KENWOOD

HF TRANSCEIVER
TS-870S

INTELLIGENT DIGITAL ENHANCED COMMUNICATIONS SYSTEM

The New Standard of
DSP

An industry first : digital signal processing at the IF stage

Move to the Top

with Kenwood's TS-870S and Next Generation DSP

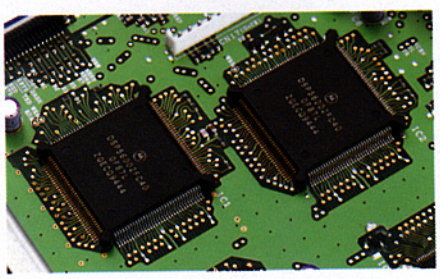
Investing in a new HF transceiver is a serious decision that defines the core of your station. It is your personal mark, reflecting your scope of knowledge and awareness of modern communications technology, and how you can use it to your best advantage in amateur radio.

In its continuing role as a technology leader, Kenwood is proud to introduce you to another industry first: the TS-870S All-Mode HF Transceiver with Next Generation Digital Signal Processing at the IF stage on transmit and receive. The performance characteristics of this radio have set entirely new standards, unmatched by any other product in its class. With the TS-870S as the centerpiece of your station, you will experience the top level of HF operating convenience.

Next Generation Digital Signal Processing

DSP technology uses a dedicated computer chip to convert analog waveforms into digital information in 'real-time', providing the opportunity to filter and enhance the quality of the signal before it is reconverted into analog form for the human ear or for radio frequency transmission.

The design approach used by Kenwood in the TS-870S uses DSP at the IF stage, allowing the greatest range of control and unprecedented receiver performance. This Next Generation DSP is achieved by two 24-bit 20MIPS (Million Instructions Per Second) DSP chips with a dynamic range of 144dB, enabling you to pick out weak signals that you've never even heard before, apply custom enhancements to your transmitted voice and achieve remarkable noise reduction.



DIGITAL FILTER

The key innovation setting the TS-870S apart from every other transceiver on the market is the IF-stage, Next Generation Digital Signal Processor. By capturing the signal at IF frequencies and applying complex algorithms according to your configuration parameters, you can achieve filtering that is simply impossible with an analog circuit. For instance, in SSB, CW and FSK modes you can tune the DSP filter sharp enough to attain over 100dB out of pass band attenuation with virtually no signal loss. And there's no need to purchase additional filters — it's all done with DSP.

▮ SSB MODE

When operating in SSB mode, the Digital IF Filter enables both high and low cut frequency variance so you can operate it as a slope tune, cutting out noise with minimal effect on sound quality. The high cut variance is adjustable in 12 steps between 1.4 and 6.0 kHz, and the low cut variance is divided into 10 segments between 0 and 1000 Hz.

▮ High Cut Frequency (kHz); default: 2.6

1.4	1.6	1.8	2.0	2.2	2.4	2.6	2.8
3.0	3.4	4.6	6.0				

▮ Low Cut Frequency (kHz); default: 300

0	50	100	200	300	400	500	600
800	1000						

▮ CW MODE

The Variable Bandwidth Tuning (VBT) function is supplemented by center frequency shift, allowing you to tune out adjacent signal interference. The VBT provides 6 tuning steps between 50 and 1000 Hz, and the center frequency shift can be adjusted in 13 steps between 400 and 1000 Hz.

▮ Pass Bandwidth (Hz); default: 1000

50	100	200	400	600	1000

▮ Shift • Center Frequency (Hz); default: 800

400	450	500	550	600	650	700	750
800	850	900	950	1000			

▮ FM MODE

In FM mode the VBT feature operates as a variable pass bandwidth in 6 steps between 5 and 14 kHz.

▮ Pass Bandwidth (kHz); default: 14

5	6	8	10	12	14

▮ AM MODE

The independent high cut and low cut frequency control gives you slope tune capability in AM as well. In addition, the high cut frequency can reduce interference by controlling the IF pass bandwidth — useful for receiving shortwave broadcasts. The high cut frequency is adjusted in 6 stages between 2.5 and 7 kHz, and the low cut frequency can be set to 0, 100, 200 or 500 Hz.

▮ High Cut Frequency (kHz); default: 6

2.5	3	4	5	6	7

▮ Low Cut Frequency (Hz); default: 100

0	100	200	500

▮ FSK MODE

Similar to FM mode, the VBT function provides noise reduction capabilities in FSK with 4 stages available: 250, 500, 1000 and 1500 Hz.

▮ Pass Bandwidth (Hz); default: 1500

250	500	1000	1500

DSP DETECTION

Through DSP processing in the detector circuit, the TS-870S provides significantly better S/N ratio than a comparable analog circuit. This results in lower distortion and higher quality detection in all modes, far surpassing previous non-DSP designs.

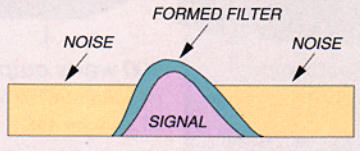
NOISE REDUCTION

The TS-870S offers you 2 methods of noise reduction to give you the edge in receiving weak signals: the Line Enhancer Method (LEM) and the Speech Processing/Auto Correlation (SPAC) function.

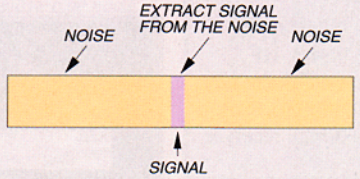
LEM allows you to custom-shape a filter curve around a target signal, essentially 'carving' it out of the background noise — a powerful tool in SSB operation. SPAC utilizes a special statistical/correlation algorithm to pull weak signals out of the noise, ideal for tough CW conditions.

The characteristics of both the LEM and SPAC functions are fully configurable through the TS-870S menu interface.

▮ LINE ENHANCER METHOD

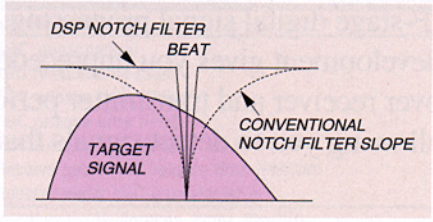


▮ SPAC METHOD



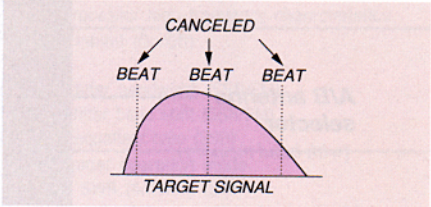
IF AUTO-NOTCH

The IF Auto-Notch feature provides extremely sharp notch filtering of carrier frequencies from broadcast and continuous beat sources. Since it is dealing with the signal in a digital form at the IF stage, the interfering beat can be 'sliced' out in a far more precise manner than is possible in conventional analog systems. The Auto-Notch will track with changes in the beat signal as well, so you can 'set it and forget it'. Works in all modes except CW and FSK.



BEAT CANCEL

The Beat Cancel function automatically detects and eliminates multiple beats interfering with a desired signal. Works in all modes except CW.



VARIABLE AGC CIRCUIT

The AGC Circuit is modeled on a time-based continuously-variable design for maximum convenience. The digital format delivers very fast release characteristics, surpassing even the best analog designs. You can select automatic or manual mode and a custom release time for each mode.

VOICE EQUALIZER

You can apply equalization to your transmit audio in AM and SSB modes by altering the bandpass filter's width and low cut frequency, giving you control over voice tonal qualities. The Bandpass Filter has 5 steps between 1.8 and 3.0 kHz, and the low-cut frequency is adjustable in 6 steps from 0 to 500 Hz. The transmit filter has an attenuation factor of 100dB.

SPEECH PROCESSOR

The Speech Processor is divided into three audio frequency bands: low, mid and high. All are fully adjustable through the menu interface.

TRANSMIT EQUALIZER

You can further tailor your transmit audio by adding clarity (high boost), strength (low boost) and removing background ambient noise other than voice (comb filter). This allows you to optimize your signal for specific contacts.

High Speed Computer Control Interface

The TS-870S is fully computer-controllable through a built-in 57.6 Kbps interface and Microsoft® Windows™ compatible software (supplied). You can expand the functionality of the rig by setting up virtually any combination of settings (including on/off control) for frequencies, bands, modes, and any other parameters with this software program.

Supplied PC software gives you complete control over the TS-870S through the D-SUB 9-pin nconnection on the back panel

Smooth Operating

The TS-870S has a full array of additional features that make HF operating a truly pleasurable experience. All of the drudgery is eliminated, leaving you free to pilot your way through DX contests, DX peditions, or whatever your HF passion is. The TS-870S arms you with leading edge digital technology plus all of the convenience these features give you.

BUILT-IN ELECTRONIC KEYER

You'll be flying high with morse code generated by the full-featured built-in Electronic Keyer. It's based on the popular K1 LogiKey and offers full or semi break-in, rise/fall times adjustable through DSP, plus a side tone monitor. The TS-870S also sports a second keyer connection.

CW PITCH CONTROL

The CW Pitch Control is adjustable in 50 Hz steps between 400 Hz and 1000 Hz. Can also be linked to the side tone.

CW REVERSE MODE

In reverse mode the pitch of interference competing with the CW signal is reversed, so the operator can approach the target from either side.

100-WATT OUTPUT

The TS-870S puts out 100 watts in SSB, CW, FSK, and FM modes. Output on AM is 25 watts.

ADVANCED INTERCEPT POINT (AIP)

AIP extends the receiver dynamic range and reduces adjacent signal interference. You can activate and store AIP on each band.

MULTIPLE SCANNING MODES

All-Scan Mode covers all memory channels that have stored information; Group Scan Mode scans all 100 memory channels in groups of 10; Lock-Out Memory Scan allows you to sample only certain channels; and Program Scan is used to scan a frequency spread between two VFO settings. You can control the speed of any scan mode, and choose time-operated or carrier-operated busy-stop-resume.

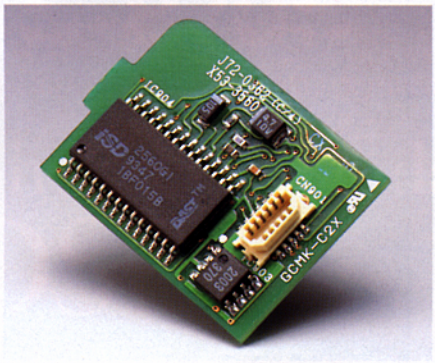
MENU FUNCTION

All of the power of the DSP and other functions can be accessed through the menu-

driven display interface on the front of the TS-870S. You may also activate the **Quick Menu** feature to access only your most commonly-used functions.

RECEIVE ANTENNA
You can also hook up an external receiver to a dedicated connector to access other frequencies on the same antenna being used by the TS-870S.

DIGITAL RECORDING UNIT (OPTION)
The optional DRU-3 is a high-quality digital recording device which lets you store up to 4 messages for a total of 60 seconds.



AUTO ANTENNA TUNER
The sophisticated Auto Antenna Tuner works in all bands from 1.8 to 28 MHz with rapid tuning lock when using presets. It also operates when the radio is in receive mode, maximizing the strength of received signals.

DUAL ANTENNA TERMINALS
You may connect two separate antennas at the same time and switch between them from the front panel controls. Antenna selection is stored in band memory for automatic recall when you change bands.

TF-SET
Transmit Frequency Set allows you to perform a one-touch check of your transmit frequency while operating splits. You can lock the receive frequency and adjust the transmit frequency as well.

ΔFREQUENCY
This function gives you an instant display of the frequency difference between transmit and receive when you are operating splits.

QUICK MEMORY
Use the one-touch Quick Memory for storing temporary frequencies 'on the fly' (5 channels). This is ideal for use during contests or changing conditions.

100 MAIN MEMORY CHANNELS
You have more than enough room to store frequency, mode and other settings of your favorite operating 'hangouts'. You can also set one channel for use as a programmable VFO or programmable scan.

TRANSMIT AGC
The microphone AGC ensures that your transmitted signal is not over-modulated, even if the voice input level varies (SSB, FM, AM).

ATTENUATOR
You can select 4 stages of attenuation for each band: off, -6dB, -12dB, and -18dB.

NOISE BLANKER
The Noise Blanker is a variable-level type that nulls pulse-type interference.

PROGRAMMABLE FUNCTION KEYS
You can program your most often used functions in any of 4 user-programmable keys for quick access.

OTHER FEATURES:
- General coverage receiver (100 Hz ~ 30 MHz)
- RIT/XIT (Variable range: ±9.99 kHz)
- Voice Synthesizer compatible (with optional VS-2)
- All-mode squelch
- RF Gain
- Split transfer function
- VOX
- Frequency lock/transmit inhibit
- Variable beep (3 levels)

OPTIONAL ACCESSORIES

MC-90
DSP-compatible Desktop Microphone

MC-80
Desktop Microphone

DRU-3
Digital Recording Unit

VS-2
Voice Synthesizer

SO-2
Superior Stability TCXO (Temperature-Compensated Crystal Oscillator)

IF-232C
Interface Unit (for split transfer using a transceiver other than a TS-870S)

MC-60A
Deluxe Desktop Microphone

MC-43S
Hand Microphone

SP-31
External Speaker

PC-1A
Phone Patch Controller (Available only where phone patch operation is legal)

LF-30A
Low-pass Filter

PG-2Z
DC Power Cable

HS-5
Deluxe Headphones (8Ω)

HS-6
Small Headphones (12.5Ω)

PS-52
Heavy-Duty Power Supply (22.5A)

PS-40
DC Switching Power Supply

SW-2100
SWR/Power Meter (1.8~30MHz)

SM-230
Station Monitor

Not all products are available in all markets.

SPECIFICATIONS

	TS-870S
GENERAL	
Transmitter Frequency Range	160, 80, 40, 30, 20, 17, 15, 12, 10 meter bands
Receiver Frequency Range	100 kHz ~ 30 MHz
Mode	A1A (CW), J3E (SSB), A3E (AM), F3E (FM), F1D (FSK)
Power Requirement	13.8 V DC ±15%
Current Drain (approx.)	20.5 A (transmit), 2 A (standby)
Operating Temperature	14° F ~ +122° F (-10° C ~ +50° C)
Frequency Stability	Within ±10 x 10^{-6} (±0.5 x 10^{-6} with SO-2)
Antenna Impedance	50 Ω (nominal)
Microphone Impedance	600 Ω
Dimensions, projections not included (W x H x D)	13 x 4-3/4 x 13-1/8 in. (330 x 120 x 334 mm)
Weight (approx.)	25.35 lbs. (11.5 kg)
TRANSMITTER	
RF Output Power	SSB/CW/FM/FSK: 100 W; AM: 25 W
Modulation	
SSB	Balanced modulation
FM	Reactance modulation
AM	Low-power modulation
Maximum Frequency Deviation	Less than ±5 kHz (wide); Less than ±2.5 kHz (narrow)
Spurious Response	Less than -60 dB
Carrier Suppression	Greater than 50 dB
Unwanted Sideband Suppression	Greater than 50 dB
Transmit Frequency Response	300 ~ 2600 Hz (-6 dB)
XIT Variable Range	±9.99 kHz
Antenna Tunable Range	20 Ω ~ 150 Ω

RECEIVER	
Circuitry	Quadruple Conversion Superheterodyne (SSB/CW/AM/FM/FSK)
Intermediate Frequency	
1st IF	73.05 MHz
2nd IF	8.83 MHz
3rd IF	455 kHz
4th IF	11.3 kHz
Sensitivity	
SSB/CW/FSK (S+N/N 10 dB)	Less than 1 µV (100 ~ 500 kHz), Less than 4 µV (500 kHz ~ 1.705 MHz), Less than 0.2 µV (1.705 ~ 24.5 MHz), Less than 0.13 µV (24.5 ~ 28 MHz), Less than 0.13 µV (28 ~ 30 MHz)
AM (S+N/N 10 dB)	Less than 2 µV (100 ~ 500 kHz), Less than 31.6 µV (500 kHz ~ 1.705 MHz), Less than 2 µV (1.705 ~ 24.5 MHz), Less than 2 µV (24.5 ~ 28 MHz), Less than 2 µV (28 ~ 30 MHz)
FM (12 dB SINAD)	Less than 0.25 µV (28 ~ 30 MHz)
Squelch Sensitivity	
SSB/CW/FSK/AM	Less than 2 µV (100 ~ 500 kHz), Less than 20 µV (500 kHz ~ 1.705 MHz), Less than 2 µV (1.705 ~ 28 MHz), Less than 2 µV (28 ~ 30 MHz)
FM	Less than 0.25 µV (28 ~ 30 MHz)
Spurious Response	
Image Ratio	Greater than 80 dB (1.8 ~ 30 MHz)
IF Rejection	Greater than 80 dB (1.8 ~ 30 MHz)
Selectivity	
SSB (Lo:300; Hi: 2600)	2300 Hz (-6 dB), 3300 Hz (-60 dB)
CW (Width: 200)	200 Hz (-6 dB), 450 Hz (-60 dB)
FSK (Width: 500)	500 Hz (-6 dB), 1000 Hz (-60 dB)
AM (Lo:100; Hi: 4000)	9 kHz (-6 dB), 12 kHz (-60 dB)
FM (Width: 14 k)	14 kHz (-6 dB), 18 kHz (-60 dB)
RIT Variable Range	±9.99 kHz
Notch Filter Attenuation	Greater than 40 dB
Audio Output Power	1.5 W (8 Ω, 10% distortion)
Audio Output Impedance	8 Ω

Kenwood follows a policy of continuous advancement in development.
For this reason specifications may be changed without notice.

These specifications are guaranteed for Amateur Bands only.

JQA-1205 ISO 9001
Communications Equipment Division
Kenwood Corporation
ISO9001 certification

KENWOOD CORPORATION
14-6, 1-chome, Dogenzaka, Shibuya-ku, Tokyo 150-8501, Japan

KENWOOD COMMUNICATIONS CORPORATION
Headquarters
3975 Johns Creek Court, Suwanee, GA 30024-1265

Order Administration/Customer Support/Distribution
P.O. BOX 22745, 2201 East Dominguez St., Long Beach, CA 90801-5745

KENWOOD ELECTRONICS CANADA INC.
Canadian Headquarters and Distribution
6070 Kestrel Road, Mississauga, Ontario, Canada L5T 1S8

This has been printed on recycled paper.
CA232KP-E-8 (01) 010303B Printed in Japan