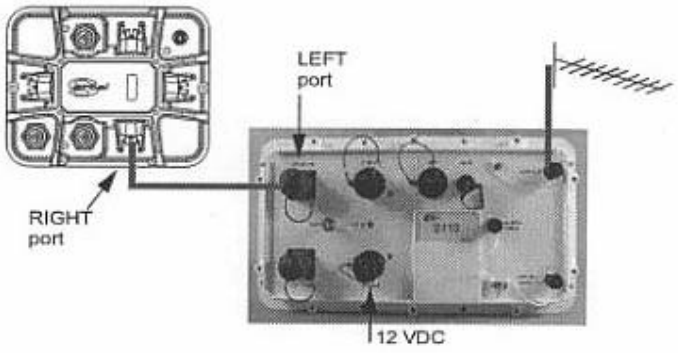
These are approximate values, depending on the type and direction of the antenna and on various RF transmission parameters.

REM basic configuration

- Along the spread

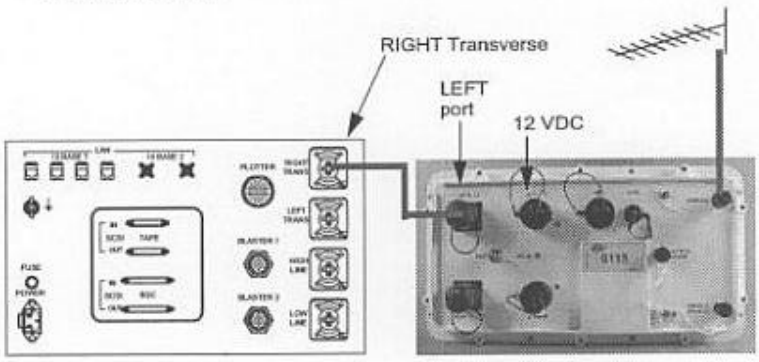
  Typically, you can implement a radio telemetry cell anywhere across a wireline spread by simply attaching a REM to the Right or Left Transverse connector of an LAUX. Each REM controls SU6-Rs on a single frequency. Up to 16 REMs can be implemented across the spread.

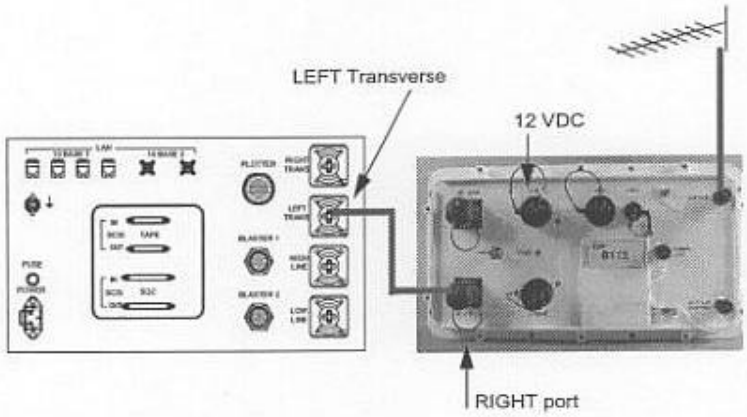




- Cabin-mounted REM

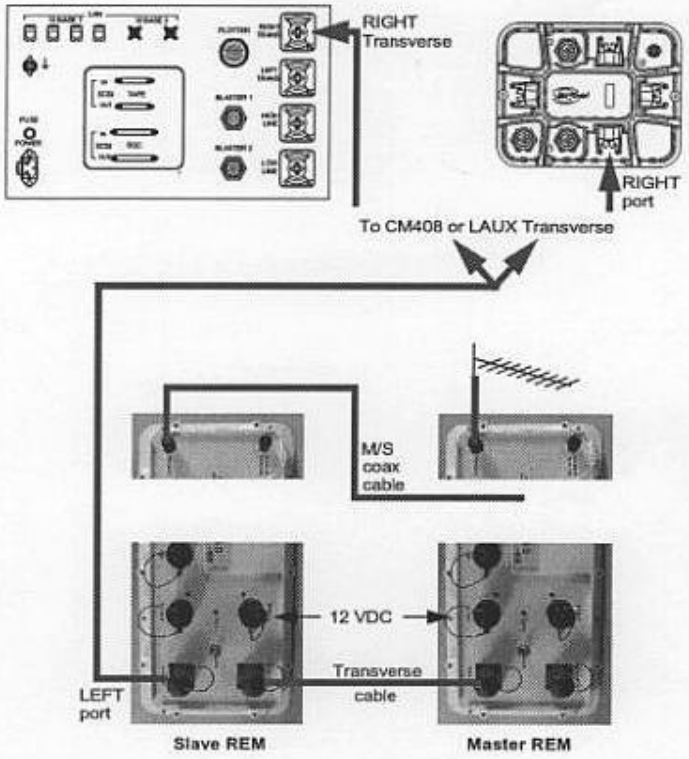
  The REM is connected to the Left or Right Transverse connector of the CM408 or CMXL





REM Master/Slave configuration

In the Master/Slave configuration, up to six REMs can be series-connected, allowing up to six frequencies to be used on a single antenna. The Left (Right) port of one of the REMs is connected to the Right (Left) Transverse port of the control module (CM408 or 408XL) or an LAUX. Only the master REM is equipped with an antenna and sends commands to SU6-Rs.



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Cab-mount aerial installation

Mast Mounting

For in-depth information concerning the mast mounting procedure, please refer to the manufacturer's documentation.

Compressor setting

For in-depth information, please refer to the manufacturer's document.

Before using the air compressor on the field, the primary pressure switch sensing the receiver should be set according to the motor maximum compression capacity in order not to damage the motor.

For a 50 PSI maximum compression capacity given as an example, the motor should start when the receiver pressure falls around 25 PSI and stop at 50. To set the pressure switch correctly, use the following procedure:

· Remove the pressure switch cover to access the two adjusting screws.

WARNING

The four terminal screws are at line voltage and present a shock hazard.

Turn the center adjusting screw counter-clockwise to decrease cut-in pressure (ON) and cut-out pressure (OFF).

To change the cut-out pressure without affecting the cut-in setting, turn the off-center screw clockwise to increase the setting or counterclockwise to decrease the setting.

To check the settings, release air from the system until the compressor starts and note the pressure gauge reading when it comes on, then dose the air valve and note the pressure at which the compressor shuts off.

Rotator Setting

The information given below concerns the AR-40 Antenna Rotator manufactured by Hy-Gain. For in-depth description, the user should refer to the manufacturer documents.

Pre-Installation Check and Calibration.

Before mounting the rotator unit on the considered mast or tower, check the operation with the control unit and cable. Strip all conductors at both ends of the cable and attach to the terminals. Connect terminal 1 to terminal 1, etc. On the control box, simply insert the bare wire between the nut and the terminal and tighten the screw. Do not wrap the wire around the screw!

Plug the control unit line cord into a convenient wall outlet. Turn the direction control knob to 'N'. Momentarily press down on the start button. The rotator will start to turn and the indicator light will come on. When the rotator reaches 'N', it will automatically stop and light-will go off.

Turn the knob COUNTERCLOCKW/SE to 'S' and press the start button. If the rotator unit stops before the South position and the indicator light turns off, adjust the 'CCW end of rotation' shaft counterclockwise as far as it will go. The adjustments for end of rotation are located on the bottom side of the control box. Tm~ the unit to 'W', stop, then again to 'S', using the method as described previously. If the control light remains on this time, slowly turn the 'CCW' shaft clockwise until the light goes off.

Turn the knob CLOCKWISE to 'S' and press the start button. The rotator unit should turn clockwise toward the 'SOUTH' position. If the rotator stops before reaching the 'SOUTH' position and the indicator light turns off, adjust the 'CW end of rotation' shaft clockwise as far as it will go. Turn the unit to 'E', stop, then again 'back to 'S'. If the light remains on, slowly turn the 'CW' shaft counterclockwise until the light turn off.

Leave both rotators in the 'NORTH' position for the mast and antennae array indexing and put a pen mark on upper and lower parts of each rotator so that the 'NORTH' position is dearly visible.

Typical setting of the cab-mount antenna

After installing the antenna (see *Cab-mount aerial installation on page 8-14),* a variety of adjustments can be considered with a view to coveting your specific spread performance. But before attempting any adjustment, the recording unit has to be located to optimise the system's RF performance.

Choosing a good site involves prior planning. An advance party and survey crew typically provides site information, including a suggested spot to place the Recording Unit.

It is also helpful to consult a topographical map.

A recording unit is situated for best operation when located:

· Out of hazardous areas.

STOP *CAUTION*

Do not raise any system antenna near electrical power distribution lines.

· At maximum possible elevation for optimum RF performance.

· At the most suitable place to minimize REM re-location during the operation.

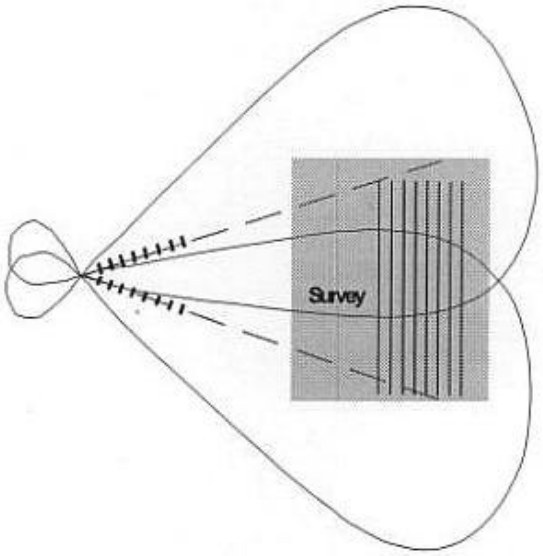
· Away from tall, dense foliage and other objects that could possibly attenuate RF signals.

· Away from outside RF interference patterns.

· Within the system's RF range, which is typically 12 to 24 km% but will vary in relation to the above listed conditions configurations with two stacked 7-element YAGI dual arrays.

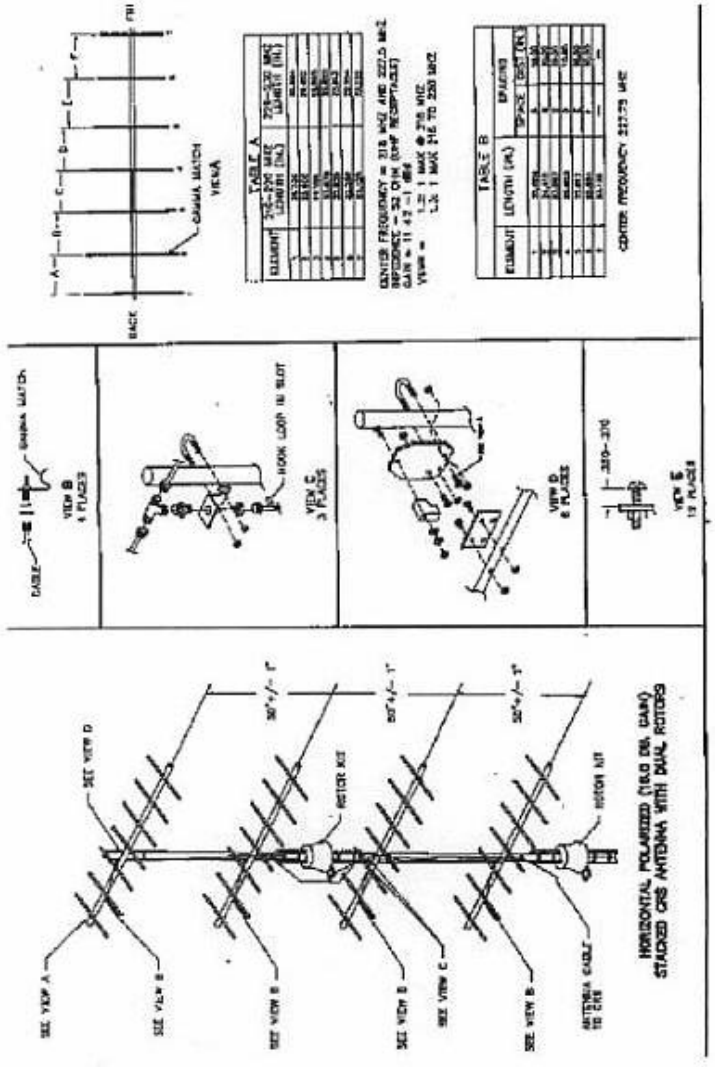
OMNI	12 - 18 km (8 - 11 miles)
Yagi	18 - 24 km (11 - 15 miles)

Using the rotor of antenna, rotate one array to address the farthest first spread number, and address the other one to the farthest last spread number.



By shifting the two arrays, the radio cover will be increased, but the gain will be decreased.

Horizontally polarized, Stacked Antenna with Dual Rotors



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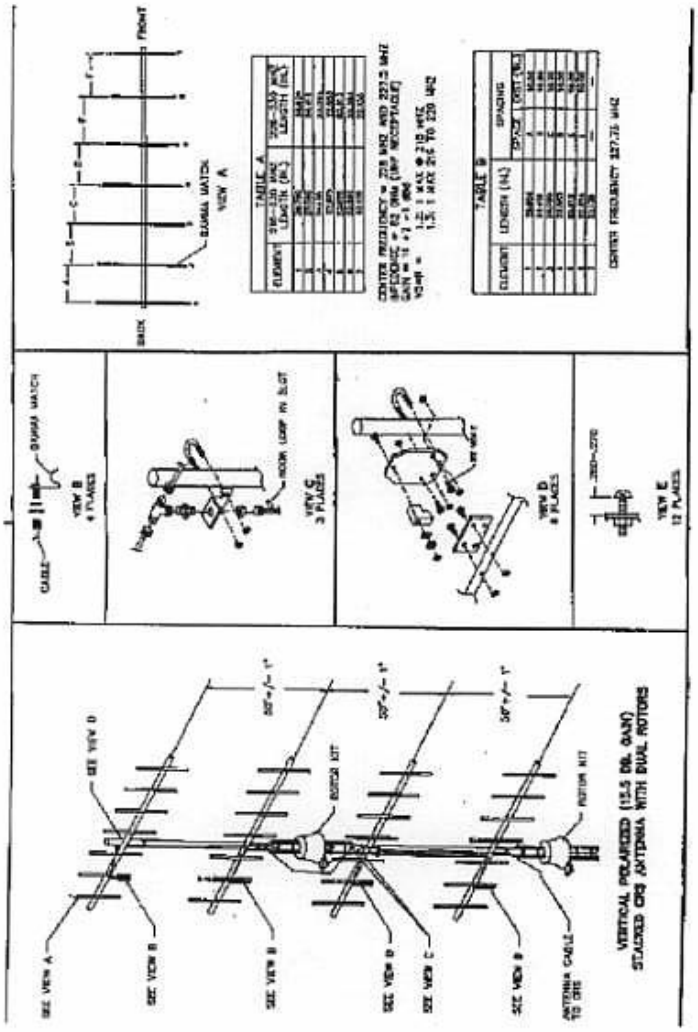
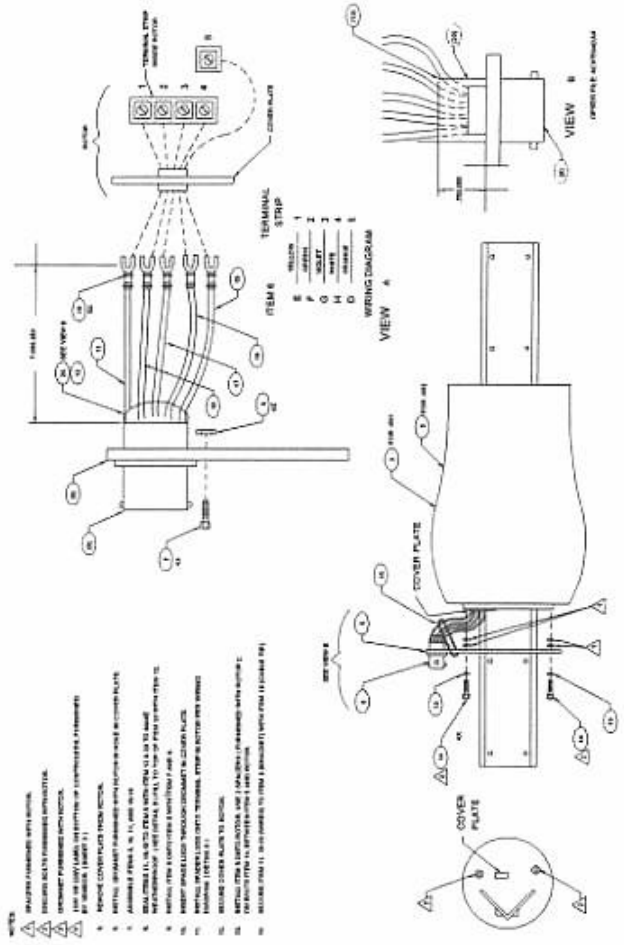
Vertically polarized, Stacked Antenna with Dual Rotors



Antenna Rotor Control Assembly Details



(P / N 2005660-001, -002)

SU6-R deployment

Overview

Controlled by operational commands on the transmit frequency from the Remote Eagle Module (REM), the microprocessor in the SU6-R can receive, convert, stack, store and transmit (on the REM receive frequency) seismic data to be processed by the CM408 or CMXL.

With up to six REMs in the master/slave configuration, the data can be retrieved simultaneously from all. SU6Rs on up to six frequencies. In case of radio restrictions, a simple wire telemetry link can be used in place of the RE link. To transmit data, two modes are available:

RF mode;
Wire-Link mode.

For general requirements relating to radio transmission and power supply, see the following paragraphs:

· *Typical setting of the cab-mount antenna (page 8-17)* · *SU6-R signal Quality Control (page 8-31)* o *Conditions Affecting Reception (page 8-32)*

· *SU6-R Battery Management (page 8-34)*

· *FDPA - Field Deployment Aid (page 8~37)*

The connectors on the SU6-R consist of:

- Two geophone connectors - GEO A and GEO B:

  Used to input seismic signals into the SU6-R.

- WL/DPA (Wire Line / Field Deployment Aid) connector:

  Used for Wire Line operation. This port connects to other Master or Slave units by a Wire-Line cable.

  Used for field checks and setup (FDPA).