



OWNER'S MANUAL

Century/22

CONTENTS

SECTION	TITLE	PAGE
I	INTRODUCTION	1
	CONDENSED OPERATING INSTRUCTIONS	1
	SPECIFICATIONS	2
II	DETAILED OPERATING INSTRUCTIONS	3
	Installation	3
	Station Interconnections	3
	Operation	5
	Operating Hints	7
III	PHOTOGRAPH - TOP VIEW	9
	PHOTOGRAPH - BOTTOM VIEW	10
	CHASSIS WIRING DIAGRAM	11
	MAIN SCHEMATIC	Insert
	WARRANTY	Insert



NOTES ON CENTURY 22 SET UP FOR SPRAT

By Colin Turner G3VTT

Many of our members will no doubt have invested in the Ten Tec Century 22 transceiver and found the lack of a complete service manual to be a failing. Despite rumours to the contrary it seems Ten Tec will not be producing a manual, such as they have always produced, merely an operators guide.

What is required is a description of a method for setting up the PA driver and the output stage quiescent currents and ALC levels.

Ten Tec inform me that the current settings are 30mA for the driver and 140mA for the PA. These currents are set up with the "driver bias" and "final bias" potentiometers respectively, with the drive at minimum. The "ALC" pot should be adjusted to give a maximum output of 20 watts with drive control set at maximum.

I have also learned that, because of failures of the MRP475s, these devices have now been replaced with 2SC1969s.

SECTION I

INTRODUCTION

Century/22 is a versatile six band, medium power cw transceiver employing the latest techniques in solid state technology. Full band coverage on 80, 40, 30, 20 and 15 meters and the cw portion of 10 meters (28.0 to 28.5 MHz) allows reception of ssb as well as cw signals by means of a double-direct conversion circuit. Performance is comparable to the conventional superheterodyne. Offset tuning, an S-Meter, high sensitivity and a variable audio filter enhance receiver performance. The 50 watt transmitter features full break-in (QSK), ALC, forward power and SWR meter and built-in sidetone oscillator.

As you become more familiar with the operation of your Century/22 you will value these conveniences more and more. The broad band circuitry completely eliminates tune-up when changing bands or moving within a band. The instant break-in feature, which allows incoming signals to be heard between transmitted characters, is a luxury enjoyed by only a few cw operators, but desired by all. It changes cw contacts from a series of monologues into conversation.

A full line of optional accessories adds convenience and pleasure to your operating enjoyment. Model 226 is a unique crystal calibrator printed circuit assembly that is easily installed inside the Century/22 chassis. It provides marker signals every 25 kHz across all bands, that are pulsed at a slow rate for easy identification. The calibrator is controlled with a front panel on/off switch. Model 679 is another internally mounted printed circuit assembly that adds the electronic portion of our Model 670 keyer. All that is necessary for keyer cw is an external paddle. Model 979 is a 5 ampere power supply that provides overcurrent and overvoltage protection for the Century/22. It is available in a 230 V ac version as Model 979-E. Model 279 is a combination magnetic circuit breaker and whine filter that is necessary when operating mobile, while Model 1179 is only the circuit breaker for use with batteries or power supplies that do not offer over current protection at the 5-6 ampere level. Our standard Model 645 and 670 keyers also are compatible accessories for Century/22.

CONDENSED OPERATING INSTRUCTIONS

The following instructions will enable the operator to place the Century/22 into operation quickly. For a more detailed description of the controls and their functions, refer to SECTION II.

REAR APRON CONTROLS

- POWER INPUT** - Connect the top pin of this four pin socket to +12 to 14 VDC and the bottom pin to -12 to 14 VDC. Maximum current drain from the power supply will be approximately five amperes. If a TEN-TEC power supply is used, the connecting cable on the supply plugs directly into the POWER INPUT socket.
- ANTENNA** - Connect a 50 to 75 ohm unbalanced resonant antenna, such as a beam, dipole or vertical. An antenna tuner should be used with balanced, long wire and similar antennas with a higher input impedance to provide a reasonable match to 50 ohms.
- KEY** - Connect a straight key, bug, electronic keyer or keyboard to either the jack marked KEY on the rear panel or the one on the front panel. Electronic keyers and keyboards should have either a reed switch key line or one that switches low positive key line voltages. **IMPORTANT: KEYERS DESIGNED TO OPERATE WITH GRID BLOCK KEYING (HIGH NEGATIVE KEY LINE VOLTAGE) MUST NOT BE USED WITH CENTURY/22.** Damage to the keying circuits will result. TEN-TEC Models 645 and 670 Keyers are compatible with the Century/22 circuit.
- GND POST** - To reduce the possibility of stray pickup on interconnecting cables, which may cause parasitic oscillation, all station equipment should be well grounded to earth. This also reduces possibility of electrical shock, and provides some lightning protection. Connect a short, heavy lead, preferably shield braid, between chassis lug on rear panel and a good earth ground. Make lead as short as is practical.

FRONT PANEL CONTROLS

INITIAL CONTROL SETTINGS

- 1.) Select desired band with BAND switch.
- 2.) Set DRIVE control fully counter-clockwise.
- 3.) Apply power by actuating push-pull AF-POWER on/off switch to 'in' position. If using TEN-TEC power supply, make sure that its power switch is in the 'on' position. Pilot lamp and red LED dial indicator should illuminate.
- 4.) Tune dial to desired frequency within the selected band.
- 5.) Push LOCK button in and advance DRIVE until power meter indicates 20 watts output power when FWD/REF push button is in the FWD (in) position.
- 6.) Reset LOCK button to OFF (out) position. Transceiver is now ready for operation.

SPECIFICATIONS

GENERAL

FREQUENCY COVERAGE - 3.5 to 4.0; 7.0 to 7.5; 10.0 to 10.5; 14.0 to 14.5; 21.0 to 21.5; 28.0 to 28.5 MHz. (VFO provides approximately 40 kHz overrun on each band edge.)

STABILITY - Less than 20 Hz change per degree F from 70 to 110 F after 30 minute warm-up.

TUNING RATE - Approximately 17 kHz per revolution.

POWER REQUIREMENTS - 12 to 14 VDC. 5 amperes maximum transmit @ 13.5 VDC, 500 mA receive.

FREQUENCY TOLERANCE - ± 5 kHz of dial reading. (± 2 kHz when using optional calibrator.)

ANTENNA IMPEDANCE - Unbalanced (coaxial), 50-75 ohms.

RECEIVER SENSITIVITY - 0.5 μ V for 10 dB S+N/N, typical.

RECEIVER SELECTIVITY - 4 pole variable band pass audio filter. 750 Hz center frequency, 200 Hz bandwidth, variable skirt attenuation.

RECEIVER OFFSET - Adjustable ± 2 kHz, zero offset at center detent.

AUDIO OUTPUT - 1 watt, less than 2% THD.

TRANSMITTER INPUT POWER - 50 watts maximum.

RF OUTPUT - 20 watts all bands for SWR less than 2:1, ALC limited.

SEMICONDUCTORS - 28 transistors, 24 diodes, 7 integrated circuits.

CONSTRUCTION - Rigid metal chassis. Molded front panel. Aluminum back, top and bottom. Stainless steel tilt-up bail.

DIMENSIONS HWD - 4"x10"x10.5" (10.2 x 25.4 x 26.7 cm).

WEIGHT - 6 lbs (2.7 kg).

FRONT PANEL CONTROLS

Receiver RF gain; receiver AF-POWER; OFFSET; receiver audio FILTER; BAND switch; main tuning; transmitter DRIVE; FWD/REF power push button switch; CAL./OFF push button switch for optional calibrator; LOCK/OFF push button switch; PHONES jack; KEY jack; ALC LED indicator.

REAR PANEL CONNECTIONS

ANTENNA jack; POWER INPUT socket; KEY jack; two AUX 12 VDC jacks; 7.5 A FUSE; GND post.

SECTION II

DETAILED OPERATING INSTRUCTIONS

INSTALLATION

GENERAL

Choose an operating location that is cool and dry. Allow adequate ventilation around the transceiver chassis and power supply heat sink. Natural convection cooling is all that is required. During mobile operation, free access to cool air should be available to the chassis also. Do not direct the outlet vent of the automobile's heater directly at the Century/22.

STATION INTERCONNECTIONS

POWER REQUIREMENTS

A supply of 12 to 14 volts dc, capable of supplying 5 amperes, negative ground, is required. Voltage regulation of 10% or better between no load and full load is required for distortion-free and properly keyed transmissions. (e.g. A 13 volt no load supply should not go below 11.7 volts at 5 amperes.) Century/22 may be operated directly from an automobile type storage battery in fixed or mobile locations, provided that voltage under full load does not go below 11 volts. It is permissible to connect a slow charger across the battery to maintain full charge. However if the charger is connected across a discharged battery during transceiver operation, some unfiltered ac ripple from the charger may cause amplitude modulation of the transmitted note at line frequency. It is recommended that the charger be disconnected under these conditions, or that the battery be given time to charge somewhat before operation. In all cases of battery operation or from a supply that does not limit output current to approximately 5 amperes, Model 1179 Circuit Breaker should be used in series with the +12 volt input lead to provide over-current protection.

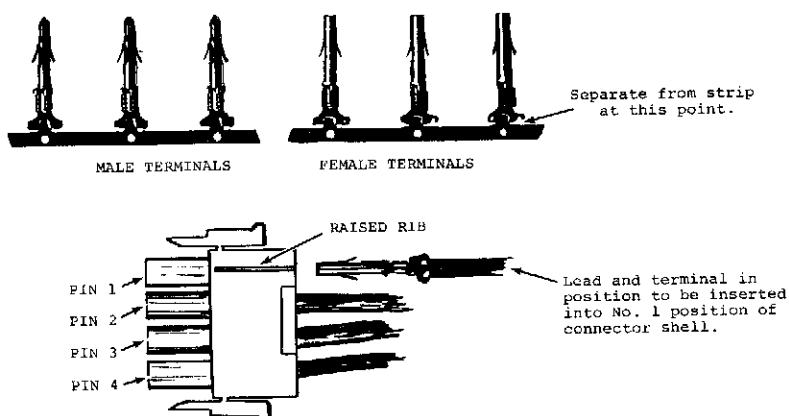
For 115 or 230 volt ac operation, a well regulated supply is required. TEN-TEC Model 979 supply is especially designed for Century/22 operation, although other TEN-TEC supplies may be used if Model 1179 is also used.

POWER CONNECTIONS

Power is supplied to the transceiver by means of the four pin AMP MATE-N-LOC connector. The chassis connector is of the male type and mates directly with the cable connector supplied and attached to all TEN-TEC supplies. It is only necessary to insert cable connector into the chassis receptacle when using Model 979.

When used with TEN-TEC supplies, the front panel POWER switch on the supply must be in the 'on' position. Transceiver power will then be controlled by the AF-POWER switch on the Century/22 front panel.

When using a dc source other than a TEN-TEC supply, it will be necessary to construct a power cable using the accessory AMP connector supplied with the transceiver. Wires for this cable should be at least #16, and #14 if the power lead is more than a few feet long. Pin connections (see AMP MATE-N-LOC detail drawing) are as follows: Pin 1 = GND; Pin 4 = + Voltage. Pins 2 and 3 need not be connected. They are shorted together in the Century/22 so that TEN-TEC power supplies will be controllable from their power switches.



AMP Universal MATE-N-LOC Connector - This connector is intended for high production with automatic staking of the wire to the pin terminals. However, it can be assembled in the field without staking machinery by crimping and soldering the leads to the terminals and then inserting the terminals into the plastic shell. To do this, refer to the detail drawing below and proceed as follows:

1. The terminals are supplied connected to a strip of flat metal. Break the individual connectors from the strip by bending back and forth at the point of narrow attachment, or by clipping them off with diagonals.
2. Wire sizes that can be accommodated range between 12 and 18 gauge. Strip insulation 1/4" back from end.
3. Insert stripped end into barrel far enough so that insulation just starts between large thin and small wide tabs.
4. With long nose pliers, roll over small wide tabs so that they hold bare wire.
5. Solder leads to rolled tabs by applying iron tip to top of rolled tabs while feeding rosin core solder between wire and tabs. Do not allow solder to run down into hollow tube.
6. After terminals are well soldered, roll large thin tabs down over insulation and crimp with pliers.
7. Insert terminals into plastic shell from solid plastic end so that they finally locate in individual tubes. The terminals will automatically lock into place when inserted to the proper depth. MAKE ABSOLUTELY CERTAIN THAT TERMINALS ARE INSERTED INTO CORRECT HOLES SINCE REMOVAL IS DIFFICULT.

To remove terminals, an extractor is necessary to collapse the lanced holding tabs on the sides of each barrel. The extractor can be a metal tube, at least one half inch long, with an outside diameter between 0.125" and 0.135" and an inside diameter of 0.100". Insert the extractor tube into the pin end of the shell, over the terminal to be removed, to a depth of about 1/2". Pull on the wire and extract terminal.

Additional connector kits are available from TEN-TEC at \$1.00 each, with a minimum order of \$2.00. When ordering, ask for AMP 4 pin MATE-N-LOC cable connector and specify male or female terminals.

ANTENNA CONNECTIONS

Any unbalanced antenna presenting 35 to 75 ohms impedance to the unit will work satisfactorily. This represents a SWR of 1.5 to 1 or less. When using random length antennas or open wire feed systems, a matching network such as the TEN-TEC Model 227 or 228 Antenna Tuners, should be used to obtain an equivalent impedance. If an antenna tuner is used, locate it as far as is practical from the immediate transceiver location. Do not place tuner on top of transceiver or close to key or other cables going to the transceiver or associated accessories.

A type PL-259 coaxial connector is required to connect the antenna to the Century/22. The center conductor is connected to the pin and the shield braid to the shell of the connector.

An unbalanced antenna is one which has a feed point with one of the two terminals at ground potential. The transmission cable in this case is usually of the coaxial type, with the outer shield connected to the ground potential terminal or shell of the connector. Balanced antennas have both feed terminals above ground potential. These can be converted into an unbalanced feed configuration by either inserting a balun between the feed point and the transceiver (at antenna, transceiver or anywhere in transmission line), or with an antenna tuner designed to accept balanced loads and unbalanced inputs. Further information on this subject is available from the many antenna handbooks.

GROUND CONNECTIONS

To reduce possibility of stray pickup on interconnecting cables, and provide a measure of safety to the operator from possible shock in ac powered systems, all station equipment chassis should be strapped together and grounded to earth. This is especially important when using high impedance antennas and matching networks, where rf voltage levels are necessarily high. It is also important to strap all equipment chassis together with short heavy leads, preferably with braid. This procedure brings all metal components that are accessible to touching to the same potential, removing the possibility of shock when touching more than one piece of equipment. In mobile installations, connect a ground strap between the rear panel GND post and the automobile chassis (dash board if metal). Earth ground leads should be of heavy wire or braid and as short and direct as possible. (A ground lead that is one quarter wavelength long at the operating frequency will not bring the chassis to ground potential at this frequency, even though it will to dc and other frequencies.)

KEY

The key activates a series of circuits that supply operating voltages to various transmitter and receiver circuits. When the key is closed, the receiver is disabled and operating bias is applied to the transmitter. At the same time the antenna is electrically isolated from the receiver input. There is a short time delay in the audio muting circuit to eliminate clicks in the speaker when keying. It is not long enough to interfere with the full break-in feature of the unit.

For proper operation, the key line requires a very low resistance path to chassis, with no appreciable voltage across it. Hence, electronic keyers with reed relays or transistor switched circuits incorporating low saturation NPN transistors are recommended. Series diodes in the key line will inhibit proper keying. Improper key line conditions may cause lower than rated output power, improper keying envelope and/or key clicks. TEN-TEC Models 645 and 670 Keyers are designed for use with the Century/22.

A parallel KEY jack is located on the front panel.

The sidetone oscillator is also controlled by the key line. Its pitch and volume can be adjusted through the two small access holes in the left side of the bottom cover. The controls are printed circuit potentiometers that require a small bladed screw driver for adjustment. Volume is independent of the AF control setting.

AUX 12 VDC

These two jacks may be used to power external equipment such as an electronic keyer. They are connected to the +12 volt supply line in the unit and are switched and fused by the Century/22. Any appreciable power drawn from these jacks may cause the fuse to blow or the Model 1179 to trip before full power is realized from the transmitter. Therefore, these jacks should not be used to power equipment that draws more than about two amperes. TEN-TEC keyers only require a fraction of an ampere.

OPERATION

FRONT PANEL CONTROLS AND THEIR FUNCTIONS

Power On/Off Switch

The power switch is located on the AF-POWER control. It is a pushbutton type that controls the +12 volts applied to the Century/22 and the two AUX 12 VDC jacks on the rear panel. Voltage is applied when the switch knob is pushed 'in'. If a TEN-TEC power supply is used, this switch cannot be used to recycle the automatic shutdown feature of the supply when overloaded. The switch on the power supply must be recycled in this instance.

Frequency Determining Controls

BAND Switch - The six position BAND switch selects the desired 500 kHz segment of the Amateur bands starting at 3.5, 7.0, 10.0, 14.0, 21.0 or 28.0 MHz. There is an overrun of the VFO range resulting in an extension on each end of the 500 kHz range of approximately 40 kHz. Operation in these guard bands is possible with the Century/22 (MARS stations for example).

Main Tuning and Slide Rule Dial - The main tuning knob simultaneously adjusts both receiver and transmitter frequency. The dial skirt is marked in 1 kHz increments up to 100 kHz. This scale is used in determining the frequency of operation within the 100 kHz segment noted on the slide rule LED dial. The lower scale is used when operating on the 3.5 to 4.0 MHz band and the upper scale for all other bands.

Dial Pointer Zero Set - When calibrating at any 100 kHz point or by receiving WWV at 10.0 MHz, the slide rule LED pointer may be set accurately to the scale marking with the aid of the serrated disc knob protruding from the bottom of the case. It is located between the main tuning knob and the BAND switch, on the bottom front edge of the front panel. This adjustment need be made only occasionally as the string ages, since the pointer is not intended for exact indications of frequency, but rather as a segment indicator telling which 100 kHz segment you are tuned to. Accurate frequency determination is made by use of the 0-100 kHz dial skirt.

The skirt can be calibrated to a known frequency such as WWV by tuning the station or calibrator in and while holding the main knob securely, rotating the skirt to the correct kHz mark.

Receiver Controls

AF-POWER Control - Adjusts level of received audio from speaker or headphones. This control does not affect the level of the sidetone oscillator. The power function of this control was explained above.

OFFSET Control - This control permits moving the receiver frequency up to approximately 2 kHz above or below the transmitter frequency. The two frequencies are the same at the detent position. This control provides the beat note necessary to copy cw transmissions when the transmitter frequency is adjusted exactly to the frequency of the incoming signal (received signal is zero beat at detent position). Either the higher or lower setting of the OFFSET control is used when copying code. When the OFFSET control is set to the + half of its range (clockwise from center detent), an incoming signal should be tuned to the beat note that is above the zero beat dial frequency and when the control is in the - range, the signal beat should be the one lower in frequency than the zero beat position. This assures that your transmitted carrier is close to the received frequency. Another method of checking to see if the correct beat is being used is to rotate the OFFSET control toward the center position. No matter what side of center you are on, the beat note should decrease toward zero beat. If it increases in pitch, you are receiving on the incorrect side and the main tuning knob should be readjusted to the opposite beat. In some instances, when an interfering station is present in one position of the OFFSET control, readjustment of the OFFSET to the opposite side of the detent will eliminate or greatly reduce the interference.

RF Gain Control - This control activates a PIN diode attenuator in the receiver's antenna line which reduces the susceptibility to overload in the presence of extremely strong signals. Attenuation increases as the control is rotated counterclockwise. The correct setting of the RF control is that which produces meter readings between S8 and full scale, or fully clockwise if the received signal is not above S8. When the meter is pinned to full scale, you may be in the range where overload becomes a problem and spurious signals appear with the desired one. Reduce the RF control to eliminate this possibility.

Audio Bandpass Filter - The FILTER control sets the skirt attenuation of the bandpass filter in the audio channel. It is a four pole filter (attenuation slope of 24 dB per octave) which has a center frequency of 750 Hz and a bandwidth of 200 Hz. In general, reduce the FILTER control to approximately mid-rotation while tuning signals in and when the desired station is adjusted to a beat note of 750 Hz, its strength will be loudest and in the center of the filter passband. Rotation of the control fully CCW will then reduce all interfering stations to the maximum capability of the filter. Full clockwise rotation effectively removes the filter from the circuit since the skirts are not attenuated at all.

Calibrate On/Off Switch - The push button switch marked CAL./OFF energizes the optional Model 226 Crystal Calibrator when it is installed in the Century/22. The calibrator is operating when the push button is 'in'.

S-Meter - The S-Meter is operational whenever the unit is in the receive mode. For most accurate readings, the RF control should be fully clockwise. When transmitting, the meter switches to a rf power meter.

PHONES Jack - This jack is the external headphones or speaker connection. When employed, the internal speaker is automatically disabled. Although the amplifier is designed for an 8 ohm load, external speakers between 4 and 16 ohms will work satisfactorily.

Headphones of any impedance will also work directly from this jack. However, since the amount of power required to drive headphones to a satisfactory level is much less than for a speaker, it is recommended that high impedance headphones be used, which will automatically reduce the power level, or that an attenuator be used with low impedance phones. The attenuator will greatly reduce residual noise because the amplifier will be working at a more favorable signal to noise setting of the AF control. A simple resistor network consisting of approximately 15 ohms in series with the phones and a shunt resistor of 2.7 or 3.3 ohms across the phones should suffice. Both resistors can be 1/4 watt types and be soldered to the phones connector terminals and concealed in the shell of the connector.

Transmitter Controls

LOCK Pushbutton - This switch is in parallel with the key line. It is used while adjusting the DRIVE control and when measuring or adjusting antenna systems. The transceiver is in the key-down transmitting mode when the LOCK switch is pushed in.

DRIVE Control - This control sets the level of rf applied to the final amplifier. For full rated power it is set (with LOCK switch 'in') just to the point where the ALC LED on the front panel lights. Increasing DRIVE beyond this setting will not increase output power but will degrade keying characteristics and produce key clicks if advanced to extremes.

KEY Jack- The front panel KEY jack parallels the phono connector on the rear panel and may be used alternately with it. An instance where both would be used is in installations where a keyboard is connected to one jack and a straight key or keyer to the other. The connector accepts a standard one circuit, 1/4" phone plug.

FWD/REF Switch - This pushbutton panel switch selects either the relative power output scale (0 to 1) when in the FWD position or SWR when in the REF position. The meter automatically switches to the chosen meter scale whenever the transmitter is in the key-down or LOCK position. The meter reverts to an S-Meter when receiving.

OPERATING HINTS

- 1.) The speaker is most effective when the unit is placed on a hard surface and the bail is lowered. Adequate sound quality is still produced with the bail up if the unit rests on a hard surface.
- 2.) The unit may be operated as a QRPp station simply by reducing the DRIVE.
- 3.) Sidetone level and pitch are adjustable through the two access holes in the left bottom cover. Use a small bladed screwdriver.
- 4.) The VFO oscillator in the Century/22, like any LC tuned circuit, is adversely affected by ac magnetic fields cutting the coil turns. The oscillator output is frequency modulated at the line frequency causing a 'dirty' cw note in both transmit and receive modes. When installing the unit, locate any ac operated equipment which may generate magnetic fields, such as power supplies, electric clocks, rotator controls, etc. as far as possible from the transceiver. Do not place these accessories directly on top of the transceiver or the transceiver on them, since the VFO is located front and center. A check of the purity of the received signal should be made at the time of installation.
- 5.) Due to the possibility of high voltage transients being generated in the output rf amplifier during band switching, changing bands should not be done while transmitting power to the load. Either turn the DRIVE control fully counterclockwise or be certain of a key-up condition. YOU RISK THE POSSIBILITY OF DESTROYING THE OUTPUT TRANSISTORS IF THIS PRECAUTION IS NOT OBSERVED.

- 6.) Although improperly matched antennas will not damage the unit, we suggest an SWR below 2 to 1 be achieved for maximum performance. In cases where the antenna cannot be matched to a suitable SWR, the unit can still be operated at a reduced output level by reducing the DRIVE to where the power supply or circuit breaker does not trip out.
- 7.) To determine SWR, place the unit in the LOCK mode and advance DRIVE to where ALC LED just lights. Place FWD/REF switch in REF position ('out' position) and read SWR on meter scale.
- 8.) When operating mobile, always turn the Century/22 off when starting or stopping the engine. High voltage transients from the generator may appear on the supply line before the vehicle's regulator contacts close.
- 9.) Failure of a called station to return your call may be due to your transmitter being as much as four kHz off of the desired frequency, caused by your listening to the incorrect beat note. To set your transmitter to the same frequency as the incoming signal, set OFFSET to detent center position and tune main tuning for a zero beat note. Zero beat is when no audio note is heard, with audio pitch increasing either side of this position. To copy the station, reset OFFSET to either side of the detent position for a comfortable tone. (Refer to OFFSET paragraph above for further information and methods of setting frequency.)
- 10.) WWV at 10.0 MHz or CHU at 7.335 MHz can be used to calibrate the dial skirt accurately near these frequencies. For accurate calibration throughout the operating range of the transceiver, Model 226 Calibrator will provide markers every 25 kHz.
- 11.) RF control should be used to prevent pinning the meter on strong signals. This insures operation well below the overload point.
- 12.) When calling CQ or before initial contact is made with a specific station, use the widest position (full CW) of the FILTER control so that the incoming station may still be heard if he is a bit off your frequency. After contact is established, you can adjust the OFFSET control for the desired 750 Hz beat note without changing your transmitting frequency, and then make best use of the filter by turning the control CCW. Because of the narrow passband when fully CCW, you may miss hearing your contact altogether.

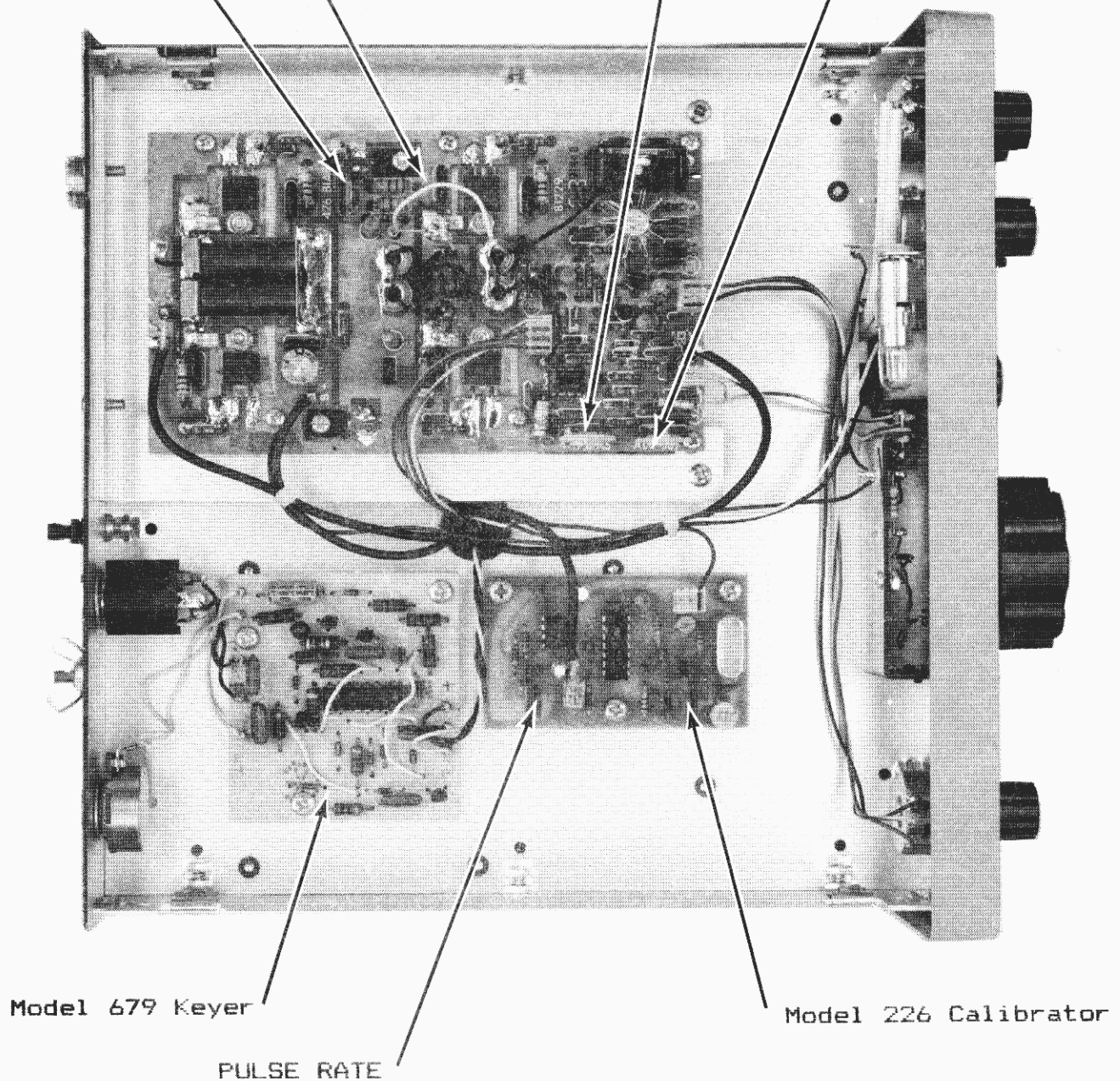
SECTION III TECHNICAL DATA

FINAL AMPLIFIER ASSEMBLY
No. 81229

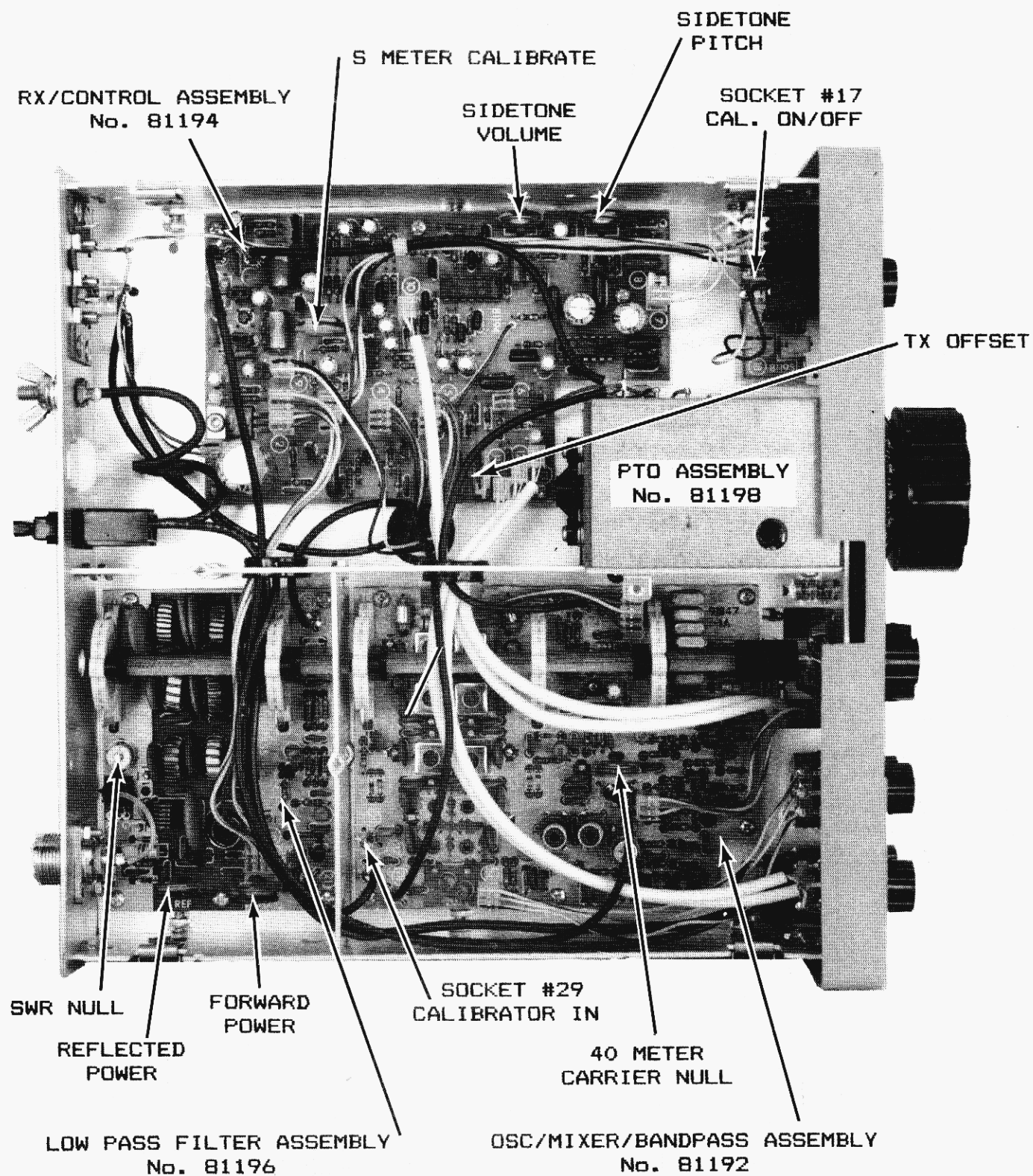
FINAL BIAS

DRIVER BIAS

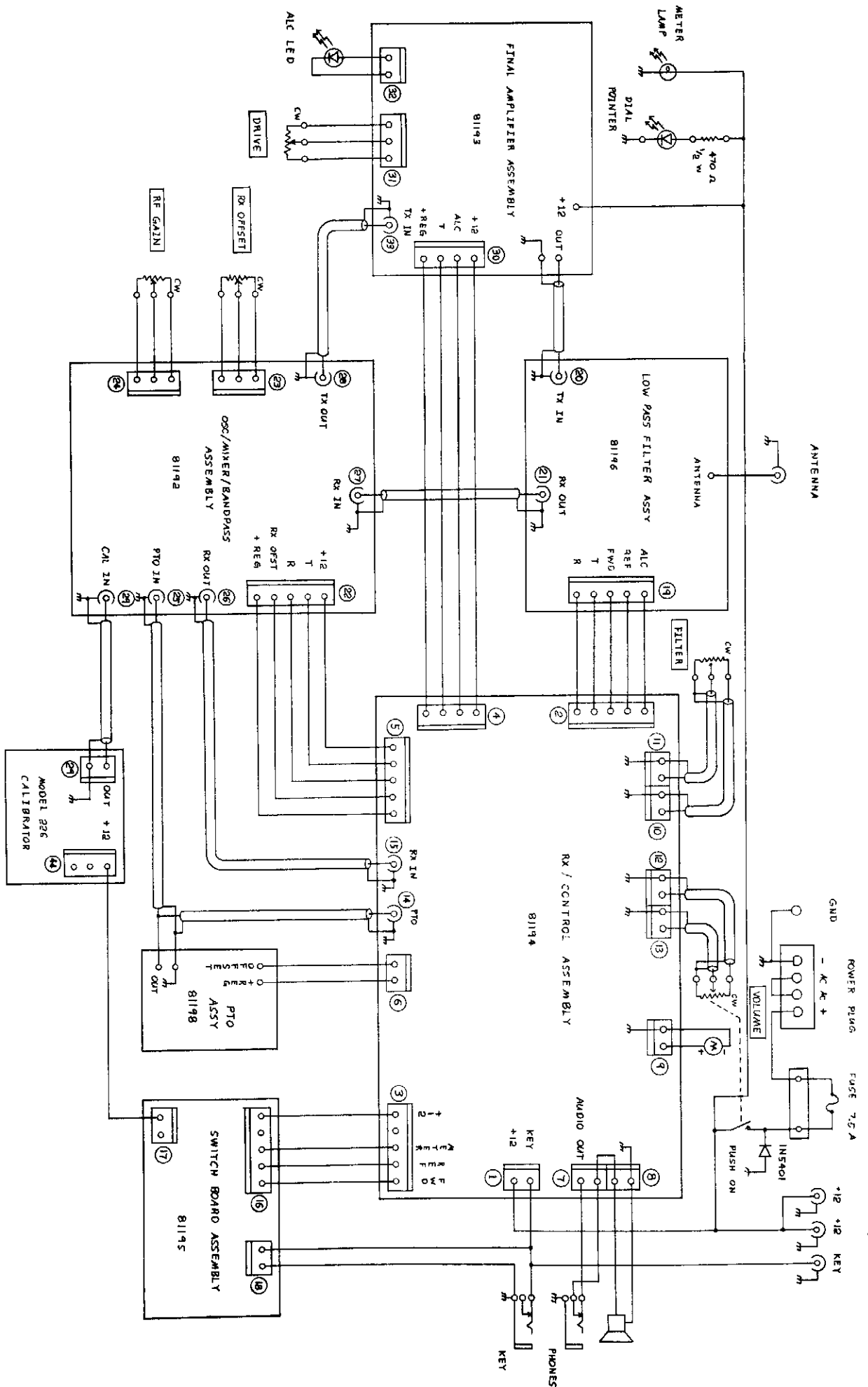
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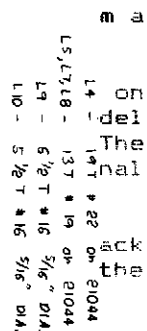
MODEL 579 - TOP VIEW



MODEL 579 - BOTTOM VIEW

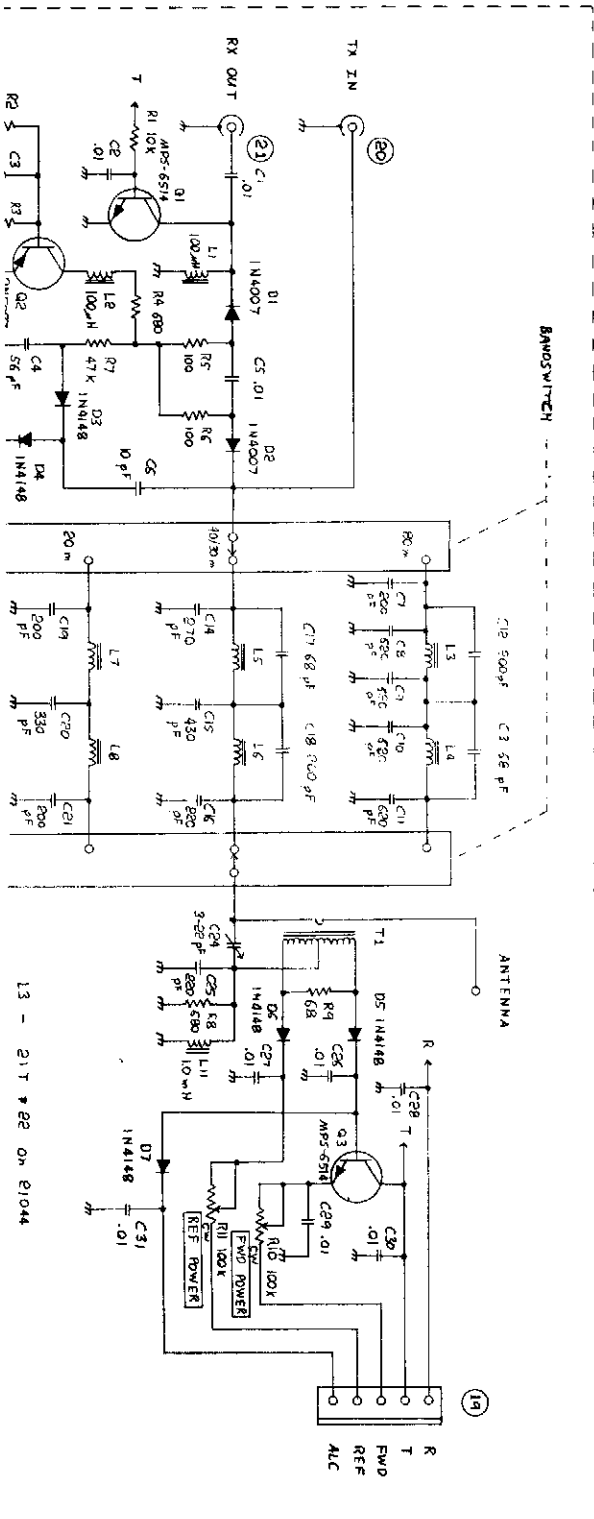
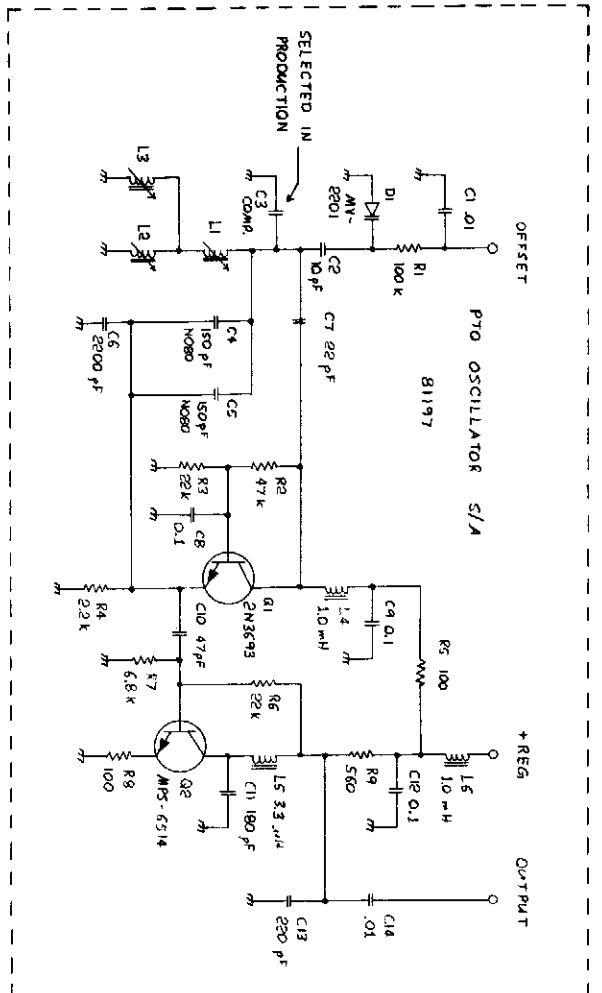


CHASSIS WIRING DIAGRAM



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The schematic diagram illustrates the Final Amplifier Assembly, a multi-stage vacuum tube amplifier. The circuit is powered by a +12V supply. It begins with a driver stage consisting of a 6X4 tube (Q1) and a 6X5 tube (Q2). The output of the driver stage is coupled to a push-pull output stage using a 6X5 tube (Q3) and a 6X4 tube (Q4). The output of the push-pull stage is coupled to a final output stage using a 6X5 tube (Q5) and a 6X4 tube (Q6). The final output stage is coupled to a 50A output transformer (T4). The circuit includes various components such as resistors (R1-R10), capacitors (C1-C10), and transformers (T1, T2, T3, T4). The circuit is labeled with component values and tube types, and includes a 50A output transformer.



TEN-TEC INSTRUCTIONS
MODEL 679 CENTURY KEYSER KIT

TEN-TEC Model 679 Century Keyer Kit was designed specifically for use with the Century/22 transceiver. This optional accessory is installed within the transceiver and provides electronic keying of the transmitter when used with an external paddle. The circuit features self-completing dits and dahs, preset weighting for optimum articulation in the most used speed range, a speed range between 6 and 50 words per minute and easy installation.

INSTALLATION

1. Remove both top and bottom covers from the Century/22. Four screws, located on the side surfaces, secure each section.
2. Remove the two plug buttons that cover the 3/8" holes in the back panel of the transceiver that are designated SPEED and PADDLE.
3. Place a lock washer on the phone jack supplied with the kit and insert jack into the hole marked PADDLE. Secure with the 3/8" flat washer and hex nut so that the small corner flat on the body of the jack is up and parallel to the chassis.
4. Place a lock washer on the potentiometer bushing and insert the control in the hole marked SPEED. Secure with a hex nut so that the terminals are facing the phone jack just installed. Note that one lug of the control has been clipped off.
5. Cut the hook-up wire supplied with the kit as follows:

Qty.	Color	Length in inches.
1	Yellow	2
2	Yellow	3
1	Yellow	10
1	Black	2
1	Black	10
1	Red	2
1	Red	10

Strip both ends of all leads 1/8". Twist the three 10" leads together to form a cable.

6. Install the Model 679 printed circuit assembly on the three unused standoffs on the chassis top that surround the label designating the location of the Model 679. Use the three 6-32 machine screws provided to secure the assembly. The orientation of the PCB should be such that the edge containing the five terminal pins runs closest to the back panel of the transceiver.
7. Connect and solder the 2" black lead between the top lug (GND) of the phone jack and the center terminal of the set of three terminals to the left of the mounting screw.
8. Connect and solder the 2" red lead between the left lug on the jack to the left most terminal on the PCB. Also connect and solder the 2" yellow lead between the right jack lug and the remaining terminal of the set of three.
9. Connect the two 3" yellow leads between the SPEED control lugs and the two terminals to the right of the mounting screw.
10. Install the 10" twisted cable to the remaining set of three terminals on the PCB as follows: The black lead to the center terminal, the yellow to the left terminal and the red to the right terminal.
11. Route the cable through the plastic grommet in the center of the chassis to the bottom section, and then toward the rear panel and the three jack phone connector. Connect the black lead to one of the GND lugs on this connector, the yellow lead to the terminal on the jack marked KEY and the red to one of the 12 VDC AUX jacks.
12. Finally, install the knob supplied to the shaft of the SPEED control.

To check operation of the keyer before replacing the covers, turn the transceiver upright and connect power cable. Set DRIVE control fully counterclockwise. Insert the paddle plug into the PADDLE jack. (Connections of the stereo type 1/4" plug are as follows: Barrel = GND; Tip = Dit; Ring = Dah.)

Turn power on and check operation of the keyer. Check speed range also. Replace top and bottom covers.

NOTE: An alternate keyer, straight key or keyboard can still be used with the Century/22 just by connecting it to either the front KEY jack or the phono connector jack on the rear panel marked KEY. Actuation of either will key the transmitter without having to disconnect the unused keyer.

INCREASING MAXIMUM SPEED

To increase the maximum speed limit from the factory setting of 50 WPM, replace R2 on the PC assembly with a resistor of lesser value. A 1.8 K resistor will increase the maximum speed attainable to approximately 90 WPM. Values between 3.3K and 1.8K will provide maximum speeds between 50 and 90 WPM. The lowest speed of 6 WPM will only slightly be increased by changing R2. The increased speed range resulting from this modification may somewhat reduce the ease of setting the control to the desired speed. To compensate for this, you may want to increase the minimum speed as detailed in the next paragraph.

INCREASING MINIMUM SPEED

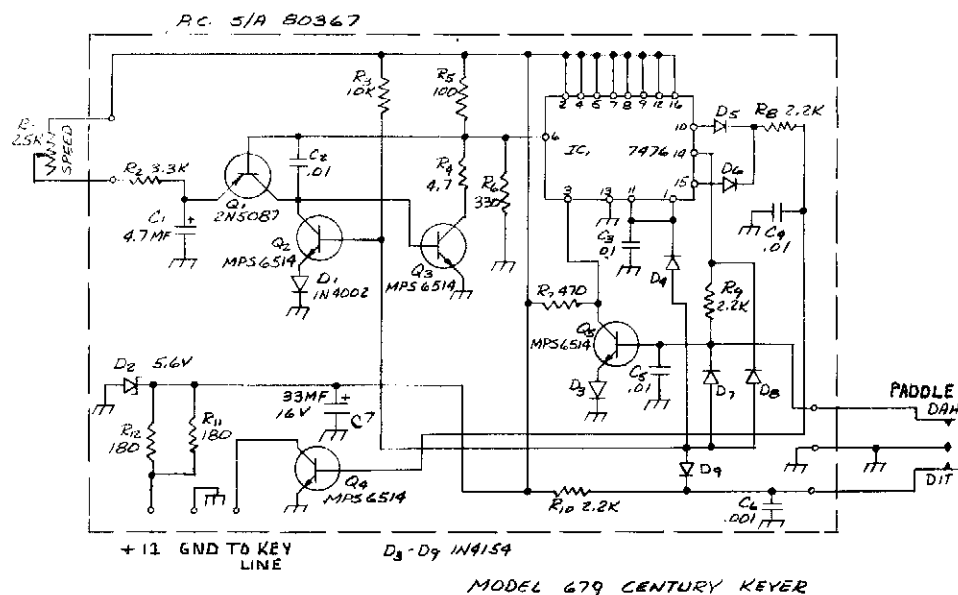
The minimum speed attainable can be increased from 6 WPM by bridging a resistor across the two active terminals of the SPEED control R1, or by replacing the control with one of smaller total resistance. For example, a 27K resistor shunted across the control, or a 15K potentiometer, will increase the minimum speed to approximately 9 WPM. Lower resistance will further increase the minimum speed limit. This modification has no effect on the maximum speed limit since the control is completely out of the circuit when fully clockwise.

REMOVING WEIGHTING CIRCUIT

To remove all weighting so that dit and space durations are equal, replace C4 with a .001 mfd capacitor. It is not recommended that weighting be increased above the factory set level because articulation (readability) of the code will deteriorate, especially at the higher speeds.

LEFT-HANDED CW OPERATORS

If you wish to switch the dit and dah paddles, either change the connections in the paddle connector or the red and yellow wires between the PADDLE jack and the PCB.



TEN TEC INSTRUCTION SHEET
MODEL 226 CRYSTAL CALIBRATORGENERAL

The TEN-TEC Model 226 crystal calibrator is an accessory which provides accurate determination of the received operating frequency. It inserts highly accurate signals every 25 kHz into the receiving antenna circuit. These signals are derived from a crystal oscillator that is factory set to zero beat with WWV. An integrated circuit divides the 3.2 MHz signal by 128 to produce the 25 kHz signal which contains harmonics that extend above 30 MHz. It is these harmonics that are received and tuned to zero beat to determine the accuracy of the VFO dial scale.

To easily identify the calibrator signal on a crowded band, the output is pulsed approximately 3 or 4 times a second. This rate can be adjusted by R1. Also, a push-on-push-off switch is provided on the front panel to turn the calibrator off during transceiver operation.

INSTALLATION

- 1.) Remove both top and bottom covers from CENTURY/22 by removing the four screws holding each cover. Carefully separate them from the chassis and set them aside.
- 2.) Locate the three unused stand-off spacers on the top side of the chassis pan that are located around the area designated for Model 226. Position the calibrator assembly on the stand-offs, aligning the three mounting holes with the stand-offs.
- 3.) Secure the assembly in place with the three 6-32 x 1/4" machine screws supplied. Tighten securely since the ground return path is through the spacers.
- 4.) Plug one end of the coaxial cable supplied with the calibrator into the socket marked 29 on the calibrator so that the cable exits toward the center of the assembly.
- 5.) Route the cable through the large grommet in the center of the chassis to the other side of the chassis. Continue routing it through the grommet in the center shield closest to the front of the unit and over to the unused socket marked 29 at the rear edge of the Oscillator/Mixer/Band Pass Filter assembly.
- 6.) Attach the red cable supplied with the calibrator that has the three terminal connector to socket marked 44 on the Model 226. The wires should exit toward the edge of the PC assembly when properly inserted.
- 7.) Route the other end of this wire (with the two terminal connector attached) through the same center grommet in the chassis and then forward around the PTO box toward the CAL. ON-OFF switch located on the front panel.
- 8.) Observe the unused two terminal socket on the PC board that contains the three front panel switches. It is the center socket of three. Plug the connector into this socket so that the wires exit in the same direction as those already plugged into the other two sockets.
- 9.) Turn the transceiver on and check for proper operation before replacing the top and bottom covers. Check for proper switch operation (on/off) and for calibrator signals every 25 kHz.
- 10.) Replace top and bottom covers.

OPERATION

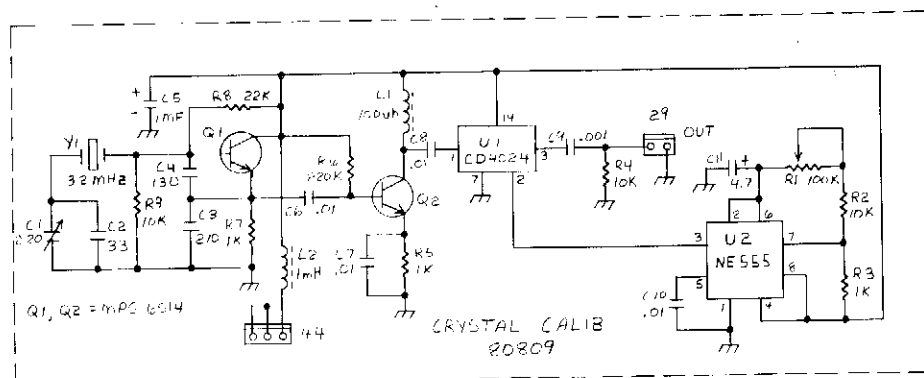
- 1.) With the transceiver tuned to approximate frequency desired, tune the dial to the closest 25 kHz marker that is 0, 25, 50 or 75 on the scale. The pulsed calibrator signal should be heard near this position. (Use the broadest selectivity position for calibration purposes so that the zero beat will be easily discernable.)
- 2.) Tune the receiver so that the pulse signal is nulled to zero audio beat. Readjust the dial skirt while holding the main tuning knob, so that the indicated reading corresponds to the proper frequency mark that is 0, 25, 50 or 75 kHz.

- 3.) Turn the calibrator off when operating normally.

THEORY OF OPERATION

Transistor Q1 is a Colpitts crystal controlled oscillator operating with the crystal at 3.2 MHz. Transistor Q2 is a buffer which drives the integrated circuit divider U1. U1 divides the 3.2 MHz signal by 128 producing an output of 25 kHz. This output is very rich in harmonics which can be heard all the way up to 30 MHz. U2 is an astable multivibrator operating at approximately 3 Hz. The output of this oscillator is used to gate the divider producing a pulsed output. The frequency of these pulses can be adjusted with thumb pot R1. The calibrator is aligned at the factory. If realignment becomes necessary, proceed as follows:

- 1.) Turn the band switch to 10 MHz and the dial to 10.000 and tune in WWV. Wait until the announcement occurs and tune the voice for maximum clarity with no audible carrier beat note.
- 2.) Turn the calibrator on and adjust C1 carefully to remove any trace of the pulsed audio beat note.



U1

PIN	VOLTAGE
1	1.0
2	DNM
3	DNM
4	DNM
5	DNM
6	DNM
7	0
8	0
9	DNM
10	0
11	DNM
12	DNM
13	0
14	7.35

U2

PIN	VOLTAGE
1	0
2	DNM
3	DNM
4	7.35
5	4.85
6	DNM
7	DNM
8	7.35

PARTS LIST

L2	21007	CHOKE-RF, 1 MHY
L1	21060	CHOKE-RF, 100 UH, 100 MA
C6-8,10	23132	CAP-FXD, .01MF, 100V, CER
C9	23133	CAP-FXD, .001MF, 500V, CER, 10%
C4	23155	CAP-FXD, 130PF, 500V, 5%
C1	23168	CAP-VAR, 3/22PF, TRIMMER, VERT
C5	23181	CAP-FXD, 1MF, 50V, EL, VERT
C11	23188	CAP-FXD, 4.7MF, 25V, EL, VERT
C2	23192	CAP-FXD, 33PF, 100V, 5%, CER
C3	23201	CAP-FXD, 270PF, 5%, 100V
Q1,2	25054	TRANSISTOR - MPS6514
U2	25076	IC-NE555
U1	25103	IC MC14024 BCP
R1	30198	RES-VAR, 100K, LIN, PC VERT, 30%
Y1	48056	CRYSTAL-QUARTZ, 3.2 MHZ, HC-33/U

DNM - DO NOT MEASURE
PULSES ARE PRESENT

TRANSISTOR	COLLECTOR	BASE	EMITTER
Q1	7.35	2.20	1.50
Q2	7.35	2.36	1.80

TEN-TEC MODEL 1179 MAGNETIC CIRCUIT BREAKER

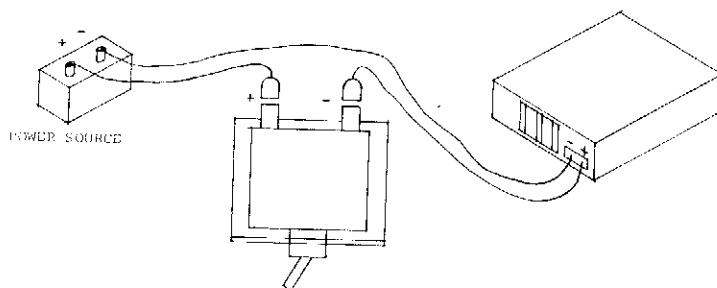
GENERAL

When operating TEN-TEC Model 579, CENTURY/22 transceiver fixed, portable, or mobile with an external power supply or any source other than a TEN-TEC Model 979 power supply, the protective circuitry for the final amplifier, being in the TEN-TEC ac power supply, is not present. In order to protect the final amplifier, it is necessary to limit any over-current that may be caused by excessive drive or improper antenna matching. This may be accomplished by inserting the appropriate circuit breaker in series with the 12 V dc supply line.

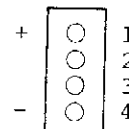
Model 1179 is a special, fast-acting magnetic circuit breaker, specifically intended for use with Model 579, CENTURY/22.

INSTALLATION

- 1.) Using #12 gauge insulated wire or larger, run one pair of conductors directly from terminals of power source to rear connector of transceiver.
- 2.) As the circuit breaker also functions as an on-off switch, select a mounting position of your choice for optimum access and operating convenience.
- 3.) Cut + conductor of conductors at desired mounting position. Solder severed ends of + line to push-on terminals as shown below.



AMP CONNECTOR



- 4.) Drill a 1/2" hole at mounting position. Unscrew and remove 3 metallic washers from barrel of circuit breaker. Attach push-on terminals to rear of circuit breaker. Insert shaft through 1/2" hole with flattened part of barrel on bottom. Replace 3 metallic washers and tighten.
- 5.) Connect + and - leads from power source to rear connector of transceiver as shown above.

OPERATION

The circuit breaker is energized by putting the switch in the "on" position. When installed as illustrated, the circuit breaker will also function as an external on-off switch. To re-set, cycle switch to extreme "off" position and return to "on" position. If used mobile, start engine before turning on as an instantaneous voltage is built up before the car regulator closes. This is particularly important in cold weather.

THEORY

When the current drawn from the external power source exceeds trip point of circuit breaker, the 12 volt line is opened. This action approximates the protective functions normally found in the power supply circuits provided in TEN-TEC equipment

SPECIFICATIONS

MODEL

1179

OPERATING RATING

5 amps

TRIP RATING

6.75 amps

1 to 2 Years

\$12.00 each

2 to 3 Years

\$15.00 each

3 to 5 Years

\$18.00 each

(Two transistors per transceiver. Labor not included.)

- 2.) Warranty on Models 515/525 Output Transistors: The output transistors on these models are unconditionally guaranteed against damage for a period of one year after date of purchase, under any load condition or mode of operation, except for static discharge on the antenna or direct lightning strike.

LINEAR AMPLIFIERS

- 1.) Model 444 Warranty Exceptions: The Amplifier and Power Supply units are both covered under the GENERAL conditions stated above, with the following exceptions:

- A.) The warranty is void if the amplifier is powered by any source other than an approved TEN-TEC power supply.
- B.) The warranty is void if any of the factory sealed internal adjustments are altered.
- C.) The warranty is void if any of the protective circuits are disabled.
- D.) If used with other than a TEN-TEC transceiver the warranty may not apply. A list of approved transceivers is included with the amplifier. If your transceiver is not listed, contact the factory.

- 2.) Extended Pro-Rata Warranty on Model 444 Output Transistors: The output transistors on this model are unconditionally guaranteed against damage for a period of one year after date of purchase, under any load condition or mode of operation, except for static discharge on the antenna or direct lightning strike. If they fail after the warranty period, the following replacement schedule will apply, provided that our service department makes the repair. (Prices listed are maximum and subject to reduction, depending on current transistor prices at time of repair.)

1 to 2 Years

\$30.00 each

2 to 3 Years

\$35.00 each

3 to 5 Years

\$40.00 each

(Four transistors per amplifier. Labor not included.)

- 3.) Proper Delivery: If the unit is returned to the factory it must be adequately packed. If the power supply section is to be returned, remove the power transformer. The transformer may be retained or returned separately as indicated.

OUT-OF-WARRANTY REPAIRS

- 1.) Field Repairs: New circuit boards or discrete components can often be supplied to eliminate the cost and bother of shipping the complete unit to us. A nominal charge will be made for the material sent. Certain assemblies integral with the main chassis, such as VFO assemblies and rack tuning mechanisms, are not field replaceable.
- 2.) Returned Units: Along with the unit, please submit a complete report on the nature of the malfunction and the conditions under which it occurs. This will enable our service department to pay special attention to your problem area and reduce overall labor costs. No matter what the malfunction is, every unit will be given a complete alignment and operational check before being returned.
- 3.) Quotations: Quotations on repair work will be given on request, after examination of the unit. The amount quoted will be firm for the specific work outlined in the quotation. Should additional material or labor requirements come to light after the repair is initiated, you will be contacted for approval before this phase of the repair is started.
- 4.) Repair Charge Payment: Charges below the \$25.00 level will be billed to you after completion of the work and at the time of re-shipment. A report of all work done and parts used will accompany the bill. For charges greater than \$25.00, prepayment will be required before the unit is returned. One of three methods of payment may be selected. 1.) Upon completion of the work the billing will be made but the unit will be held here. Upon receipt of the payment, the unit will be shipped. 2.) The unit will be returned to you on a COD basis, with COD charges borne by you. 3.) The repair charges may be paid by either MasterCard or VISA.
Approval for COD or charge card options can be given either at the time the unit is submitted to us (in the accompanying letter) or when contacted upon completion of the repair. Please submit all raised information on your charge card when paying by this means.
- 5.) Transportation Charges: Units should be returned, transportation and insurance charges prepaid. Return transportation and insurance charges will be billed to you with other costs.