Kim Frankcombe

TM-2 GENIE/HORIZONTAL LOOP PORTABLE ELECTROMAGNETIC TRANSMITTER

OPERATION MANUAL

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ABOUT THIS MANUAL

This manual describes the operation of the TM-2 GENIE/Horizontal Loop Portable Electromagnetic Transmitter.

Information pertaining to either the SE-88 GENIE Electromagnetic Receiver or the IGS-2/EM-4 GENIE/Horizontal Loop Electromagnetic Receiver can be found in operation manuals dedicated to these various receivers.

TM-2 GENIE/HORIZONTAL LOOP PORTABLE
ELECTROMAGNETIC RECEIVER

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TM-2 GENIE/Horizontal Loop Portable Electromagnetic Transmitter

1.0 INTRODUCTION

1.1 TM-2 Electromagnetic Transmitter

Scintrex has improved the successful SE-88 GENIE Portable Electromagnetic Transmitter so that it can also be used for the Horizontal Loop Electromagnetic (HLEM) survey method. This new instrument is now called the "TM-2 GENIE/Horizontal Loop Portable Electromagnetic Transmitter".

The TM-2 Transmitter is used with an appropriate receiver in mineral prospecting for massive sulphide ore bodies. It also assists in the detection of faults or shear zones and in providing information about subsurface conductivity for geological mapping, sand and gravel or groundwater exploration.

The TM-2 Transmitter can be used with either the Scintrex SE-88 GENIE Electromagnetic Receiver, or the Scintrex IGS-2/EM-4 GENIE/Horizontal Loop Electromagnetic Receiver. One advantage of the IGS-2/EM-4 Receiver is that optional sensors can be added to the basic IGS-2 system. This feature permits the taking of magnetic, VLF and EM measurements concomitantly.

To use the TM-2 Transmitter in the GENIE mode with the IGS-2 system, the EM-4 Electromagnetic Sensor Option must be installed. If the EM-4 Expansion Module is also utilized, then both GENIE and HLEM measurements can be made.

Figure TM:2
The IGS-2/EM-4 EM Receiver (left) and the SE-88 GENIE EM Receiver (right).

1.2 Modes of Operation

1.2.1 GENIE Mode

In the GENIE mode, a single receive coil at the IGS-2/EM-4 Receiver senses the amplitudes of the two transmitted fields. The receiver then normalizes the amplitudes by the free space amplitudes and calculates their ratio. All values are displayed and recorded in solid-state memory.

1.2.2 Horizontal Loop Mode

In this mode of operation, a transmitter-receiver interconnecting cable is used to connect the TM-2 Transmitter to the IGS-2/EM-4 Receiver. The phase reference for each transmitted frequency is then sent over the cable so that the signals picked up by the receiver coil may be resolved into the in-phase and quadrature components of the secondary field. This measurement mode is called "Horizontal Loop ", although it is also referred to as "Slingram" or "HLEM". When in the Horizontal Loop mode, the Scintrex IGS-2/EM-4 Receiver automatically calculates and records the GENIE mode ratio values. The simultaneous two frequency transmission cuts measurement time, compared to systems which only transmit one frequency at a time.

Note: In order to perform horizontal loop measurements, the TM-2 HLEM Upgrade Option must be installed.

1.3 Accessory Items

1.3.1 Battery Charger

The TM-2 Transmitter includes a battery charger. It operates from 115/230 V AC at 50/60 Hz and is 50 VA overload protected. A completely discharged battery pack is normally recharged in 7 hours.

1.4 Optional Items

1.4.1 TM-2 HLEM Upgrade Option

In order to perform horizontal loop measurements, the TM-2 HLEM Upgrade Option must be installed. Included with the kit are the following:

1. HLEM Electronic Circuit Board
2. Isolation Transformer
3. Tiltmeter/Intercom Module
4. Designation Plate

A complete description of the TM-2 HLEM Upgrade Option is provided in Section 2.4 of this manual.

1.4.2 Transmitter-Receiver Interconnecting Cables

Scintrex prepares transmitter-receiver interconnecting cables for horizontal loop measurements to order, in any lengths up to 300 metres, or imperial measure equivalents.

2.0 TM-2 PHYSICAL DESCRIPTION

2.1 TM-2 GENIE/HLEM Portable Electromagnetic Transmitter

The TM-2 Transmitter is shipped fully operational from the factory with a charged battery pack installed. However, before field use, it is recommended to recharge the battery pack as outlined in Section 6.0.

The various features of the TM-2 Transmitter are outlined below:

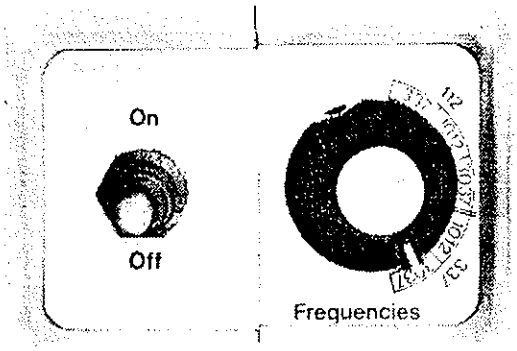

Figure TM:3
TM-2 Power Switch and Frequency Pair Selector

1. Power Switch:

Aside from its main function of switching the transmitter on or off, this toggle switch also has a reset function. Should the frequency be changed inadvertently while the transmitter is operating, an automatic shut-down will be triggered to prevent damage to the electronics. Normal operation can be restored by recycling the power switch.

2. Frequency Pair Selector:

The frequency pair selector is a five-position rotary switch that selects the five available frequency pairs.

Frequency selection should only be made while the transmitter is off.

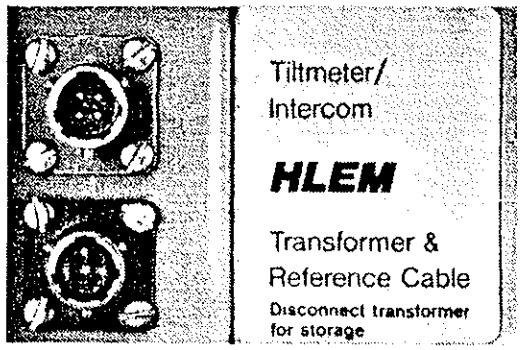

Figure TM:4
TM-2 HLEM Connector and Tiltmeter/Intercom Connector.

3. Transformer and Cable Connector:

The isolation transformer is connected to the lower connector on the left side of the transmitter when setting up for HLEM measurements. The transmitter-receiver interconnecting cable is attached to the connector mounted on the isolation transformer housing.

4. Intercom Connector:

The upper connector on the left side of the transmitter is used for connecting the tiltmeter/intercom module via a cable connector.

5. Audio Alarm:

An audible three-function alarm is built into the backpack. The tone is approximately 4000 Hz and signalling is as follows:

Low Battery
A one second "beep" every 35 seconds. Depending on temperature, 5 to 10 minutes of continuous operation are possible after the warning starts.

Low Moment
If the transmitter moments depart from their specified value, either due to excessively low battery or other reasons, the alarm is also triggered. A short "beep" every second indicates low reference channel moment (112.5 Hz, 337.5 Hz). Two short beeps once per second warn of low signal channel output (337.5 Hz, 1012.5 Hz, 3037.5 Hz).

Normal Sounds
On power up, the alarm may beep briefly until the amplitude control circuitry has stabilized. The two transmitters indicate

their normal operation by a soft steady hum at the selected frequencies.

As the battery nears exhaustion, the battery alarm will sound, followed by a rapid beeping after a few minutes when amplitude control is no longer possible.

2.2 Battery Packs

Figure TM:5
TM-2 Battery Pack.

The TM-2 Transmitter is supplied with a Heavy Duty Battery Pack. As an option, a Light Duty Battery Pack is available.

Each pack contains 20 rechargeable nickel-cadmium cells. The Light Duty Pack has a 4 Ampere-Hour Capacity. The Heavy Duty Pack has a 7 Ampere-Hour capacity.

2.3 Battery Charger

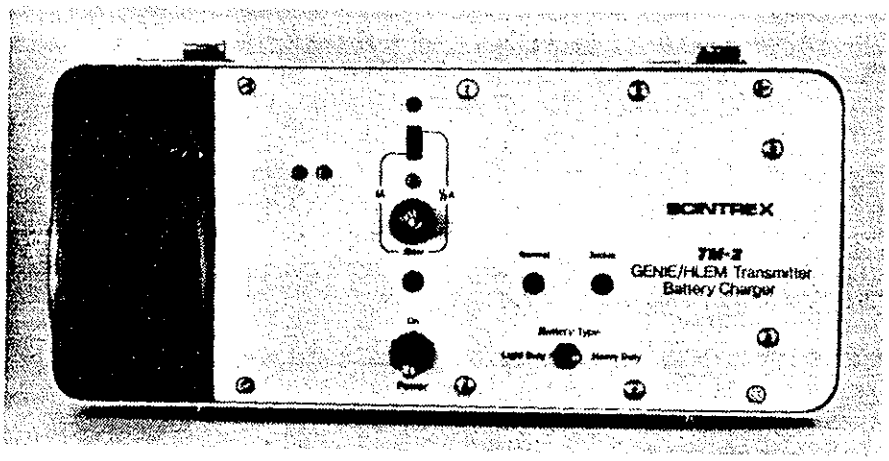

Figure TM:6
TM-2 Battery Charger.

1. Power Switch:

The power switch controls power supplied to the charger through the power line cord.

2. Power Indicator:

The power indicator is illuminated when the charger is switched on. If the indicator is not illuminated, check the following:

1) Power plug is connected to the power outlet and power is available.
2) Fuse is inserted correctly and in good condition.
3) Correct input voltage has been selected.

3. Cooling Fan:

The fan operates as soon as power is switched on. The air inlet vent is located on the right side and the exhaust vent is located on the bottom of the charger.

4. Fuse Holder:

The fuse holder contains a fuse to protect the charger circuitry in the event of an overload, malfunction or wrong input voltage selection.

Important: Do not substitute fuses of a higher rating than indicated on the front panel. Also, the fuse must be changed depending upon the supply voltage.

5. Battery Voltage Selector:

The battery voltage selector can be actuated with a small screwdriver. The voltage indicated on the switch must correspond to the line voltage before operating the charger. If the charger is connected to 230 V with the slide switch in the 115 V position, the fuse will blow and the charger may suffer serious damage. If the situation is reversed (i.e. the line voltage is 115 V and the slide switch shows 230 V) the charger will not operate properly.

Important: The input voltage must be within ±10% of the switch selected value. If it is below tolerance, the charger will not operate properly. If the input voltage is too high, the charger may overheat and suffer damage. See also Section 6.0.

6. Battery Type Selector:

The battery type selector switch is used to select the appropriate charging current depending upon whether the transmitter battery is

of the light or heavy duty type. If the wrong switch position is selected, the battery will not be charged.

7. Normal Charge Lamp:

The normal charge lamp will only light up when the charger is powered up, an intact transmitter battery is connected to the charging cable and the battery type selector is in the proper position.

8. Trickle Charge Lamp:

The trickle charge lamp lights up when the transmitter battery has received a full charge and is being supplied with a trickle charging current to maintain full capacity. Full charging requires no more than seven hours.

The charger has an automatic timer for the transmitter battery pack. This timer will switch the charging circuit to TRICKLE charge when the battery has been on charge for seven hours.

In case of an input power interruption, the timer will automatically go to standby and continue counting until input power is restored. This ensures that TRICKLE charging is only initiated after the battery has received a full charge.

The timer is reset to zero hours by disconnecting and reconnecting the battery packs.

The transmitter batteries are fitted with a thermal sensor which overrides the timer should the battery be fully charged in less than seven hours (i.e. partial discharge). Nickel-cadmium batteries become hot when fully charged. The temperature rise is considerable due to the power supplied for charging. Overheating is detrimental to battery life. See also Battery Care, Section 6.0.

2.4 TM-2 HLEM Upgrade Option

The TM-2 HLEM Upgrade Option involves the installation of an electronic circuit board. This circuit board can be installed by Scintrex at our factory, or the user can install the board.

2.4.1 Installing the HLEM Upgrade Option

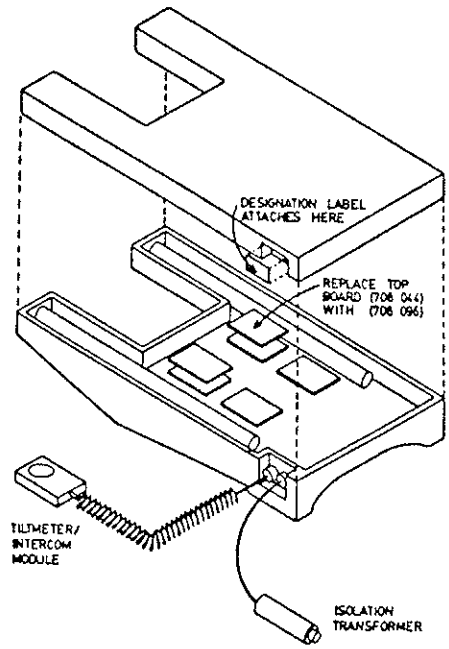

Figure TM:7
TM-2 HLEM Upgrade Option

The installation of the HLEM electronic circuit board involves the following steps:

1. Place the TM-2 Transmitter down on its backpack frame so that the cover panel is accessible.

2. Turn the instrument off and remove the battery pack.

3. There are ten screws on the cover panel of the transmitter. Remove these screws.

4. The cover panel can now be taken off.

5. Refer to Figure TM:7 to locate the electronic circuit board #708 044. This board is replaced with the HLEM electronic circuit board #708 096.

6. Remove the two screws that are holding board #708 044 in place and pull the board out of its connector.

7. Gently push board #708 096 into the connector and fasten it into place with the two screws that were removed.

8. Replace the cover panel and fasten it with the ten screws that were removed.

9. Attach the designation label, that is supplied with the TM-2 HLEM Upgrade Option, to the transmitter cover (Figure TM:7) opposite the two connectors on the left side of the transmitter.

10. Replace the battery pack.

2.4.2 Isolation Transformer

The purpose of the isolation transformer is to prevent stray coupling from the transmitter to the transmitter-receiver interconnecting cable.

The isolation transformer is connected directly to the TM-2 Transmitter via the transformer and cable connector. When the isolation transformer is connected to the transmitter the intercom is automatically enabled in the standby mode.

Note: The TM-2 Transmitter should not be stored with the isolation transformer connected because a current drain of 15 mA will be placed on the battery pack.

2.4.3 Tiltmeter/Intercom Module

The tiltmeter/intercom module can be used only if the HLEM electronic circuit board from the TM-2 HLEM Upgrade Option has been installed inside the transmitter.

The tiltmeter/intercom module can be mounted on the TM-2 Transmitter's chest strap. The module is connected via a retractile cable to the intercom connector on the transmitter.

A tiltmeter sensor is incorporated into the HLEM electronic circuit board. The tilt angle is displayed by an analog meter mounted in the tiltmeter/intercom module.

If the transmitter operator is using his tiltmeter, he should verify that his tilt angle corresponds with the receiver operator's tilt angle. Failure to do this could result in non-coplanarity between the transmitter and receiver coils. This condition can cause inaccurate data to be generated.

This module also contains a front panel mounted speaker and microphone. Since similar devices are available for the receiver, the two operators may communicate over the transmitter-receiver interconnecting cable. If no cable is used, as in the GENIE mode, communication must be done by voice or by portable radio, depending upon distance and terrain.

Note: Voice communication is possible only when both the TM-2 Transmitter and the IGS-2/EM-4 Receiver are turned off and the transmitter-receiver interconnecting cable is attached. (See Section 5.0 for further information.)

2.5 Transmitter-Receiver Interconnecting Cables

The transmitter-receiver interconnecting cables come complete with connectors on both ends of the cable. The cable transmits the reference frequency signal from the transmitter to the receiver, as well as transmitting voice communication between operators.

Scintrex prepares transmitter-receiver interconnecting cables for horizontal loop measurements to order, in any lengths up to 300 metres or imperial measure equivalents.

3.0 THEORY OF OPERATION

3.1 TM-2 Transmitter

The TM-2 Transmitter contains two iron-cored coils permitting a pair of frequencies to be transmitted simultaneously. Five frequency pairs between 112.5 and 3037.5 Hz can be selected to cover a broad range of earth conductivities. The transmitting moments of these coils are automatically stabilized to 0.1% to permit accurate amplitude measurements to be made at the receiver.

Both transmitted signals are derived from a crystal-controlled master oscillator by variable frequency division. The series-tuned solenoid in each channel is driven by a high efficiency switching amplifier and forms part of two feedback loops. One of these precisely controls the transmitted moment by comparing it with a temperature compensated reference. The other loop keeps the transmitting element accurately tuned by variation of the tuning capacitor.

For horizontal loop operation, a signal carrying phase information is generated and sent to the IGS-2/EM-4 Receiver via an externally packaged isolation transformer and a transmitter-receiver interconnecting cable. A tiltmeter and intercom are also provided in horizontal loop mode operation.

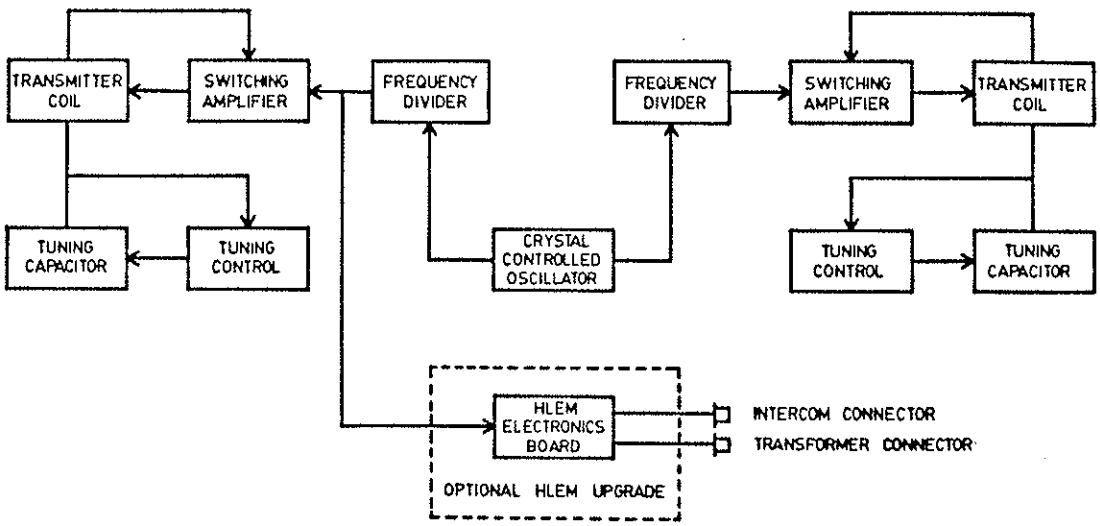

Figure TM:8
Transmitter Block Diagram

3.2 Battery Charger

The power line voltage is first reduced by the power transformer, then rectified and filtered before entering the current regulator which controls the charging current supplied to the transmitter battery.

The seven hour timer that switches the current regulator from full charging to trickle charging is enabled when input power is supplied. However, the timing cycle starts only when a battery pack is connected. In the absence of an enable signal due to input power interruption, the timer will enter a standby mode and continue the cycle upon input power restoration.

The high temperature cut-off receives its temperature information from a sensor built into the transmitter battery pack. The current regulator is switched to trickle charging irrespective of the timing cycle if the battery temperature exceeds the threshold which indicates a fully charged condition.

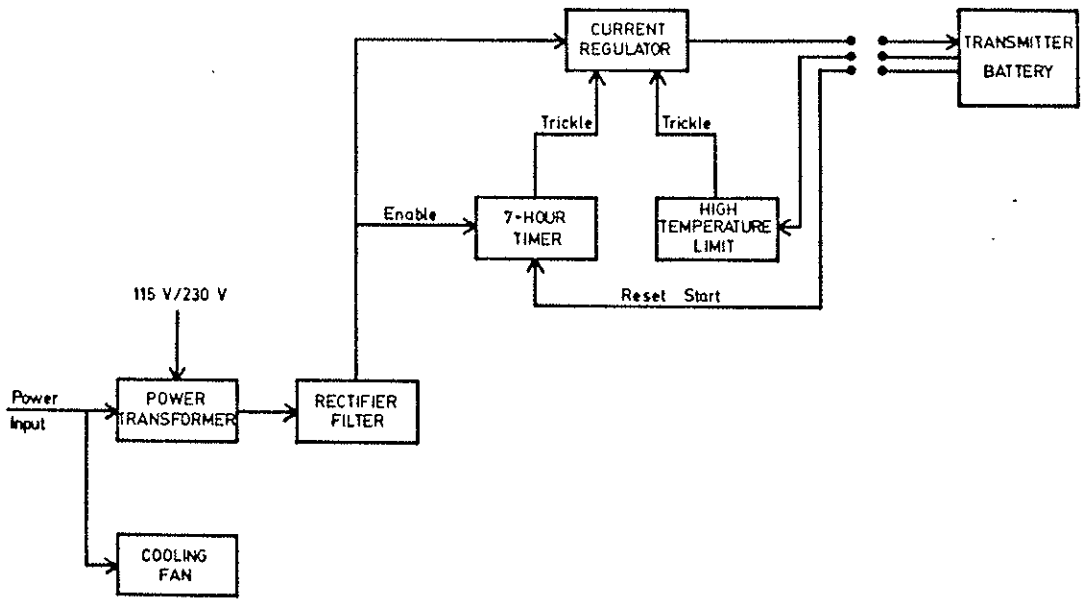

Figure TM:9
Battery Charger Block Diagram

4.0 SETTING UP THE TRANSMITTER

The TM-2 Transmitter is shipped fully operational from the factory with a charged battery pack installed. However, before field use, it is recommended to recharge the battery pack as outlined in sub-section 6.1.

Figure TM:10
Putting on the TM-2 Transmitter is easy with the adjustable snap fasteners.

If the transmitter is to be used in the horizontal loop mode, then the setup procedure is as follows:

1. The isolation transformer is connected to the transformer and cable connector on the lower left side of the transmitter.

2. The tiltmeter/intercom module is attached to the intercom connector on the lower left side of the transmitter.

3. The transmitter-receiver interconnecting cable strain reliefs are attached to the transmitter as shown in Figure TM:11.

4. The transmitter-receiver interconnecting cable is then mated to the isolation transformer.

5. The operator straps on the transmitter as illustrated above.

6. The other end of the transmitter-receiver interconnecting cable is connected to the IGS-2/EM-4 expansion module.

7. The strain relief on this far end of the transmitter-receiver interconnecting cable is attached to the IGS-2 console.

In the GENIE mode the tiltmeter option can be utilized, if the HLEM electronic circuit board has been installed. The tiltmeter can help to orient the transmitter and receiver coils to coplanarity in order to improve signal strength.

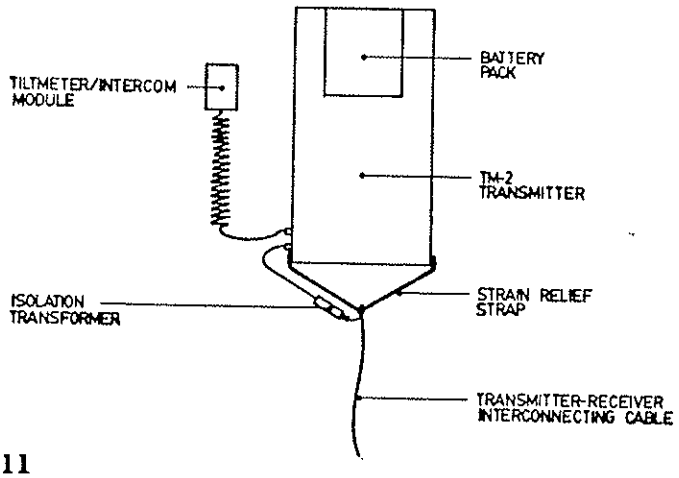

Figure TM:11
Typical Moving Source HLEM Mode Setup.

5.0 PERFORMING A MEASUREMENT

Once the TM-2 transmitter is set-up for operation, in either the GENIE or HLEM mode, the taking of measurements can proceed. A complete description of the full procedure is outlined in the IGS-2/EM-4 Operation Manual.

Transmitter Operation:

The transmitter operator's main responsibilities during a measurement will include:

1. Switching the transmitting frequency pairs when requested by the IGS-2/EM-4 Receiver operator.

2. Monitoring the Tiltmeter analog meter during measurements and holding the transmitter steady.

3. Switching the transmitter off between measurements to conserve the battery pack life.

Transmitter-Receiver Coil Orientation:

Coil orientation affects the ratio reading in GENIE mode operation and is due to the transmitter coil geometry. Because two coils are used to transmit each frequency of a given frequency pair, ratio accuracy is maintained as long as both transmitting coils remain equidistant from the receive coil. The transmitter operator should therefore position himself so that he faces either direction of the survey line.

The equidistant criteria is then satisfied. Small departures from this position become insignificant as the transmitter-receiver separation increases.

Tiltmeter Operation:

The optional tiltmeter is utilized in order to achieve coplanarity between the transmitter and receiver coils. The purpose of the tiltmeter is to improve signal strength in GENIE mode measurements, or to correct in-phase HLEM mode data.

If the TM-2 HLEM Upgrade Option has been installed, the tiltmeter will display the tilt angle of the transmitter coils. When the correct tilt has been reached, the transmitter operator should signal the receiver operator to proceed.

Note: The desired tilt must be established beforehand by an appropriate method (e.g. using an inclinometer).

Intercom Operation:

The intercom system can be used when the TM-2 Transmitter and the IGS-2/EM-4 Receiver are connected via the isolation transformer and the transmitter-receiver interconnecting cable.

When both the TM-2 Transmitter and the IGS-2/EM-4 Receiver are turned off (i.e. measurement not in progress), either operator may talk to the other by pressing the "Push To Talk" button and speaking into his microphone/speaker.

When both the TM-2 Transmitter and the IGS-2/EM-4 Receiver are turned on (i.e. measurement in progress), the intercom is disabled.

After the IGS-2/EM-4 Receiver operator has terminated his measurement, he can signal the TM-2 Transmitter operator by pressing the "Push To Talk" button. The TM-2 Transmitter Operator will then hear a beeping signal from his tiltmeter/intercom module. The transmitter operator should then turn off the TM-2 Transmitter and two-way voice communication may resume.

6.0 BATTERY CHARGING AND BATTERY CARE

6.1 Battery Charger Operation

1. Select the correct input voltage (115 V AC or 230 V AC) with the front panel slide switch and insert the correct fuse.

   If there is doubt as to whether the voltage is within the ±10% tolerance, then use an AC voltmeter to check. Regular power distribution networks usually meet this condition. If a motor generator is used, then the output voltage should be measured and adjusted to fall within this range. Some motor generators have a built-in voltmeter for output voltage adjustment and monitoring.

2. Do not block the fan air intake and exhausts.

   IMPORTANT: Ensure that the battery packs are above freezing temperature before charging. Charging efficiency of a cold battery is very poor, so a full charge may not be acquired in seven hours. Also, battery life will be reduced if normal charging currents are used repeatedly on a battery which is colder than 0°C.

3. Connect the battery pack and select either HEAVY DUTY or LIGHT DUTY with the toggle switch, depending upon the transmitter battery pack to be charged.

4. Switch Power On. The Red Power Lamp should be on as well as the Normal Charge Lamp. If the wrong transmitter battery type was selected in the previous step, the transmitter Normal Charge Lamp will not light up.

5. As soon as the Trickle Charge Lamp lights up, the battery is fully charged and ready for use. It is safe to leave the battery on trickle charge for extended periods of time to maintain capacity.

6.2 Battery Care

With proper care, nickel-cadmium batteries can provide power through more than 1000 charge-discharge cycles.

Unlike lead-acid cells, nickel-cadmium batteries do not retain their charge over long periods of time if not used. Self-discharge depends on temperature and battery design, but as a rule of thumb, approximately 10% of capacity is lost per week at room temperature due to this phenomenon. Trickle charging will compensate for this loss and keep the battery at full capacity.

During long periods of non-use, it is advisable to recharge, or better still, cycle the batteries (discharge and recharge) every 30 to 60 days. Discharging can be conveniently accomplished by leaving transmitter on for a few hours.

Complete discharge can reduce battery life.

Do not allow the battery pack to discharge to the point that it is completely dead.

While in most cases a full charge will restore the battery pack to full capacity, occasionally one or more cells within the pack may "reverse polarize" after complete exhaustion. This state may not always be reversible with the normal charging current. Do not attempt to subject battery packs to higher charging currents than through normal charging. If reverse polarized cells are suspected, as indicated by less than nominal voltage after full charge and therefore considerably reduced endurance, return the pack to the factory for repair or replacement.

Overcharging can reduce battery life.

Do not overcharge the batteries by repeating charging cycles in short succession. Seven hours of charging is sufficient to bring an exhausted battery pack to full capacity. Overcharging shortens the battery life of nickel-cadmium batteries due to overheating. Do not charge batteries which are at temperatures below freezing.

Caution: Transmitter battery packs are fused for overcurrent protection. Failure of one or both fuses will be indicated by the Normal Charge Lamp not being illuminated when attempting to charge the battery. To replace the fuse(s), the battery pack must be opened by removing the six cover screws and carefully prying the two case halves apart. The fuses are installed in clips near the connector.

DO NOT substitute fuses of a different rating.

When re-assembling the battery pack, compress the rubber gasket by applying hand pressure on the case lid, then gently tighten the six cover screws.

7.0 SPECIFICATIONS

7.1 TM-2 Electromagnetic Transmitter

Transmit Coils	One iron cored coil for each of two frequencies.
Transmitting Frequency Pairs	Five pairs selected from the following frequencies: 112.5, 337.5, 1012.5 and 3037.5 Hz. The 3037.5/1012.5 pair is not available.
Transmitting Moments	136 Am at 112.5 Hz, 90 Am at 337.5 Hz, 45 Am at 1012.5 Hz, 23 Am at 3037.5 Hz.
Relative Amplitude Stability	Better than 0.1%
Power Supply	Rechargeable nickel-cadmium batteries; 2 options available, Light and Heavy Duty Battery Packs. Each pack contains 20 cells at 1.25 V nominal with a total output of ±12.5 V nominal. The Heavy Duty Pack has 7 A hour capacity while the Light Duty Pack has 4 A hour capacity.
Power Supply Endurance	Light Duty Pack: 2 hours continuous at 20°C. Heavy Duty Pack: 3.5 hours continuous at 20°C.
Operating Temperature Range	-30°C to +50°C
Storage Temperature Range	-40°C to +50°C
Total Weight	With light duty battery: 16.1 kg. With heavy duty battery: 17.8 kg.
Dimensions	820 x 370 x 155 mm

7.2 Optional and Accessory Items

Battery Charger:

Power Requirement	115 V or 230 V, 50 Hz or 60 Hz, 50 VA.
Charging Time	7 hours for completely discharged batteries, subsequent automatic trickle charging.
Weight and Dimensions	4.5 kg, 290 x 150 x 130 mm

TM-2 HLEM Upgrade Option

Tiltmeter/Intercom Module	0.27 kg, 115 x 75 x 30 mm
Isolation Transformer	0.12 kg, 120 x 25 mm
HLEM Electronics Circuit Board	0.20 kg, 175 x 115 mm

Transmitter-Receiver Interconnecting Cables:

Horizontal Loop Measurements	Made to order in any length up to 300 m, or imperial measure equivalent.
Cable Weights	100 m, 3.0 kg; 200 m, 5.9 kg; 300 m, 8.8 kg.

8.0 TM-2 PARTS LIST

Part	Part Numbers
TM-2 Transmitter	708 028
TM-2 Battery Charger	708 011
Fuse - 10A Quick-Blow	512 024
Fuse - 1A Slow-Blow	512 033
Fuse - 500 mA Slow-Blow	512 035
Transmitter Carrying Case	708 017
TM-2 Operation Manual	708 702
Options/ Accessories	
TM-2 HLEM Upgrade Kit	708 026
Transmitter-Receiver Interconnecting Cable (Length to be determined by customer)	708 029
Spare Isolation Transformer	708 503
Light Duty Battery Pack	708 035
Heavy Duty Battery Pack	708 034
TM-2 Spare Parts Kit	708 531
TM-2 Upgrade Spare Parts Kit	708 532
Battery Charger Mechanical Spare Parts	708 082
Battery Charger Electrical Spare Parts	708 084

the failure. Scintrex' reply will also indicate the appropriate charge to be made for the replacement component and the credit that may be granted, based on item a) above, on receipt of the defective part. Where some doubt exists at Scintrex that a correct technical diagnosis of failure has been made, some test procedures may be suggested for fault confirmation.

- On receipt of the purchaser's order, Scintrex will send the replacement component as requested. The purchaser will be charged the full value of the replacement component, but subject to a credit on receipt of the defective item. The purchase order should provide full shipping instructions for the replacement component.

- The purchaser will carefully pack and remit the faulty component via prepaid airfreight to Scintrex Limited, 222 Snidercroft Road, Concord, Ontario, Canada L4K 1B5 or for clients outside Canada to Scintrex Limited, in care of Murray and Robinson, Customs Brokers, Lester B. Pearson International Airport, marked "Defective Part - Returned to Manufacturer".

- Upon receipt of the defective part, Scintrex will inspect it and confirm that the failure thereof falls within the terms of this warranty. If this is confirmed, Scintrex will then issue an appropriate refund to the purchaser. Unless the defective component is returned to Scintrex for inspection and confirmation of the nature of the failure, no credit can be given thereon. A component which is found not to be defective on receipt will be returned to the purchaser.

h) Scintrex undertakes to keep on hand a reasonable stock of these rechargeable battery packs in order to supply a rapid replacement thereof when required.