POINTER AVIONICS

FIELD MAINTENANCE MANUAL

FOR

POINTER SENTRY

MODEL 4000-10, -11

TSO-C91A

REV. 2, JUNE-96

Web: www.pointeravionics.com Tel: (519) 648-3778 Fax: (519) 648-3075 Email: sales@pointeravionics.com

NOTICE

The Maintenance Instructions included in this manual are supplied in accordance with pertinent sections of the "Engineering and Inspection Manual" and pertinent sections of the "Airworthiness Manual", Transport Canada, Aviation

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1. GENERAL

1.1. General Description

POINTER SENTRY emergency locator transmitter is a self-contained, battery-powered unit, manufactured to meet the requirements of the Federal Aviation Administration technical standard order TSO-C91a. When activated, either automatically or manually, the unit transmits an amplitude modulated downsweeping audio tone on the international civil and military frequencies of l2l.5 MHz and 243.0 MHz.

The electronics and power supply is housed in a high-impact, fire retardant waterproof case with carrying handle. The equipment is designed to withstand forced landing and crash environmental conditions and survive in an operable condition. See **Figure 1-1** below for ELT layout and important features.

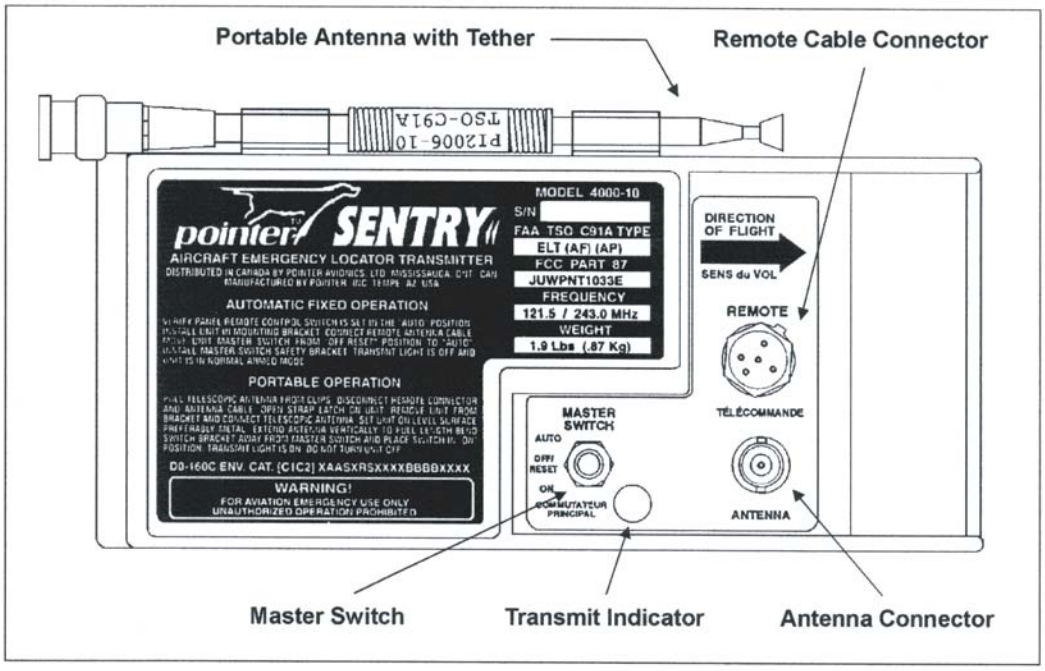

Figure 1-1. Pointer Sentry Control Details

1.1.1. System Components

POINTER SENTRY is supplied in two models, the 4000-10 and 4000-11. The model 4000-10, designated as a type **AF/AP** (Automatic Fixed/Automatic Portable), includes a telescopic antenna for portable operation. The model 4000-11 is intended for automatic fixed operation only. Both models include a fixed (whip) antenna, coaxial cable, remote control panel switch/monitor, master switch-guard kit and mounting bracket assembly. Refer to **Figure 1-2**.

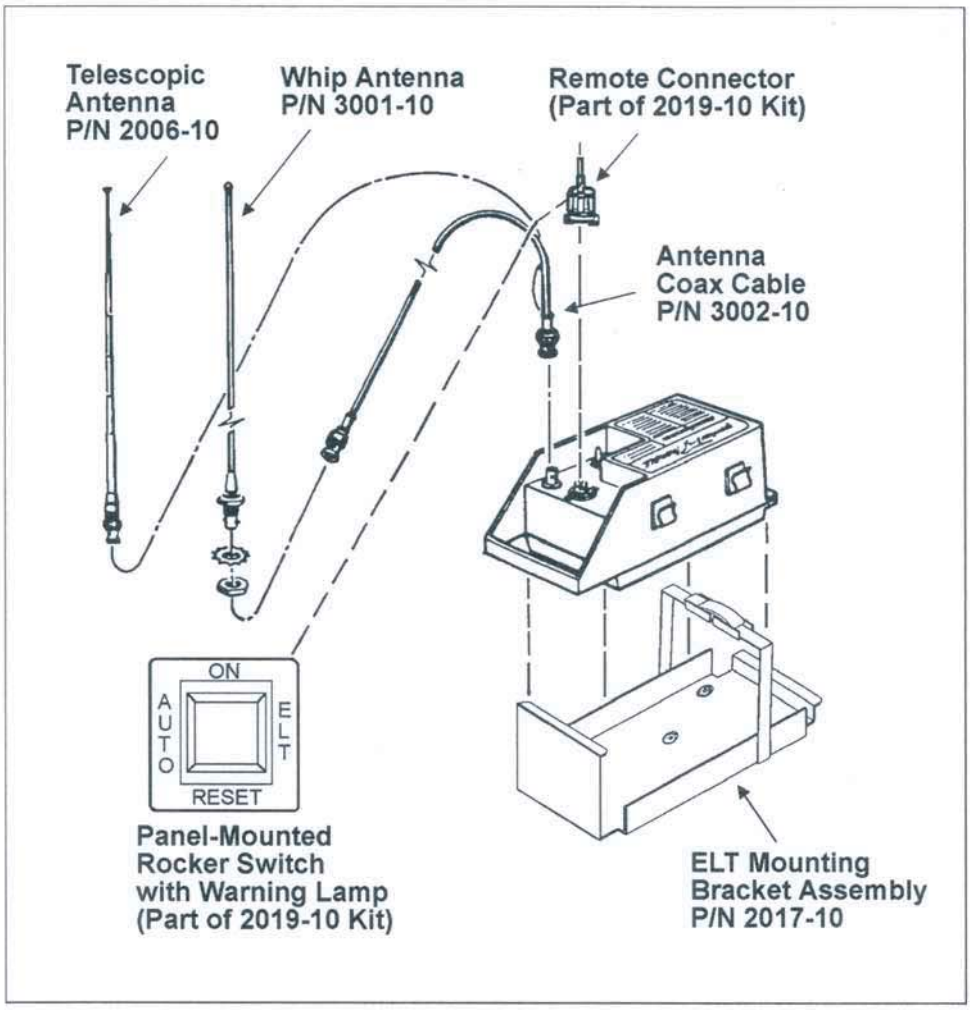

Figure 1-2. Pointer Sentry ELT Major System Components

1.1.2. Activation

Automatic activation of the ***POINTER SENTRY*** utilizes a specialized inertia switch designed to meet the specific requirements of TSO-C91a, for ELT activation thresholds. Refer to **Figure 1-3.**

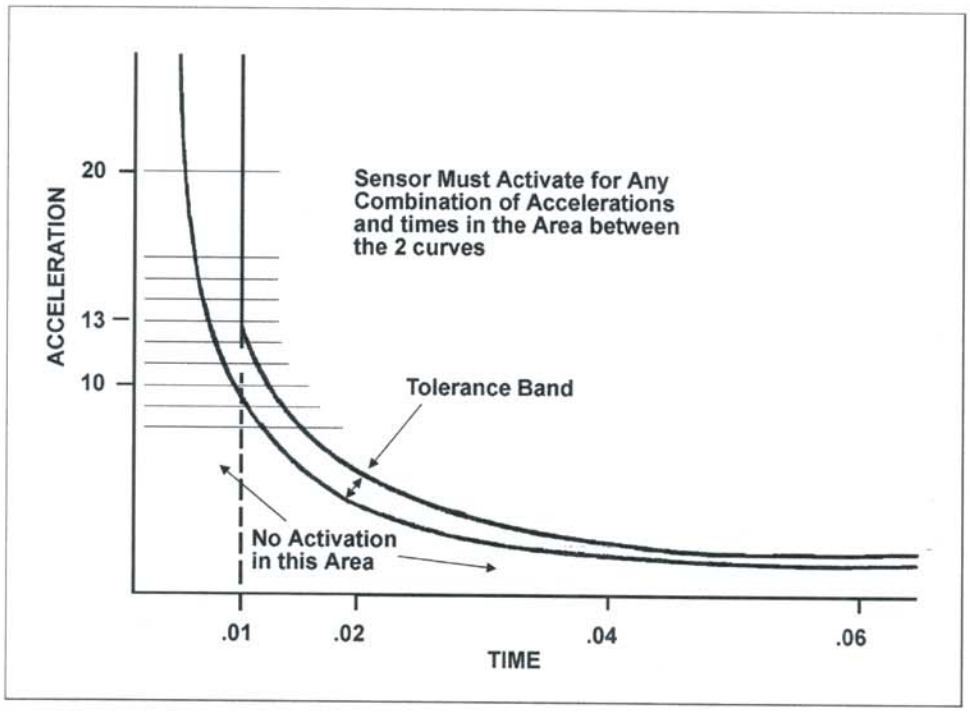

Figure 1-3. Inertia Sensor Response Curve

1.1.3. Power Source

Primary power is independent of the aircraft electrical system, utilizing an internal 7.5 volt alkaline/manganese battery pack.

1.2. Transmitter

The printed circuit board transmitter is a discrete component design incorporating modern, highly efficient transistor devices as well as time-proven military and aerospace qualified semiconductor and passive components. Refer to **Figure 9-3** and **Figure 9-4** for circuit board details. The physical size of the transmitter circuit board is 2.8" long by 2.5" wide. Maximum component height is .5". Weight is two ounces.

Modulation of the carrier frequency is the assigned A3E modulation type downswept tone designated by the FCC . This tone sweeps within the limits of 1600 Hz to 300 Hz, sweeping a minimum of 700 Hz at a rate of 2 to 4 Hz. This tone pulse-modulates the VHF/UHF carriers operating at 121.5 MHz and 243.0 MHz respectively.

Modulation is in the form of a non-symmetrical rectangular wave which gates the carrier on and off at a predetermined duty cycle (approximately 50%). The index of modulation is 100%, resulting in the equivalent to a pulse duration modulation (PDM) system. The modulator circuit consists of a voltage controlled multivibrator, Q3 and Q4, and carrier

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modulation gate driver Q5. The ramp sweep control to drive the multivibrator is generated by a unijunction oscillator, Q1.

The transmitter carrier chain includes a temperature stabilized crystal controlled oscillator, Q6, operating at 121.5 MHz, frequency doubling drive amplifier Q7, and power amplifier Q8, with associated output filter providing impedance matching to the antenna system and suppression of unwanted harmonics.

Peak effective radiated power (PERP) is rated at 125 mw minimum per carrier frequency at ambient temperature.

The design is optimized to provide in excess of the minimum required output power (PERP) of 75mw after 50 hours of continuous operation at -20°C as required by TSO-C91a.

1.3. Inertia Switch Characteristics

The inertia sensing switch, commonly referred to as the "G-Switch", is mounted on the transmitter circuit board. This switch is designed to activate the ELT under deceleration forces as specified by TSO-C91a and is intended specifically for use in aircraft ELT applications. The activation curve is shown in **Figure 1-3**.

The output pulse of the "G"-switch is used to trigger an SCR-latch, Q9, which, when active, drives bipolar power transistor Q10 to supply power to the transmitter circuitry. The latch and transmitter will remain activated until the hold-on current is removed from the SCR. This is accomplished locally by cycling the master switch to the "OFF/RESET" position momentarily, or remotely by activating opto-isolator I-1, which shunts the SCR holding current and deactivates it.

1.4. Remote Switch Characteristics

There are no failure modes associated with the remote control panel switch or the interconnecting cable which would prevent automatic activation. Automatic activation is accomplished completely within the ELT unit without remote intervention. Damage to the interconnecting cable between the remote control switch and the remote connector on the ELT transmitter resulting in an open circuit or short circuit of any of the conductors in the interconnecting cable will not prevent the ELT unit from activating and operating automatically. An open circuit condition simply isolates the ELT from whichever remote function is served by the affected conductor. Shorting of the remote reset line to ground will disable that function, again not part of the automatic action desired in an impact situation. Shorting of the "A" or "B" conductors to ground will open fusible links on these terminals, disabling the remote function provided by that terminal but retaining the normal internal automatic activation. Shorting the remote reset conductor to the "A" or "B" terminals locks the activation latch into an "ON" condition, operating the transmitter. Shorting the "A" and "B" terminals activates the ELT in the same manner as the remote activation switch.

Every effort has been made in the design of the external circuitry of the ***POINTER SENTRY ELT*** so as to provide simple and straightforward remote operation without the possibility of a disabling malfunction.
This functionality is not inhibited by inadvertent activation and subsequent remote reset. The system has been set up so that damage to or destruction of part or all of the remote control circuitry results in a normally operating, automatically activated ELT unit. As a backup, manual activation is always possible merely by disconnecting the remote control cable and turning the master switch to "ON" position.

1.4.1. Remote Switch Functions

1.4.1.1. "AUTO" Mode

When the unit master switch and remote switch are in the "**AUTO**" position, the transmitter will operate in the normal armed or automatic manner.

1.4.1.2. Remote "ON" Mode

In the event of a an emergency and manual is desired, place the remote cabin switch in the "**ON**' position. This closes contacts A & B of the remote connector which will override the automatic function and activate the transmitter. This mode also provides a means to conveniently test the transmitter during preflight inspection.

1.4.1.3. Remote "RESET" Mode

This mode is used in case of an inadvertent activation. In the event the transmitter is activated and is transmitting a false emergency signal, the pilot can reset the unit by momentarily placing the remote cabin switch in the "**RESET**" position. Upon release, the switch returns to the "**AUTO**" position and the transmitter is re-armed, and the monitor light is extinguished.

1.5. Antenna Characteristics

1.5.1. Standard Antenna

The standard whip antenna is identified as P/N 3001-10, and connected to ELT with cable P/N 3002-10. This cable length should not be altered. Should longer cables be required, contact ***POINTER AVIONICS*** for special cable lengths. The antenna radiation pattern is horizontally omnidirectional.

1.5.2. High Velocity Antenna

An optional high velocity antenna is identified as P/N 3003-(). This element was initially designed for installations on high performance jet and turbo powered corporate type aircraft. Due to the rugged construction and low profile, it has also become very adaptable for helicopter applications. The length of the tapered stainless steel rod represents 1/4 wavelength at 243.0 MHz and 1/8 wavelength at 121.5 MHz. A tunable duplexing impedance matching network in the mounting base provides alignment for operation in a standard 50 ohm system. The radiation pattern is omnidirectional in the mounting plane. This antenna can be ordered with cable lengths of 18, 30, 45, 60 or 120 inches by adding the desired length in the parenthesis of the base part number.

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2. INSTALLATION

Refer to Additional and more detailed installation information (including hardware and wire requirements.), provided in the Operation and Installation manuals for the Pointer model 4000-10 and 4000-11 ELT's.

2.1. Transmitter Location

Installation of the ***POINTER SENTRY*** model 4000-10 and 4000-11 aircraft emergency locator transmitter shall be made in accordance with current regulatory requirements pertaining to aircraft alterations. **The Installation must satisfy airworthiness requirements pertinent to type, and jurisdiction of aircraft registry.**

CAUTION !

INSTALLATION IN THE PRESSURIZED AREA OF AN AIRCRAFT CONSTITUTES A MAJOR MODIFICATION. CONSULT LOCAL REGULATORY AUTHORITIES BEFORE PROCEEDING.

The ***POINTER SENTRY*** model 4000-10, 11 should be located so as to afford easy access to the ELT for performance testing, servicing, and manual activation/deactivation, when the aircraft is on the ground. A location in the aft of the aircraft is normally less susceptible to impact damage. Consider the proposed location of the antenna when selecting the ELT location.

NOTE:

MOUNTING LOCATION SHOULD AFFORD EASY REMOVAL OF THE ELT FROM THE AIRCRAFT FOR DETACHED OPERATION.

(4000-10 AF/AP ONLY)

2.2. Transmitter Mounting

The model 4000-10,11 transmitter should be mounted on a solid surface with minimum vibration. Install the mounting bracket to the aircraft structure so that the transmitter is installed parallel to the longitudinal axis of the aircraft and the direction of flight arrow points forward. The bracket must be mounted parallel to or at a slightly positive angle relative to the line-of-flight. Do not install the transmitter bracket at a negative angle relative to the line-of-flight, as this will cause the Inertia switch to be overly sensitive and may result in inadvertent activation.

1. Attach the mounting bracket with #6 pan head screws, washers and nuts. The heads must be flush with the bracket surface. Capture the ELT retaining strap in the gap between the rear and center screw holes.

2. Slide the ELT forward in the bracket and secure it in place with the retaining strap.

3. Snap the telescopic antenna into the retaining clips on the side of the transmitter case (Model 4000-10 AF/AP only).

4. Place master switch in the **"AUTO"** position and install the switch guard bracket supplied. The unit is now armed and will activate upon sensing a deceleration above the thresholds described by **Figure 1-3**.

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2.3. Standard Whip Antenna

The 3001-10 Whip antenna and 3002-10 coaxial cable are provided with the 4000-10 and 4000-11 systems. Use **ONLY** the cable supplied with the system and do not cut or alter it in any way. The ELT system shall not use the antenna of another avionics system. Mount the antenna as far aft as possible on the surface of the aircraft.

Pay particular attention to the following:

1. Mount Whip vertically on the upper surface of aircraft (or helicopter).
2. Locate so as to minimize coupling from adjacent communications antennae.
3. Must not foul other antennae when whipped in flight.
4. Mount whip as close as possible to transmitter. Neatly coil and tie any excess in the coax cable.

2.4. Optional High Velocity Antenna

The model 3003-( ) antenna may be mounted at any convenient location, preferably on the upper structure of the main fuselage of the aircraft as near to the transmitter as possible. Excess coaxial cable connected to the base of the antenna can be coiled and stowed. The antenna is to be mounted to the airframe following the instructions of drawing no. 3003, supplied with antenna, see **Figure 9-5**. After installation, connect the coaxial cable from the antenna base to the RF connector on the transmitter.

2.5. Remote Switch

Installation of the remote control switch, P/N 2019-10, provides remote selection of all the emergency transmitter functions. Refer to **Figure 9-1. Primary Power Wiring Diagram** for an overview of ELT system control wiring. A red warning light is built into the Remote switch to indicate when the transmitter is operating. The Remote Switch/Monitor should be mounted in the pilot's field of view.

Great care should be exercised not to short pins "A" & "B" to ground as this will cause internal damage to circuitry related to remote operation and will necessitate return to POINTER for repair.

2.5.1. Remote Switch Installation Steps

Follow the installation steps listed below. Refer to **Figure 2-2** for pin and terminal details for the Remote Connector and Remote Switch/Monitor.

1. Verify that the components listed below are contained in the kit.
   - 3-position Remote rocker Switch.
   - 5-pin Female Remote Cable connector.
   - Panel decal (ON/AUTO/RESET).
   - Warning Label
2. Select a location on the instrument panel for the Remote Switch/Face plate assembly. A 3/4" square hole is required for the switch installation. Take into consideration Switch visibility to the Pilot and free space behind the connector for wiring.
3. Connect the wires as shown in **Figure 2-1**. Use only the connector and switch supplied in the kit. Failure to do so voids the Transport Canada approval of the system. (Refer to **Figure 2-2** for connector and switch/monitor details).
4. At the panel end of the cable, remove the cable covering, forming the shield into a pigtail. Connect the pigtail to aircraft ground.

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5. At the transmitter end of the cable, remove the cable covering and form the shield into a pigtail. Connect the pigtail to pin D of the female remote connector.
6. Install an in-line fuse or circuit breaker (1 amp max.) in the aircraft power circuit to the Remote Switch.
7. Connect Remote Switch terminal "2" to either remote connector pin "H" for 12 volt systems or to pin "E" for 24 volt systems.
8. With the Remote connector disconnected, make the measurements described in **Table 1** before proceeding to the next step.

Measure Pins	Switch Position AUTO (Centre)	Switch Position ON (Up)	Switch Position RESET (Down)
A to B	OPEN	0 ohms	OPEN
A or B to D	OPEN	OPEN/0 VDC	OPEN/0 VDC
E or H to D	0 VDC	0 VDC	Buss Volts

Table 1. Remote Conector pin-out Test

9. Apply silicon grease to the contacts of the remote cable connector to create a waterproof seal, then mate the remote connector to the transmitter.
10. Affix the warning label to the instrument panel above, below or adjacent to the Remote Switch/Face Plate to comply with current regulatory requirements. This completes the Remote Switch Installation. The warning label shall contain the text (or text with same meaning) as shown below.

> For Aviation Emergency use only. Unauthorized operation is prohibited.

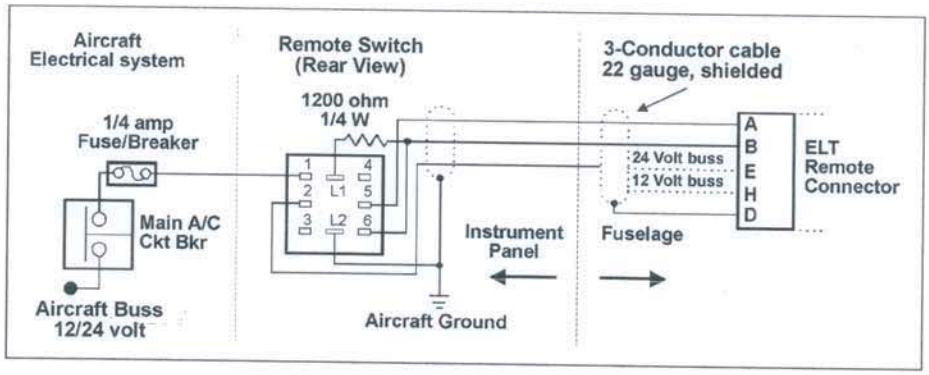

Figure 2-1. Remote Switch Wiring

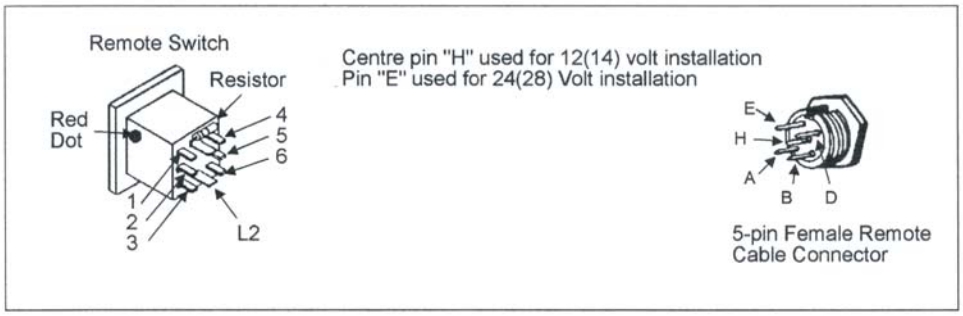

Figure 2-2. Connector & Switch Details

3. TEST PROCEDURE

NOTE:
WHILE THE AUTOMATIC AND REMOTE MANUAL OPERATION OF THE ELT IS INDEPENDENT OF THE AIRCRAFT POWER SUPPLY, AIRCRAFT ELECTRICAL BUS POWER *IS* REQUIRED TO ACCOMPLISH REMOTE RESET.

The following steps are normally carried out as an installation checkout or periodic operational test (i.e. pre-flight check).

All field/preflight tests must be performed in accordance with current government regulations.

1. Tune a VHF test or aircraft receiver to 121.50 MHz or 243.0 MHz and adjust the squelch to maximum. Remove the telescopic antenna (if present) from its retaining clips. Remove the transmitter from the mounting bracket. Connect the transmitter antenna connector either to the remote antenna or to a 50 ohm dummy load. Thrust the ELT in the direction of the flight arrow and jerk it back. A down-sweeping warbling tone should be heard on the test receiver and the indicator light should operate.

2. When the warbling tone is heard, reset the unit by cycling the master switch to "**OFF/RESET**", then back to "**AUTO**". The tone will stop and the transmit indicator light will go out.

3. Set the master switch to the "**ON**" position. The warbling tone should again be heard. Return the master switch to the "OFF' position.

4. Place the master switch in the "**AUTO**" position. Repeat steps 1 and 2 above, this time using the "**REMOTE PANEL SWITCH**".

5. Install the unit in the mounting bracket and secure with the retaining strap. Replace the telescopic antenna into the retaining clips. Set the master switch in the "**AUTO**" position. Verify that the transmitter is not operating and that the indicator light is out. Secure the master switch in the "**AUTO**" position with the master switch bracket kit. The unit is now in the normal "**ARMED**" flight mode.

3.1. Operational Test Considerations

The global search and rescue satellite system is now in full operation. Any testing that may be necessary should be conducted in such a way that electromagnetic energy is not radiated if at all possible. Operational testing should be performed with the following considerations:

- Tests should be conducted only within the time period of the first five minutes after any hour.
- Tests should be limited to no more than three audio sweeps of the transmitter.
- If tests must be made beyond the above limitations, notify the local flight service authority.

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4. RECOMMENDED MAINTENANCE INSPECTIONS

4.1. Mechanical

Visually inspect the unit, connections, and mounting bracket at prescribed intervals for cleanliness and security. Check external fixed antenna mounting for tightness.

4.2. Electrical

The installed equipment should be functionally tested at least every 90 days utilizing predetermined procedures.

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5. BATTERY REPLACEMENT

The battery pack is removed as described in the steps below.

1. Remove the telescopic antenna (if present) from its retaining clips and disconnect both the remote antenna cable and the remote switch/monitor cable from the transmitter. Remove the transmitter from the mounting bracket.

2. Remove the 6 base plate screws, retaining the Teflon washers.

3. Remove the base plate (save the gasket), and disconnect the battery connector.

4. Remove and replace the battery pack with a **Pointer P/N C2020** battery pack, reversing the above procedure.

5. Update the Manufacturing and Expiry dates on the external ELT battery label. The new battery pack may be supplied with a new battery label or new date sticker to be applied over the old dates.

5.1. Battery Pack Lifetime

The Battery Pack must be replaced under any of the folllowing conditions:

- After use in an emergency.
- After an inadvertent activation of unknown duration.
- When the total of all known transmissions exceeds one hour.
- On or before the expiry data stamped on the ELT battery label and on the battery pack. The **Pointer C2020** battery pack is a 2-year battery pack.

5.2. Non-Pointer Battery Packs

The use of other than ***POINTER*** supplied battery packs voids the continuous warranty and may additionally damage the components in the ELT and render it non-functional. The battery pack as designed for the model 4000-10 and 4000-11 provides short term thermal isolation and high level shock protection.

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6. FIELD REPAIRS

With the exception of replacing the battery pack and performing annual certification tests, the transmitters are "**not**" a field repairable item. Any attempts at unauthorized repairs, will void the continuous warranty. The unit is to be returned to the ***POINTER AVIONICS*** repair facility if it fails to operate properly.

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7. OPERATIONAL TEST

7.1. Operational Tests in Aircraft

Operational testing may be performed in the aircraft to determine if transmitter malfunction is due to cabling or wiring defects. Follow the test procedure outlined in **Section 3.**

7.2. Frequent False Activation

Frequent Inadvertent Activation may be caused by one of the following.

- ELT improperly installed relative to aircraft line of flight, possibly at a negative angle.
- Unit installed on non-rigid support structure.

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8. RECERTIFICATION TEST

8.1. US Registered Aircraft

8.1.1. Regulations

Annual inspection of Emergency Locator Transmitters is required to satisfy FAR Part 91.207, which came into effect on June 21, 1994. The pertinent paragraphs are listed below.

- PAR. (d)(1) **Proper Installation.**
- PAR. (d)(2) **Battery Corrosion.**
- PAR. (d)(3) **Operation of the Controls and Crash Sensor.**
- PAR. (d)(4) **The presence of sufficient Signal radiated from its antenna.**

8.1.2. Recommended Inspection Method

The following describes a suggested method of inspection to satisfy the previously listed regulations.

8.1.2.1. Proper Installation

Refer to DO-183 PAR. 3.1.8, "ELT Mounting".
The ELT shall be mounted to primary aircraft load-carrying structures such as trusses, bulkheads, longerons, spars, or floor beams (not aircraft skin). The mounts shall have a maximum static load deflection no greater than 0.1 inch when a force of 100 lb. is applied to the mount in the most flexible direction.

The aircraft system should also be inspected for proper installation of the external (fixed) antenna, corrosion at the mounting point and coaxial cable connectors. If installed, the remote cable and connector should be inspected for frayed or broken wires.

8.1.2.2. Battery Corrosion

Place the ELT master switch in the "OFF" position and remove the unit from the mounting bracket. Remove the 6 cover screws, then remove the cover and gasket. Inspect the interior of the unit and the battery pack covers for discoloration. Confirm that the battery pack date matches the battery label replacement date on the exterior of the unit. Set the gasket on the ELT cover, and replace the cover. "**Lightly**" hand tighten the 6 screws.

8.1.2.3. Operation of the Controls and Crash Sensor

Connect a 50 ohm RF load to "RF Output" connector. Test the automatic activation of the unit as described in the steps in **Section 3**.

8.1.2.4. The Presence of Sufficient Radiated Signal

The preferred test requires a VHF receiver with manual squelch control. Tune the receiver to 121.5 MHz and turn the squelch to maximum position. Adjust the volume control until a slight background noise is heard. with the receiver position near to or in the aircraft, set the installed ELT master switch to the "ON" position for five seconds. The ELT transmit signal level should be high enough to break the squelch level.

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A secondary test requires a simple AM transistor radio receiver. tune the receiver at an extreme away from normal AM radio stations and adjust the volume to maximum. Place the AM receiver near the ELT antenna and activate the ELT as previously described. If the downsweeping tone is heard, the ELT is transmitting at a nominal power level.

Neither of the above tests will provide a positive indication of the specified ELT transmission level. Ideally, the unit should be tested at a certified avionics facility utilizing a spectrum analyzer or RF power meter with bandpass filters.

8.2. Canadian Registered Aircraft

ELT's installed in Canadian registered aircraft, shall pass an annual performance test as described in the Transport Canada Engineering and Inspection Manual and shall be certified as per Airworthiness Manual. This test, which may only be carried out by an Approved Maintenance Organization must be certified on a Maintenance Release Tag. The Battery label shall be affixed as described in Section **5.** The Certification label shall be affixed as described in paragraph **8.5.**

The required performance tests shall verify that the following parameters meet specifications:

1. Peak Power.
2. Operating Frequency.
3. DC Current.
4. Audio Modulation
5. Automatic Activation.
6. Reset Operation.

8.3. Test Equipment (For Transport Canada Annual Performance Test).

Test equipment required for the annual performance test should have characteristics equal to or better than the following:

1. Power supply, 0-10 vdc, 300 ma regulated
2. Voltmeter, 0-10 vdc, 50k ohms/volt
3. Milliammeter, 0-300 ma dc
4. RF power meter, 0-300 mw (HP 431C or Equiv.)
5. Frequency counter, 150 Mhz
6. Diplexer (Pointer diplexer or equivalent).

8.4. Tests

To prepare the equipment for test, remove the bottom cover of the ELT and connect the ELT and test equipment as shown in **Figure 9-2**. Note that the peak power and operating frequency measurements should be made after 3 minutes of operation.

8.4.1. Peak Power

Peak power at the operating frequencies may be determined by measuring the average RMS power and calculating the equivalent peak power. Connect the RMS power meter to the 121,5 MHz output of the diplexer. Turn the ELT to the "ON" position and record the power reading. Repeat the measurement with the 243 MHz output of the diplexer connected to the power meter. The average power is calculated as follows where Pave is the level shown on the RMS power meter at each frequency:

$$Ppk = 2\frac{(Pave)}{.45}$$

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The calculated power shall be a minimum of 125 mw at each frequency with the ELT input voltage at 7.5 VDC.

8.4.2. Operating Frequency

With the output of the 20 dB power divider connected to the frequency counter, place a jumper wire from the ground side (minus battery) area of the circuit board to the base of transistor Q4 disabling the audio modulation (refer to the circuit board layout in fig. 6. The 12l.5 MHz carrier frequency shall fall within the range of 121.493925 MHz to 121.506075 MHz.

8.4.3. DC Current Test

Adjust the regulated bench power supply voltage to 7.2 volts. Place the unit master switch in the "ON" position. The current measured by a Milliammeter should not exceed 150 Ma.

8.4.4. Audio Modulation

This test consists of listening to the received modulation from the ELT on a VHF radio receiver and counting the number of sweeps in a 5 second time period. The tone should be a typical downsweeping ELT tone and should sweep at a rate between 2 Hz and 4 Hz (10 to 20 sweeps in 5 seconds).

8.4.5. Automatic Activation

Automatic activation is accomplished by a deceleration sensing inertia switch which senses the change of force only in the direction of flight when the ELT is installed in the aircraft. The direction of flight is indicated by the arrow on the ELT. To test the automatic activation perform the following.

1. Set the master switch to the "OFF" position to reset the inertia sensor.
2. Set the master switch to the "AUTO" position.
3. Hold the unit in both hands with the ELT handle facing forward.
4. Thrust the unit forward in the direction indicated by the arrow on the ELT and jerk it back.
5. The ELT should activate, the LED on the ELT should illuminate and the sweeping tone should be heard on the monitor receiver.
6. Reset the inertia sensor by placing the master switch in the "OFF" position. Re-test if necessary.

8.5. Certification

If the ELT has passed the above tests successfully, it may be certified airworthy in accordance with current regulatory requirements by completing the necessary documentation. The certification date shall be recorded on an annual certification label which is to be affixed to the ELT.

8.6. Repair

Due to the continuous warranty coverage of ***POINTER*** products, any attempted field repairs will void the warranty. If the unit is malfunctioning, it should be returned "**Pre-paid**" to:

Pointer Avionics,

207 Centennial Court
Kitchener, Ontario
N2B 3X2 CANADA

Phone (519) 648-3778 Fax (519) 648-3075

9. SCHEMATICS AND DRAWINGS

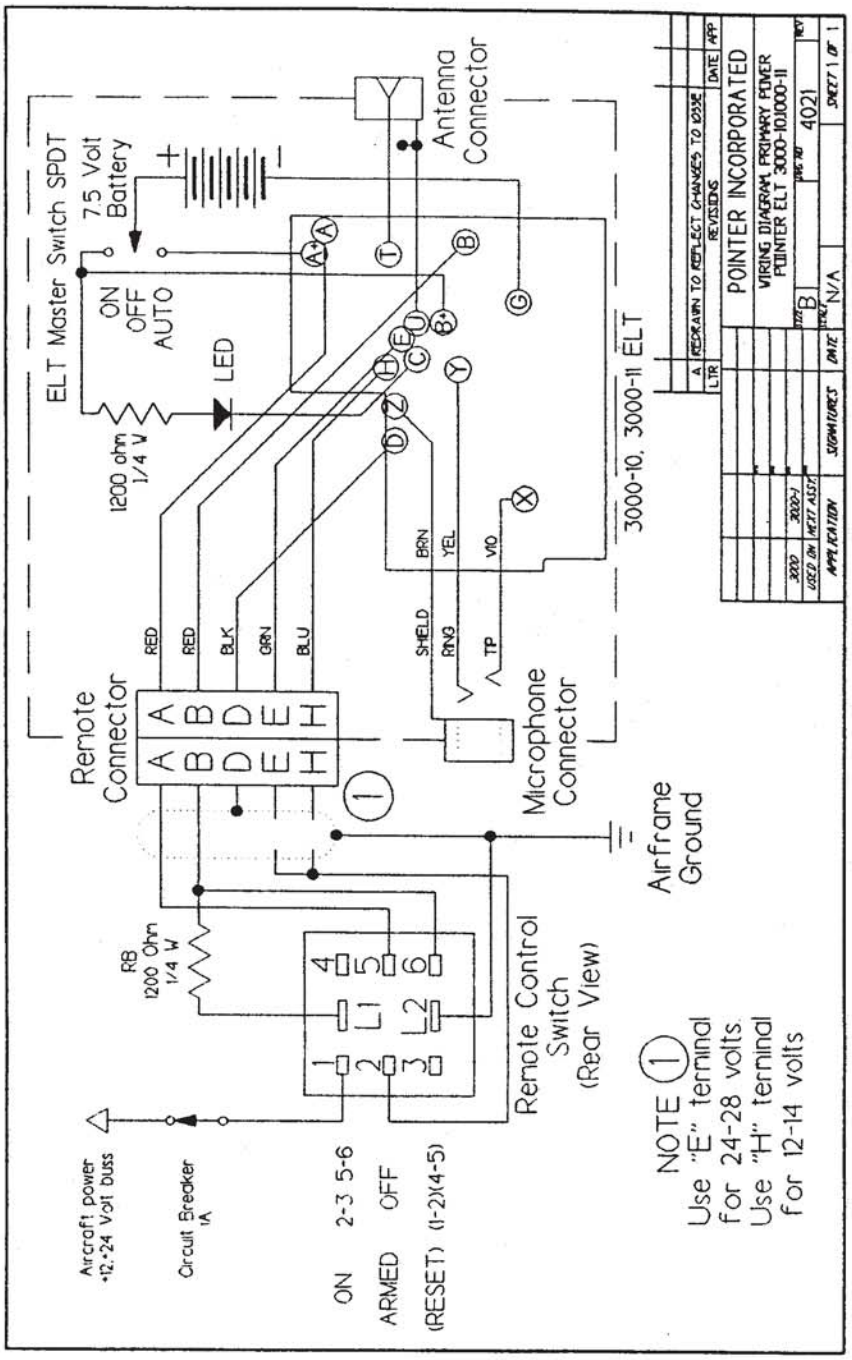

Figure 9-1. Primary Power Wiring Diagram

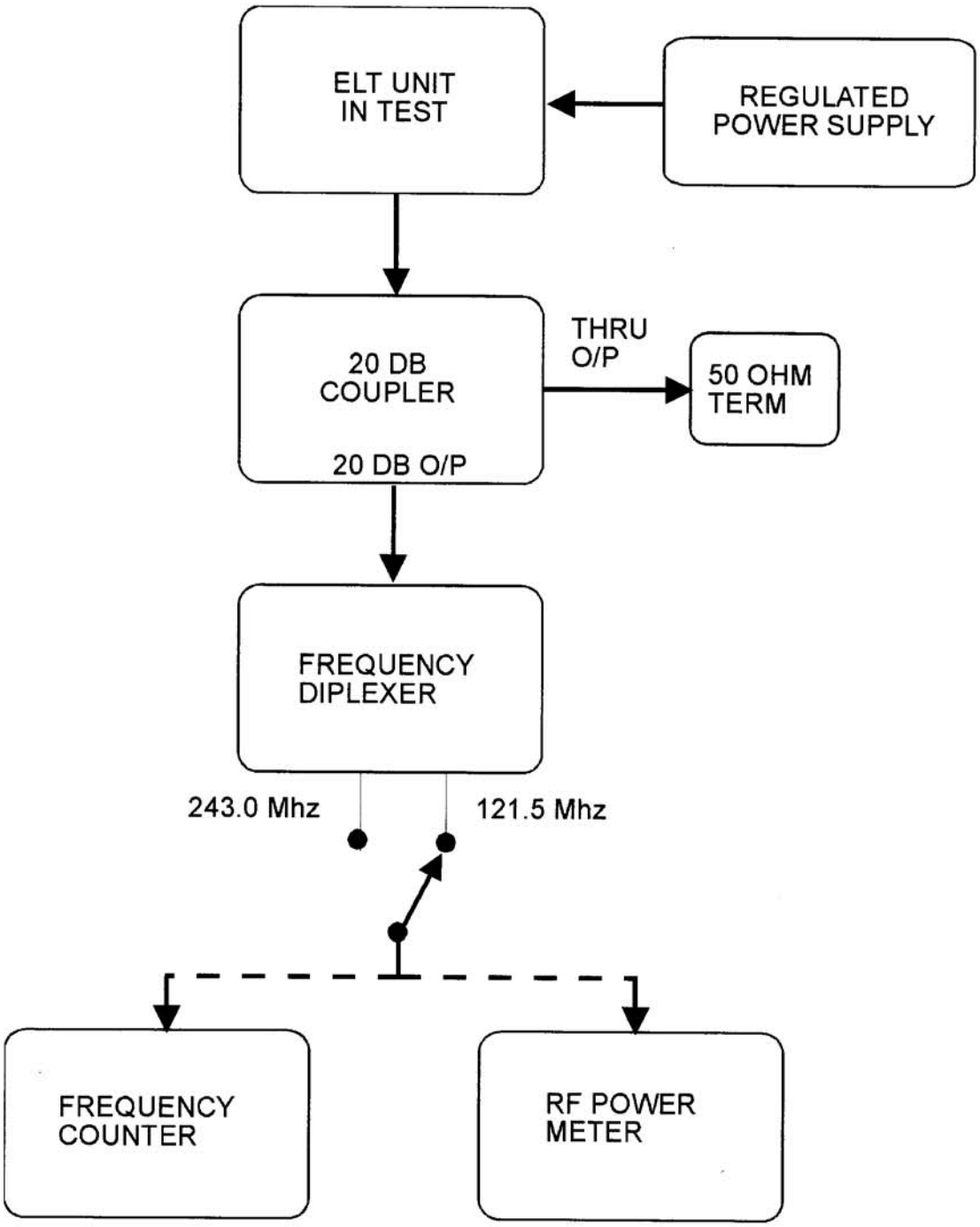

Figure 9-2. Recommended Test Setup

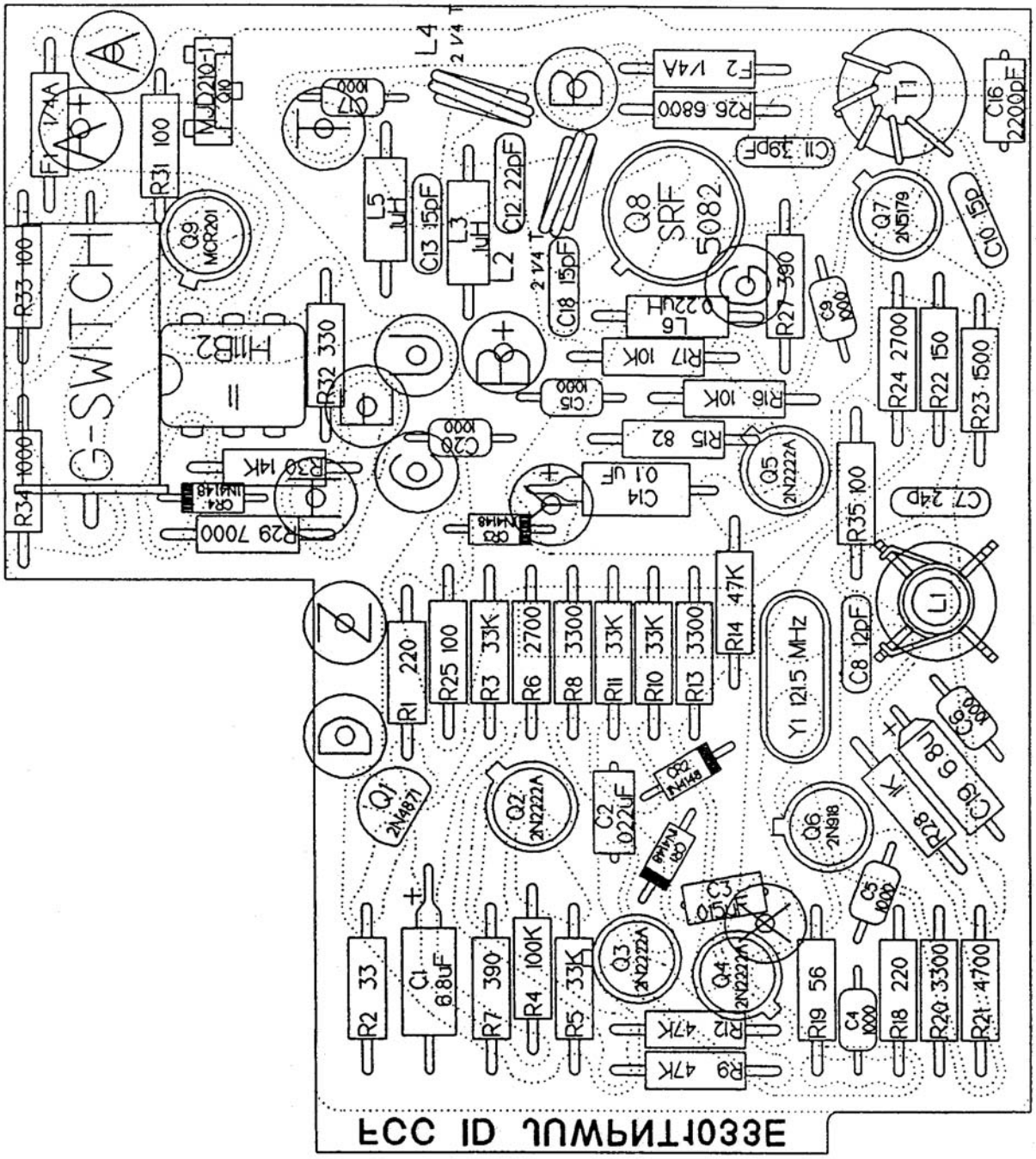

Figure 9-3. Transmitter Circuit Board Layout

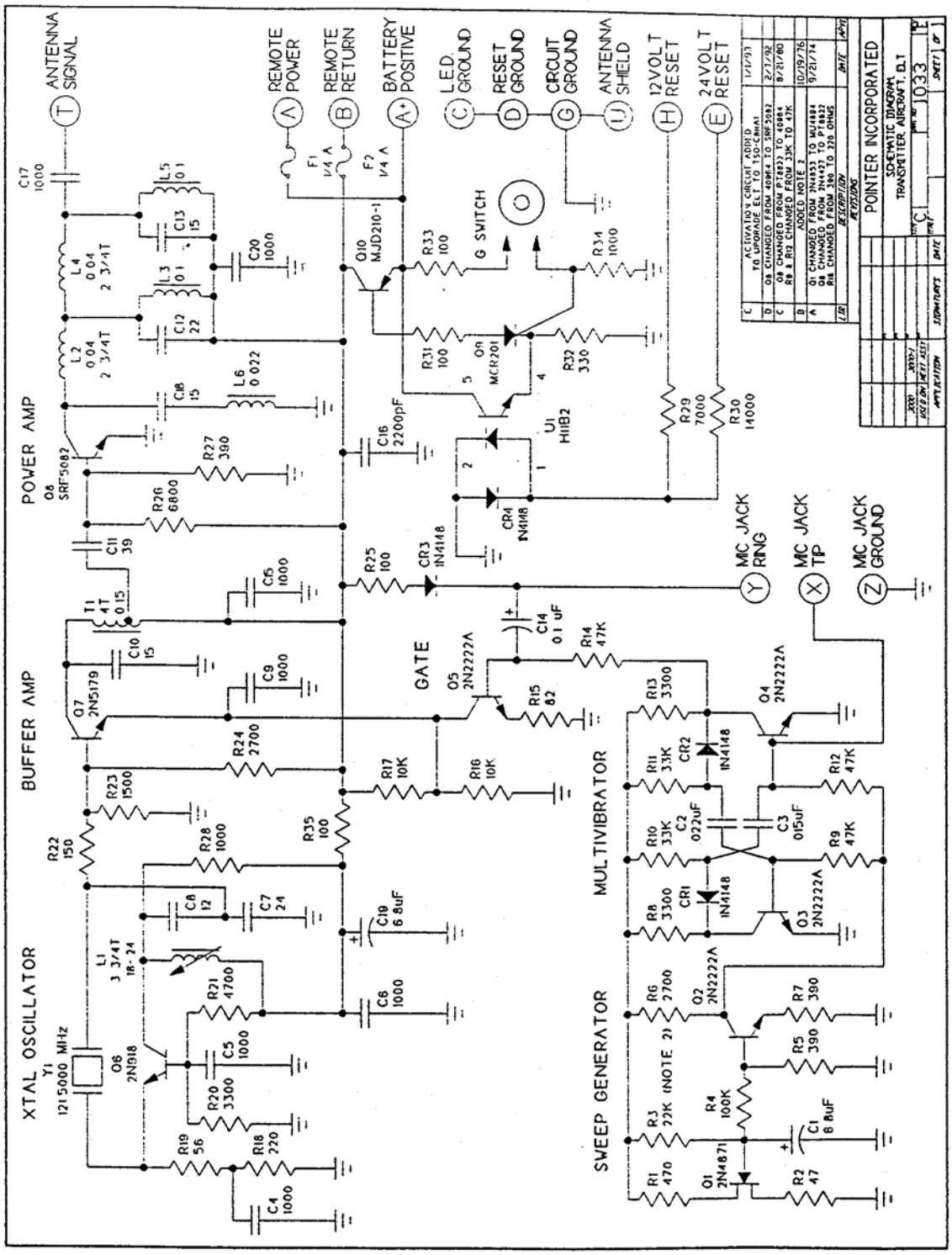

Figure 9-4. Transmitter Schematic Diagram

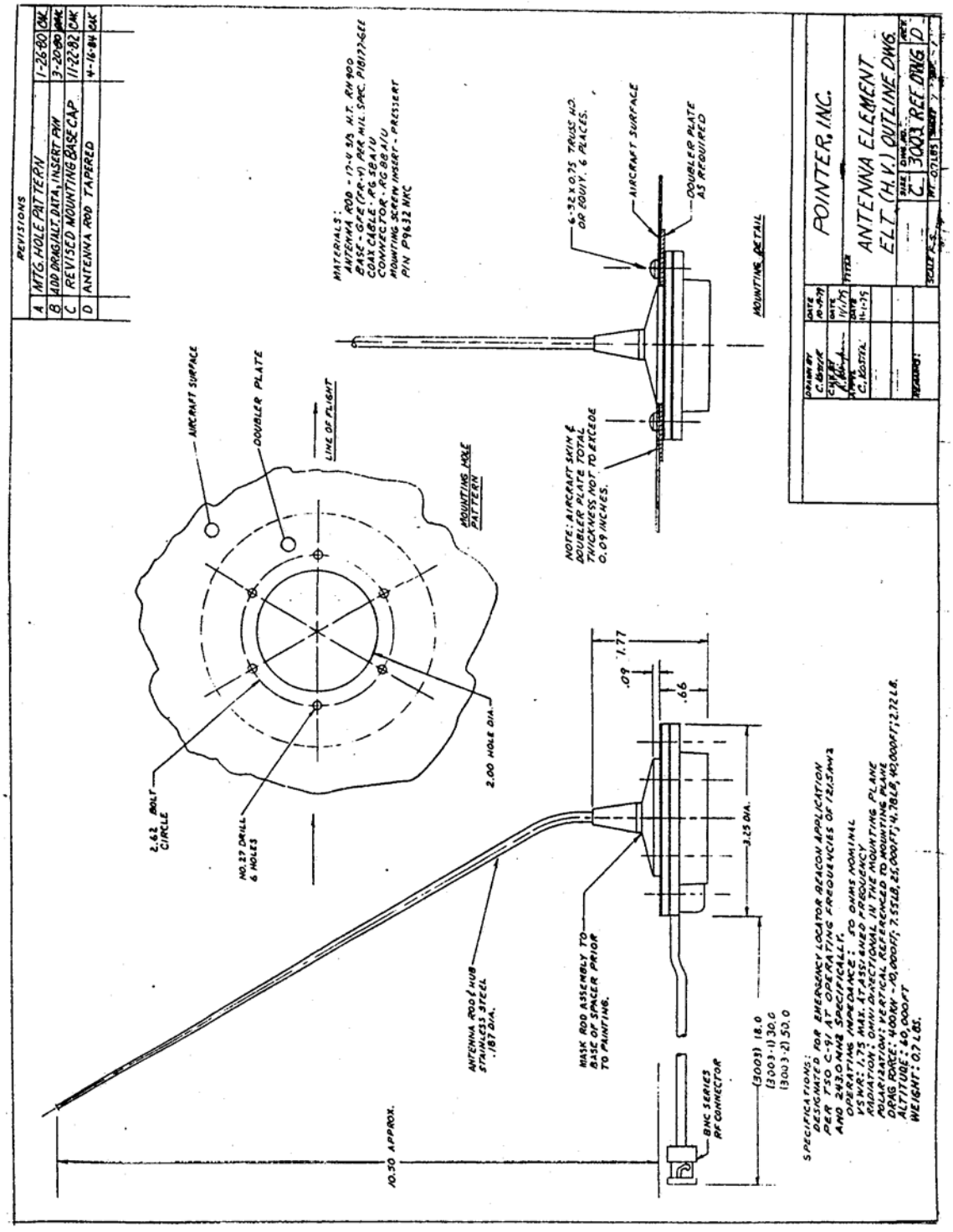

Figure 9-5 High Velocity Antenna