TECHNICAL MANUAL

OPERATION, MAINTENANCE, INSTALLATION INSTRUCTIONS AND ILLUSTRATED PARTS BREAKDOWN

HF DSP RECEIVER
MODEL RX-340

TEN-TEC, INC.
1185 DOLLY PARTON PARKWAY
SEVIERVILLE, TN 37862

THIS MANUAL WAS PREPARED IN ACCORDANCE WITH MIL-HDBK-1221

PART NO. 74262
1ST PRINTING - 1/01
PRINTED IN U.S.A.

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ADDENDUM – ERRATA FOR FIRST PRINTING OF RX-340 MANUAL

Despite our best abilities to prevent them, a couple of errors and omissions do exist in the text of the RX-340 manual. They are:

1) Page 4-2. Section 4-5. As indicated, arrow keys are reversed. Right arrow button decreases rate, left arrow button increases rate.

2) Page 4-6, section 4-18. PBT is also operable in AM mode.

3) Page 4-16, section 4-36. To halt a scan, it is only necessary to press PAUSE once, not twice.

4) Page 4-21, section 4-41. First paragraph. The sentence beginning "the next channel or frequency…." does not apply. When pressing the PAUSE button, the scan resumes immediately and you CANNOT single step through the scan sequence by pressing the PAUSE button.

5) Page 5-4. Audio/IF Select. 'Mute' is not displayed as described. When the LSB/BOTH/USB lights are all off, the 'Mute' function is in effect.

6) While "Dwell" for scanning can be set at a value below 1.0 seconds, the "Dwell" feature will not function at a value below 1.0 seconds. "Dwell" settings of less than 1.0 seconds will default to a setting of 1.0 seconds.

7) The display intensity of the RX-340 can be varied. Press and hold the SETUP button. While holding the button down, turn the MEMORY/SCAN knob. The lower display will show a display intensity percentage value from 0-100% and the display can be adjusted by turning the knob.

CHAPTER 1

GENERAL INFORMATION

1-1 PURPOSE AND FUNCTION: The TEN-TEC RX-340 is an all-mode, general-coverage receiver that delivers military-grade performance at off-the-shelf commercial pricing. Powerful digital signal processing (DSP) and over 60,000 lines of intensive code provide a level of performance and flexibility unattainable with conventional analog circuitry.

The RX-340 may be controlled locally from the front panel, or operated remotely through a RS-232 interface. Knobs, switches, and displays are arranged ergonomically into four intuitive control groups. Frequency, Mode, and Tuning Rate are presented in 12.5mm blue-green fluorescent characters on the receiver's main alphanumeric display. Operating frequency is controlled by direct keypad entry or by a weighted main tuning knob, with continuous coverage from below 50 kHz to 30 MHz. Ten step-tuning rates are provided (from 1 Hz to 1 MHz) to accommodate a wide range of tuning requirements. Display resolution is 1 Hz, and frequency stability is ± 1 ppm over an operating range of 0-50 degrees C.

In addition to manual tuning, 100 channel memories are provided to retain and recall operating frequency, mode, and other basic operating parameters. Sophisticated programmable *Memory-Scan* (MScan) and F1-F2 frequency-scan (Pscan) modes are also provided, along with up to 100 frequency-lockouts and a rapid-access scratchpad memory. A two-line alphanumeric display provides continuous presentation of the receiver's *Memory/Scan* status, and a dedicated *Memory/Scan* knob facilitates menu management and scan programming.

Signal amplification, filtering, and processing are divided between analog and digital circuitry. Analog features include 1/2-octave front-end filters, ruggedized balanced mixers, and triple-conversion design to ensure wide dynamic range and superior rejection of unwanted signals. A sophisticated multistage *Automatic Gain Control (AGC)* system provides 80dB of control range ahead of the A-to-D converters plus an addtional 40 dB in DSP. A switchable attenuator and preamp expand signal-handling range to over 140 dB.

Digitally-controlled operating parameters include an adjustable, offset beat-frequency oscillator (BFO), variable passband tuning (PBT), tunable notch filter (Notch), wide-range squelch (SQL), and a variable noise blanker (NB). An extensive bandwidth (BW) menu provides 57 standard-shape DSP filters ranging from 100 Hz to 16 kHz, plus an added selection of fast filters for enhanced reception of delay-critical digital modes such as SITOR. Three preset AGC rates (Fast, Medium, and Slow) are provided, along with a unique Program Mode that supports fully-adjustable Attack, Hang, and Decay settings. A momentary AGC-cancel switch (Dump) instantly restores full receiver sensitivity on demand. A dedicated two-line alphanumeric display continuously presents operating-parameter status, and a companion *Aux Parameters* knob adjusts selected operating characteristics.

Detection modes include USB, LSB, ISB, CW, CW1, NBFM, AM, and Synchronous AM, with selectable sidebands. SAM significantly reduces fading and adjacent-channel interference on AM signals. Separate headphone and speaker gain controls adjust listening level (speaker-level audio is routed to a built-in 4-inch speaker and a switchable external-speaker jack). An AF-channel selector routes upper, lower, or both sideband channels to the speaker line in ISB and SAM modes. In addition, balanced and unbalanced line-level outputs are available on the rear panel for remote monitoring.

Signal strength is displayed in either S-units or dBm on a large-scale, 2-1/2-inch analog meter. Meter sensitivity is automatically compensated when the preamp or attenuator are activated or manual gain is adjusted.

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Rear-panel BNC jacks provide inputs for the antenna and external reference oscillator, plus access to mixer and I.F. monitoring points. A standard DB-25 jack accepts a Multi-drop RS-232 line for remote receiver operation. The RX-340's built-in power supply is designed for international use, accepting a wide range of voltages and line frequencies. Conservative engineering, all-SMD circuitry, and rugged mechanical construction ensure reliable long-term performance.

1-2 SPECIFICATIONS:

Applicable from 50 kHz to 30 MHz, unless otherwise stated.

Power Supply: Internal, accepts 48-440 Hz line power, 90-264 VAC. 30 watts nominal.

Frequency Tuning System:

Tuning Range: 50 kHz to 30 MHz at typical sensitivity. Tunable to 0 MHz with degraded performance.

Tuning Increment: 1 Hz minimum.

Synthesizer lock time: 10 mS nominal.

BFO: Tunable in CW mode only, ± 8 kHz, 10 Hz steps. Fixed frequency in SSB and ISB modes, disabled in AM and FM modes.

Accuracy: All internal oscillators may be locked to either internal or external frequency standards. The internal reference is adjustable by a continuously variable trimmer, allowing calibration to any desired accuracy.

Stability (internal standard): ± 1ppm within the 0-50 degrees C operating range.

External Frequency Standard: 1, 2, 5, or 10 MHz ±1 ppm, 500 mV-2V p-p, high impedance load. The receiver automatically detects and uses the external standard upon application, at power-up, or after serial link activity. If the external standard slews far outside the ± 1 ppm specified, internal circuitry will lose lock until the input returns to within specification, or will re-lock at the next power-up or serial activity provided the input is within spec. at a valid reference frequency (1, 2, 5, or 10 MHz). A frequency-out-of-lock condition is always reported over the serial link. Removal of the external frequency standard input immediately returns the receiver to the internal standard.

Tuning Method: Local tuning via direct keypad entry, step-arrow keys, or main tuning knob. Remote tuning via multi-drop RS232.

Frequency Indication: Local indication via main alphanumeric display, 1-Hz resolution. Remote frequency status reported via the RS-232 serial link.

Interface Connections:

RF Input:

Impedance: 50 ohms nominal
VSWR: 2.5:1 maximum in preselector passband.
Connector: Rear-panel BNC
Protection: Internal Surge Protector

Balanced Line-level Audio Output:

Two 600-ohm Lines
Level: 0 dBm nominal, center-tapped, ungrounded.
Connector: DA-15, 3 pins.
Function: Upper and Lower sideband audio on separate lines in ISB mode. Same signal on both lines in other modes.

Single-ended Line-level Audio Outputs:

Level: 10 mW into 600 ohms, one AC-coupled and one DC coupled.
Connector: DA-15, two pins each line.
Function: Upper.lower, or both sidebands in ISB mode, software configured.

Mono/Stereo Headphones:

Level: 10 mW into 600 ohms per channel. front-panel volume control.
Connector: Front-panel 1/4" stereo phone jack
Function: Monaural except in ISB, where USB and LSB are split in stereo phones.

Monaural Speaker-Level Output:

Level: 1.5 W into 4 ohms at 10% THD, 4" internal or external speaker. Front-panel volume control.
Connector: External, 1/4" rear-panel mono jack.
Function: Monaural monitoring, all modes.

Signal Monitor Delayed AGC:

Frequency: 455 kHz center (inverted, 1 kHz tuning step)
Bandwidth: 16 kHz (-6 dB).

Level: -10 dBm nominal (+/- 3 dBm). AGC delayed 40 dB.
Impedance: 50 ohms nominal.
Connector: Rear panel BNC.

IF Output, Post DSP:
Frequency: 455 kHz center (inverted).
Bandwidth: Determined by IF filter selection.
Level: -10 dBm nominal (AGC leveled).
Impedance: 50 ohms nominal.
Connector: Rear panel BNC.

1st Mixer Out, Wideband:
Frequency: 45.455 MHz Center frequency (inverted, 1 kHz tuning step, no AGC).
Bandwidth: Determined by preselector filter.
Level: -16 dB relative to RX input (Preamp and Attenuator OFF).
Impedance: 50 ohms nominal.
Connector: Rear panel BNC.

2nd Mixer Out, no AGC:
Frequency: 455 kHz center frequency (inverted, 1kHz tuning steps).
Bandwidth: 16 kHz (-6 dB).
Level: 0 dB rel to RX input (PRESEL/ ATTN OFF).
Impedance: 50 ohms nominal.
Connector: Rear panel BNC.

Receiver Sensitivity:

Dynamic Range:

Mode	Noise Figure (dB) Typ	Max	3rd Order Intercept (dBm) Typ	Min
10 dB PREAMP ON	10	14	20	15
PREAMP OFF	17	19	30	25
15 dB ATTEN	32	34	45	40

VLF Sens., Typ, .3 kHz bandwidth preamp OFF.

	16 dB SINAD
>500 kHz	-116 dBm (.35uV)
100 kHz	-115 dBm (.4uV)
50 kHz	-114 dBm (.45uV)
20 kHz	-107 dBm (1 uV)
15 kHz	-104 dBm (1.4uV)
10 kHz	-94 dBm (4.5 uV)
5 kHz	-82 dBm (18uV)

Spurious Responses: All spurious less than -119 dBm equivalent input- preamp ON.

Control Interface:
Standard: Multi-drop RS-232.
Config: Dipswitch programmable. 300 to 19200 baud. 7 or 8 data bits. even, odd, or no parity.
Connector: DB-25 female.

Sensitivity By Mode

Mode	BW	SINAD	Preamp OFF Typical	Max	Preamp ON Typical	Max
AM: (50% Mod @ 400 Hz)	6 kHz	10 dB	-103 dBm/ 1.6 uV	-101 dBm/ 2.0 uV	-112dBm/ 0.56 uV	-108dBm 0.9 uV
FM: (6 kHz dev @ 1 kHz)	16 kHz	16 dB	-102 dBm/ 1.8 uV	-100 dBm/ 2.2 uV	-108dBm/ 0.9 uV	-104dBm/ 1.4 uV
USB/LSB/ISB:	3.2 kHz	10 dB	-112 dBm/ 0.6 uV	-110 dBm/ 0.7 uV	-119dBm/ 0.25 uV	-115dBm 0.4 uV
CW:	300 Hz	16 dB	-116 dBm/ 0.35 uV	-114 dBm/ 0.45 uV	-124dBm/ 0.14 uV	-120dBm/ 0.22 uV

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Gain Characteristics:

Gain control:

Receiver operates with automatic (AGC) or manual gain control. Manual gain control reduces receiver gain and increases AGC threshold by up to 120 dB.

AGC:

Range:	90 dB minimum
Threshold:	3 uV typical
Attack Time:	15 mS typical, to within ±3dB of 20 dB step.

Release Time:

MODE	ATTACK (dB/ms)	HANG (sec)	DECAY (dB/sec)
FAST	0.8	0	1200
MEDIUM	0.8	0	100
SLOW	0.8	0	25
PROGRAMMABLE	0.01-1.0	0.01-99.9	0.01-99.9

Manual AGC:

Range:	120 dB. Controlled through the Front Panel or RS-232 interface.
Attack/Release Times:	Limited only by RS-232 serial transfer rate.

Programmable AGC:

Setting Ranges:

Attack:	0.01-1.0 dB/ms
Hang:	0.01-99.9 seconds
Decay:	0.01-99.9 dB/s

Signal Handling Characteristics (Preamp Off):

Image Rejection: 90 dB typical, 80 dB minimum (all mixers).

IF Rejection: 90 dB typical, 80 dB minimum (all IFs).

Third order intercept point: 30 dBm typical, 25 dBm minimum (See chart P1-5).

Second order intercept point: +75 dBm, typ, 60 dBm minimum.

Selectivity: 57 bandwidths selectable from 0.1 to 16 kHz. Shape factor better than 1.5:1 (6 to 60 dB).

Bandwidth Selection via Menu:

100 Hz, 120 Hz, 150 Hz, 170 Hz, 200 Hz, 220 Hz, 250 Hz, 300 Hz, 350 Hz, 400 Hz, 450 Hz, 500 Hz, 600 Hz, 700 Hz, 800 Hz, 900 Hz, 1 kHz, 1.1 kHz, 1.2 kHz, 1.3 kHz, 1.4 kHz, 1.5 kHz, 1.6 kHz, 1.7 kHz, 1.8 kHz, 1.9 kHz, 2.0 kHz, 2.2 kHz, 2.4 kHz, 2.6 kHz, 2.8 kHz, 3.0 kHz, 3.2 kHz, 3.4 kHz, 3.6 kHz, 3.8 kHz, 4.0 kHz, 4.4 kHz, 4.8 kHz, 5.2 kHz, 5.6 kHz, 6.0 kHz, 6.4 kHz, 6.8 kHz, 7.2 kHz, 7.6 kHz, 8.0 kHz, 8.8 kHz, 9.6 kHz, 10.4 kHz, 11.2 kHz, 12.0 kHz, 12.8 kHz, 13.6 kHz, 14.4 kHz, 15.2 kHz, 16.0 kHz.

Bandwidth Selection via Keypad Entry:

Upon entry, receiver automatically selects the closest filter in the menu of equal or greater bandwidth.

Fast-Filters:

Fast Filters offer reduced signal latency and degraded shape factors to facilitate reception of delay-critical digital modes.

Fast-Filter Selection:

All standard menu bandwidths up to 4 kHz are available as Fast Filters.

Fixed Bandwidths:

Bandwidth is fixed at 3.2 kHz in ISB mode. Minimum available bandwidth is 600 Hz in FM mode, and 4 kHz in SAM mode.

Blocking on tune: <5% THD: -6 dBm input 30% AM 1 kHz.

Blocking off tune: 200 kHz offset. 15dBm typ. 10 dBm min for 3 dB desense.

Ultimate Rejection: Greater than 70 dB regardless of filter selected.

Group Delay: No more than .1 ms variation overpassband of 300 Hz to 3050 Hz (Notch OFF).

Lo Phase noise: -120 dBc/Hz @ 20 kHz offset typical, -110 dBc/Hz max.

1-3 ENVIRONMENTAL CONDITIONS

Normal Operating:

Temperature:	0 to 50 degree C (32-122F)
Humidity:	Up to 95% Rel, non-cond.
Altitude:	Up to 10,000 feet MSL.
Shock:	Not applicable
Vibration:	Not applicable

Storage/Transport:

Temperature:	-46 to 71 degree C (-50-160F)
Humidity:	Up to 95% Rel, non-cond.
Altitude:	Up to 15,000 feet MSL.
Shock:	10 G, 11 mS duration
Vibration:	1-1/2 G, 5 to 200 Hz

1-4 MECHANICAL

Size: 5.25" H x 19.0" W x 12.5" D or 133.35mm H x 482.6mm Wx 17.5mmD

Weight: 12.5 lbs. or (5.67 kg.)

Cooling: Air convection cooled within fan ventilated rack cabinet. Units are directly stackable with no fillers required between chassis.

Mounting: Model RX-340 conforms to EIA standard 19" rack mount panel space and is 3U high. Slide mechanism attachment points (10-32 thread) arecompatible with Jonathan slide type 375 QD.

Cable connectors Rear panel:

Receiver Antenna input:	BNC female
IF output 455 kHz:	BNC female
1st Mixer Out:	BNC female
2nd Mixer Out:	BNC female
Signal Monitor:	BNC female
External Reference:	BNC female

Cable Connectors, Rear Panel:

Receiver Antenna input:	BNC female
IF output 455 kHz:	BNC female
1st Mixer Out:	BNC female
2nd Mixer Out:	BNC female
Signal Monitor:	BNC female
External Reference:	BNC female

Remote Control: (RS-232) DB25, female

Main Power: Detachable 3 conductor AC cord

Audio/Aux: 15 pin D connector, female

External Speaker: 1/4" monaural phone jack

Ground: 10-24 stud

Front Panel:

Stereo headphone: 1/4" stereo jack

1-5 EQUIPMENT/PARTS SUPPLIED

Qty	Item	Ten-Tech part #
1	HF DSP RECEIVER MODEL RX-340	27071
1	AC POWER CORD	46138
1	TECHNICAL MANUAL	74262
1	.050 ALLEN WRENCH	38040
1	.062 ALLEN WRENCH	38088
1	WARRANTY CARD	74020
4	RUBBER FEET	42020
4	LOCK WASHERS	51001
4	6x32 SCREWS	60010
1	FUSE, 1A, GDC-1A	27071

5x20 mm. (spare fuse in power entry module at rear of RX-340).

Specifications subject to change without notice.

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CHAPTER 4

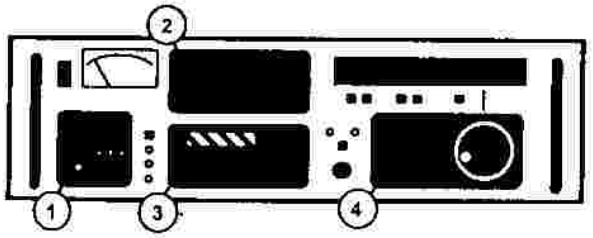
DETAILED OPERATING INSTRUCTIONS

4-1 INTRODUCTION:

This portion of the manual describes how to operate the RX-340 using front-panel controls and displays. It begins with an overview of panel layout, followed by in-depth instructions for using each function and control feature. Detailed front and rear panel illustrations are provided in Figures 1-1 and 1-2. Please refer to these figures, as needed, to supplement written instructions.

4-2 FRONT PANEL OVERVIEW:

The RX-340 panel is ergonomically arranged for convenient operation, with most controls positioned within the four shaded control groups highlighted below:



1. Audio Group: The panel's *Audio* group (1) provides separate headphone and speaker volume controls, plus a channel selector which is used when using selectable sideband sync AM or monitoring ISB signals. A standard 1/4" stereo front-panel headphone jack is mounted directly below the headphone volume control.

2. Auxiliary Parameters Group: The controls in the *Auxiliary Parameters* group (2) are used to program receiver operating characteristics such as bandwidth, AGC response, BFO offset, etc. The status of each operating parameter appears in a two-line alphanumeric display window positioned in the center of the block. Push-button switches select individual function for programming. Programming is accomplished using the group's dedicated edit-control knob and main keypad (4).

3. Memory/Scan Group: The controls in the *Memory/Scan* group (3) are used to store or recall memory channels and to set up specific scan operations. Push-button switches select individual functions, and a dedicated edit-control knob plus the main keypad (4) are used to perform data-entry and menu-search functions. Status information appears in the group's two-line alphanumeric display window.

4. Tuning/Keypad Group: The controls in the *Tuning/keypad* block (4) are used to set receiver operating frequency. In addition, the keypad is used to enter numeric data for some auxiliary parameters and scan setups. The receiver's main alphanumeric display, located directly above the tuning-control block, provides a continuous presentation of operating mode, tuning step, and operating frequency. It also displays selected keypad entries and status messages.

Other prominent front-panel features include a manual IF-gain control and Pre-amp/Attenuator switch located to the left of the main keypad (4). The receiver's signal-strength meter and main power switch are located above the volume controls at the front panel's top-left corner. To adjust the intensity of the front panel illumination, push and hold the *Setup* button in the *Memory/Scan* group and turn the *Memory/Scan* knob.

4-3 MAIN TUNING knob:

The *Main Tuning* knob is used to select operating frequency over the receiver's 30-MHz range. This control operates in step-tune mode, with ten preset tuning rates available from 1 Hz to 1 MHz per step (see 4-5). Selected step size is displayed continuously on the main alphanumeric display directly above the *Step* selector buttons.

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Rotating the *Main Tuning* knob changes operating frequency by the chosen step size, with clockwise rotation increasing frequency and counterclockwise rotation decreasing it. The *Main Tuning* knob is automatically disabled whenever the dial-lock function is engaged (See 4-4).

4-4 LOCK button:

The *Lock* button is used to prevent accidental frequency changes. When pressed on, the *Lock* LED illuminates and both the *Main Tuning* knob and -/+ *Step Tuning* keypad functions are disabled. When toggled off, the LED goes out and normal tuning is restored. The dial-lock feature doesn't affect the keypad's sign (±) functions, which are used for programming *BFO*, *PBT*, and *Notch* parameters. Only the *Main Tuning* function is disabled.

4-5 STEP ← → buttons:

These switches are used to select step-tuning rate. A total of ten tuning increments are available: 1 Hz, 10 Hz, 50 Hz, 100 Hz, 1 kHz, 5 kHz, 9 kHz, 10 kHz, 0.1 MHz, and 1 MHz. Pressing [←] decreases rate, and pressing [→] increases it. Larger tuning increments (0.1 MHz and 1 MHz) provide rapid frequency excursions to other portions of the HF spectrum, while smaller increments complement the operating mode in use (AM, FM, SSB, etc).

Step rate is presented continuously on the main alphanumeric display directly above the *Step* selector buttons.

Important Note: Newly entered step-rate increments do not take effect *until the tuning dial (or keypad) is activated.* If you are tuned to 3.900020 MHz and increase the tuning step from 10 Hz to 100 Hz, nothing will happen until you begin to tune the radio. At this point, the new tuning increments will become 3.900100, 3.900200, 3.900300, etc.

4-6 MODE ← → buttons:

The *Mode* ← → switches are used to step though the receiver's detection modes. The *Mode* menu is circular, and may be stepped through from either direction. A total of eight detection modes are available on the RX-340:

AM: Amplitude Modulation
SAM: Synochronous AM, selectable sideband
USB: Upper Sideband
LSD: Lower Sideband
ISB: Independent Sideband, selectable sideband
CW: Continuous Wave, variable BFO
CW1: Continuous Wave, 0-Hz Offset
FM: Frequency Modulation

Detection-mode is displayed in the main display window directly above the *Mode* ← → switches. Audio from upper, lower, or both sidebands may be selected in ISB and SAM modes (See 4-12). The SAM detector *must be locked onto the carrier of an incoming AM signal* in order to provide Synchronous AM reception. Lockup is indicated when periods punctuate the mode-display:

S.A.M. (locked) vs. **S A M** (unlocked)

When locked, the sideband containing less interference may be selected by the AF channel switch. Normal AM reception occurs when the detector is unlocked. Minimum SAM bandwidth is 4 kHz. Note that the *Mode* ← → buttons restore *Mode* display for inspection or editing whenever the main display is overwritten by *Mute* (after a software *Mute* command). Only inspection is possible in Remote mode. Return to Local mode to edit the mode setting (and reset the *Mute* condition).

4-7 BITE buttons:

The RX-340 features a Built-In Test Equipment (*BITE*) mode which is used to conduct various internal self-diagnostic procedures. To place the receiver in BITE mode, press both *Mode* ← → switches simultaneously. The main alphanumeric display will then present the message 'ENTER BITE LEVEL'. Pressing a designated keypad digit (1, 2, 3, etc.) initiates the specific test-level sequence you wish to conduct. See Section 5-7 for a full description of RX-340 self-diagnostic capabilities and procedures.

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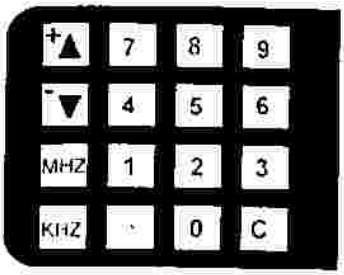
4-8 ↑/+ and ↓/- buttons:

The ↑/+ and ↓/- buttons are located in the upper left-hand quadrant of the receiver's keypad:

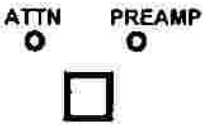


A. Tuning Function: In addition to the main tuning knob, the ↑/+ and ↓/- keys may be used to step-tune the receiver. Pressing ↑ once increases frequency by one step, and pressing ↓ once decreases it. Holding either button down provides continuous tuning. Keypad tuning is disabled by the dial lock.

B. Sign Function: The tuning keys also double as sign function keys (+ and -) when entering *Auxiliary Parameter* settings via the keypad. When used for parameter entry, the sign key *must be pressed after the numeric entry.* If the sign is entered first, the receiver will interpret it as a tuning command and change operating frequency. Note that the dial lock does not affect the sign function. Also note that the *Aux* function button has to be pressed after + or - is entered.

4-9 ATTN/PREAMP button:

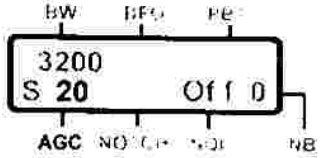
This switch is used to step through a circular menu providing three selections: *Attenuator On, Normal,* and *Preamp On*:



When *Attn* is selected, approximately 15 dB of RF attenuation is inserted into the signal path. When *Preamp* is selected, approximately 10 dB of supplemental RF gain is added to the signal path. When no LEDs are illuminated, the receiver is operating in its *Normal* (or straight-through) configuration. Note that the receiver's S-meter is automatically compensated to remain calibrated for all three settings.

4-10 MANUAL GAIN knob:

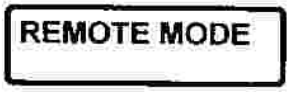
The *Manual Gain* control is used to adjust the receiver's IF-amplification level over a 120-dB range. As the control is adjusted, a corresponding IF-gain level appears in the AGC area of the *Auxiliary Parameter* display window:



Note that this number represents *gain reduction* in dB *below maximum.* (Example: 20 = 20 dB reduction). This reading may also be interpreted as a 20-dB *increase* in the receiver's AGC threshold.

4-11 REMOTE button:

The *Remote* switch is used to activate the RS-232 control mode. When activated, the LED will illuminate and a 'Remote Mode' message will appear in the *Memory/Scan* display window:



In Local mode, all front-panel knobs and switches are active. In *Remote* mode, most panel controls are locked out and operation is conducted via the remote RS-232 bus (only the Phones and Speaker level controls plus the main power ON/OFF switch remain active). Local operation may be restored by disengaging the *Remote* switch—unless the *Remote With Local Lockout* function has been activated over the RS-232 interface. When this security feature is turned on, the *Remote* switch or power cycling cannot be used to restore local operation. Only a radio reset will exit this mode.

4-12 ISB SPEAKER SOURCE button:

The ISB speaker-source button functions in ISB and SAM modes, and is used to step through a circular menu containing three audio-source selections: *LSB, BOTH, and USB.* Three LED indicators display

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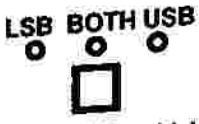
the selected choice (see below):



In ISB or SAM mode, either sideband—or BOTH—may be selected. In all other modes, the *BOTH* LED remains illuminated to indicate normal operation.

Exceptions: When the *Mute* function is activated over the *Remote* RS-232 bus, all three LEDs extinguish and the status message 'MUTE' appears in the *Mode* area of the main display. Also, sideband selection doesn't occur when the synchronous detector is in an unlocked condition in SAM mode.

4-13 SPEAKER knob:

The *Speaker* potentiometer is used to adjust volume level for the internal or external speaker. An external speaker may be plugged into J7 on the rear panel, disabling the internal speaker.

4-14 PHONES knob:

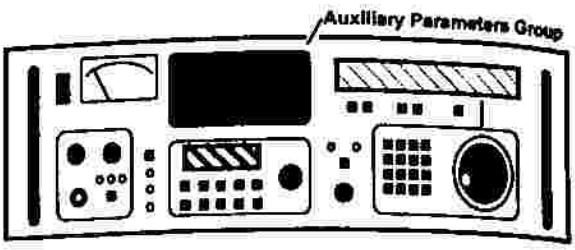
The *Phones* potentiometer adjusts volume level to the *front-panel Phones* jack. This jack accepts a standard 1/4" stereo or monaural phone plug.

4-15 AUXILIARY PARAMETER Overview:

Controls in the *Auxiliary Parameter* group are used for setting up and controlling various receiver operating characteristics. These include:

A. Receiver IF bandwidth
B. BFO-Offset Frequency
C. Passband Tuning
D. AGC Parameters
E. Notch-filter Frequency
F. Squelch Sensitivity
G. Noise Blanker Pulse Width
H. Optional Features

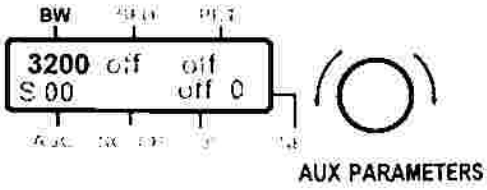
A dedicated two-line alphanumeric display shows the operating status of each auxiliary function, and the group's *Edit Knob* controls various menu selections and control setting.



4-16 BW (Bandwidth) button:

The *BW* button is used to activate the *IF Bandwidth* edit mode. Bandwidth is continuously displayed in either Hz or kHz in the *BW* area of the display window. The bandwidth menu contains a selection of 57 pre-programmed bandwidth settings, ranging from 100 Hz to 16.0 kHz. Additional *Fast Filters* are also provided at 0.2 to 4 kHz and below for enhanced digital-mode reception.

To change bandwidth, press the *BW* button. It will illuminate and assign the *Edit Knob* to the bandwidth menu:



A. Set Bandwidth via the Edit Knob: Rotate the *Edit Knob* to scroll through the bandwidth selections. When scrolling, the receiver's bandwidth will actively change with each new menu selection. Pressing a different *Auxiliary Parameters* switch will disengage the *Edit Knob* from the bandwidth menu and exit the bandwidth edit mode. The displayed bandwidth will remain selected until a new choice is made.

B. Set Bandwidth Via Keypad: Enter the desired bandwidth (in Hz) via the keypad. The receiver's main frequency display will blank and the keypad entry will appear. Next, press the *BW* button to complete the edit operation. Your selection (or the nearest standard bandwidth above it) will transfer to the *Auxiliary Parameters* display window. Also, the filter will become activated and the main display will restore to the receiver's operating frequency.

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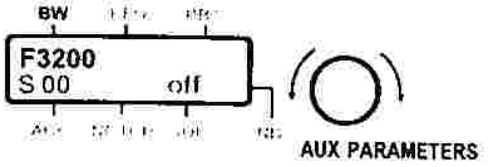
C. Set Fast Filters: An alternate set of *Fast Filters* may be selected for bandwidths of 0.2- 4 kHz. *Fast Filters* offer reduced signal latency and degraded shape factors to facilitate reception of delay-critical HF-digital modes such as SITOR and QPSK. To activate the *Fast Filter* Menu, first activate the *BW* function and enter a bandwidth of 0.2-4 kHz. Then, press *BW* a second time. The letter 'F' will appear in the *BW* window in front of the bandwidth to indicate that the fast filter is in place:

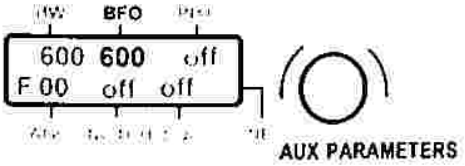


You may toggle between the Fast Filter mode and normal mode by continuing to press the *BW* button.

D. Exceptions: The receiver's *Notch* function is not available in the Fast Filter mode and is automatically deactivated. Also, in ISB mode, IF bandwidth is fixed at 3.2 kHz. Minimum bandwidth for FM mode is 600 Hz, and 4 kHz for SAM mode. Notch only works for CW, CW1, LSB, and USB.

4-17 BFO (Beat Frequency Oscillator) button:

In the CW detection mode, the receiver's BFO (Beat Frequency Oscillator) may be adjusted to select sideband (CWU or CWL) and offset frequency. To enter the BFO *Edit* function, place the receiver in CW mode and press the *BFO* button. The button will illuminate and the *Edit Knob* will be assigned to function as the BFO frequency offset control. Offset frequency is displayed continuously in Hz in the BFO area of the display window:



A. Set BFO Offset via the Edit Knob: Rotate the *Edit Knob* to select both the desired *Sideband* and *Offset* frequency. *Offset* may be adjusted continuously from -8 kHz to +8 kHz, a frequency span which takes in both upper and lower sidebands:

1. To select LSB-CW: A positive *Offset* number (+) places the receiver in CW-LSB mode.

2. To select USB-CW: A negative *Offset* number (-) places the receiver in CW-USB mode.

For CW reception, the offset frequency is normally adjusted to correspond with the operator's preferred CW listening pitch (400 Hz for example). For digital signal reception, offset is normally set to the median frequency between the highest and lowest AF tones required by the modem. When the *PBT* function is disengaged, BFO offset frequency relates to the center of the receiver's selected bandpass filter (*BW*).

Activating another edit parameter switch will disengage the *Edit Knob* from the offset function and exit the BFO Edit mode. The displayed offset remains selected until a new choice is made.

B. Set BFO Offset via the Keypad: Enter the desired *Offset* frequency (in Hz) via the keypad followed by the desired sign (+ or -). Your keypad entry will appear in the main display window. Next, *press* the *BFO* button to complete the edit operation. Your selection will then transfer to the *Auxiliary Parameter* display, become activated, and the main display will automatically restore to the receiver's operating frequency.

Important Note: You must *enter* a sign (+ or -) after entering the numbers and before pressing the *BFO* button. If you enter the sign before, the receiver will interpret it as a step-tuning command and change frequency.

C. Exceptions: *BFO Offset* is fix-tuned to 0 Hz in CW1 and fix-tuned to ±1800 Hz in ISB. In USB and LSB, offset is pre-programmed to track the selected bandwidth for best AF response characteristics. Note that the *BFO Offset* function works only in CW mode, and the *BFO display* remains blanked in other modes. To temporarily view a fixed offset frequency in other modes, *press* and *hold* the *BFO*

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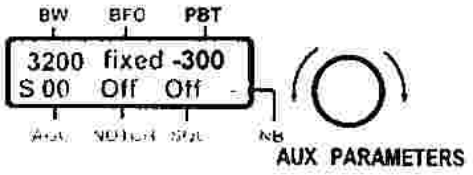
button. The fixed *Offset* will appear in the display window until the button is released. For example, in ISB, the display will read 'BFO Freq: ±1800 Hz', and in AM where no BFO is required, it will read 'No BFO in FM/AM'. The LED on the BFO switch normally remains unlit in all modes except CW.

4-18 PBT (Passband Tuning) button:

The *PBT* button is used in the CW, USB and LSB modes to shift the receiver's passband center without altering operating frequency. The *PBT* feature is especially useful for rejecting interference caused by encroaching signals, and for altering the receiver's audio characteristics during SSB or data reception.

To activate the *PBT* edit feature, *press* the *PBT* button. The switch will illuminate, the *Edit Knob* will be assigned to the *PBT* shift function, the previous *PBT* setting will be activated, and its frequency will be displayed in the *PBT* portion of the display:



A. To set Passband Tuning via the Edit Knob: Rotate the *Edit Knob* for a setting that reduces unwanted interference or produces a desired change in audio characteristics. Shift is adjustable over a 4000-Hz range (-2000 to +2000 Hz). The shift frequency is shown in Hz in the *PBT* area of the display window. In USB mode, a plus (+) shift moves the passband toward higher-frequency audio response, and a minus (-) shift moves it toward lower-frequency response. In LSB, this effect is reversed. In CW, the *PBT* and *BFO Offset* functions interact and should be set for preference.

Once the desired shift is selected, it may be toggled in or out with the *PBT* button. The current shift will be retained until a new value is entered. Activating another edit parameter button will disengage the *Edit Knob* from the *PBT* function and exit the PBT edit mode.

B. Set Passband Tuning via the Key Pad: Enter the desired *PBT* shift (in Hz) via the keypad *followed by* the desired + or - sign to indicate direction of shift (numerical values from 0 to 2000 are valid). When entering this number, the receiver's main frequency display will blank and your entry will appear. When the entry is completed, press the *PBT* button. Your selection will transfer to the *Auxiliary Parameter* display, become activated, and the main display will automatically restore to the receiver's operating frequency. Note that you must *enter the sign (+ or -) after entering the numbers and before pressing the PBT button.* If you enter the sign first, the receiver will interpret it as a step-tuning command and change frequency.

4-19 DUMP button:

The *Dump* button is used to cancel normal AGC recovery time to restore full receiver sensitivity. This feature is especially useful when attempting to copy a weak signal in the wake of an extremely strong one, especially with slower AGC settings in place. *Dump* may also be applied in special applications when the receiver is operating under external control. When the *Dump* button is depressed, a status message appears in the *AGC* area of the display:

When the *Dump* button is released, the current AGC settings will be restored.

4-20 AGC button:

The *AGC* button is used to select AGC rate. Three pre-programmed settings (*Slow*, *Medium*, and *Fast*) are available, plus a fourth fully programmable setting (*Prog*). To change AGC rate, press the *AGC* button. It will illuminate and the *Edit Knob* will be assigned to *AGC* menu. To step through the menu options, rotate the *Edit Knob*. Each selection will spell out in the *AGC* area for two seconds, then become activated:

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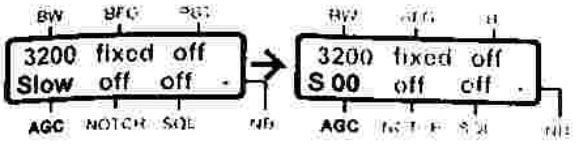
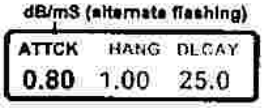


Upon activation, the display will revert to a single-letter (*S, M, F, P*) preceeding the Manual Gain control setting (see 4-10).

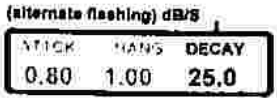
To Set Up *Programmable AGC*: This mode provides three adjustable parameters: *Attack* in dB/mS, *Hang* in seconds, and *Decay* in dB/Sec. To alter existing settings, first press *AGC* to enter the AGC edit mode. Next, select 'Prog' with the *Edit Knob*. To begin programming, *press* the *AGC* button a second time. The display will change, as shown below:



1. Set Attack Time: The first displayed parameter, *AGC Attack Time*, will flash alternately between *ATTCK* and *dB/mS* at 1 second intervals. To alter *ATTCK*, rotate the *Edit Knob* through the range of available settings and choose the desired value. *Attack Time* is continuously adjustable from 0.01 mS/dB to 1.00 mS/dB.

2. Set Hang Time: To advance the edit menu to *Hang Time*, press the *AGC* button again. The second parameter, *HANG*, should now flash alternately with *Sec*. To alter hang time, rotate the *Edit Knob* to select the desired value. Hang time is adjustable from 0.00 to 99.9 seconds.

3. Set Decay Time: To advance to *Decay Time*, press the *AGC* button again. The third parameter, *DECAY*, should flash alternately with dB/S. Rotate the *Edit Knob* and select the desired value. Decay is adjustable from 0.01 dB/Sec to 99.9 dB/Sec.



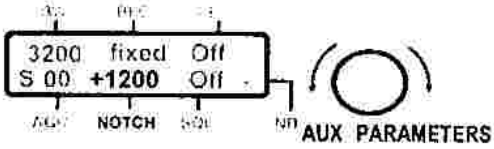
Press the *AGC* button one more time to disengage the edit function and restore the normal *AGC* display.

Activating any other edit parameter button will disengage the *AGC* edit function and the current settings will be retained until a new selection is made. Note that the AGC is always operational, even when the edit function is turned OFF and the *AGC* light is off.

4-21 NOTCH button:

The *Notch* button is used to activate a narrow-band reject filter to eliminate unwanted single-frequency heterodynes. The Notch works in CW, CW1, LSB, and USB modes only, and tunes manually over a 4000-Hz range (±2000 Hz). Note that the Notch disengages automatically when bandwidth settings exceed 4 kHz or when *Fast Filters* are selected.

To enable the filter, press the *Notch* button. It's LED will illuminate and the *Edit Knob* will be assigned to the filter's control function. Once enabled, the previously-entered filter frequency (in Hz) will appear in the display:



A. Adjust Notch via the Edit Knob: Rotate the *Edit Knob* to eliminate the undesired signal or heterodyne. The filter's new center frequency will appear in the display. Note that a + notch frequency cancels heterodynes in the USB passband, and a - frequency cancels them in the LSB passband. Pressing another function button deactivates the *Edit Knob*. To fully deactivate the *Notch* filter, press the *Notch* button for *OFF*, as indicated in the *Aux Parameter* window.

B. Set Notch Filter Frequency via the Keypad: Enter the desired filter frequency (between 0 and

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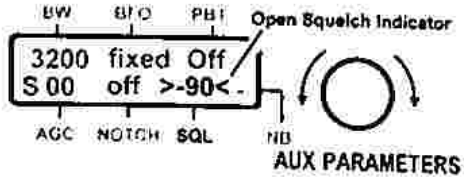
2000 Hz) via the keypad, followed by the sign: '+' for USB, and ' - ' for LSB. The main frequency display will show your entry. Press the *Notch* button to activate the entry and transfer the notch frequency to the *Auxiliary Parameters* display window. Upon activation, the main display will restore to the receiver's operating frequency. Note that you must *enter* the sign (+ or -) after entering the numbers and before *pressing* the *Notch* button. If you enter the sign first, the receiver will interpret your entry as a step-tuning command and change frequency.

C. Exceptions: The notch function is not available with Fast Filters or wide BW settings, and its LED will not illuminate in unavailable modes.

4-22 SQL (Squelch) button:

The *Squelch* function is used to eliminate unwanted background noise when no incoming signal is present. This feature operates in all detection modes, and mutes receiver audio when in the "closed" state. Squelch threshold (the strength a signal must have to open the squelch) is tied to the receiver's AGC system and is continuously adjustable from -140 dBm to +10 dBm.

To enable the Squelch, press the *SQL* button. It will illuminate and the *Edit Knob* will be assigned to the squelch control function. Also, the squelch circuit will activate and the previous threshold setting (in dBm) will appear in the *SQL* display area of the display. If the squelch is closed, the setting is bracketed by arrows (example: >-90<). If it is open, the arrows are not be displayed:



A. Set Squelch Threshold via the Edit Knob: Rotate the *Edit Knob* for a setting where undesired background noise is cut off (the arrows will appear). Once set, the squelch may be toggled on and off manually with the *SQL* button-the current threshold setting will be retained until a new value is entered. Activating another edit parameter button disengages the *Edit Knob*. To fully deactivate the squelch function, press the *SQL* button for *OFF*, as indicated in the *Aux Parameter* window.

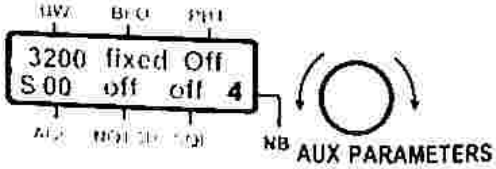
B. Set Squelch Threshold via the Keypad: Enter the desired threshold setting numerically (between -140 and +10 dBm) via the keypad. The entry will appear in the main frequency display. To activate your entry, press the *SQL* button. It will illuminate and the new threshold will transfer to the *Aux Parameters* display. The main display will automatically restore to the receiver's operating frequency. Note that you must *enter the sign (+ or -) after entering the numbers and before pressing the SQL button.* If you enter the sign first, the receiver will interpret your entry as a step-tuning command and change frequency.

C. Exceptions: In ISB and locked-up SAM modes, the squelch is controlled only by the signal present in the channel (or channels) selected by the channel selector switch (LSB, BOTH, or USB). Signals in a deselected channel will not open the squelch. *Squelch* threshold can still be adjusted.

4-23 NB (Noise Blanker) button:

The noise blanker reduces interference from unwanted pulse noise. This feature operates in all detection modes, providing a total of ten blanker settings.

To enable the blanker, press the *NB* button. It will illuminate and the *Edit Knob* will be assigned to the blanker's edit function. Also, the blanker will become activated and the previous setting (0-9) will appear in the *NB* display area of the display:



1. Set Noise Blanker via the Edit Knob: Rotate the *Edit Knob* for the lowest setting where significant reduction of the unwanted noise occurs. The new setting will appear in the *NB* area of the display. The blanker may be toggled in or out with the *NB* button, and the current setting will be retained until a

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new value is entered. Activating another edit parameter button disengages the *Edit Knob*. To fully deactivate the blanker, *press* the *NB* button for a '-' indication in the *Aux Parameter* window.

B. Set Noise Blanker via the Keypad: Enter the desired blanker setting (between 0 and 9) via the keypad. The receiver's main frequency display will blank and show your entry. To activate your entry, press the *NB* button. The blanker level will transfer to the *Auxiliary Parameter* display, become activated, and the main display will automatically restore to the receiver's operating frequency.

4-24 OPT-1 (Option 1) Button: Reserved for future applications.

4-25 OPT-2 (Option-2) Button: Reserved for future applications.

4-26 MEMORY/SCAN Overview: Controls in the *Memory/Scan* group may be used to store and recall frequently-used channels, and also to search selected channels or frequency spans for activity.

1. Storing Frequencies: The receiver's *Channel Memory* stores up to 100 numbered channels, retaining frequency, mode, and basic operating parameters for each. In addition, a un-numbered *Scratch-Pad* memory is available for rapid storage and retrieval of an alternate operating frequency. Frequencies may be entered into memory as follows:

A. *Store* current operating frequency in a channel selected by keypad entry (1-100).

B. *Store* current operating frequency in the lowest-numbered empty channel (1-100).

C. *Store* current operating frequency in *Scratchpad* memory for rapid recall.

2. Recalling Frequencies: Several options are available to retrieve and activate pre-programmed frequencies from the memory channels:

A. *Keypad-Enter* a channel number, then press *Recall* to activate it.

B. *Scroll* through the channel menu with the *Edit Knob*, then press *Recall* to activate it.

C. *Tune* through the channel menu with the *Edit Knob* for instant activation.

D. *MScan* the channel menu using *Mscan* set-up options to conduct an automated search.

E. Press *Recall*, *Scratch* to quickly activate frequency stored in the scratchpad memory.

A number of set-up options are available to customize the *Mscan* feature, including variable channel range, dwell time, dead time, and gaze time—plus several pause or stop options. Also, up to 100 lockouts are available to exclude selected memory channels from *Mscan* searches.

3. Clearing Memories: Frequency entries stored in the channel memory may be replaced or deleted in the following ways:

A. *Overwrite* an existing entry, replacing it with a new entry.

B. *Clear* an existing entry to create an empty channel for future use.

4. Frequency Search: In addition to *Mscan* monitoring, the RX-340 also provides a sophisticated *Pscan* (Programmable Scan) mode which may be used to search out activity over specified frequency spans. A number of special *Pscan* features are available to meet the unique requirements of multi-mode F1-F2 scanning.

5. Security functions: Special security functions are available to lock out unauthorized tampering with front-panel controls. Alphanumeric screens may also be blanked during Remote operation.

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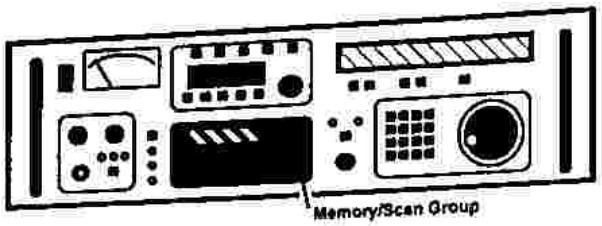
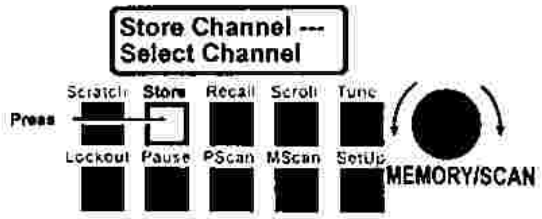


4-27 STORE THE CURRENT OPERATING FREQUENCY IN A SPECIFIED CHANNEL (1-100):

This function is used to *Store* the current operating frequency under a memory-channel number of your choice. To enter the *Store* mode:

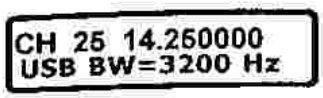
1. Press the *Store* button. *'Store Channel - - -'* will appear in the top line of the *Memory/Scan* display and *'Select Channel* will appear below:



2. Compose any channel number between 1 and 100 (your choice), and enter it on the receiver's *Main Keypad* (example: enter 25). This number will appear on the *Memory/Scan* display, as shown below:

Important Note: When using keypad entry, if the channel number chosen is already occupied, *a new entry will overwrite the existing one without notification.* If you are concerned about overwriting an occupied channel by mistake, check the channel menu using the receiver's scroll mode to ensure the slot chosen is empty (See 4-31).

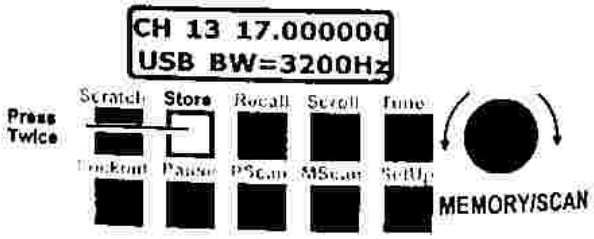
3. To complete the entry, *press* the *Store* button a second time. This enters the receiver's current frequency, mode, and basic *Aux/Parameter* settings into channel number selected. Upon entry, the *Memory/Scan* display will change to show the channel, operating frequency, mode, and bandwidth in normal channel-menu format:



Important Note: You may exit the *'Store Channel - - -'* function at any time and resume normal receiver operation *without* completing an entry-in-progress. To escape, *press* ' C ' (Clear) on the main keypad. Pressing the ' C ' key will terminate most other *Memory-Scan* programming functions, as well:

4-28 STORE THE CURRENT OPERATING FREQUENCY IN THE LOWEST EMPTY CHANNEL NUMBER:

This function is used to fill gaps in the channel menu by assigning the current operating frequency to the *lowest empty channel number* available (1-100). To use this feature, simply *press* the *Store* button *twice*, in succession, when making your entry:



On the first press, the display will read *'Store Channel - - -'*. On the second press, the lowest, empty channel number and the current operating frequency will appear in channel-menu format.

If no empty channels are available, *'Memory Full'* will appear for three seconds, then restore to *'Select Channel.'* In the event of a full memory, you may *Overwrite* an occupied channel (See 4-31, 4-32).

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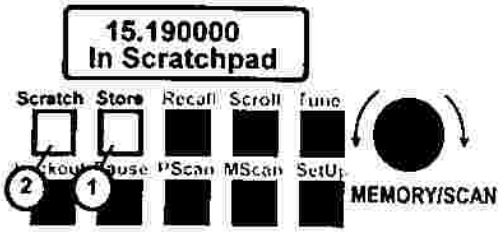
or *Clear* an occupied channel to create an *Empty Channel* (See Section 4-33).

4-29 Store the Current Operating Frequency in the *Scratchpad Memory:*

The *Scratchpad Memory* has no assigned channel number and is accessible without entering into the channel menu. To store the current operating frequency in the *Scratchpad, press* the *Store* button, then the *Scratch* button:

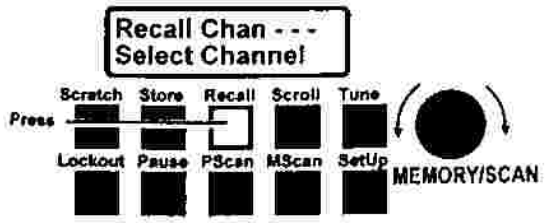


When the *Store* button is pressed, *'Store Channel - - -'* appears in the display. When *Scratch* is pressed, the display momentarily shows the current frequency plus the notation *'In Scratchpad'*. When the *Scratch* button is released, the display reverts to the channel-menu display—showing frequency plus mode and bandwidth.

4-30 TO RECALL A SPECIFIC CHANNEL FROM MEMORY:

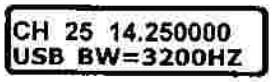
This function is used to recall a specific channel number from the menu, and to make it the receiver's current operating frequency. To enter the *Recall* mode:

1. *Press* the *Recall* button. *'Recall Chan - - -'* and *'Select Channel'* will appear in the *Memory/Scan* display:



2. Enter the number of the channel you wish to recall on the *Main Keypad*. The number you enter will appear in the top line of the *Memory/Scan* display (example, enter 25):

3. *Press* the *Recall* button again. The *Memory/Scan* display will show *'Channel 25 Recalled'* for approximately two seconds, and then present the channel number and operating frequency in menu format. Simultaneously, the receiver's other displays will shift to the recalled channel settings and the receiver will operate on the recalled channel:

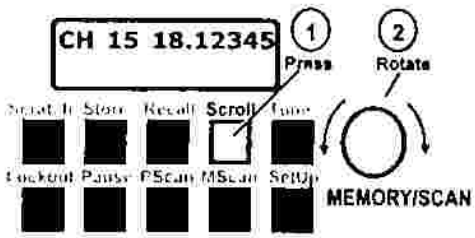


Important Note: Once a channel has been recalled, you may tune the receiver and adjust its operating parameters normally. However, these amended settings *will not* be retained in memory unless you activate the *Store* function and overwrite the old ones.

4-31 USING THE *SCROLL* FUNCTION TO PREVIEW THE CHANNEL MENU:

The *Scroll* function is used to preview the listing of occupied channels stored in the receiver's channel menu.

To scroll through the channel menu, *press* the *Scroll* button. The *Scroll* button will illuminate and the *Memory/Scan Edit* Knob will be assigned to the scroll function. Rotate the *Edit Knob* to preview menu contents, as shown:



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1. To *Recall* a channel while scrolling: To recall a displayed channel, simply *press* the *Recall* button. The selected channel will load into the receiver and become active. Pressing *Recall* cancels the *Scroll* function, so you must *press* the *Scroll* button again if you elect to resume scrolling. Push and hold *tune* to monitor *Tune* to write text.

2. To *Store* a channel while scrolling: To overwrite a menu entry with the frequency in current use, press the *Store* button. The display will present a request for confirmation (this is done to prevent accidental overwrites):

```
Store Data Over
CH  25  14.250000
```

If you wish to complete the overwrite, press *Store* one more time. The old information will be overwritten and the current operating frequency will replace it. Also, the display will revert to channel-menu format:

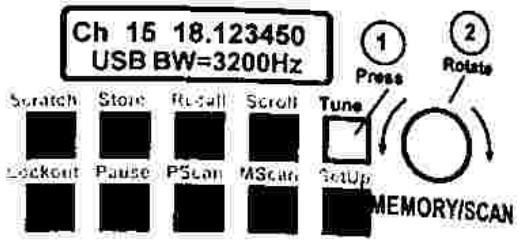
```
CH  25   3.850000
 LSB BW=3200Hz
```

If you *do not* wish to complete the overwrite when the confirmation message appears, *press* 'C' *twice* on the main keypad to escape and restore the channel-menu.

4-32 Using the *Tune* Function to Access Frequencies from the Channel Menu:

Like the *Scroll* function, the *Tune* function may be used to view the listing of occupied channels stored in the receiver's channel menu. However, as each entry appears in the menu window, it will also be temporarily activated to permit monitoring. Note that *Tune* selections are not fully recalled in that *the main displays do not change and receiver settings may not be altered by the front panel controls.*

To tune through the channel menu, *press* the *Tune* button. It will illuminate and the *Memory/Scan Edit Knob* will be assigned to the tune function. Rotate the *Edit Knob* to simultaneously preview menu contents and monitor channel activity, as shown below:



1. To *Recall* a channel in *Tune* mode: To fully activate a channel while in *Tune* mode, press the *Recall* button. The selected channel will load and become fully activated. Pressing *Recall* cancels the tune function, so you must *press* the *Tune* button again if you elect to resume tuning via the *Edit Knob.*

2. To *Store* a channel while in Tune mode: To overwrite a stored channel with the frequency in current use, *press* the *Store* button. The display will present a confirmation request:

```
Store Data Over
CH  25  14.250000
```

If you wish to complete the overwrite, press *Store* one more time. The old information will be overwritten and the current operating frequency will replace it. Also, the display will revert to channel-menu format:

```
CH  25   3.850000
 LSB BW=3200 Hz
```

If you *do not* wish to complete the overwrite when the confirmation message appears, *press* 'C' on the main keypad to escape.

4-33 Clearing Occupied Channels to Create *Empty Channels:*

This function is used to clear un-needed frequencies from the program menu, emptying slots for future use. Channel clearing is done via the Tune mode.

Begin by pressing the *Tune* button. It will illuminate and the *Edit Knob* will be assigned to the tune

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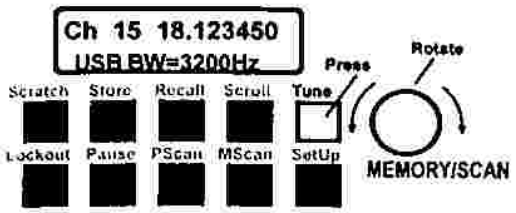
function. Rotate the *Edit Knob* to the channel you wish to clear, as shown below:



1. Clear a Single Channel: When the desired channel-menu entry appears in the *Memory/Scan* display, *press* 'C' (*Clear*) on the main keypad. A confirmation request will appear in the *Memory/Scan* window:

Push C again to Clear this chan

The confirmation message remains on-screen for approximately two seconds. During that interval *press* 'C' again to clear the channel. The display will change to:

Channel cleared

This message will remain on screen for about two seconds. At the end of that interval, the menu will advance to the next-higher menu entry.

Important Note: If you elect *not* to clear the slot after the confirmation request appears, *do not* press 'C ' a second time. In a couple of seconds, the display will revert back to the current menu setting and the operation will be halted.

2. Clearing Sequential Channels: To clear sequentially- numbered slots in rapid succession, select the lowest-numbered channel in the group with the *Edit Knob* and *press* 'C' *twice*, in rapid succession. When the next-higher channel entry appears in the *Memory/Scan* window, *press* 'C' *twice*, again. Continue this procedure until all channels in the sequence are empty. All channels are cleared when the receiver is reset See Ssection 4-37).

4-34 SCAN MODE Primer:

The following terms and concepts are used when setting up *PScan* and *MScan* parameters. Programming will be easier if you understand each:

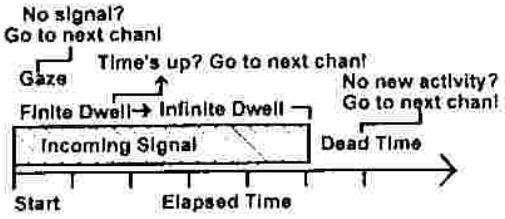
1. Finite Dwell: *Finite Dwell* is the time interval (in seconds) the receiver will remain on frequency after locking onto a signal. The *Finite Dwell* feature is especially useful when scanning a band containing many continuous-carrier AM signals. In this mode, the scanner locks onto the incoming carrier for a *specified period of time*, then quits the channel and resumes searching for another signal. Dwell is adjustable from 0.1 to 29 seconds.

2. Infinite Dwell: *Infinite Dwell* means the receiver will remain on the frequency for as long as the squelch is held opened by a signal. *Infinite Dwell* is especially useful when scanning two-way intermittent push-to-talk communication.When set for *Infinite Dwell*, the scanner locks onto the signal for as long as its there.

3. Dead Time: *Dead Time* is the time interval (in seconds) the receiver will remain on a frequency *after* the incoming signal either goes off-air or falls below the *Squelch* threshold. This function is especially useful when anticipating a two-way reply, or when it may be necessary to bridge signal fading and pauses in SSB speech. *Dead Time* is programmable from 0.1 to 29 seconds.

4. Gaze Time: *Gaze Time* is the interval the receiver will wait for activity to appear on a dead frequency before moving on to the next. Lengthening this parameter is useful when CW, SSB, or pulse-type data signals cause short activity gaps. *Gaze Time* is programmable from 0.01 to 29.9 seconds.

The relationship between *Dwell, Dead*, and *Gaze* Time is shown here:



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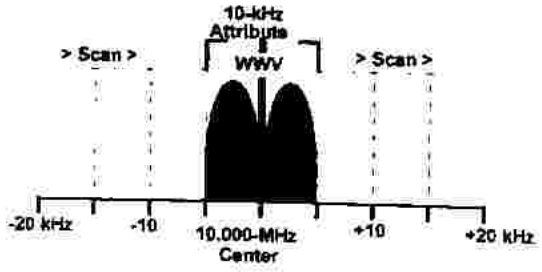
5. Channel Lockouts: *Channel Lockouts* are used to instruct the scanner to skip over specified menu channels during searches for activity in the MScan mode.

6. Frequency Lockouts: *Frequency Lockouts* are used to eliminate scan interruptions caused by unwanted signals. The *Frequency Lockout* has two components: 1.) a Lockout Center, and 2.) the Bandwidth Attribute. The Lockout Center is determined by the receiver's operating frequency at the time of the lockout entry. The Bandwidth Attribute is determined by receiver's selected bandwidth (BW). Together, these parameters establish the *Frequency Interval* that will be skipped on subsequent scans. To calculate the boundaries of the *Frequency Interval*, use the formula:

$$Interval = (Center) \pm 1/2(Attribute)$$

To illustrate how frequency lockouts work, suppose WWV at 10 MHz disrupts a scan searching for intermittent push-to-talk signals. Now, suppose the receiver's bandwidth is set at 10 kHz:



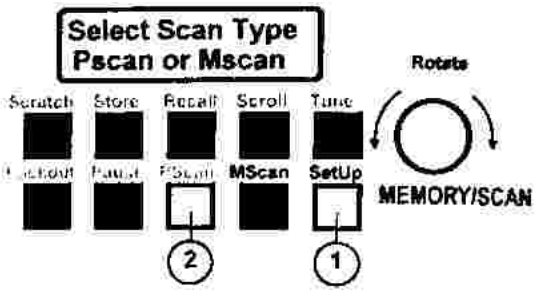
Entering the *Lockout* command while the receiver is paused on the unwanted station will automatically program a 10.000-MHz Lockout Center and a 10-kHz Bandwidth Attribute into the *PScan memory*. As a result of this entry, when scanning resumes, the *Frequency Interval* between 9.995 MHz and 10.005 MHz will be excluded on future passes—eliminating the interference problem.

Important Note: When initiating a new *PScan* setup, it's usually advisable to clear all previous lockouts from memory and start with a clean "slate". All lockouts and channels are cleared when the receiver is reset (See section 4-37).

4-35 TO SETUP A PSCAN (PROGRAMMED F$_1$→F$_2$) FREQUENCY SWEEP:

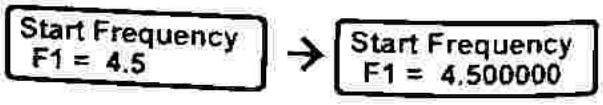
The PScan mode is used to search all frequencies between a specified *Start* frequency (F1) and an *End* frequency (F2). F1 is the lower frequency in the search, and F2 is the higher.

To enter the Scan Setup mode, clear any other scan fucntions and press the *Setup* button. It will light and the 'Select Scan Type' message will appear:



Now, press the *PScan* button. It will illuminate, and the *Edit Knob* will be assigned to the *PScan* menu. The display will present the 'Start Frequency' menu prompt, along with the last-entered value for F1:

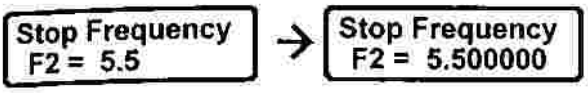
1. *F1* Start Frequency: Use the main keypad to enter the desired start frequency, followed by the *MHz* or *kHz* key (as appropriate). Your entry will appear in the *Memory/Scan* display window, and will overwrite the old entry when you *press* the MHz or kHz key (example, enter 4.5, then MHz):



Important Note: If you make a mistake while entering a frequency, *press* 'C' to clear the screen. To change F1 after an entry is complete, simply start over again.

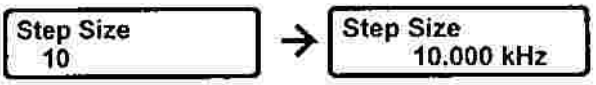
2. *F2* Stop Frequency: Rotate the *Edit Knob* clockwise to the next menu prompt, 'Stop Frequency' which will display the last-entered *F2*:

To enter a new *F2*, use the keypad as in step-1 (example, 5.5 MHz):



3. ***Step* Size:** Step size defines the frequency shift for each "hop" the scanner will make as it moves from F1 toward F2. Step size is most easily programmed in kHz, and is adjustable from 1 Hz (.001 kHz) upward.

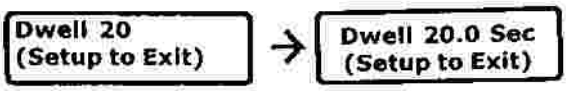
To enter Step Size, rotate the *Edit Knob* clockwise to the next menu prompt, 'Step Size' plus the last-entered value. Use the main keypad to enter the desired numbers followed by the kHz key (example, 10 kHz):



4. ***Dwell* Time:** *Dwell* is the time in seconds the receiver remains on one frequency *after* it locks onto a signal. Two Dwell-time options are available: *Finite Dwell* and *Infinite Dwell*. If your objective is to stop on each station briefly, before moving on to the next, set a *Finite Dwell* for any desired period between 0.1 and 29 seconds. If your objective is to continue monitoring for as long as the signal is present (as when monitoring intermittent push-to-talk traffic), then enter any time of *30 seconds or greater* to initiate the *Infinite Dwell* default.

To enter a new Dwell time, advance the *Edit Knob* clockwise to the *Dwell* menu prompt:

A. ***Finite Dwell* Time:** Use the main keypad to keystroke in a *two-number* entry between 0.1 and 29 seconds (0.1, 1.2, 5.0, 10, etc.). The entry will self-complete automatically when the second number is keyed in:



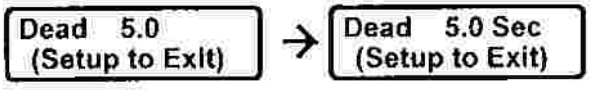
B. ***Infinite Dwell* Time:** Use the main keypad to keystroke in a *two-number* entry of 30 seconds or greater. The program will automatically default to *Infinite Dwell Time*, and the following message will appear in the *Memory/Scan* display:

At this point, you may exit *PScan Setup* to begin scanning, or you may edit the *Dead Time* and *Gaze Time* settings. If you know the existing *Dead* and *Gaze* parameters are acceptable for your task, exit at this time. If you do not know what they are or need to amend them, continue with the setup procedure.

C. **To Exit:** If you elect to exit Setup at this point, press the *Setup* button. The switch will toggle off, the *Setup* and *PScan* LEDs will go out, and the *Memory/Scan* display will go dark until you initiate a new *Memory/Scan* function.

5. ***Dead* Time:** *Dead Time* is the interval the receiver will remain on frequency after a signal drops out and the squelch closes. This function holds the receiver on frequency (or channel) between push-to-talk exchanges and during pauses in SSB speech.

To enter a new dead time, advance the *Edit Knob* clockwise to the *Dead Time* prompt. *Dead Time* is adjustable from 0.1 second to 29 seconds (same as dwell time). Use the main keypad to keystroke in a *two-number* entry (0.1, 1.2, 5.0, 10, etc.). The entry will self-complete automatically when the second number is keystroked in:



At this point, you may either *Exit* the PScan setup or continue on and enter a *Gaze* time. To *Exit*, press the *Setup* button.

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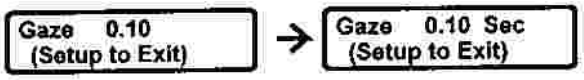
6. Gaze Time: *Gaze* represents the interval-in seconds--the receiver will wait for a signal to appear on a quiet frequency before moving to the next. Longer *Gaze* times are useful when searching for CW, SSB, and some digital-mode signals where short pauses or gaps may be present. Short *Gaze* times are preferred for carrier-based signals such as AM and FM.

To enter a new *Gaze* Time, advance the *Edit Knob* clockwise to the *Gaze* prompt. The *Gaze* interval is continuously adjustable from 0.01 -29.9 seconds. Use the main keypad to keystroke in a *three number* entry (0.01, 1.20, 5.00, 10.0, etc.). The entry will self-complete automatically when the third number is keystroked in:

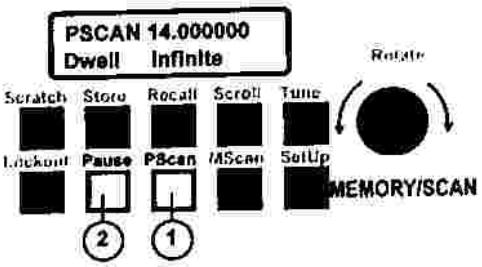


At this point, *PScan* setup is complete. Rotate the *Edit Knob* in either direction to review entries, or exit *PScan Setup*. To exit, press the *Setup* button. The *Setup* and *PScan* LEDs will go out, and the *Memory/Scan* display will go dark until a new *Memory/Scan* function is initiate d.

4-36 INITIATING PSCAN:

Once scanning parameters are set up, ensure the *Setup* button is off before attempting to begin the scan run. Also, to reduce background noise or to eliminate undesirably weak stations, set the receiver's *Squelch* control to a desirable threshold level (much as you would to quiet a FM scanner receiver). Setting the *Squelch* control above the background noise is especially important when using *Infinite Dwell*, since background noise alone could permanently halt the scan from progressing.

To initiate a PScan, press the *PScan* button *once*. The LED will illuminate and the *Memory/Scan* display will show the *PScan* function, F1 frequency, and *Dwell Time* (see below):



With each advancing step in the scan sequence, the *Aux Parameter* display and main frequency display will update to show operating parameters and operating frequency. To may halt the scan temporarily at any point, *press* the *Pause* button *twice*. Pressing it a second time will resume scanning.

If *Infinite Dwell* has been selected, reception of any continuously transmitting signal sufficiently strong to open the *Squelch* will halt the scan. To resume scanning, press *Pause* twice. To insert a *Frequency Lockout* to eliminate the signal on future passes, refer to section 4-37 (Frequency Lockouts) below.

Important Note: To alter the *Squelch* threshold (or any other *Aux Parameter* settings) during a scan, you must first disengage the *PScan* function. *Press* the *PScan* button *once* to disengage.

4-37 FREQUENCY LOCKOUTS:

Frequency Lockouts are used to eliminate unwanted interference that would otherwise disrupt a continuous F1-to-F2 *PScan* search. Unlike a channel lockout, the *Frequency Lockout* has a Central Frequency plus a Bandwidth Attribute. The Bandwidth Attribute allows the scan to circumvent the signal's modulation and heterodyne products, ensuring a consistent lockout when those products span more than one scanning step. When initiating a new *PScan* set-up, its usually advisable to clear all previous lockouts from memory (See Section 4-34).

1. Clearing Frequency Lockouts: To clear existing lockouts, press *Setup*, *PScan*, and *Lockout* in sequence. The *Setup* and *PScan* buttons will illuminate, and the *Edit Knob* will be assigned to the lockout menu. Additionally, the first entry in the lockout menu will appear in the *Memory/Scan* display,

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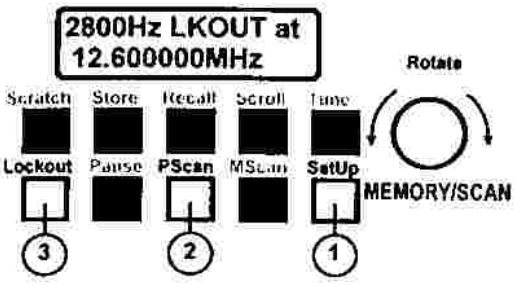
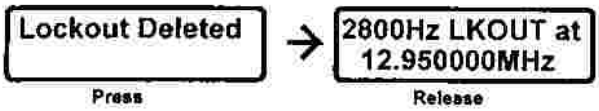
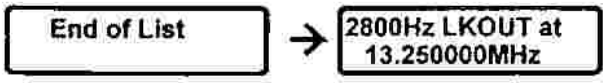
showing both the Bandwidth Attribute and the Lockout Center (example, *2800 Hz Attribute* at *12.6 MHz Center*):



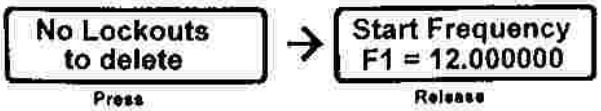
To delete the displayed lockout, press *Lockout* a second time. The message 'Lockout Deleted' will appear while the button is depressed, and the next lockout menu entry will be appear when the button is released:



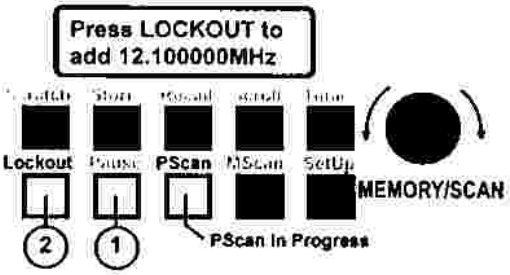
To delete the next entry, press *Lockout* once again. You may continue this procedure until all existing lockouts have been canceled. Alternatively, you may delete selected lockouts by scrolling though the lockout menu with the *Edit Knob* and pressing *Lockout* on only those entries you wish to delete. At the end of the menu, the display will flash 'End of List', then revert back to the last entry:



When all entries have been removed from the menu, pressing *Lockout* will cause the display to flash 'No Lockouts to delete'. The display will then revert to the *PScan* set-up menu:

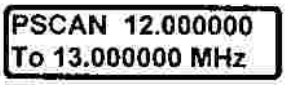


2. Adding Frequency Lockouts: *Frequency Lockouts* are normally added when the *PScan* is in progress becomes halted by an unwanted station. To add a lockout, first press *Pause* to suspend the scan, then press *Lockout*. The *Pause* button will illuminate and a prompt will appear in the display to confirm the frequency (example, 12.1-MHz center with 5-kHz BW):



To add the indicated lockout, press *Lockout* a second time. The display will change to show the entry has been recorded:

After your entry is complete, press *Pause* off to resume scanning. The LED will go out and the display will revert to the normal *PSCAN* running message:



If you decide to *not* enter a lockout after setting it up, first *press* 'C' (clear) on the main keyboard, then press *Pause* to escape. Note that *Pause* will not disengage unless the *Lockout* command is either completed (with a second press) or canceled via the keypad, by pressing 'C'.

3. Channel Lockouts from Main Tuning: Finally, it is possible to toggle frequency Lockouts in or out of the channel list while remaining in receive mode. Simply press the *Lockout* button while the desired frequency is displayed during normal receiver operation, and a confirmation message will appear in the *Memory/Scan* window. By pressing the *Lockout* button a second time, the *Memory/Scan* window will confirm Lockout deletion.

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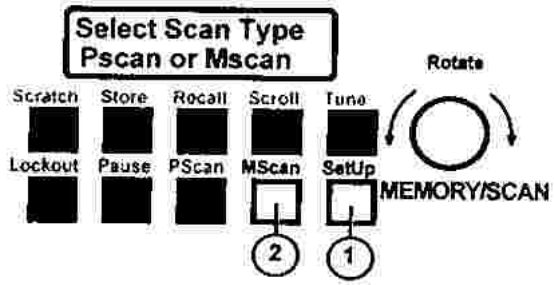
Important Note: You must press *Pause* to suspend the PScan before attempting to enter the *Lockout* command. If you press *Lockout* without first pausing the *scan*, the display will prompt you to use the *Pause* button:

Must be In PAUSE mode

4-38 TO SET UP A MEMORY /SCAN FREQUENCY SWEEP:

The *MScan* mode is used to search frequencies stored in the receiver's channel memory for activity. To enter the scan setup mode, press the *Setup* button. It will illuminate and a 'Select Scan Type' message will appear in the display:



Now, press the *MScan* button. It will illuminate, the *Edit Knob* will be assigned to the *MScan* menu, and the display will present the 'Start Channel' menu prompt which includes the previous start point:

Start Channel Ch 01 1.000000	OR	Start Channel Ch 01 Empty

1. Start Channel: To enter a new Start Channel, use the main keypad to keystroke in the desired channel as a *three-digit number* (001, 050, 100, etc). Your entry will appear in the *Memory/Scan* display window, and will overwrite into memory automatically *when the third digit is entered:* (example, enter 050 for channel 50):

Important Note: For this and other scan parameters, terminate entries with *MScan button* or turn on the *Memory/Scan edit knb.*

Start Channel Ch 050	→	Start Channel Ch 50 4.500000

If you make a mistake while entering, *press* 'C' to clear the entry. If you wish to change the start point after entry is complete, simply start over.

2. Stop Channel: Rotate the *Edit Knob* clockwise to the next menu prompt; 'Stop Channel' with the last-entered selection:

Stop Channel Ch 75 22.100000

To enter a new Stop Channel, use the main keypad (as in step-1) to keystroke in the desired three-digit channel number (example, 080 for channel 80):

Stop Channel Ch 080	→	Stop Channel Ch 80 25.160000

If you make a mistake while entering the channel, *press* 'C' to clear the entry. If you wish to change the start point after entry is complete, simply start over.

3. Dwell Time: *Dwell* is the time in seconds the receiver remains on one frequency after it locks onto a signal. Two Dwell-Time options are available: *Finite Dwell* and *Infinite Dwell.* If your objective is to stop on each occupied channel briefly, then move on to the next, set a *Finite Dwell* for any desired period between 0.1 and 29 seconds. If your objective is to continue monitoring an occupied channel for as long as activity is present (as when monitoring two-way traffic), then enter any time of 30 seconds or greater to initiate the *Infinite Dwell* default.

To enter a new Dwell Time, advance the *Edit Knob* clockwise to the *Dwell* menu prompt:

A. Finite Dwell Time: Use the main keypad to keystroke in a two-number entry between 0.1 and 29 seconds (0.1, 1.2, 5.0, 10, etc.). The entry will self-complete automatically *when the second number is entered:*

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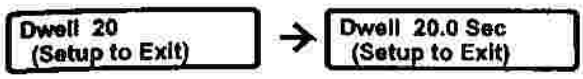


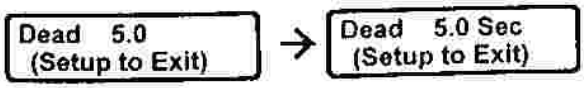
B. Infinite Dwell Time: Use the main keypad to keystroke in a two-number entry of 30 seconds or greater. The program will automatically default to *Infinite Dwell Time*, and the following message will appear in the *Memory/Scan* display:

At this point, you may exit *MScan* Setup to begin scanning, or you may edit the *Dead Time* and *Gaze Time* settings. If you know the existing *Dead* and *Gaze* parameters are acceptable for your task, exit now. If you do not know what they are or need to amend them, continue with the setup procedure.

C. To Exit: If you elect to exit Setup at this point, press the *Setup* button. The switch will toggle off, the Setup and MScan LEDs will go out, and the *Memory/Scan* display will go dark until you initiate a new *Memory/Scan* function.

4. Dead Time: *Dead Time* is the interval the receiver will remain on frequency after a signal drops out and the *Squelch* closes. This function holds the receiver on frequency (or channel) between push-to-talk exchanges and during pauses in SSB speech or data.

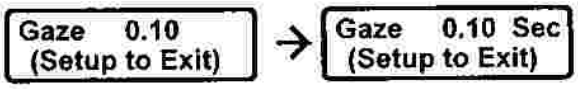
To enter a new Dead Time, advance the *Edit Knob* clockwise to the *Dead Time* prompt. *Dead Time* is adjustable from 0.1 second to 29 seconds (same as dwell time). Use the main keypad to keystroke in a two-number entry (0.1, 1.2, 5.0, 10, etc.). The entry will self-complete automatically *when the second number is entered.*



At this point, you may either Exit the *PScan* setup or continue on and enter a *Gaze Time*. To Exit, press the *Setup* button.

5. Gaze Time: *Gaze* represents the interval-in seconds-the receiver will wait for a signal to appear on a quiet channel before moving on to the next. Longer *Gaze Times* are useful when searching for CW, SSB, and some digital-mode signals where short pauses or gaps may be present. Short *Gaze Times* are preferred for carrier-based signals like FM and AM.

To enter a new *Gaze Time*, advance the *Edit Knob* clockwise to the *Gaze* prompt. The *Gaze* interval is continuously adjustable from 0.01 -29.9 seconds. Use the main keypad to keystroke in a three number entry (0.01, 1.20, 5.00, 10.0, etc.). The entry will self-complete automatically *when the third number is entered:*

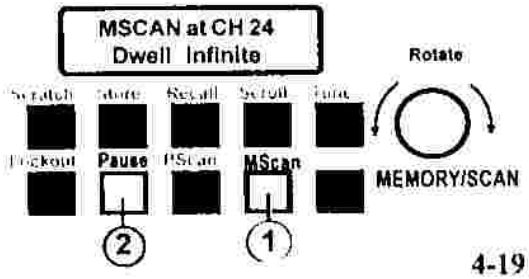


At this point, the *MScan* Setup is complete. You may rotate the *Edit Knob* in either direction to review your entries, or exit *MScan* Setup. To exit, press the *Setup* button. The *Setup* and *PScan LEDs* will go out, and the *Memory/Scan* display will go dark until you initiate a new *Memory/Scan* function.

Important Note: *Gaze*, *Dwell*, and *Dead Times* are shared by both *PScan* and *MScan* functions. When changing from one mode to the next, remember to check and–if need be–reset these parameters.

4-39 INITIATING MSCAN:

To initiate an MScan, first make sure the *Setup* function is turned off and the *Squelch* threshold is set to eliminate background noise and undesirably weak signals (as with any scanner). Setting the *Squelch* is especially important when using *Infinite Dwell*, since the scan function will not advance to the next channel while the *Squelch* is open. To initiate the scan, press *MScan, once:*



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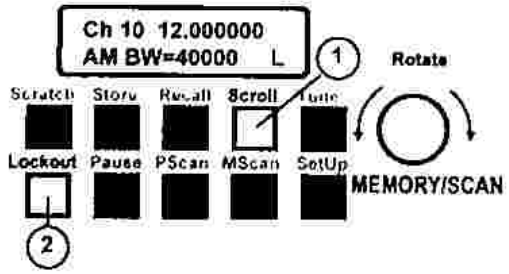
The LED will illuminate and the *Memory Scan* display will show the *PScan* function, current channel number, and *Dwell Time*. With each captured channel, the *Aux Parameters* display shows the receiver parameters for that channel. You may halt the scan sequence temporarily at any point by pressing the *Pause* button *twice*. Pressing it a second time will resume scanning.

If *Infinite Dwell* has been selected, reception of any sufficiently strong, continuously-transmitting signal to open the *Squelch* will halt the scan. To override and resume scanning, press *Pause, twice*. To insert *MScan Frequency Lockouts* to eliminate unwanted channels on future passes (See Section 4-40).

Important Note: To alter the *Squelch* threshold or to alter any other *Aux Parameter* settings during *MScan, press* the *Pause* button *once* to disengage. Press it again to resume scan operation.

4-40 LOCKING OUT *MSCAN* CHANNELS:

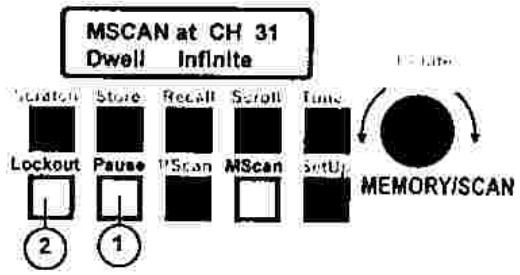
1. Clearing or Adding Lockouts Via the Menu: *MScan Lockouts* are used to eliminate unwanted channels that would normally "hang up" and disrupt a useful channel search. In some cases, you may wish to clear some (or all) existing lockouts before beginning your *MScan*. This is done in the receiver's *Channel Scroll* mode:



To scroll the channel menu, *press* the *Scroll* button *once*, and use the *Edit Knob* to select channels. Note that any channel previously locked out will display the letter 'L' in the lower right side of the display. To eliminate the lockout, press the *Lockout* button *twice*. The 'L' will disappear and the channel will be restored to the scan list.

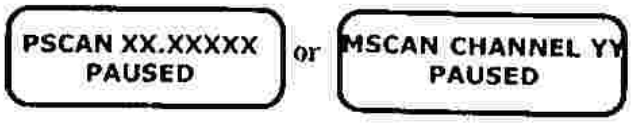
The *Lockout* button is a toggle control, so pressing it again will reinstate any lockout. By the same token, you may select *any* channel in the *Scroll* menu and either lock or unlock it by toggling the *Lockout* button. Note that the *MScan Lockout* function works in the Scroll mode only and will not work in Tune mode.

2. Adding Lockouts While Scanning: Channels may also be added (but not removed) from the lockout list while an *MScan is* in progress. To lockout an unwanted channel, simply press *Pause* while the scanner is held up on the station *once*, then *press* the *Lockout* button *twice*. A brief *Channel Locked* message will appear while the button is being depressed, indicating the entry has been made.



4-41 PAUSING AND RESTARTING SCANS:

In *Programmed* or *Memory/Scan* mode, push the unlit *Pause* button to enter Pause mode, temporarily stopping the scanning at the current frequency or channel. The *Pause* LED lights, and the *Memory/Scan* display reads:



where XX.... or YY is the current frequency or channel in the scan sequence.

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When a scan is *Paused*, the displays reflect the presently active *Receive Frequency* and *Auxiliary Parameters*. The scan can be restarted at the next Channel or Frequency in the scan sequence by pushing the *Pause* button again, extinguishing the *Pause* LED. The next Channel or Frequency is held for a minimum of one second to allow double pushes of the *Pause* button to single step through the scan sequence.

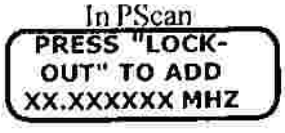
Pause mode may also be exited by pushing the lit *PScan* or *MScan* button. This will exit *both* Pause and Scan modes, extinguishing the *Pause* and *MScan* or *PScan* LEDs. This will not return the *Memory/Scan*, *Auxiliary Parameter*, *Main Display* and *Receive Frequency* to the settings that existed before the scan was started.

In Pause mode, the receiver can be tuned and *Auxiliary Parameters* can be changed to look more closely at the received signal. In Paused PScan mode, the XX...frequency displayed in the *Memory/Scan* Display remains fixed regardless of any receiver tuning adjustments. Any changes to the *Auxiliary Parameters* are ignored when the scan is restarted.

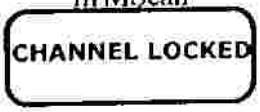
Scan Setup Parameters can be changed while a scan is paused. The *Scan Setup* procedures are the same as before except the *Select Scan Type* prompt never appears, and the *Pause* LED is lit. When *Pause* and *Scan Setup* modes are enabled concurrently, pushing the lit *Pause* button will exit both modes and restart the scan.

In *PScan Pause* mode, frequency lockouts may be added to the lockout list. Push the *Lockout* button to store the current receiver tuned frequency and IF Bandwidth in one of the *Lockout* memory locations. The *Memory/Scan* Display reads:

In PScan



In MScan



for three seconds, and then returns to its previous display. The new Lockout Frequency will be skipped in subsequent scan passes. If there are no empty Lockout locations available, the display reads:

for three seconds, and then returns to its previous display. A new *Lockout* with a Center Frequency identical to an existing Lockout overwrites the existing Lockout and does not require an additional memory location. Scan Setup mode may be entered to delete an existing *Lockout* and make room for the new one, if desired.

Similarly, to quickly change a channel from *include* to *skip* status, push the *Lockout* button during a *Paused MScan*. Channel may be toggled while in scroll mode by pressing the *Lockout* button. 'L' appears in the display to indicate a locked-out channel. The *Memory/Scan* display reads:

for three seconds, where XX and YY...relate to the paused channel. The channel will be skipped in subsequent scan passes. Editing is restricted to the Paused Channel.

If the *Lockout* button is pushed during an actively scanning (or dwelling) scan ,the *Memory/Scan* display reads:

for three seconds, and then returns to its previous display. In this case, the scan is suspended at the present frequecy for three additional seconds to allow the operator time to Pause the scan, if desired.

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CHAPTER 5

DETAILED REMOTE RS-232 OPERATING INSTRUCTIONS

5-1 MULTI-DROP NETWORK:

In addition to front-panel control, the RX-340 may be controlled remotely via its MULTI-DROP RS-232 interface using a PC (Personal Computer). The RX-340 must be in *Local* mode for front-panel operation and *Remote* mode for RS-232 control. See section (5-10) for details of the *Remote* button and the RS-232 security commands. Control software is necessary for remote operation. The RX-340 interface is based on plain text (ASCII) codes and strings which reduces the software design burden. An ASCII based interface allows the operator to exercise the RX-340 using a dedicated terminal or through a PC running, terminal-emulation software. In this way, software designers can quickly become familiar with commands and responses of the RX-340.

The RX-340 operates as a DCE device for serial interface applications, and a 3-wire interface is required for connection to a suitable controller (TXDATA, RXDATA and GND). When connecting multiple RX-340s to a single controller, all units are wired parallel to the control bus. In this way, all receivers share a single TXDATA line, RXDATA line and GND line (See figure 5-1). After the receivers have been wired, they must be configured. Dipswitches S1 and S2 located on the rear panel allow users to set serial interface parameters and receiver addresses. Dip switch S1 is used to select serial interface parameters (See figure 5-2). Dip switch S2 is used to set the receivers address (range 0 to 127). Switch S2-1 is not used for address selection and should be left in the down position for normal operation. (This switch is used to activate Non-Multidrop RS-232 default).

The RX-340 is interfaced to a PC or other suitable controller via a Multidrop serial network. Signal levels for the network are RS-232 compatible. However, unlike conventional RS-232 systems which allow only a single connection, the RX-340 has been designed to allow multiple connections. While any number of receivers may be interconnected at one time, the number of simultaneous connections is limited by line capacitance. Total capacitance should not exceed 2500 pF. However, the Baud rate and RS-232 drive delay may be adjusted to allow operation with a less than perfect installation (See Section 5-4, Hnnn command).

The multi-drop feature may be disabled by sending the 'U5' command. After this command is received, the interface becomes standard RS-232C (single receiver system). The 'U4' command restores the multidrop feature. Set dip switch S2-1 to configure the power-up default of the Multidrop feature (See Figure 5-2).

Important Note: A standard serial cable *will not work.* An interface cable for the RX-340 must use pins *2, 3 and 7* only. Other pins on the DB-25 connector carry DSP data.

CONNECTION DIAGRAM

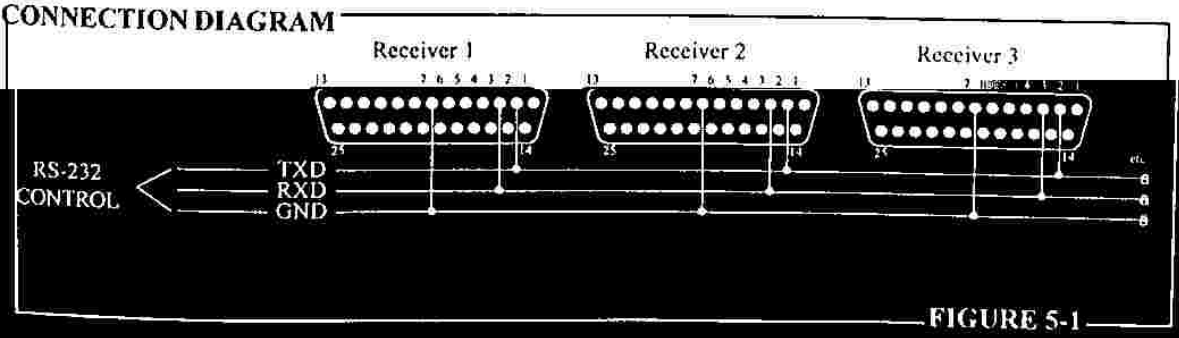

FIGURE 5-1

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5-2 RECEIVER CONTROL:

Control of the RX-340 is achieved through plain text (ASCII) command codes sent from a remote PC or other control unit. Command codes provide control of frequency, mode, and other operating parameters--plus control of BITE self-diagnostics and *Scan/Memory* functions. All command codes consist of a single ASCII letter. The comma ' , ' and dollar sign '$' are also used in addressing operations.In addition to a command code letter, additional information may be required immediately following the letter (See specific codes). All command strings must be terminated by a carriage return ASCII 13 (hex 0D). Only capital letters are allowed in command strings.

The desired receiver (or group of receivers) must be selected or addressed before commands can be issued. The *Select* light on the front panel will illuminate when radio has been addressed. Dipswitch *S2* (on the rear panel of each receiver) allows a receiver's address to be set from 0 to 127 (See Figure 5-2). To select a receiver, send '$' followed by the assigned address number. For example, to address receiver 15, send '$15'. To address more than one receiver, list each one separating each address by a comma. For example, to address receivers 9, 15, and 22, send '$9,15,22'. Receivers remain addressed until another addressing command is issued.

Once a receiver (or group) is addressed, additional receiver commands may be sent to control frequency, mode, operating parameters, etc. Some receiver commands are single characters –such as 'X'–which tells a receiver to report the current incoming signal level. Other commands require added information to complete the command, such as 'F10.12345' to set frequency or 'D3' to set the detection mode to CW.

It is important to follow proper syntax when issuing commands. Receivers not included in the command address ignore commands intended for designated receivers. In addition, if a selected receiver detects an error in the incoming command string, it will ignore the command *and* de-select itself as a safegaurd against data errors.

Multiple addresses and mutiple operating commands may be placed in the same command-string as long as the total command string length does not exceed 256 characters, including the terminating carriage return. For example, '$0,2F10.1D1M4A100' <CR> would command receivers 0 and 2 to tune 10.1 MHz, AM detection mode, programmable AGC, with attenuation set for 100 dB.

5-3 RECEIVER RESPONSE COMMANDS:

Some commands interrogate the receiver, requiring it to return data to the controller. These responses are generally similar to the command format. For example, if a receiver is asked to report its current operating frequency (TF), the response might be: 'F10.12345'. In addition, whenever a receiver *sends* information, a status code is appended to the end of each response. The status code is the letter *S* followed by a number such as, 'S1' which indicates that the receiver is operating in remote mode. The status number is encoded as follows:

1	Receiver is in remote control mode.
2	Synthesizer is out of lock.
4	Not used.
8	Last string had character transmission error.
16	Last string had data error.
32	Last string had lost data.
64	External reference applied.
128	Receiver in mute (activated by command).

If the receiver and interface are operating properly, the receiver would report a status code of 'S1' (or 'S64' if using an external reference). Each receiver response is terminated with a carriage return ASCII 13 (hex 0D).

Important Note: Interrogation commands may be directed to *only one receiver* at a time. Response commands addressed to multiple receivers are ignored.

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5-4 RECEIVER CONTROL COMANDS:

Control commands affect receiver operating status (setting of frequency, mode, bandwidth, etc.). All commands in this group require additional data following the command code. If a command code is sent to a receiver without properly-formatted supplemental data, the receiver will ignore the command code and deselect itself. It will then ignore any incoming characters until it receives a carriage return (ASCII 13).

The section below describes individual commands plus the type and range of data that should follow to properly complete the command. For example, 'Fnn.nnnnnn' represents the *Set Frequency* command 'F', which should be followed by up to two digits, a decimal point, and then six digits. In most commands a decimal point will be required (any exceptions will be noted below).

COMMAND	DESCRIPTION	VALID RANGE
Annn	**MANUAL AGC ATTENUATION** Selects the amount of *AGC Attenuation* to use (same as *Manual Gain* setting on front panel). Adjusts over 120-dB range, may be set in any mode.Receiver gain is reduced and AGC threshold is increased by the number of dB indicated. Example: 'A30' (Set Attenuation to 30 dB)	**0 - 120 dB**
B+n.nnn **(B-n.nnn)**	**BFO FREQUENCY** +/- 8000 Hz Sets *BFO-Offset* frequency when receiver is in CW mode. BFO is fixed in sideband and CW1 modes, and not operational in others. In CW mode, BFO Offset is relative to the receiver's tuned frequency (which is also the passband center when passband tuning is turned OFF). Example: 'B-0.2' (Set BFO to 200 Hz) 'B-2.0' (Set BFO to -2000 Hz)	**+/- 8000 Hz**
Dn	**DETECTION MODE** This command allows setting the receiver detection mode. Detection mode designators are: 1 AM 2 FM 3 CW (with variable-offset BFO) 4 CW1 (BFO fixed at 0 Hz) 5 ISB (both sidebands, 3.2 kHz fixed BW) 6 LSB 7 USB 8 SAM (Synchronous AM)	**1 - 8**

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Example: 'D3' (Set receiver to CW mode)
'D1' (Set receiver to AM mode)

E, U or B

E[U,L,B,M]

AUDIO / IF SELECT
Allows *Audio/IF* selection and receiver muting. Affects the IF output and audio outputs. Either Upper, Lower, or both ISB audio channels may be selected for output. Either Upper or Lower IF may be selected for output. If *Both* is selected, IF selection remains at last setting. Also, receiver may be muted by using the 'M' selection. A receiver which is muted will set the mute flag in the status byte and display 'Mute' in the *Mode* area of the main display. The *Mode* display may be restored momentarily by pushing either *Mode* button (in *Remote Mode*). return to local mode to clear the mute condition and edit the *Mode* setting.

Example: 'EU' (Select Upper IF and Upper Audio)
'ELEB' (Select Lower IF and Both Audio)

Fnn.nnnnnn

0 - 30 MHz

FREQUENCY
Allows setting operating *Frequency* with a resolution of 1 Hz from 0-30 MHz. Least significant digits may be dropped (assumed 0). A decimal point is required except when frequency is 0 Hz (it is not necessary to have any frequency data in the command string for 0 Hz). Display frequency is the suppressed-carrier frequency in sideband modes and passband center in all other modes.

Example: 'F14.123456' (set frequency to 14.123456 MHz)
'F14.1' (set frequency to 14.100000 MHz)
'F'<CR> (set frequency to 0 Hz)

Hnnn

0 - 255 ms

SET RS-232 DELAY
Controls the time between tx-output enable and the occurrence of the first transmitted bit on the RS-232 transmit line. This command may be used to overcome an RS-232 controller with a slow response. Units are in milliseconds.

Example: 'H40' (Set delay to 40 milliseconds)

Innnn

.1 - 16 kHz
(FM .6 - 16 kHz)

IF FILTER
This command selects the IF-filter *Bandwidth*. Bandwidth range is 100 Hz to 16 kHz in all detection modes except ISB (600 Hz is FM, SAM, ISB narrow filter limit. 4 kHz is SAM narrow filter limit). BW is fixed at 3.2 kHz in ISB mode. If operator requests an unavailable filter, the receiver will select the closest wider filter to the request. Units are in kHz. Appending a 'C' to

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the 'I' command will access a *Fast Filter* for bandwidths below 4 kHz. An 'F' is displayed in front of the filter selected on the front panel when *Fast Filters* are used. Fast Filters exhibit reduced delay times with degraded shape factors. Fast Filters should only be used in systems sensitive to filter delay.

Example: 'I3.2' (Set IF Bandwidth to 3.2 kHz)
'I0.5' (Set IF Bandwidth to 500 Hz)

Kn **PRE-AMP/ATTENUATOR** **1 - 3**

Allows control of *Pre-amp* and *Attenuator*

'K1' Normal - Preamp OFF, attenuator OFF
'K2' Preamp on, attenuator OFF
'K3' Attenuator on, preamp OFF

Mn **AGC OPERATING MODE** **1-4**

Selects the AGC operating mode. 'F', 'M', 'S', and 'P' are displayed in front of AGC seting on front panel. Where 'n' is one of the following:

'M1' Fast AGC
'M2' Medium AGC
'M3' Slow AGC
'M4' Programmable AGC

Note: The receiver will accept and execute a manual gain 'A' command in any of the AGC modes.

PROGRAMMABLE AGC MODE SETTINGS

Note: Receiver accepts new parameters for Progammable AGC at any time, but uses them only in *Programmable* mode (M4).

MA Set *Attack Rate* in dB/mS. **Range: 00.01 to 01.00**
Example: 'MA0.40' Program for 0.4 dB/mS

MD Program *Decay Rate* in dB/sec. **Range: 00.01 to 99.99**

MH Program *Hang Time* in seconds. **Range: 00.01 to 99.99**

*Dump* AGC state and restart AGC process.

TM Query the *Programmed AGC* settings. The receiver will respond with a string similiar to:

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'M1MA00.90MD75.00MH02.00S1'

```
|     |     |     |
|     |     |     |_Hang Time (sec)
|     |     |_Decay Rate (dB/sec)
|     |_Attack Rate (dB/msec)
|_AGC Mode (1,2,3 or 4)
```

Pre-programmed AGC modes are set up as follows:

AGC Mode	Attack	Decay	Hang
Fast (M1)	0.8 dB/msec	1200 dB/sec	0
Med (M2)	0.8 dB/msec	100 dB/sec	0
Slow(M3)	0.8 dB/msec	25 dB/sec	0

Nnn.nnn

NOTCH FREQUENCY — **=/- 2000 Hz (around pass-band center)**

Allows tuning the receiver's *Notch Filter*. The notch filter functions in CW, CW1, LSB and USB modes for bandwidth settings of 4 kHz or less, and may be tuned +/- 2 kHz either side of the passband center. A notch frequency of 0 Hz effectively turns the filter OFF. The notch frequency indicates the audio (in Hz) to be removed. Notch frequencies are relative to BFO offset.

Example: 'N.500' (Notch 500 Hz Audio Tone).
'N4.000' (Notch 4000 Hz Audio Tone).

Onn

NOISE BLANKER SETTINGS — **0 - 9**

Allows setting the *Noise Blanker* setting threshold. Range is from 0(off) to 9.

Example: 'O5' (Set Blanker width to 5).
'O0' (Set Blanker to OFF).

Pnn.nnn

PASS BAND TUNING — **+/- 2000 Hz**

Allows setting *Passband Tuning*. Feature is available in CW, AM, or SSB modes and shifts the filter's center frequency without affecting receiver's operating frequency or BFO.

Example: 'P1.8' (Shift passband 1.8 kHz).
'P-1.0' (Shift passband -1 kHz).

Qnnn

SQUELCH — **0-150 (-140 - +10dBm)**

Allows setting *Squelch* control. Entry of 0 represents minimum threshold (open squelch) and 150 represents maximum threshold (closed squelch).

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Example: 'Q50' (Set Squelch threshold to -90 dBm).

Un **DIGITAL DSP INTERFACE CONTROL** 1-5

Allows setting operational status of DSP digital output.

1 Interface OFF.
2 Interface ON - no control flags in serial data.
3 Interface ON - control bits included in serial data.
4 Enable Multidrop interface (default when S2-1 is down).
5 Disable Multidrop interface (single receiver system default when S2-1 is up).

Z **MASTER RESET**

This command forces all receiver parameters back to factory default conditions and also takes it out of *Remote* mode. All memories are cleared. About three seconds are required to complete the process.

!n[+/-] **USER OUTPUT CONTROL**

Sets the state of each *User Output* provided on the rear panel of the RX-340. Outputs are programmed individually by setting 'n' to 1,2,3 or 4. Outputs are programmed to be *On* '+5v' by appending a '+' sign to the command. Appending a ' - ' sign will program the output to the *Off* state (0v). All *User Outputs* are programmed to the *Off* state at *Power-On* and after a *Reset*.

Example: '!1+' Turns on user output 1.
'!3-' Turns off user output 3.

5-5 RX-340 RECEIVER MEMORY COMMAND SET:

The command set provides two commands for accessing the receiver's 100 memories. Memories are stored in a battery-backed RAM and will remain stored during power down and storage. A master reset will clear all stored memories.

1-100

Wnnn **WRITE MEMORY**

Write current *Operating Parameters* to memory number 'nnn' (1-100) available. The memory holds all basic receiver operating parameters such as frquency, mode, filter selection, etc.

Example: 'W20' (Write parameters to memory 20).

RECALL MEMORY 1-100

Rnnn Recall memory 'nnn' to main operating Parameters. Memory channels 1-100 available.

Example: 'R20' (recall memory 20).

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5-6 RX-340 RECEIVER QUERY COMMAND SET: Some commands request the receiver to send information back to the controller. These responses generally follow the same format as an issued command. For example, a typical response to a *Current Operating-Frequency* query might be: 'F10.12345' (or 10.123.450 MHz). In addition, whenever the receiver sends information, a status code is appended to the end of each response. The status code is the letter 'S', followed by a number. For example, 'S1' indicates the receiver is operating in remote mode. The status number codes are as follows:

1	Receiver is in remote control mode.
2	Synthesizer is out of lock.
4	Not used.
8	Last string had character transmission error.
16	Last string had data error.
32	Last string had lost data.
64	External reference applied.

A properly operating receiver and interface typically returns an 'S1' status code terminated with a carriage return ASCII 13 (hex 0D).

G

REPORT STATUS
Receiver responds with all operating parameters relevant to the current operating mode. Parameters that are OFF, or are not relevant to the current mode, will not be included in the response. See, also, command 'J'.

Command: 'G'
Response 'F15.010000D2B-1800'...etc...<CR>

Tx (xxx)

REPORT SPECIFIC STATUS
The receiver responds with the operating data, as specified, prefaced by the command.

Example 1: (single request)
Command: 'TF' - Request receiver operating frequency.
Response: 'F15.0100000' <CR>
For: frequency=15.01 MHz

Example 2: (multiple requests)
Command: 'TFBNX'- Request operating frequency, BFO offest, notch-filter setting, and current S-meter level.
Response: 'F15.0100000B-00N0.00X020'<CR>
For: frequency=15.01 MHz
BFO= -1800 Hz
Notch=0.00 Hz (OFF Position)
S-meter=20db Signal

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X **REPORT SIGNAL LEVEL**

This command requests signal level (or S-meter reading). Range is 0-150 covering the 150-dN dynamic range of the receiver (-140 to +10 dBm).

Example:

Command:	'X'-Request S-meter reading.
Response:	'X015'
For:	S-meter= -125dBm signal level.

V **REPORT FIRMWARE REVISION NUMBER**

The receiver will respond with a number indicating the revision level of the firmware.

Example:

Command:	'V' - Request firmware revision number.
Response:	'V1.90'
For:	Firmware revision number of 1.90

J **REPORT ALL OPERATING PARAMETERS**

The receiver responds with all operating parameters regardless of their current use or relation to the current operating modes. See command 'G' for additional information.

5-7 RX-340 RECEIVER BITE (Built-In Test Equipment):

The RX-340 contains BITE firmware routines to assist in field level trouble-shooting and repair. Three levels of testing are provided. Although each level executes the identical test routines, the data are interpreted and processed differently. Accordingly, each BITE level has its own particular response set. BITE Level-1 provides a simple pass/fail response. BITE Level-2 provides a board-level diagnosis and responds with one or more RX-340 sub-assembly numbers representing likely failures. BITE Level-3 provides a Pass/Fail result on individual internal tests.

Control codes to initiate the different levels of BITE are:

S3 Initiate Level-1 BITE
Responses: *Pass* or *Fail*

S4 Initiate Level-2 BITE
Responses: *Pass* or *Fail* followed by one or more sub-assembly numbers.

S5 Initiate Level-3 BITE
Responses: *Pass* or *Fail* followed by a pair of decimal numbers separated by a colon (Example: 127:64). Numbers represent individual test results encoded into two bytes. The eight bits of each byte represent different BITE tests. If the bit is

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set at '1', its corresponding BITE test failed. If clear '0', it passed. The two bytes are encoded as follows:

First byte:

'd0' Generate Audio Tone and Measure with CPU A/D
'd1' Check LO1 Lock Status
'd2' Check LO2 Lock Status
'd3' Check LO3 Lock Status
'd4' Check REF Lock Status
'd5' Check LO1 Loop Lock Time
'd6' Check LO2 Loop Lock Time

Second byte:

'd0' Check CPU/DSP Interface
'd1' Check IF for high noise level
'd2' Check IF for normal signal levels
'd3' Check S-Meter Level
'd4' Apply Manual AGC and Measure
'd5' Remove Manual AGC and Measure
'd6' DSP RESET FAILURE FLAG
'd7' not assigned

5-8 DSP DATA OUTPUT:

The RX-340 receiver contains a digital output interface providing post-DSP IF and AF data from the Digital Signal Processor. This output may be interfaced with user-supplied equipment for additional signal processing. Signal quality between the RX-340 and external devices is maintained since D/A and A/D stages are eliminated. In addition, the data streams may be turned ON or OFF as needed by remote command. Because the RX-340 provides both audio and IF outputs, the data streams to have control signals associated with them. Also, because the serial and parallel interfaces are implemented differently, the control signals associated with each are different.

The *Serial Interface* provides Serial Clock, Serial Data and Frame Start signals. The Serial Data output provides a 14-bit signed sample. Additional control signals are provided to indicate the origin of the sample. The IF/AF line indicates if a sample is *IF Data* or *AF Data*. The 'U/L' line indicates if the AF sample is from the *Upper* or *Lower Sideband*. In all receiver modes, except ISB, the Upper and Lower samples are the same. When in ISB mode, the Upper and Lower samples are selected by remote commands.

The *Parallel Data* stream consists of a 14-bit signed sample embedded in a 16-bit word, with the Upper two bits providing additional information about the sample. These two bits are encoded to indicate the origin of the sample. Bit 15 indicates if the sample is an IF or AF sample. If bit 15 indicates an AF sample, bit 14 will indicate either a Upper or Lower sample. In all modes except ISB, the Upper and Lower samples are the same. When in ISB mode, Upper and Lower samples may be controlled by remote commands. Also the control bits (bit 14 and bit 15) can be turned OFF (or forced to logic 0) by remote command.

5-19 SCAN OPERATION:

The RX-340 provides two scanning modes (Refer to Chapter 4 for a complete explanation of all scan functions). Briefly, channel scanning, called *M-Scan*, allows the radio to search for activity on pre-programmed

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memory channels. F1-F2 scanning, called *P-Scan* allows the radio to search for activity in a given frequency range. Commands are provided for setting the various parameters for each of the scanning modes. Time controls are common to both scanning modes. Frequency data is entered in MHz and must fall within the radio's 0-30 MHz range. The allowable range for time data is 0 to 99.99 seconds. Allowable channel numbers and lockout numbers are 1-100. 100 Lockouts and 100 Memory channels are provided.

A. To Configure Program-Scan; f1 to f2 with lockouts.

*C0ff.ffffff	*PScan* entry of Starting Frequency in MHz (*C012.250000 for 12.250 MHz).
*C1ff.ffffff	*PScan* entry of Ending Frequency in MHz (*C113.250000 for 13.250 MHz).
*C2ff.ffffff	*PScan* entry of Step Size in MHz (example (*C200.010000 for 10 kHz).
*CAff.ffffff	Add *Lockout* at specified frequency in MHz. (*CA12.000000 for 12 MHz).
*CDff.ffffff	Delete *Lockout* at specified frequency in MHz (*CD12.000000 for 12 MHz).
*CBff.ffffff-ff.ffffff	Add *Lockout Range* of F1-F2 (*CB12.000000-12500000 for 12-12.5 MHz).
*CNnnn	Delete *Lockout* by Number. Use *TA to get lockout list. (*CN021 for #21)

B. Configure Memory-Scan; Channel to Channel with Lockouts.

*C4ccc	Start Channel for *MScan*: Range 0-100 (example: *C4020 for channel 20).
*C5ccc	Stop Channel for *MScan*: Range 0-100 (example: *C5040 for channel 40).
*CSccc	Skip Channel in *MScan*: (example: *CS030 for channel 30).
*CUccc	Include Channel in *MScan:* (example: *CU060 for channel 60).
*CEccc	Delete Memory by number. Use *TM to get list of memories. (*CE050)

C. Common Scanning Time Control Functions

*C3dd.dd	Set *Dwell Time* in seconds (example: *C301.00 or 1 second).
*C6	Reserved for future use.
*C7dd.dd	Set *Dead Time* in seconds--Default to 8 seconds.
*C8dd.dd	Set *Gaze Time* in seconds (example *C800.50 for 0.5 second)

D. Scanning Control Functions

*CP	Pause if scan running. Ignore if scan not active.
*CG	Continue if dwelling or paused.
*CF	Start *PScan*. Ignore if already scanning or if F1 is greater than F2.
*CM	Start MScan. Ignore if already scanning or if C start is greater than C stop.
*CX	Stop scanning and return to manual mode. Ignore if not scanning.

E. Scanning Query Functions

*TS	Request scan status. Returns single *TSbXsss

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'b' is a single decimal number containing bit-encoded status information:

Bit 0 Set if *Scan* is in *Dwell-Time* cycle.
Bit 1 Set if *Dwell* is set to infinite (Dwell time set to zero)
Bit 2 Set if *Squelch* is open (channel is active).
Bit 3 Set if running *MScan*. Cleared if running *PScan*.
Bit 4 Set if Scan (*MScan* or *PScan*) is active. Cleared otherwise.
Bit 5 Set if *Scan* is in *Dead-Time* cycle.
Bit 6 Set if *Scan* is in *Gaze-Time* cycle.
Bit 7 Set if *Scan* is in *Pause* state.

*TA Report all *PScan* Lockouts. No response if lockout list is empty.
*TM Report all active memory channels. 'S' appended if channel is skipped. No response if empty.
*TD Report lockout by number. Use *TA to get complete lockout list. No response if lockout empty.
*TR Report memory by number. Use *TM to get complete memory list. No response if empty.
*TC Report all *Scan* settings except *Lockouts* and contents of memory channels.
*TL Tell last lockout number.
*TF Tell number of free *Lockouts*.
*CK Kill all *Lockouts*.
*TIff.ffffff Tell if specified frequency is in a *Lockout*.

5-11 RX-340 SECURITY FUNCTIONS:

The RX-340 operates in one of three control modes: *Local, Remote,* or *Local Lockout* mode. The RX-340 may be switched between *Local* and *Remote* mode by pressing the *Remote* button or sending the appropriate *R or *L RS-232 interface command. In *Remote* mode, the RS-232 interface has control and front panel operation is not allowed. The user may return the RX-340 to *Local* mode by pressing the lit *Remote* button. In *Local Lockout* mode, the lit *Remote* button will not return control to the front panel.

The RX-340 includes additional commands for interface control and secure operation. The new commands are part of the extended command set which is a superset of the Ten-Tec RX-331 command interface.

The following commands control *Remote* operation of the RX-340 through its RS-232 interface:
*R1 Remote Control ON.
*R0 Remote Control OFF.

Similar to remote mode, but operator cannot override remote operation:

*L1 Remote Control with Local Lockout ON.
*L0 Remote Control with Local Lockout OFF.

Important Note: When in *L1 mode, the only ways to exit are: 1.)Entering *L0, *R0, or *R1 and 2.)Radio reset.

Screen blanking for secure operation. Radio will function normally. All numeric indicators are blanked:

*S1 Remote Screen Blanking-Blank Screen.
*S0 Remote Screen Blanking-Normal Screen.

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CONFIGURATION DIAGRAM

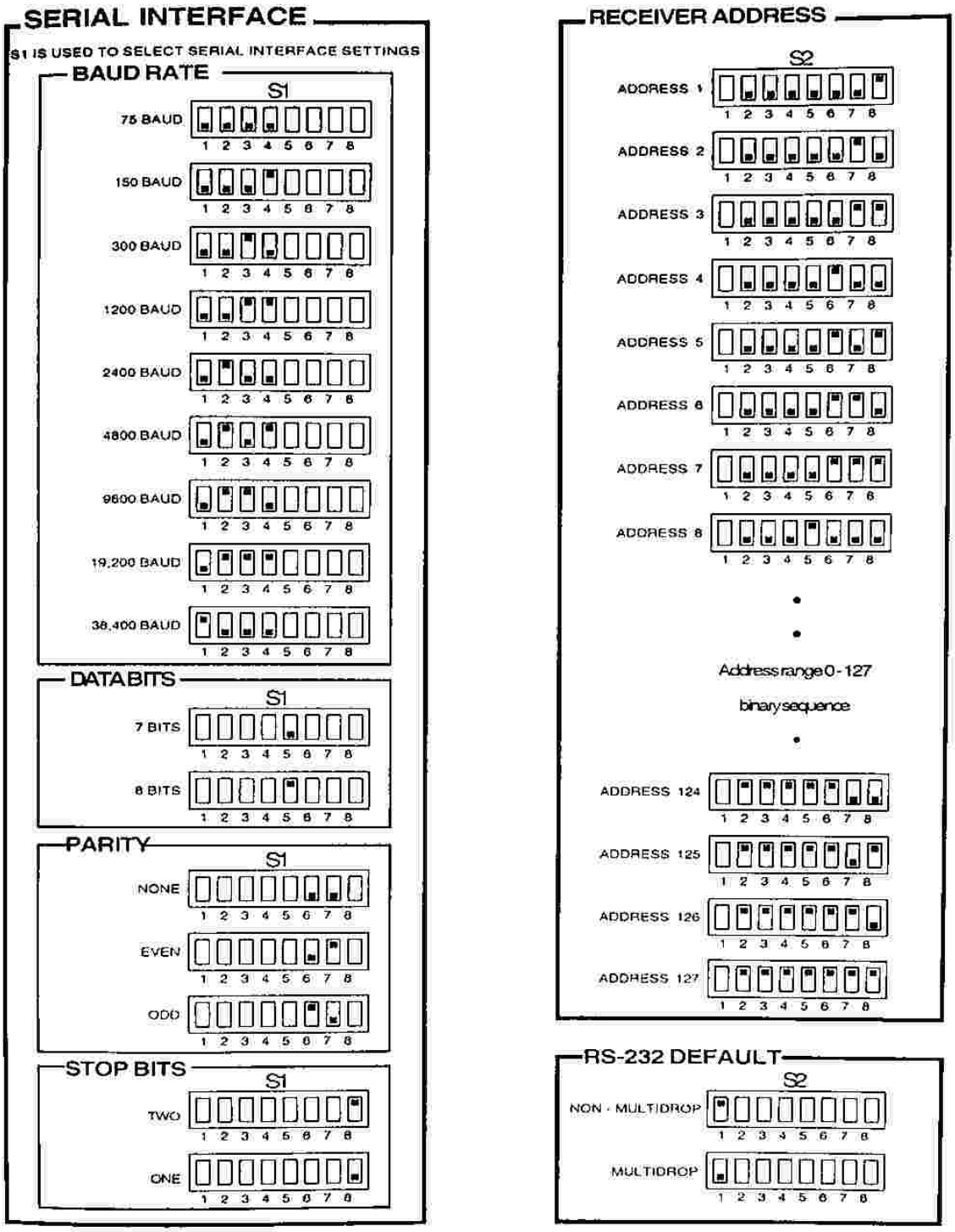

FIGURE 5-2

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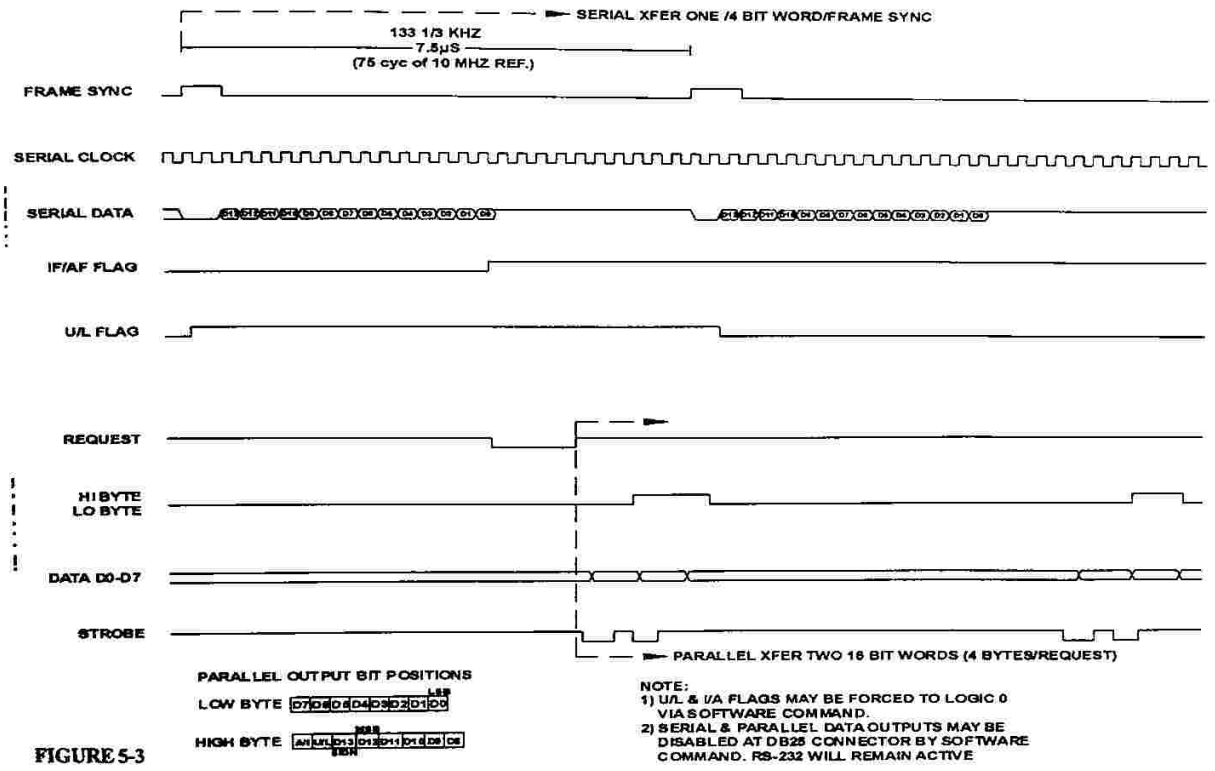
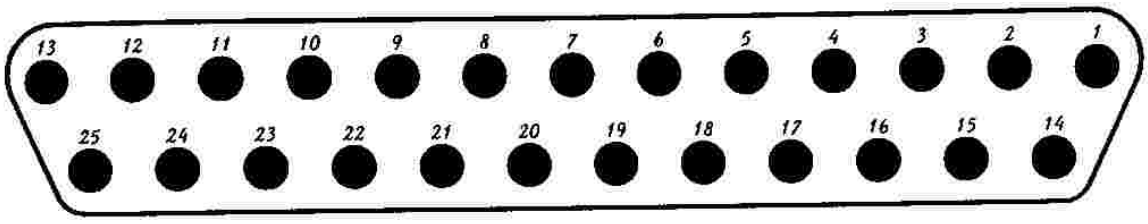

SERIAL XFER ONE /4 BIT WORD/FRAME SYNC
133 1/3 KHZ
7.5µS
(75 cyc of 10 MHZ REF.)
FRAME SYNC
SERIAL CLOCK
SERIAL DATA
IF/AF FLAG
U/L FLAG
REQUEST
HI BYTE
LO BYTE
DATA D0-D7
STROBE
PARALLEL XFER TWO 16 BIT WORDS (4 BYTES/REQUEST)
PARALLEL OUTPUT BIT POSITIONS
LOW BYTE
HIGH BYTE
NOTE:
1) U/L & I/A FLAGS MAY BE FORCED TO LOGIC 0 VIA SOFTWARE COMMAND.
2) SERIAL & PARALLEL DATA OUTPUTS MAY BE DISABLED AT DB25 CONNECTOR BY SOFTWARE COMMAND. RS-232 WILL REMAIN ACTIVE

FIGURE 5-3

RX-340 DB25 PIN ASSIGNMENTS



1	GND	
2	RS232 TXO	
3	RS232 RXO	
4	DSP PARALLEL	HI/LO BYTE INDICATOR
5	DSP PARALLEL	DATA D0
6	DSP PARALLEL	DATA D2
7	GND	
8	DSP PARALLEL	DATA D5
9	DSP PARALLEL	DATA D7
10	DSP PARALLEL	REQUEST
11	GND	
12	DSP PARALLEL	IF/AF INDICATOR
13	GND	
14	DSP SERIAL	FRAME SYNC
15	DSP SERIAL	SERIAL DATA
16	DSP SERIAL	SERIAL CLOCK
17	DSP PARALLEL	DATA D1
18	DSP PARALLEL	DATA D3
19	DSP PARALLEL	DATA D4
20	DSP PARALLEL	DATA D6
21	GND	
22	+5V	
23	DSP PARALLEL	DATA STROBE
24	GND	
25	DSP PARALLEL	U/L INDICATOR

FIGURE 5-4

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RX-340 FRONT VIEW

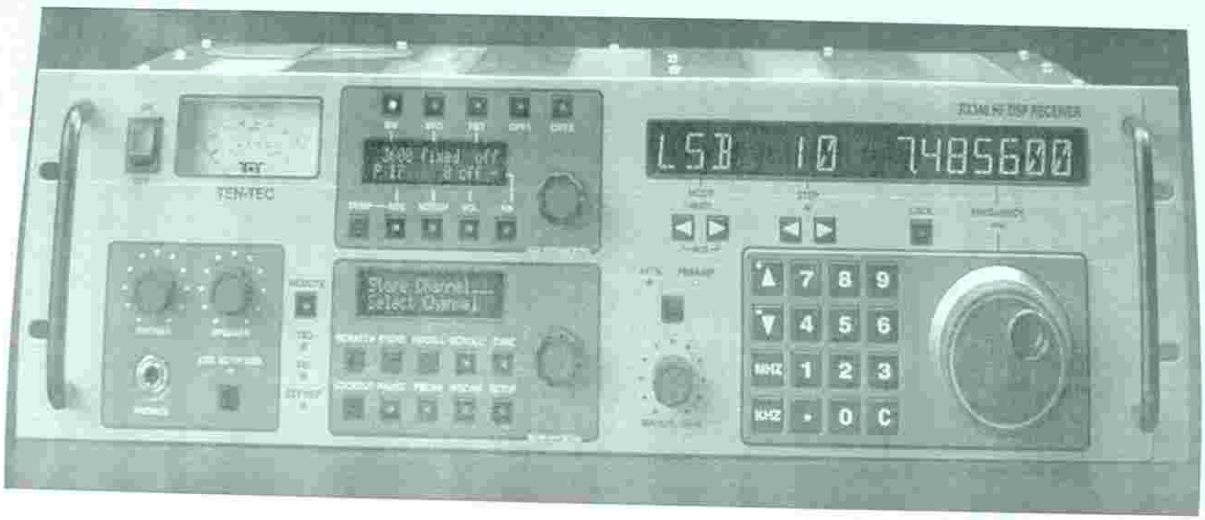


FIGURE 1-1

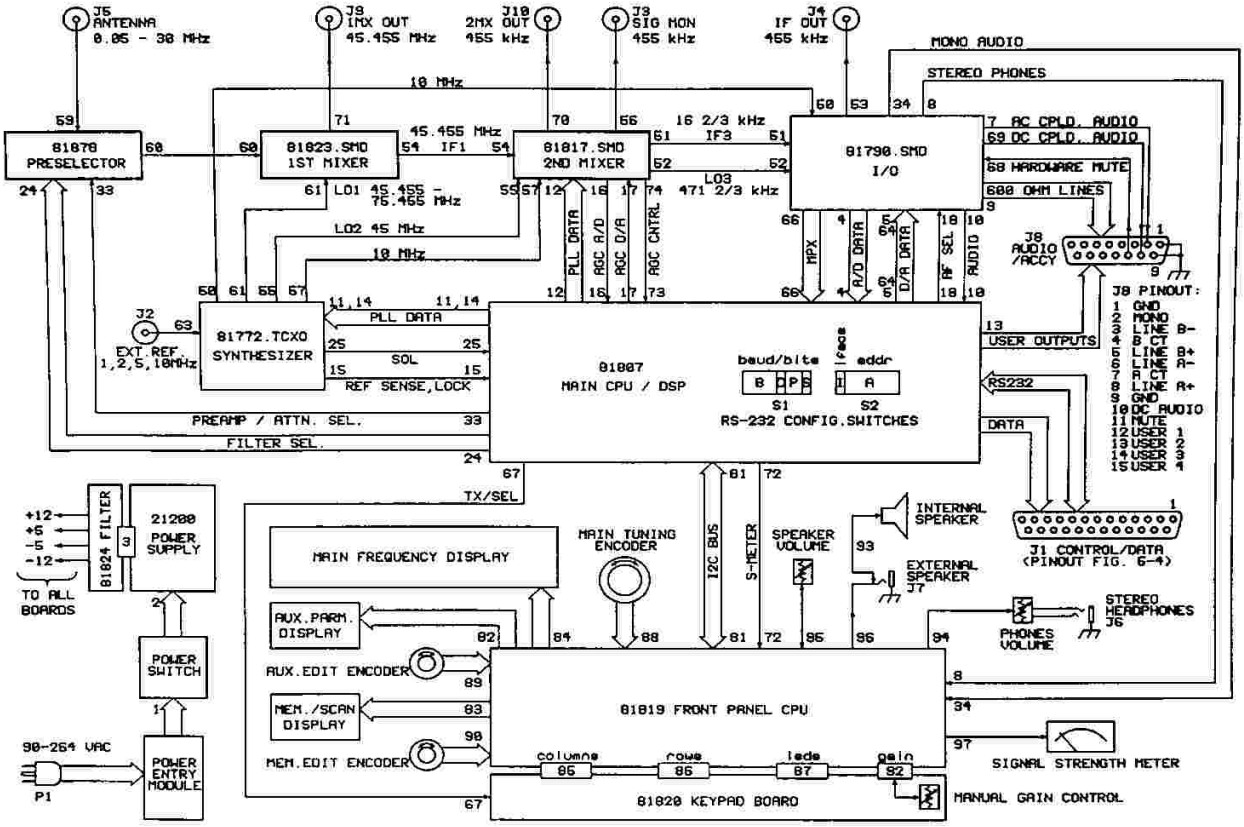
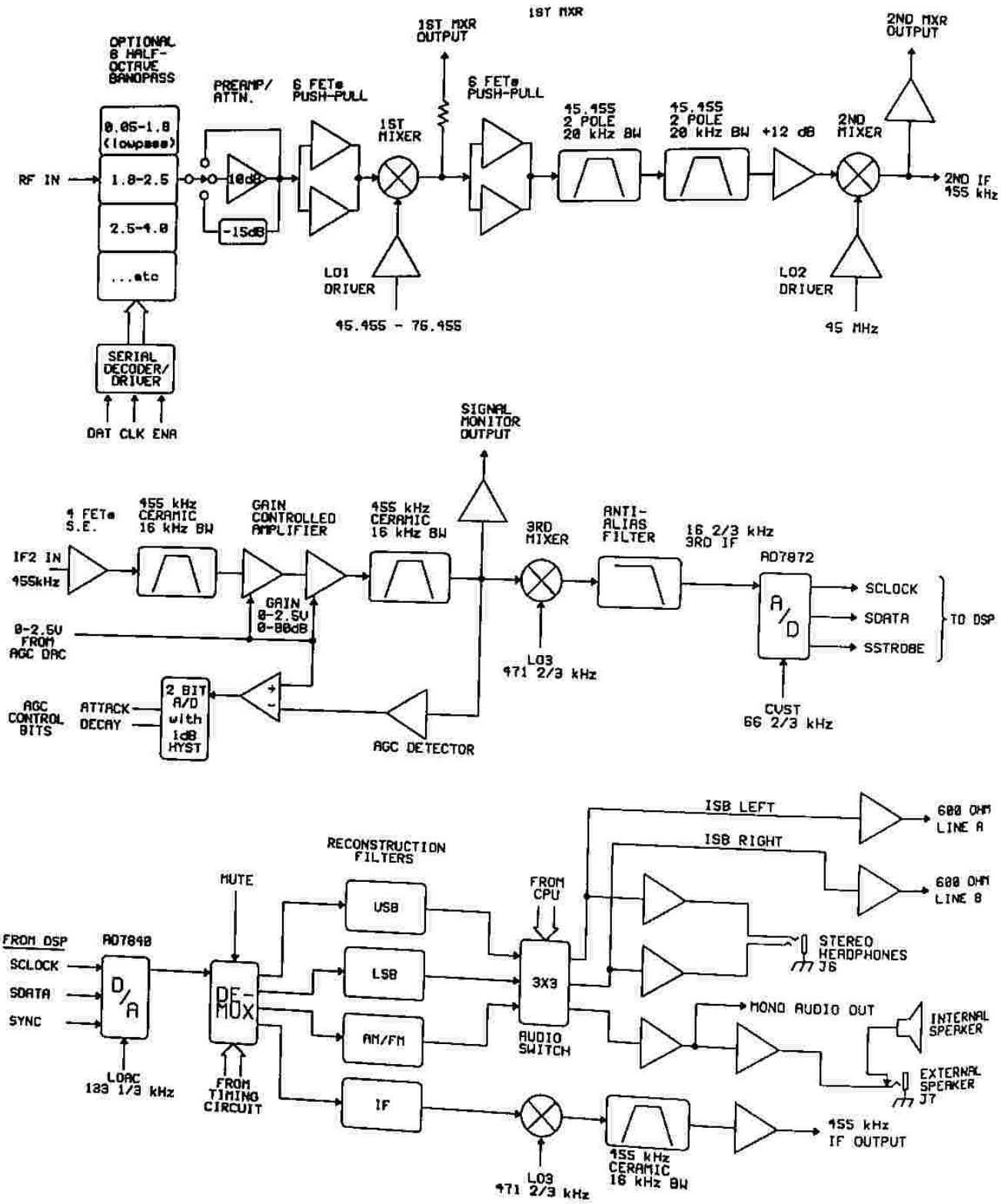

J5 ANTENNA 0.05 - 30 MHz
J9 IMX OUT 45.455 MHz
J10 2MX OUT 455 kHz
J3 SIG MON 455 kHz
J4 IF OUT 455 kHz
MONO AUDIO
STEREO PHONES
10 MHz
81878 PRESELECTOR
81823.SMD 1ST MIXER
45.455 MHz IF1
81817.SMD 2ND MIXER
16 2/3 kHz IF3
LO3 471 2/3 kHz
81790.SMD I/O
7 AC CPLD. AUDIO
69 DC CPLD. AUDIO
68 HARDWARE MUTE
600 OHM LINES
LO1 45.455 - 76.455 MHz
LO2 45 MHz
10 MHz
PLL DATA
AGC A/D
AGC D/A
AGC CNTRL
MPX
A/D DATA
D/A DATA
AF SEL
AUDIO
J8 AUDIO /ACCY
J8 PINOUT:
1 GND
2 MONO
3 LINE B-
4 B CT
5 LINE B+
6 LINE A-
7 A CT
8 LINE A+
9 GND
10 DC AUDIO
11 MUTE
12 USER 1
13 USER 2
14 USER 3
15 USER 4
J2 EXT.REF. 1,2,5,10MHz
81772.TCXO SYNTHESIZER
PLL DATA
SDL
REF SENSE,LOCK
81807 MAIN CPU / DSP
baud/bits
parity
addr
S1
S2
RS-232 CONFIG.SWITCHES
USER OUTPUTS
RS232
DATA
PREAMP / ATTN. SEL.
FILTER SEL.
TX/SEL
+12
+5
-5
-12
TO ALL BOARDS
81824 FILTER
21200 POWER SUPPLY
POWER SWITCH
90-264 VAC
POWER ENTRY MODULE
P1
MAIN FREQUENCY DISPLAY
MAIN TUNING ENCODER
I2C BUS
S-METER
SPEAKER VOLUME
INTERNAL SPEAKER
EXTERNAL SPEAKER
J7
J1 CONTROL/DATA (PINOUT FIG. 6-4)
PHONES VOLUME
STEREO HEADPHONES J6
AUX.PARM. DISPLAY
AUX.EDIT ENCODER
MEM./SCAN DISPLAY
MEM.EDIT ENCODER
81819 FRONT PANEL CPU
columns
rows
leds
gain
SIGNAL STRENGTH METER
81820 KEYPAD BOARD
MANUAL GAIN CONTROL

FIGURE 3-4

MODEL RX-340 BLOCK DIAGRAM



LOGIC BOARD BLOCK DIAGRAM

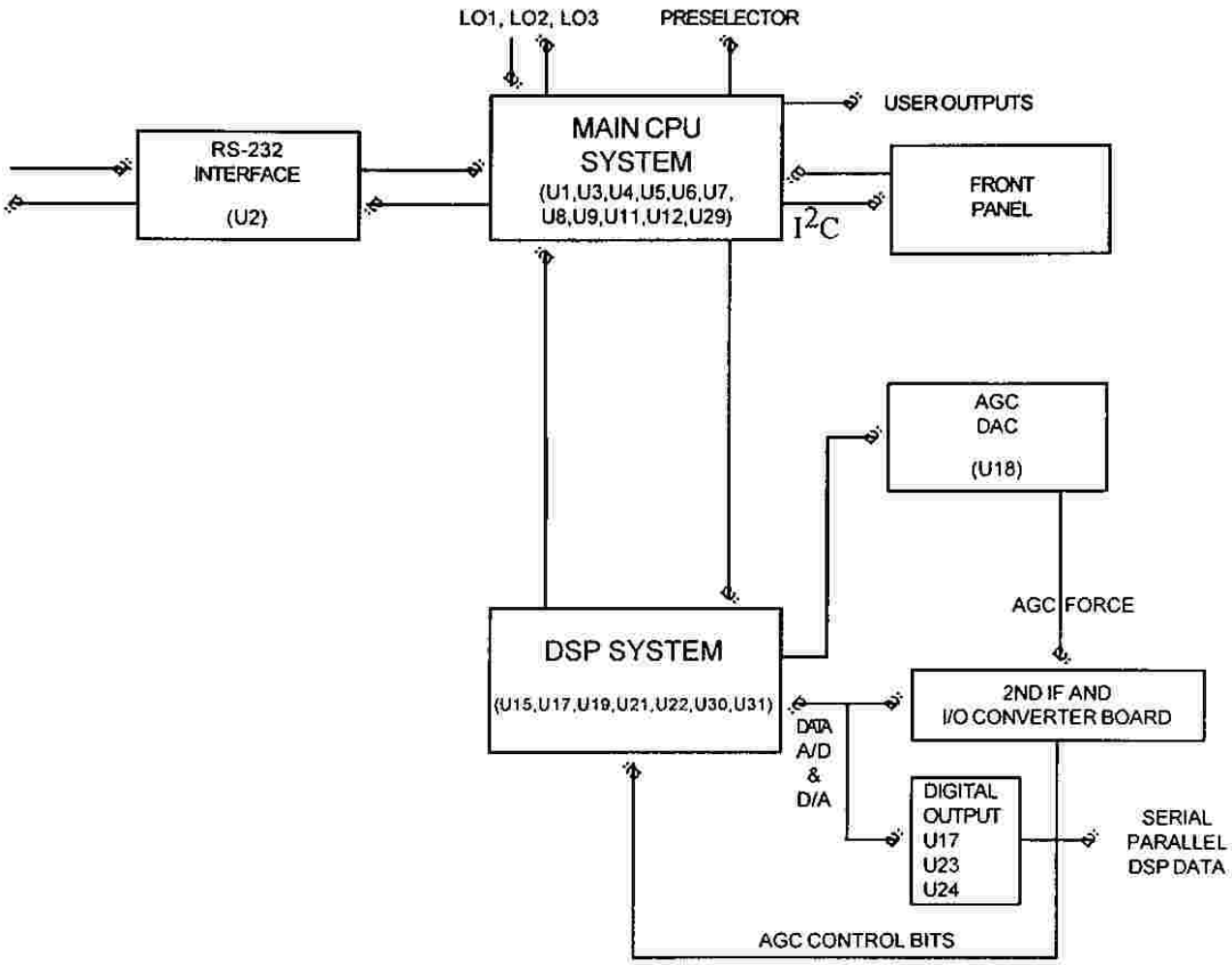


FIGURE 10-2

SYNTHESIZER BLOCK DIAGRAM

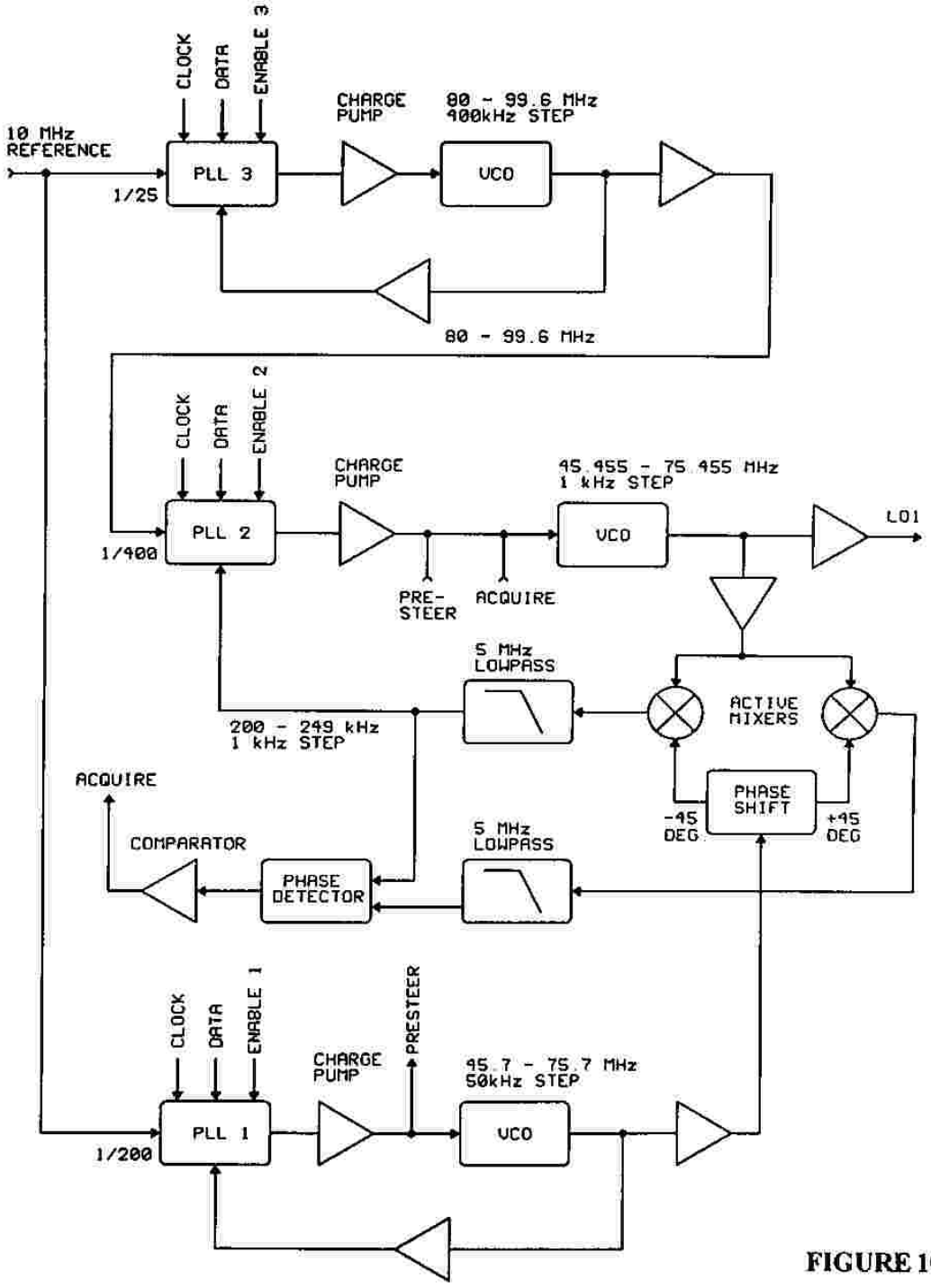


FIGURE 10-3