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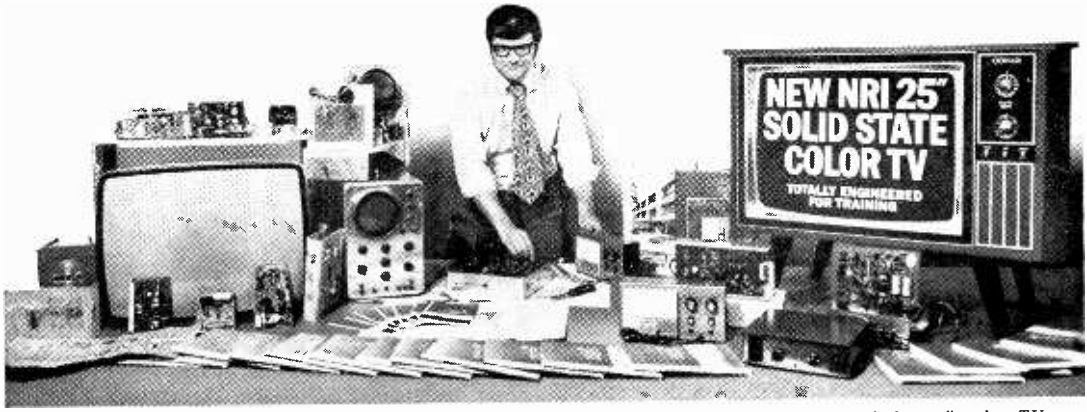

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The new equipment shown on the cover are: From the top; Heath's HW-202 2-meter FM mobile transceiver, Sonar's 2528 10-channel scanning monitor, Drake's SPR-4 programmable shortwave receiver, Pearce-Simpson's "Simba" CB SSB base station with digital readout, and SBE's "Scanvision" slow-scan TV monitor receiver with built-in cassette tape recorder and camera/lens. The two representative QSL cards are from Radio Moscow and Deutsche Welle.

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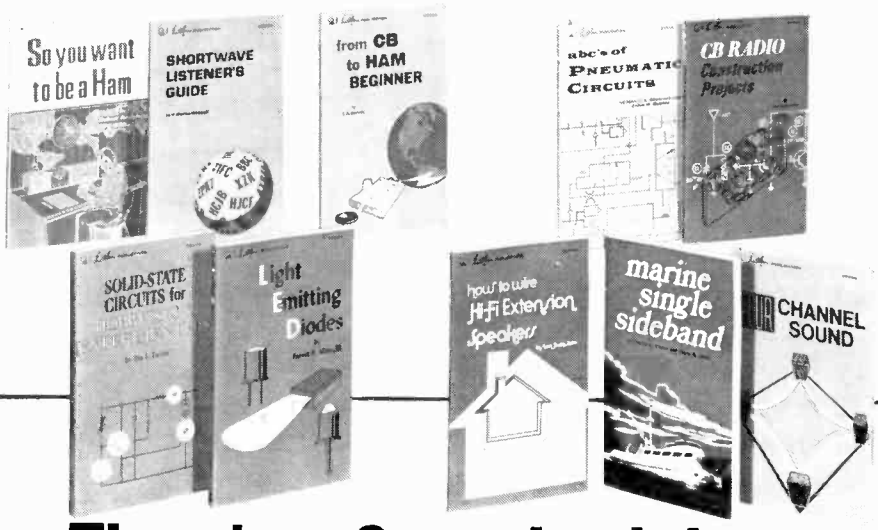

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Looking ahead to 1974, SW listeners can expect to receive more stations as the "superpower" war rages on.

FOUR-HUNDRED kilowatts from Swaziland, 250 kW from Amazonian Brazil . . . these are the latest announcements of superpowered shortwave broadcast stations to be built in the developing world. In Africa, in South America, in Asia, shortwaves are still the means of mass outreach. Now more than ever, shortwave listeners in North America can follow the battle for the minds of the Third World as it moves into its new, post-Cold-War phase.

1973 was an ice-breaker in the Cold War of the shortwaves. The effects of the Nixon visit to Peking and the Brezhnev visit to Washington were clearly felt in the shortwave broadcast bands. Jamming was at an all-time low since 1945. Now it's mostly directed against Radio Liberty and some of the language services of Radio Free Europe, chiefly Czech and Slovak. With the ending of the Vietnam war, some of the clandestine stations which had mushroomed on both sides quietly folded their tents and dismantled their transmitters. Radio Hanoi was noted replacing scheduled English-language releases, beamed to the now-departed U.S. troops, with programming in such local languages as Lao and Cambodian.

A remarkable example of the thaw in the wall of secrecy surrounding internal broadcast operations in the People's Republic of China came in mid-1973 when for the first time ever, direct QSL verifications (in Chinese) were received from the Fukien Front People's Broadcasting station, which faces the Nationalist Chinese stronghold of Taiwan. First to receive one of these QSL letters was a shortwave listener in West Germany, a country which had only recently recognized Mainland China. It was followed shortly thereafter by similar verification letters to DX-ers in Sweden. So far,

The Shortwave Section of this Handbook was written by Dr. Richard E. Wood, a linguist who teaches at Louisiana State University in Baton Rouge, La. Dr. Wood is a DX-er who began on SW and AM 15 years ago but is now equally active on FM and TV. He holds awards in DX-ing and monitoring from Vatican Radio, Radio RSA, Radio Japan, and the National Radio Club; he is also official monitor for those stations and for Deutsche Welle and Radio Sweden. Author of the book "Shortwave Voices of the World" and many articles on DX-ing and languages, he also contributes to "World Radio-TV Handbook" and "World Radio Bulletin."

Radio Sweden Saturday-night show "The Pops" being recorded in Stockholm studio. (l to r) Fanny Francke, Sydney Coulson DJ Roger Wallis, and Kim Loughran.

no such letters have been received by U.S. DX-ers. But now that the word is out that a reply may be possible after 20 years of silence, Chinese regional stations are no doubt being showered with reception reports from American SWL's. (Look for the Fukien station at the low end of the two SWBC bands: 3200 kHz right at the bottom of the 90-meter band; and 3900 kHz, similarly placed in the 75-meter international broadcast band. Dawn, your time, offers the best chance to hear it.)

While this goes on, the shortwave power race continues. The two projects mentioned in our first paragraph are typical. In Brazil, plans call for the siting of a network of 250-kW SW transmitters in the developing Amazon basin, the first to be placed in Altamira, the junction of the new East-West and North-South highways. These are to be operated by Radio Rural, the Ministry of Agriculture station beamed to settlers in Brazil's outback. You can hear the current, low-powered (7.5 kW) Radio Rural on 15105 kHz around dusk, your time.

The second ambitious plan in a country not previously among the shortwave giants is for a station to serve Africa from the land-locked kingdom of Swaziland, the "Switzerland of Africa." Owners will be Trans-World Radio, a New Jersey-based religious broadcaster. As of this writing, South Africa, which together with Mozambique surrounds Swaziland, still has no television. So the potential radio audience in Swaziland's big neighbor is very great. The mountainous kingdom will become another Luxembourg or Monaco—a small nation beaming powerful commercial or religious radio into larger nation states where radio is under tight government control. Swazi Music Radio, a commercial station, with programs produced in Johannesburg studios, is beamed back into South Africa, and sometimes heard on 6155 kHz in the 49-meter band in North America around 0430 GMT. It's a good catch if you can get it. The Swazi Trans-World Radio station will add a new continent to the TWR station network, which reaches the Americas from Bonaire and Europe from Monte Carlo.

New, high-powered operations inaugurated in 1973 included the first 500-kW Swedish transmitter, at Karlsborg. There's no boost in the Scandinavian station's signal in North America at present, since the Karlsborg station has no America-based antennas.

Other European nations belatedly joining the SW power race are Austria (planning two 250 kilowatters), Belgium (ditto), and Luxembourg, which recently boosted its power on the French-language 15350-kHz outlet from 6 kW to the 50 kW range. The Vatican Radio has just informed this writer of superpower plans—not yet finalized.

In Africa, Zambia's Chinese-built transmitters went into regular service in 1973. Unfortunately, they still exhibit frequency drift, a problem which plagues stations in the developing world and annoys SWL's with piercing heterodynes. A good notch filter on your receiver will help remove them. Watch for the voice from Lusaka, partly in English, around 1800-2100 GMT right at the top of the 16-meter band, on 17895 kHz. Zambia has now taken over

Hausa, the lingua franca of the southern Sahara, is one of 28 languages heard over "Voice of Germany," beamed from Cologne.

AT PUERTO VALLARTS
MEXICO BND MAZATLAN
GTH 17/1400Z

His Eminence Cardinal John Wright (USA), Prefect of Sacred Congregation for Clergy, being interviewed by Vice-Director of News, Press & Information Div. of Vatican Radio.

some of the African liberation movement programs formerly carried on Radio Tanzania, Dar-es-Salaam, on 15435 kHz.

In the Middle East, the Israel Broadcasting Authority undertook a big SW expansion plan in 1973. Main aim was to reach beleaguered Soviet Jews with programs in Russian, Yiddish, Georgian, and Hebrew. As many as nine SW transmitters are now used in parallel in these and other languages, compared with only four in 1972. This was an attempt to counteract intense jamming (which can be heard in the U.S., too, though emanating from the heart of the Soviet Union). US SWL's benefited from the Israeli expansion plan, too, since the IBA finally introduced a North American service for late-evening at 0500 GMT: a 15-minute newscast and Israeli Press Review. It is on the familiar out-of-band frequency of 9009 kHz and the new in-band channels of 11705 and 11960 kHz on 25 meters. These are changeable, as the crowded bands and ever-changing interference situation keeps stations on their toes and leads to more-and-more changes at odd times of year, rather than at the usual seasonal frequency-change dates.

Elsewhere in Asia, there were not many changes on the shortwave broadcast front. But in the Philippines, where the Marcos government closed down many domestic broadcasters and took control of others, the Voice of the Philippines inaugurated a North American service beamed toward San Francisco, on 9580 kHz (sometimes drifting). Look for it in the very late evening or after your local midnight. The styling is intimate—very different from the harsh propaganda or cool reserve of other SW broadcasters.

In Latin America, earthquake-stricken Nicaragua's Radio Nacional remains silent on 11875 kHz. This once-popular 100-kW station is perhaps a permanent casualty of the Managua disaster. A far smaller station popped up for a few days in November 1972 in Guatemala: Radio Tesulutlan on 4835 kHz in the 6-meter tropical band. It is located in the Indian settlement of Coban in the province of Alta Verapaz. Just as the word began to spread, it went off the air. However, the Benedictine Fathers who operate the station may have it back on the air soon.

Radio Norway reporter Gundel Krauss Dahl interviewing Lapp woman high above the Arctic Circle. Transmitter is at Tromso.

Looking ahead, then, we see more superpower operations and no immediate chance of an expansion of the crowded, narrow SWBC bands. The race to establish major overseas relay bases may be slowing down, however. But while the big stations get bigger, there will always be new little stations popping up to keep us on our toes, striving for that "first"—the verification from the new station whose name and location comes faintly and garbled through the noise and sideband splash. ◈

BEYOND THE HORIZON ON TV & FM

The world above 30 MHz is the new DX challenge.

THE "Higher Hertz"—the world above 30 MHz—are capturing the imagination and testing the DX-ing skills of listeners everywhere; viewers, too, for these bands include television, both VHF (channels 2 through 13) and UHF (14 through 83). This is the "frontier" of DX-ing today and is constantly expanding as Dx-ers carve out new distance records and explore new propagation modes and equipment.

The magic words for the DX-er above 30 MHz are E-skip, meteor scatter, tropospheric bending, and auroral scatter. For the author, auroral reception is last, since he lives in the Deep South. There auroral displays are seen only every decade or so. Equally rare, therefore, is the sound and sight familiar to alert VHF DX-ers in Canada and the northern tier of states—the rush of aurora-scattered TV and FM stations. At times they are hopelessly garbled and jumbled together, and not even separable with a directional antenna since they all come from the North! At other times, auroral reception is perfectly clear over distances of 300 to 1000 miles or more. The station heard is not necessarily from farther north; indeed, it can be from due south, as during recent reception by auroral propagation (in Virginia) of an FM station from Florida.

While the shortwave listener relies on the F layer of the ionosphere for his basic reception, it's the E layer which provides that prized commodity of the VHF DX-er, E-skip. Skip is a natural phenomenon not yet fully explained. It's associated with fast-moving, highly charged clouds which form in the E layer and bounce the signal back to earth, rather than absorbing it or passing it through to outer space. Although this is still disputed, there seem to be two kinds of skip: one associated with auroral displays and sunspot activity; the other more closely correlated with turbulence in the upper atmosphere, which on earth may also produce tornado action and other violent weather.

Skip is a changeable phenomenon. It comes and goes, being known as sporadic E-skip. When it is occurring the m.u.f. (maximum usable frequency) is constantly changing, rising and falling. A typical VHF DX-er tracks skip by keeping tuned to the lowest assigned TV channel, Channel 2, which has a video frequency of 55.25 MHz and an audio frequency of 59.75 MHz. Since the audio and video are thus on different frequencies, it follows that the m.u.f. may at times lie between them, producing, typically, a good visual signal but no sound. Likewise, at times the dominant audio will be from one station, the video from another. Synchronizing sound and vision is one of the problems faced at times by the TV DX-er.

As the m.u.f. rises beyond Channel 2, skip becomes increasingly rare. The channels from 2 to 6 are known as the "low band," and it hits these fairly frequently. Beyond Ch. 6 lies the FM band—88 to 108 MHz—and FM DX-ing by skip is a real challenge. More than one U.S. DX-er has heard over 500 different FM broadcast stations by E-skip alone. In one single day in early June 1973, your author heard 71 new skip stations: FM broadcasters not previously logged, from within a 1500-mile radius of his listening location, both in the U.S. and Mexico.

Above 108 MHz, TV channels 7 to 13 are known as the "high band." E-skip there is a rarity, perhaps twice or three times a year on Channels 7, 8, or 9, much more rarely at the top VHF channel, 13.

E-skip peaks twice a year. The main peak is in early summer; the secondary peak in mid-winter. If it is safe to generalize about that volatile commodity, skip, we can say that the best month is June. Such was the case, anyway, in both 1972 and 1973. The winter peak may fall almost any time during December or January. Experience shows that the first week in June is the best of all. But skip can occur without warning at any time of the year, especially if there is unseasonal weather—cold in summer, warm in winter. Check your weather maps in newspapers and on television or, better still, listen direct to official weather reports elsewhere on VHF. Equally important, keep on the alert by staying tuned to Channel 2 and rotating your antenna at least every hour. Concentrate on the morning, noontime, and late afternoon hours (not the middle of the night, when skip never begins, although it may carry over from an all-day opening). If your Channel 2 is blocked by a strong local station, you may wish to tune Ch. 3 or whichever low-band channel is clear. But here in Baton Rouge, La., where the author has a maximum power local television outlet on Ch. 2, a mile or two away, skip is still easily recognizable through it by the characteristic line-bars beating with the local signal.

Watch for different patterns of co-channel interference. A single set of stable bars may indicate a single station coming in on skip behind a known local or semi-local transmitter. Perhaps the skip is limited to an isolated area with only one TV station on that channel for hundreds of miles. A seething mass of stations, particularly if they fade rapidly in and out, is a pretty good guide to TV skip.

Other propagation modes include light-

DX CHANNEL ASSIGNMENTS AND PROPAGATION

ASSIGNMENT	FREQ. (MHz)		MAX. LEGAL POWER
Television	Video	Audio	(e. r. p., kW)
Channel 2	55.25	59.75	100 "low band"
Channel 3	61.25	65.75	100
Channel 4	67.25	71.75	100
Channel 5	77.25	81.75	100
Channel 6	83.25	87.75	100

DX PROPAGATION for above:
E-skip, tropo, aurora, meteor, other

Ch. 7-13 — 175.25 through 215.75 — 316 "high band"

DX PROPAGATION: Tropo; possible meteor very rarely

Ch. 14-83 — 471.25 through 889.75 — 5000 "UHF"

(Exception: Ch. 37 reserved for radio astronomy)

DX PROPAGATION: Tropo; possible meteor very rarely

FM Radio — 88-108 MHz — 100

(Exceptions: a few old-established stations ranging up to 500 kW)

50

(in Chicago-Pittsburgh/Boston-Richmond/San Francisco-San Diego strips)

Includes: 88.1-91.9 MHz Educational FM
91.9-107.9 MHz Commercial FM

DX PROPAGATION: E-skip, tropo, aurora, meteor, other

Note: 3 kW maximum on Class "A" FM channels: 92.1, 92.7, 93.5, 94.3, 95.3, 95.9, 96.7, 97.7, 98.3, 99.3, 100.1, 100.9, 101.7, 102.3, 103.1, 103.9, 104.9, 105.5, 106.3, 107.1 MHz

ning scatter, aircraft scatter, and far more important, meteor scatter. These speak for themselves. In meteor scatter, for instance, the signal is refracted to earth by a falling meteor. This happens very briefly. If you are lucky, the station you see will be carrying an ID slide or other identifiable video at the time. The same thing happens on FM and you can hear and verify FM stations by meteor scatter propagation if they are transmitting reportable material when you hear them. Your author, for instance, has highly specific verification letters for meteor reception of FM stations in Sturgis, S. Dak., Beatrice, N. Dak.; Cadillac, Mich.; Winchester, Va.; and Philadelphia, Pa. Best way to tune meteor scatter is to stick your receiver in an open FM channel and beam your antenna in the direction of a predicted meteor shower, consult the ARRL "VHF Handbook" (or any astronomical handbook) for a useful table of dates.

Incomparably more stable and more common than meteor reception is tropospheric bending; trops or tropo, for short. Those stable bars referred to before may not be a single skip station. More probably, a steady signal from several hundred miles is due to a lengthening of the normal transmission path far beyond the conventional line-of-sight to the horizon or a little beyond it, out towards the 1000-mile mark. Under superb conditions, the path is even farther. The maximum trop distance reported by a member of WTFDA—the specialized TV-FM DX club—is 1510 miles, on Channel 6.

This record, which contrasts with a 1240-mile maximum reported on Ch. 2, shows that trops peak in the "high band" and spread downward. This is the opposite of E-skip! This means, then, that in looking for beginning tropo on the FM bands, you should tune to a clear channel close to 107.9 MHz. But for skip, you should monitor the 88.1 MHz end. Since tropospheric reception is not a skipping phenomenon, but stays close to the ground, topography is important. The fall months bring good tropospheric reception. One good route is up and down the Mississippi Valley between the Great Lakes and the Gulf South. For two years running, October 27 has proven to be the best day in the year for such propagation paths. Under rare weather conditions—when cold and warm fronts clash, with high pressure rapidly entering a low-pressure zone—tropospheric ducts (narrow, intense signal paths) may briefly occur over hundreds of miles. For this, it pays to have a friend at your local weather office to alert you.

Equipment for DXing. Nothing fancy is needed to get into DX on the VHF/UHF bands. An efficiently operating television set —black-and-white is fine—need not be of recent vintage. In fact, some successful TV DX-ers use equipment over ten years old. Likewise the antenna need not be fancy. Some skip DX-ers, especially those with many semi-local stations between 50 and 150 miles away, actually prefer to use "rabbit ears." These can be quite directional, although they do not have the gain of a good yagi or other multi-element antenna.

For tropospheric reception, however, a high-gain antenna and a generally efficient receiving set-up can expand your viewing farther and farther beyond the horizon. For trops, height is important. On the whole, the higher, the better. For skip, however, many very experienced DX-ers stick fairly close to the ground, 20 or 30 feet. Others have a variety of differently oriented (horizontal and vertical) antennas at different heights, ready for stations entering at all possible angles of incidence.

The author's TV-FM DX-ing installation, a fairly typical one, consists of a quad array of four FM antennas (two vertically, two horizontally), mounted atop a 50-ft tower; they are spaced some 10 feet apart so that the center height is some 55 feet above ground level. This is particularly effective for tropospheric reception, by which mode FM stations from Buffalo, Cleveland, Miami, etc. have been received and verified. However, for skip, the author frequently switches to a lower height and to a different polarization; a pair of stacked FM antennas averaging 25 feet in height.

For television, a single low-band and pair of horizontally stacked high-band yagis are used, rotor-mounted on a 40-ft guyed pole. A similar mounting is also used for a 7-ft dish covering the UHF band, channels 14 through 83.

Anyone seriously interested in exploring the world above 30 MHz should join the Worldwide TV-FM DX Association, the only club in the world devoted to that frequency spectrum exclusively. Besides the TV and FM stations mentioned here, it also covers the many fascinating utilities, including satellites, now operating on the very-high and ultra-high frequencies. (Address: P.O. Box 163, Deerfield, Illinois 60015) ◈

What to look for in a SHORTWAVE RECEIVER

Evaluating your broadcast coverage, technical and operating needs.

VARIOUS types of receivers are commonly used by shortwave listeners. They range from multiband radios to professional communications receivers (not to be confused with less-sophisticated communications-*type* receivers). Budget permitting, the serious SW listener will opt for the communications receiver since it pulls in more stations (especially distant ones) and provides clearer reception on otherwise marginal stations. Shortwave communications receivers are both *general-coverage* (i.e., covering a specified range of frequency continuously, without a gap) or cover certain designated, limited *bands*.

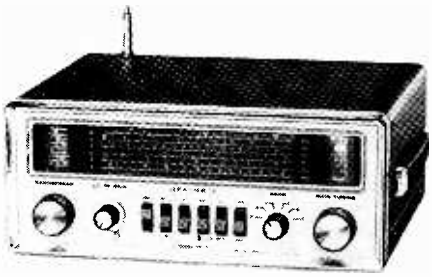
What Coverage to Look For. If shortwave broadcast listening is your thing, then the bands you are interested in fall between 2.3 and 26.1 MHz (megahertz, the old megacycles-per-second or Mc/-s). But they are not continuous throughout this range; in fact, only about a tenth of that spectrum is used by broadcasting stations officially, with a few more (in countries as varied as Britain, China, Israel, Egypt, and Spain) spilling over beyond the designated shortwave broadcast bands in happy defiance of International Telecommunications Union regulations. Unlike the amateur bands, which are in a harmonic relationship to each other, on 3.5, 7, 14 MHz, and so on, the international broadcast bands have no regular frequency relationship. Thus, receiver design based upon harmonic principles is not possible.

Drake's DSR-1 communications receiver.

The frequencies you will need include the international bands: 75, 49, 41, 31, 25, 19, 16, 13, and 11 meters, as they are popularly known. Of these, the 75- and 41-meter bands are not supposed to be used for broadcasts to the Americas, where they are an integral part of the 80- and 40-meter ham bands, respectively. But you will still want them, either to listen to the amateurs there, or to tune in to the broadcasts which are directed to North America, in some cases under the pretext of being intended for the "Atlantic Islands."

In any case, Radio Tirana, the voice of China's European ally, Albania, is there on 7300 kHz all year round, while Radio Moscow's North American service relies chiefly upon the 41-meter band during the North American winter, the main frequencies being 7150 and 7205 kHz, often supplemented by half a dozen others. At the high-frequency end, be sure that your receiver covers 13 meters, as it gives pristine reception of Europe during the day and Australia in the evening, plus many other areas. A receiver without 13 meters—particularly in areas away from the East Coast—may not give much good listening during the hours of daylight. So unless you're strictly a night owl, don't forget 13 meters (21.45-21.75

MHz). Going higher, the 11-meter band, while not obligatory at the present stage in the sunspot cycle, when it is really too high for effective use over normal paths on the earth, is a useful band to have. For those days of good conditions it may bring local-quality reception of Britain, Norway, or South Africa (almost the only foreign countries which are using it now) during the otherwise downswing midday hours.

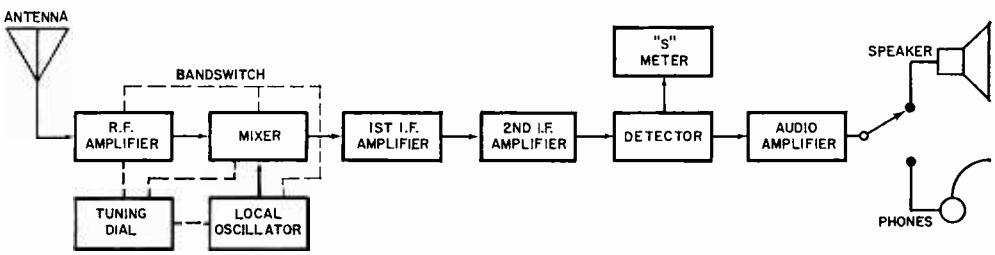


Heath's GR-78 SW receiver sold as a kit.

For the sounds of cumbias from Colombia, merengues from the Dominican Republic, valses from Venezuela, the tropical bands are not to be missed. And, while you're not likely to find the BBC, Radio Nederland, or other popular major broadcasters on them, they are best for real shortwave broadcast DX. The number of rare countries which can be heard only on the tropical bands is staggering: Belize, Gambia, Nepal, Cook Islands, and Reunion, to name just five. And, because of the greater interference on the international bands, or other reasons, many countries which operate on, say, 25, 31, or 49 meters are actually much easier to hear on 60, 90, or 120 meters: Honduras, Venezuela, Colombia, Bolivia, and almost all the African republics such as Upper Volta, Togo, Sierra Leone, Kenya, and Senegal. Thus, be sure you have coverage of 2.3-2.5 MHz (120 meters), 3.2-3.4 MHz (90 meters where you'll also hear the very handy CHU time signal from Ottawa, Canada), and 4.75-5.06 MHz (60 meters with WWV located at 5 MHz).

Other Receiver Considerations. Besides the above-specified *frequency coverage*, an SWL receiver should have the best possible characteristics of *sensitivity* and *selectivity*. Sensitivity is the ability to receive weak signals and raise them up, as the saying goes, "out of the mud:" to raise them above the background noise level, caused mainly by static (the effects of thunderstorms near and far), man-made noise, and internal receiver noise. Most genuine communications receivers today have no lack of sensitivity. It is worth checking each band, however, to make sure that sensitivity does not slump at either end of the tuning range, while peaking in the middle. Weaker signals are likely to be encountered at the high-frequency end of the shortwave spectrum, so check your reception in the 13-meter band and on 11, when open (carefully).

As more and more stations come onto the unexpanded shortwave broadcast bands, *selectivity* becomes more and more important. Check to see whether you have a choice of bandwidths: and if you do, check to see how intelligible (readable) amplitude modulated signals are at each bandwidth setting. The human voice should not be so clipped as to be incomprehensible. Getting rid of heterodynes (piercing whistles caused by stations too close, generally within 1 or 2 kHz of each other) can be performed by a *notch-filter*. It enables one to take a "slice" out of a range of frequencies, as narrow as possible, in order not to destroy the still-wanted frequencies. Check also whether you can change to a narrower bandwidth *without* switching the BFO (beat-frequency oscillator) in. You will need the BFO for CW (Morse code) signals, but not for broadcasting stations using audio modulation.



Typical shortwave receiver will have the circuits and features shown here.

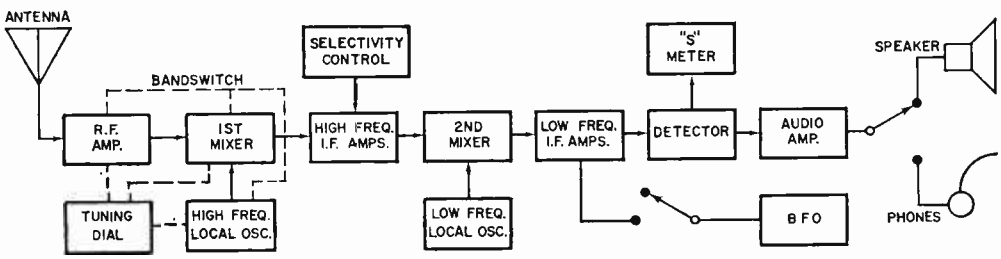
Do I Need a Preamplifier? A preamplifier adds sensitivity, not selectivity. If your problem is weak signals, then perhaps a preamp is what you need. A good preamp will raise the signals without significantly raising the noise level. The bugaboo of preamplifiers is the production of images. A properly tuned preamp should not produce spurious radiations or images of powerful stations on frequencies where they are not supposed to be. It is wise to ground the preamp and receiver together with a braided metal strap. As we have said, lack of sensitivity is the least of the problems in a contemporary receiver, at least with the major shortwave broadcasters with their average transmitter power of 250 kW!

What About Grounding? A good ground doesn't look fancy. In fact, most of it is buried and you don't see it at all. But it makes a big difference. The best practical ground is a copper rod driven into moist earth. One reason why Alaskan AM stations are not easy to hear in the "Lower 48" is because of the permafrost which prevents the digging of a good grounding system. Anyway, unless you live directly on top of permafrost or in a wasteland of solid concrete, hammer that ground rod in deep and clamp a heavy-gauge wire from it (copper again, preferably) to the "G" (sometimes "E" for the British "Earth") connection of your receiver. Some SWL's keep the ground moist in dry weather by positioning their copper rod directly under the drip of an air conditioning unit. This is a good technique, as long as the air conditioner does not produce r.f. noise. A substitute ground can be rigged by running a wire to a cold water pipe or any connection leading to ground.

How Do I Calibrate Frequency? Shortwave receiver design has progressed recently in the field of calibration. In fact, exact frequency read-out to within the nearest assigned shortwave broadcast channel, i.e., to within 5 kHz, is now available on a portable costing less than $200. This is a real breakthrough, taking all the guesswork out of tuning and letting you dial your favorite station every time. Some SWL's won't settle today for less than that when purchasing new equipment, although many still enjoy the older-style equipment which requires the compilation of a logging scale or the use of an external calibrator. The internal calibrator in many receivers, with tones marking every megahertz, or every 500 and 100 kHz, is still as useful as ever and featured on many of the latest communications receivers.

The most sophisticated form of calibration is the *electronic digital display* of a frequency of great accuracy, say, point one of a kilohertz. Such displays represent the state-of-the-art and are found on receivers in the $2000 price bracket. However, the same effect, a direct read-off of figures making up the exact frequency to which you are tuned is achieved by the *digital dial*, now found on reasonably priced equipment. A regular *tuning scale* with *pointer* remains the most common method and, if accurate, can give good results. But on the lower-priced equipment, a method involving a dial cord—subject to slippage and breaking, and often fiendishly difficult to replace—is still found.

What About Crystals? Yes, if you have a favorite frequency to which you wish to tune regularly and are using a crystal-controlled set, you can insert a compatible crystal for just that frequency. An FM station in Washington, D.C., for example, which regularly relays the BBC news, has a crystal for 9510 kHz (which makes it a double relay, since BBC 9510 kHz beamed



More sophisticated receivers use dual-conversion with two oscillators/i.f. amps.

THE SHORTWAVE BROADCAST BANDS

120-meters—Tropical Band—2300-2500 kHz

Best reception: Evening to Central America; only few stations active. Frequencies in kHz; times in GMT.

2390 Guatemala, La Voz de Atitlan, to 0345 sign-off; Spanish, Indian languages

2390 Mexico, Radio Huayacoctla, to 0300 sign-off; Spanish, Indian languages

2446 Reunion, ORTF St.-Denis, rare at 0230 sign-on in French on East Coast of United States

2500 U.S.A., WWV Fort Collins, time and frequency signals, during darkness

90 meters—Tropical Band—3200-3400 kHz

Best reception: Throughout hours of darkness to Latin America; your local dusk to Africa and Brazil; around local midnight, to Africa; before and just after dawn, to Asia, Pacific, and Central America.

3200 China, Fukien Front Station People's Liberation Army; dawn

3277 Kashmir (India), Srinagar, Kashmir, Urdu, some English; dawn

3300 Burundi, Bujumbura, 0400 French and African languages

3315 Martinique, ORTF, Fort-de-France, sign-on in French 1000

3316 Sierra Leone, Freetown, sign-off 2330 (on East Coast), sign-on 0600, English

3325 Guatemala, Radio Maya, fine marimba music, evening and after dawn

3330 Canada, CHU Ottawa, time signals in English and French, all day in Northeast

3380 Guatemala, Radio Chortis, marimba music throughout the evening

75 meters—International Band (not assigned in Americas)—3900-4000 kHz

Best reception: Europe, Africa late afternoon until after midnight; Pacific midnight to dawn; Ecuador before dawn; Asia around dawn

3910 Japan, Far East Network (U.S. Forces) pops and news, dawn

3925 Japan, Nihon Shortwave Broadcasting, late night until after dawn

3952 Great Britain, BBC, European Service, many languages, around 0500

3985 Ecuador, Escuelas Radiofonicas, Riobamba, 1000-1130

3995 Solomon Islands, English and local languages, 0800-1000

60 meters—Tropical Band—4750-5060 kHz

Best reception: All hours of darkness, to Latin America; afternoon and around midnight, to Africa; midnight to dawn, to Pacific; late night to after dawn, to Asia; a few European stations active, times as for Africa

4820 Honduras, La Voz Evangelica, Tegucigalpa, evenings and mornings, some English

4820 Gambia, Bathurst, 0630 sign-on; 2300 sign-off on East Coast; English

4845 Bolivia, Radio Fides, La Paz, early evening, 2300-0100; Catholic religious

4877 South Vietnam, VTVN Saigon, Vietnamese until after dawn

4890 Senegal, Dakar, sign-on 0600, sign-off 2300, native languages, French

4955 Colombia, Radio Nacional; fine classical music, evenings, morning

4970 Venezuela, Radio Rumbos; leading commercial station, a few English ID's; all night

5000 U.S.A., WWV, Fort Collins, throughout hours of darkness

5010 Dominican Republic, Radio Cristal, Santo Domingo; all night

49 meters—International Band—5950-6200 kHz

5955 Guatemala, TGNA, missionary station, sermons often in English evenings

5995 Vatican City, Vatican Radio, English to N. America daily 0100-0115

6025 Portugal, Radio Portugal, English 0200-0245, 0345-0430 daily

6040 United Arab Emirates, Saut-as-Sahil, Dubai, rarely 1300-1400

6065 Spain, RNE Madrid, English to N. A. 0100-0145, 0200-0245, 0300-0345

6070 Canada, CFRX, Toronto, 1 kW, daytime to Northeast, night everywhere

6085 Canada, CBC relay of Deutsche Welle, German 0155-0430, English 0435-0550

6080 Luxembourg, Radio Luxembourg, English pop service to 0200 sign-off

6100 West Germany, Deutsche Welle, German to N. A. 0000-0615

6110 Great Britain, BBC, English to N. A. 2115-0415

6115 Congo, LVRC, Brazzaville, partly in French 0400-0600. African music

6140 Burundi, Bujumbura, French and Swahili, 0400 under good conditions

6195 South Africa, Springbok Radio, English/Afrikaans commercials all night

—AND WHAT TO FIND ON THEM

41 meters—International Band (not assigned in Americas)—7100-7300 kHz

7130 Great Britain, BBC to Atlantic Islands 2115-0330
7150 U.S.S.R., Radio Moscow North American Service, 2300-0500
7265 West Germany, Sudwestfunk, Baden-Baden, nighttime under good conditions
7300 Albania, Radio Tirana, English to N.A., 0130-0200, 0230-0300, 0330-0400, 0430-0500
7335 Canada, CHU, Ottawa, time signals all day / / 3330 kHz

31 meters—International Band—9500-9775 kHz

9505 Japan, Radio Japan, English news on hour 0600-1400
9510 Ascension Island, BBC relay, English to N. A. 0200-0330
9515 Turkey, Radio Ankara, Turkish sign-on 0330
9535 Switzerland, SBC, English to N. A. 0145-0215, 0430-0500
9560 Ecuador, HCJB, Quito, missionary station, English to N. A. 0100-0600
9570 Nigeria, Radio Kaduna, Koran chants, English, Hausa, sign-on 0430
9570 Qatar, Radio Qatar, Doha, sign-on 0230, Arabic, rare catch
9605 Vatican City, Vatican to N. A. / / 5995 above, English 0100-01115
9615 Morocco, RTM Rabat, Arabic chants all night; 24-hour operation
9645 Costa Rica, TIFC, Faro del Caribe, missionary, English sermons 0300
9670 Portugal, Voice of Hope, Adventist World Radio, English Sunday 0830-0900
9700 Bulgaria, Radio Sofia, nice Balkan music, English to N. A. 0400-0430
9780 Albania, Radio Peking relay, Tirana ana, English 0100-0155, 0300-0355 (not from China!)

25 meters—International Band—11700-11975 kHz

11705 Israel, IBA, English news 0500-0515 / / 9009, 11960 kHz
11710 New Caledonia, ORTF, French 0600-1200
11775 Spain, RNE Madrid, Spanish to Latin America 2200-0400
11800 Canary Islands, RNE Tenerife, often parallel above, same time
11920 Ivory Coast, Abidjan, French, to sign-off 2400 and at sign-on 0600

19 meters—International Band—15100-15450 kHz

15105 Japan, Radio Japan, English news on hour daytimes and early evening
15110 New Zealand, NZBC, mostly home service, evenings.
15170 Tahiti, ORTF, Papeete, English lesson 0230, Tahitian 0300-0500, French to 0800
15245 Zaire, Kinshasa, 24-hour operation, French, African languages
15310 Guinea, Rep., Conakry, French, revolutionary music, sign-on 0600, to 1400
15445 Japan, Radio Japan, English to N. A. 2345-0445
15446 Brazil, Radio Nacional de Brasilia, international service, evenings

16 meters—International Band—17700-17900 kHz

17720 Taiwan, Voice of Free China, English to N. A. 0200-0350, also 17780, 17890 kHz
17770 New Zealand, NZBC, English, evenings / / 15110 kHz
17810 Malagasy Rep., Radio Nederland relay, 1400-1520 English
17815 Sweden, Radio Sweden morning service to N. A. 1400-1530, English 1400-1430
17895 Zambia, Radio Zambia, English 1700-2100, African music

13 meters—International Band—21450-21750 kHz

21525 South Africa, Radio RSA, African service in English, mornings
21605 Finland, FBC, 1 kW, 1400-1830 to Latin America, English 1400-1430, 1800-1830
21640 Japan, Radio Japan, North & Latin American service 0100-0300
21740 Australia, Radio Australia, N. A. service, English 0100-0300

11 meters—International Band—25600-26100 kHz

25730 Norway, Radio Norway, 1100-1230 1300-1430, 1500-1630, English Sundays
25790 South Africa, Radio RSA, English 0730-1500, heard under good conditions

Panasonic's RF-5000A portable SW receiver.

to North America comes via the Atlantic Relay Station on Ascension Island). Radio Japan sent some of its regular monitors a little hand-held portable with crystals for three leading NHK frequencies, 9505, 15105, and 17825 kHz. For receivers which come equipped with a certain range of frequencies and which are programmed to accept additional crystals, sets of crystals for the tropical bands, the aeronautical bands, the amateur bands, etc., may be bought and inserted.

Now—the Antenna. Strictly speaking, your antenna *is* your receiver. It seizes the incoming signals, then your receiver amplifies and converts them. But the antenna's role is the basic one. The most common SWL antenna is the *dipole*. To make a dipole, take any reasonably sturdy gauge of wire, shielded or unshielded, and measure it out. A *half-wave* dipole will measure half the wavelength at the center of the band for which the dipole antenna is being cut, minus one twentieth (5%). If you make all your measurements in meters, this should be easy to work out and it will give you practice with the metric system, which we will be using all the time eventually. Take the 19-meter band, one of the most popular. A wavelength toward the middle of that band is 19.6 meters; a half-wave, then would be 9.8 meters; a twentieth of that would be roughly half a meter. So your half-wave dipole should be 9.3 meters long. Fold it and cut it precisely in the middle. There, insert an insulator or, better still, a *balun*. That is the point where your transmission line or lead-in to the receiver is inserted. This can be ordinary twin-lead, but it's better to spend a little money and use RG-58/U coaxial cable. If you hang the dipole between two trees or buildings, or between a mast or a house, or in any other hanging position, the balun and transmission line junction will be the vulnerable stress-point. So check it thoroughly for physical strength and give the coax connection a good weatherproofing either by encasing it in a watertight box or by greasing it thoroughly. Don't forget lightning arresters at the center and ends of the dipole, or any other outdoor antenna.

The *Vee* antenna is essentially a folded dipole whose mid-point feeds directly down to the receiver via the transmission line, as above, while the two ends, rather than following a straight line, form a "V" shape encompassing an angle of, say, 30 or 40 degrees, as desired.

The *L* antenna looks, of course, like the letter L. It runs vertically, say, up a pole or the side of a house, then bends at right angles and from there horizontally into the receiver. There are many other kinds of antennas which can be built with simple wire, and antenna experimenting is part of the fun of SWL-ing. Antenna kits and prebuilt SWL antennas, including a *multi-band dipole* and a *vertical*, may be bought commercially. ◈

"What I don't understand is why it only shorts out on Mondays."

SW LISTENING & LOGGING

You've switched on your SW receiver . . . Now what?

SETTING the function switch of your new SW receiver at "On-Receive" for the first time, perhaps there's a rush of noises—stations clamoring for your attention. Good! You've hit a band that's producing signals at your location at that time of day. Tune carefully and steadily, getting the "feel" of the receiver. Right from the beginning, careful tuning is the key to success in SWL'ing regardless of the sophistication of your receiving equipment.

Radio Japan's QSL cards are works of art. This is one of some 100 different cards available and more are on way.

Let's take a typical band and see what it has to offer. 19 meters is a good one; for many listeners, the favorite. Above the top (that is, at the high-frequency end) of the band, there's a ticking clock, bleeping out the seconds and announcing the time in "Coordinated Universal Time" every five minutes. You've caught *WWV*, the Fort Collins, Colorado station of the National Bureau of Standards. And it has more than the time to offer. It gives Geoalerts: warnings of earthquake activity, typhoons, and other seismic turbulence every hour, at 18 minutes past the hour. Related to the Geoalerts are more general weather bulletins, with emphasis on tornado activity and storms at sea, at 10 minutes after the hour, and again two minutes later. At 14 minutes after the hour there's a feature of great interest to the active shortwave DX-er: the propagation forecast for the ionosphere, consisting of a statement of the sunspot index and a prediction of reception conditions for the next 24 hours.

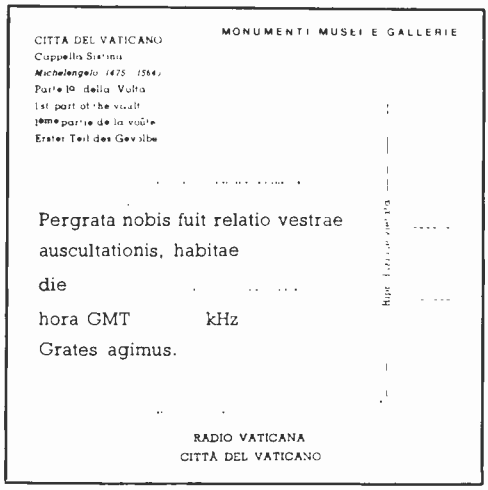
All this, and more, is on exactly 15 MHz, 15,000 kHz, or 20 meters precisely. It's also heard, in parallel, on other even frequencies throughout the shortwave spectrum: 2500, 5000, 10,000, and 20,000 kHz and you should hear all of these easily at different times of day. Right now, however, let's move along from WWV and head upwards in frequency. If you're listening in your local evening time, the first big thing you'll probably hear will be a bunch of signals either playing Oriental revolutionary march music or else reading newscasts or commentaries in which the words "Mao Tse-Tung" seem to occur with some regularity (although not so often as they did a few years ago, during the Cultural Revolution). You've guessed it—it's *Radio Peking* beaming to North America during our even-

ing hours on 15060 and 15095 kHz, much of the time in English. Besides that, there are other Peking frequencies there, like 15030 and 15080. Small wonder that some DX-ers call this "the Peking Band." But China is not alone. Right in the middle is "Auntie," as some Britons call the *BBC*, heard here on 15070 kHz. Well, the old lady isn't as straightlaced as before, with such broadcasts as "BBC Pop Club" and "Soul Time" now rubbing shoulders with the staid "From Our Own Correspondent" and "Radio Newsreel."

Just beyond that, there's one of the best frequencies to log the Middle East—15085 kHz, which provides Iranian music and Farsi talks all day and much of the night via *Radio Iran*, Teheran's powerful 350 kW transmitter. But beware of misidentification. Oriental music on 15085 can also be from *Radio Cairo*, which uses this same frequency in its Latin American beam at 2330-0200 GMT. GMT and CUT—the latter now announced by WWV in Fort Collins, in a recent change from Greenwich Mean Time—are for all practical purposes the same thing. You'll learn to make the time conversion from your local standard to the international standard soon enough. You'll be using GMT in reports to all major broadcasters. But when you begin to report to smaller stations, especially those in Latin America (except for the Latin biggies like Radio Havana, XERMX Radio Mexico, HCJB Quito, Trans-World Radio, and a few more), you'll want to learn the local times in different countries to express your reception report in the station's own time.

"Listeners' Corner," carried in English every Sunday on Radio Norway, answers questions from all over world. Speakers are Rolleiv Solholm and Berit Griebenow.

We've passed through so many countries—China, Britain, Egypt, Iran—and not even reached the official 19-meter broadcast band! That begins at 15100 kHz and stretches to 15450 kHz. Those are the outer limits, and stations are not supposed to operate on the edge frequency since part of their signal would fall outside the band. However, as of this writing, *Radio Moscow's* North American service is balanced right on the edge, at 15100 kHz. It might be a coincidence, of course, but this puts it just 5 kHz away from Radio Peking, also beaming to North America. Of course, in the



Vatican Radio sends its QSL on the back of postcard depicting one of its art treasures. This from Sistine Chapel ceiling.

crowded bands there are many strange bedfellows. It is significant, though, that most of *Radio Berlin International's* frequencies beaming from East Germany to North America are just one channel (5 kHz) away from those of West Germany's *Deutsche Welle* (for instance, RBI 6080 kHz, DW 6075 and 6085; RBI 9730 kHz, DW 9735). Returning to 19 meters, the first legal frequency inside the 15100-15450 kHz band is 15105, and that's where we find *Radio Japan*. It has a round-the-clock service in English on the hour, its General Service. The English newscasts and features generally last 15 minutes and are followed by the same in Japanese. So 15105 is your prime frequency for Japan, especially during daylight hours. After local midnight and until dawn, 9505—similarly positioned right at the bottom of the 31-meter band—is the Japanese frequency. Listeners on the West Coast should find Japan one of their most

dominant shortwave countries. Even on the East Coast, it's an easy catch.

Inside the band now, the stations come thick and fast. For tuning, you'll soon develop an easy, smooth wrist action. You'll quickly come to appreciate a good tuning knob, free of backlash. Backlash and tuning drift in the crowded, narrow shortwave broadcast bands will quickly move your receiver dial off the desired station and onto another frequency. You should be able to move your hand smoothly off the tuning knob without disturbing the dial setting. Carrying on from 15105, we find a powerful little 7.5-kW station next, *Radio New Zealand* on 15110 kHz in the North American evening. Although it's a foreign service outlet, beamed to New Zealand's Pacific Island neighbors in Fiji, Tonga, and Samoa, you'll get a good idea of how domestic broadcasting sounds Down Under, since it carries mostly relays of the NZBC's home AM broadcast programming. Thus you'll frequently hear the announcement, "This is the National Program." Listeners in Wellington would be listening to the same program at the same time on 570 kHz.

A real shortwave powerhouse is next. It is the missionary broadcaster, *HCJB*—"Heralding Christ Jesus' Blessings"—operated by the World Radio Missionary Fellowship from Quito, Ecuador. Many beginning shortwave listeners expect that the SW bands will be dominated by Moscow and Peking, that the loudest signals will come from the Communist capitals. But they soon discover that the Christian missionary stations pack a real punch. They can be loudly heard at times, such as during the day, when there is little sign of Moscow and none of Peking. HCJB's signal from high in the Andes on 15115 kHz is typical. Also powerfully present are *Trans World Radio* in Bonaire, Dutch West Indies and Monte Carlo, Monaco; the stations of the *Far East Broadcasting Company* at Manila, Philippines (FEBA), in the distant Seychelles Islands in the Indian Ocean (FEBA), and close to home with studios in San Francisco and transmitters at Belmont, California (KGEI); and smaller missionary stations in Guatemala (TGNA), Haiti (4VEH), Liberia (ELWA), and many other countries. You can learn a lot about DX-ing by listening to HCJB's "DX Party Line," which features DX tips compiled by members of the American Shortwave Listeners Club and from other sources.

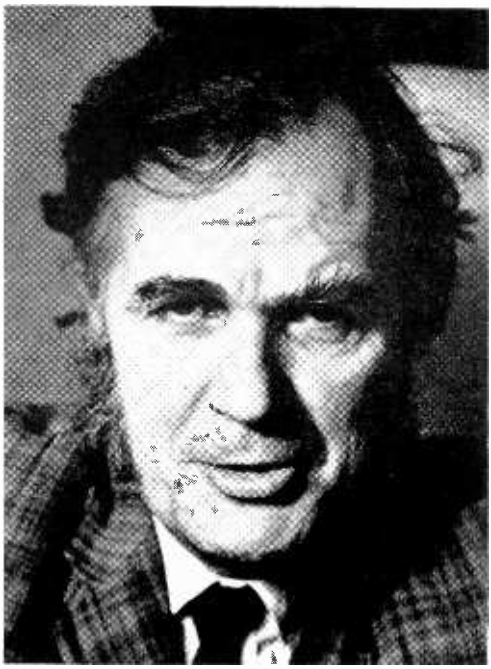
The Voice of Germany, heard over relays in Rwanda, Canada, and commemorated on this QSL card, Sines, Portugal. A relay in Malta is now under construction.

The 19-meter band has lots more to offer, day and night. It's one of the best bands for Europe and Africa during the day. At night, the focus turns to the Pacific. The frequency for flavorful *Radio Tahiti* is 15170 kHz, with English lessons prepared by Britain's BBC at 0230 GMT and sign-on in Tahitian at 0300. It switches to French at 0500 and signs off at 0800. But many nights it continues operations late, for a Tahitian festival, sometimes a competition for traditional Polynesian musicians with fascinating drum rhythms. Radio Tahiti, with lots of authentic local color and local music, is a listening favorite.

What we've said about 19 meters applies to any band. Tune systematically, moving smoothly from one end to the other. Scan the band, keeping a log of what you hear.

Log-Keeping. You can make one up for yourself from ruled paper; but it's easier and more professional to buy a prepared log book. You'll want to enter the date, time, and frequency for every logging you make. The time should be in GMT, of course, and the date should be the GMT date.

Remember that Wednesday evening in North America is already Thursday morning GMT. Broadcasters beaming programs



The first station dedicated to ecology, Radio Sweden publishes records of birdsong, carries wildlife features. Walstan Wheeler is English-language host on program.

to North America make allowances for this, and usually time their features presented earlier that GMT day for repeat the same day, local time, for American listeners. Many stations beamed to the U.S. announce the time additionally in Eastern Standard Time; sometimes additionally in Pacific Time or Central Time. But they rarely make allowances for Daylight Savings Time. If you live in a state which goes onto Daylight Time, your favorite shortwave features will come one hour later in the summer. Radio Australia is the only station which changes its transmission time (for its breakfast-time release to North America) to keep in step with U.S. Daylight Time when it is introduced.

Your log will contain a limited amount of space for the program heard. But if you intend to send a detailed reception report, the space will not hold all the items to be submitted for verification. Therefore, jot those extra details down on a separate sheet of paper so that you can send a respectable, detailed report which will convince the station that you did indeed hear it.

You will want to note reception quality, too. Your S-meter may be calibrated in 1 to 9 S-units and in decibels above S-9 (to a maximum, normally, of S9 plus 60 dB). This is a useful guide to comparative strengths. Fading rates can be estimated by watching the flicks of the S-meter and timing them against the second hand of a watch. A digital clock is a handy accessory for time fading, too. You'll learn to recognize current reception conditions from the rates of fading on known stations—particularly those passing close to the North Pole, from Asia to Eastern North America or from Europe to Western North America. In fact, a useful feature to add to your daily log would be the sunspot figure and propagation forecast taken from WWV at 14 minutes past the hour. This way, you can begin to learn propagation principles and perhaps predict good nights for reception from different areas.

There is good South American reception on aurorally disturbed nights, for example, and good Scandinavian listening when the sunspot activity is low. High sunspot action doesn't have to mean poor reception. Nights when Europe—especially north Europe—has been blanked out have brought reception of normally inaudible low-powered stations in Angola, Brazil, Uganda, and other equatorial countries.

The basic information on reception in your log, however, and in your reports to big international stations, should be in the SINPO code (see table). That's the way the big stations want it. In fact, many stations, if you request it, will send you pre-printed report forms which you can send back, filled out. They usually leave space for the SINPO (or SINFO, if you prefer; the F stands for Fading) code, then a blank for

OSLO 19

DEAR LISTENER.

WE THANK YOU FOR YOUR REPORT AND ARE PLEASED TO CONFIRM THAT YOU HAVE HEARD

NORSK RIKSKRINGKASTING

RADIO NORWAY

ON———KHZ (———M)———KW

CALL LETTERS———ON——— 19———

SINCERELY YOURS

SHORT WAVE DIVISION

17

Simple, but effective, QSL text. Frequency, band, power in kW, call letters, and date are given, plus space for signature.

USEFUL ADDRESSES FOR THE SWL

Join a club . . subscribe to a bulletin packed with DX information . . . get an updated log of stations in your favorite band or transmission mode. These addresses will give you what YOU need.

American Shortwave Listeners Club, 16182 Ballad Lane, Huntington Beach, Calif., 92649. (Covers SWBC, MWBC, utilities: monthly offset bulletin)

Association of North American Radio Clubs, P.O. Box 3012, Jackson, Tenn. 38301 (Links most DX clubs: info on all clubs; annual summer DX convention)

Australian Radio DX Club, P.O. Box 227, Box Hill, Victoria 3128, Australia (Covers SWBC, MWBC, utilities; best info on Asian-Pacific DX)

Canadian International DX Club, 169 Grandview Ave., Winnipeg 16, Man. Canada (Covers SWBC, MWBC, utilities; annual convention in Canada)

Communications Research Bureau, P.O. Box 56, Commack, N.Y. 11725 (Police and fire service frequency logs; VHF/UHF utility lists)

Danish Shortwave Club International, DK-8382 Hinnerup, Denmark (Covers SWBC, other bands; top info on European pirate broadcasters, clandestines)

DX Stamp Service, 83 Roder Parkway, Ontario N.Y. 14519 (Mint stamps to enclose with your reports to rare stations in Latin America, Asia, Africa)

Finland's DX Club International, P.O. Box 214, SF-00101 Helsinki, Finland (Illustrated trilingual magazines; background features on SWBC stations)

FM Station Atlas, P.O. Box 24-P, Adolph, Minn. 55701 (State-by-state atlas of FM stations in North America; FM frequency list, hints on FM DX)

Gilfer Associates, P.O. Box 239, Park Ridge, N.J. 07656 (Publishes books on SWBC, utilities; equipment, accessories)

International Radio Club of America, 12536 Arabian Way, Poway, Calif. 92064 (Specialized coverage of AM broadcast DX; publishes IRCA Foreign (MW) Log)

International Utility Hunters, 2180 Bolton St., Apt. 1F, Bronx, N.Y. 10462 (Non-broadcast DX bulletin, offset)

Medium Wave Circle, 7 The Avenue, Clifton, York Y03 6AS, England (AM broadcast only; info on European MW DX, European reception of U.S. broadcast band)

National Radio Club, P.O. Box 99, Cambridge, Mass. 02138 (AM broadcast; publishes NRC Domestic Log, Night Pattern Book of U.S./Canada AM stations)

Newark News Radio Club, P.O. Box 539, Newark, N.J. 07101 (General coverage including ham listening, utilities, TV, FM; holds annual picnic)

North American Shortwave Association, P.O. Box 8452, South Charleston, W. Va. 25303 (Strictly shortwave broadcast; highly specialized coverage of all SWBC stations)

RTTY Journal, P.O. Box 837, Royal Oak, Mich. 48068 (Teletypewriter DX, utilities, news agencies, RTTY weather stations)

Shortwave Reporter, P.O. Box 8, Kirkwood, N.Y. 13795 (SWBC, background on stations; printed magazine)

SPEEDX, P.O. Box 321, Santa Ana, Calif. 92702 (SWBC, propagation, utilities; publishes Utility DX-ers' Handbook)

SWL Guide, 414 Newcastle Rd., Syracuse, N.Y. 13219 (Books and accessories for SWL's; publishes SWL's Handbook)

SWL Spectrum Magazine, P.O. Box 253, Deerfield, Ill. 60015 (New magazine, covers SWBC, utilities, VHF)

Worcester Electronics Laboratory, R.D. 1, Frankfort, N.Y. 13340 (Manufacturers SM-1 and SM-2 miniature directional AM loop antennas)

World Radio Bulletin, P.O. Box 114, Edinburgh EH1 1HP, Scotland (Publishes biweekly bulletin of news of SWBC stations, new times and frequencies)

World Radio-TV Handbook, 165 W. 46th St., New York, N.Y. 10036 ("The DX-er's Bible," Full coverage of all station skeds, issued annually in January)

the names or calls of interfering stations, descriptions of rates of fading, kinds of flutter, noise, or other degrading effects. But to small stations, especially those juicy catches in Latin America, Africa, Asia, and the small islands of the Pacific, you should describe reception quality in simple words, above and beyond the SINPO code or in place of it.

Writing the Station. International broadcasters want to hear from you. Many stations constantly appeal for letters. In fact, whether or not a station stays on the air—especially in Western countries—depends upon listener reaction. Listener statistics are based upon mail response, the closest thing to Nielsen ratings in the shortwave world. The stations are glad to receive reception reports even when they have official monitors and when large international broadcasters routinely exchange tape recordings of each other's audibility.

The reports you send will help show them how they can be heard in your location, with your equipment. Therefore, it's

important when writing to specify exactly what you're using in the way of receivers, preamplifiers, filters, antennas, grounding systems, and so on. On the other hand, don't list all of the contents of your shack, such as tape recorders or stereo amplifiers, things which don't actually contribute to reception of the basic signal. And although you may be proud of your particular make of receiver or preamp, unless the distant station is likely to recognize the make and model number, it's better to describe the general type of equipment being used in simple, clear terms like "communications receiver," "hand-held portable," "clock radio," "medium-range communications-type receiver," as the case may be.

You may want to describe a single reception, lasting, say, half an hour. For a rare, low-powered station you have only heard once, this is natural; you may not hear it again. But a big, international broadcaster would actually like to know that you are listening on a regular basis and how reception is at your location over a period of days or weeks, under different propagation conditions, and perhaps at different times of day, if the station has, say, a morning and evening broadcast, both beamed your way. You could combine both techniques by sending a detailed report with plenty of authenticating program details for a single transmission on one date, along with a more general survey of that station's reception at different times, on different frequencies and over a period of days or weeks. Be honest about reception. A weak, low powered station will be suspicious if your report speaks of "loud and clear" reception where such is unlikely.

Use airmail when writing, as a stale report is of little use to the station and won't get you much of a response. You can fit a fairly good report on an aerogram form obtainable from any post office for 15 cents. A regular half-ounce airmail letter to Canada and Mexico is 11 cents; to the rest of Latin America, 17 cents; to all other countries, 21 cents. *International Reply Coupons*—little slips of blue paper which pay for a surface-mail letter from any member country of the Universal Postal Union—are available at bigger post offices and can act as return postage to help encourage smaller, poorer stations to reply. But there's no need to send them to the major, government-run stations. Actually, the best thing is to send *mint stamps*, if you can afford it, from the country to which you are reporting. Your local stamp dealer or the DX Stamp Service can provide them. But be sure they are currently valid; the stamp dealer in your town, for instance, selling to philatelists, isn't accustomed to selling stamps to be used for postage! And most countries' stamps are valid only for a few years or until the next revolution . . . unlike the U.S., all of whose stamps issued since the Civil War are still valid for postal use.

Radio Moscow operates in about 70 languages in its foreign service. Transmitter powers range from 50 to 250 kW. N. A. service heard evenings 7150, 9685, 11900.

Should I Send a Tape Recording? Many SWL's are also tape recording buffs. Some stations are glad to get tapes of their signal. But never send a "blind" tape; that is, without an accompanying letter. Sending a tape by airmail can get expensive, too. Some stations (Prague, Sofia, Budapest, a few Western countries) welcome them and will return them after listening, sometimes with their own music taped over. Others enjoy hearing them, but regretfully cannot return them. HCJB Quito is one example in this category. Others like Trans-World Radio, Bonaire, simply cannot take the time to find a compatible recorder, feed the tape on, and listen, matching it up with the accompanying letter. For a short-staffed station, this can be a big job. It would be best to contact the station by letter first. Perhaps when you have shown such expertise that you are enrolled as an official monitor, you might inquire about sending tapes. On the

S	I	N	P	O
Signal Strength (QSA)	Interference (QRM)	Atmospheric Noise (QRN)	Propagation Disturbance (QSB)	Overall Merit (QRK)
5 Excellent	5 None	5 None	5 None	5 Excellent
4 Good	4 Slight	4 Slight	4 Slight	4 Good
3 Fair	3 Moderate	3 Moderate	3 Moderate	3 Fair
2 Poor	2 Severe	2 Severe	2 Severe	2 Poor
1 Barely Audible	1 Extreme	1 Extreme	1 Extreme	1 Unusable

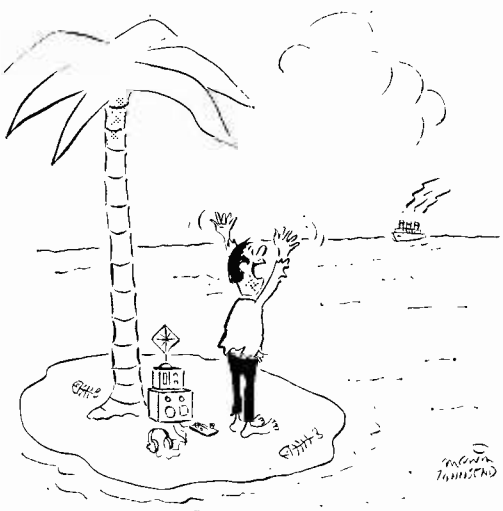
Simple SINPO code used for reporting SW reception to stations to earn QSL card.

other hand, if you detect a genuine defect or problem in the station's operation—a transmitter hum, a modulation problem, two programs dumped on top of each other on the same frequency (as happened only a few nights ago, when your author heard Radio Canada International ruefully admit it had "simulcast" the Montreal domestic AM station, CBM, and the CBC International shortwave program on the same shortwave frequency, producing a hopeless jumble)—a tape to the station would be in order.

Verification. For most SWL's, the main purpose of reporting to a station is, of course to "get that QSL"—an official verification. Only the station can issue a QSL verification, can tell you whether what you think was the station actually was what you heard. You present the evidence (the report, including program details) and the station, like a judge, hands down the decision: the verification (you hope) or nonverification (if your report is wrong). Of course, just as judges are imperfect, the station isn't always right. Tricksters can fool stations with fake reports, but you can't fool all of the people all of the time, and soon enough the trickster's name will be mud in the eyes of his fellow SWL's.

A good QSL is worth working for. Radio Japan's QSL cards are breathtaking masterpieces of Japanese art. Germany's Deutsche Welle issues cards which are gems of contemporary design. Deutsche Welle, Radio Canada International, Radio Warsaw, and many other stations produce commemorative QSL cards roughly as stamps memorializing important events are produced by all nations. It may be a sports event like the Munich Olympics, or the inauguration of a new relay base, or perhaps the 50th anniversary of radio broadcasting in a certain country. Radio Tahiti's artistic card shows a topless mermaid. Other stations verify by form letter (XERMX Radio Mexico is one example), by folder (Radio Ulan Bator, Mongolia), or by personal letter (most small stations in Latin America).

A good QSL should show date, time, and frequency of reception, and bear the signature or rubber stamp of an officer of the station. There's no harm in asking, politely, for inclusion of these details. SWL's reporting the myriad of Soviet regional transmitters to Radio Moscow like to ask for specification of the transmitter site on the QSL and sometimes Mrs. Eugenia Stepanova, the "verie-signer" (verification signer) at Radio Moscow will oblige. The verification signer is the SWL's friend; keep him (or her) friendly by sending a good report, and requesting, not demanding, a QSL verification. Soon, you'll be able to start filling an album or a wall display full of these colorful and meaningful cards from all over the world. ◈



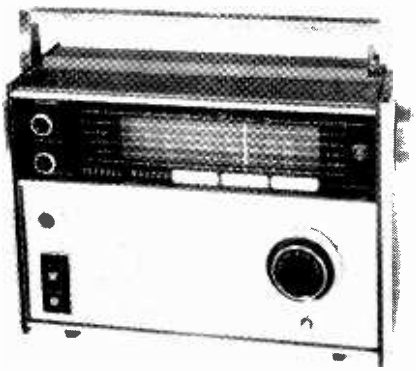
"DIDIDIT DAHDAHDAH DIDIDIT!"

SW Receivers

CHANNEL MASTER

6246 FIVE-BAND SW RECEIVER

Covers regular AM & FM broadcast bands; MB from 1.6 to 4.5 MHz; SW from 4.5 to 12 MHz;



and police band from 147 to 174 MHz. Features both 117 V a.c. & battery operation; a.f.c.; squelch control; built-in telescoping marine, SW, and PSB antennas with external terminals. 11⅜" x 8" H x 4" D. $79.95

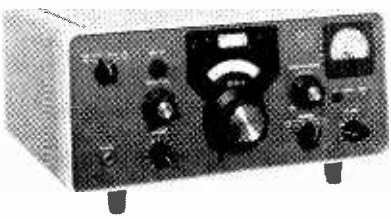
6247 SIX-BAND SW RECEIVER

Features regular AM & FM broadcast-band coverage plus both low- and high-band VHF Public Service bands, and two shortwave bands. Has telescoping SW and PSB antenna and external antenna terminals; battery condition/tuning meter; a.f.c.; squelch control. World time zone map & converter dial. Operates from 117 V a.c. or batteries. 12" W x 15⅝" H x 5" D. $109.95

COLLINS RADIO

51S-1 SHORTWAVE RECEIVER

Vacuum-tube design tunes from 200-2000 kHz (primarily for lab applications and broadcast monitoring) and 2.0-30.0 MHz; triple-conversion below 7.0 MHz; double-conversion in range 7.0-30.0 MHz; 30 bands each 1-MHz wide excepting 200-1000 kHz; direct digital readout of frequency; r.f. gain control; accurately calibrated S meter and audio output metering; mechanical filters for SSB reception; crystal-lattice filter for CW reception; bridged-T rejection notch filter; product detector; b.f.o.; built-in 100 kHz calibrator; requires external speaker; built-in 117-volt a.c. power supply; $2333.00



75S-3C SHORTWAVE RECEIVER

Vacuum-tube design; solid-state regulated power supply; tuning range covers 80 75, 40, 20, 15,

and portion of 10 meter ham bands, plus 14 other 200-kHz-wide SW bands from 4.0-28.0 MHz; dual-conversion receiver with visual resolution of frequency to less than 1 kHz; three built-in bandwidth selectors using mechanical filters; built-in 100-kHz crystal calibrators; S meter; r.f. gain control; r.f. antenna trimmer and preselector; variable b.f.o.; reception modes AM, CW, lower single sideband, and upper single sideband; headphone jack on front panel; RCA phono-jack antenna input connection; built-in 117-volt a.c. power supply; $1150.00

651S-1 SHORTWAVE RECEIVER

All-solid-state; tuning range 400 kHz-30 MHz with coarse frequency adjustment in 100-kHz

and 1-MHz steps, plus tuning dial that varies frequency in 100-Hz increments at a rate of

10-kHz per revolution; direct frequency digital readout; squelch; combination calibrated r.f. and audio-line-level output meter; switchable a.g.c.; b.f.o.; r.f. gain control; modes of reception include AM, single sideband (USB, LSB, ISB), FM (narrow-band), CW, RTTY, and data, with selection of various bandwidths provided; phase-lock frequency synthesizer; built-in 117/230-volt, 47-420 Hz a.c. power supply; 28-volt d.c. power supply available as optional extra; $4605.00

DRAKE

DSR-1 COMMUNICATIONS RECEIVER

All-solid-state; dual-gate MOSFET's; continuous coverage 10 kHz-30 MHz; phase-locked digital readout frequency synthesizer giving incremental frequency selection in 100-kHz, 1-MHz, and 10-MHz steps; 100-Hz readout of received frequency; multiple-conversion; squelch; noise blanker; notch filter; phone jack on rear panel; selectable a.v.c.; b.f.o.; various modes of reception including CW, lower and upper single sideband, AM, independent sideband, etc.; company claims AM sensitivity of 1 μV and selectivity of 6 kHz at 6 dB down and 12 kHz at 60 dB down on AM; CW selectivity at 6 dB down either 250 Hz or 1200 Hz; SSB selectivity at 6 dB down 2.4 kHz; built-in 117/230-volt, 50-420 Hz a.c. power supply; 12-volt power supply optional extra; $2295.00

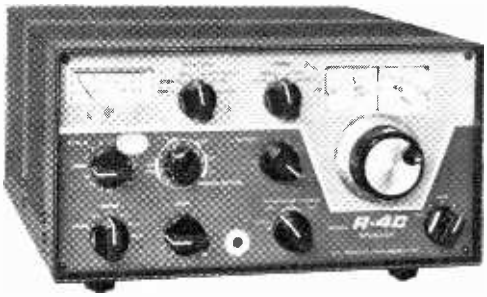
SPR-4 PROGRAMMABLE RECEIVER

All-solid-state with FET r.f. stage; tuning range covers 150-500 kHz plus any 23 500-kHz wide

ranges in spectrum from 500 kHz to 30.0 MHz (10 ranges supplied by manufacturer); dual-conversion; direct frequency readout; three built-in bandwidths, corresponding to mode of reception: 400 Hz for CW, 2400 Hz for SSB, and 4800 Hz for AM; built-in speaker; notch filter; 100-kHz calibrator and i.f.-type noise blanker available as optional extras; S meter; crystal-lattice i.f. filters; product detector; may be operated from 12-volt battery; may be used with external speaker; built-in 117-volt a.c. power supply; $579.00

R-4C COMMUNICATIONS RECEIVER

Vacuum-tube design except for solid-state v.f.o., audio, a.g.c., and accessory noise blanker; bandspread tuning 80/75, 40, 20, 15, plus a 500-kHz segment of 10-meter ham bands; dual-conversion receiver with crystal-controlled first local oscillator; 15 accessory crystal sockets provided for coverage of any 15 additional 500-kHz ranges between 1.5-30.0 MHz (excepting



5.0-6.0 MHz); antenna trimmer and preselector; r.f. gain controls; S meter; crystal lattice filter in i.f. stages; product detector; notch filter; 2-4 kHz 8-pole crystal lattice filter included; accessory filters in 0.25, 0.5, 1.5, 4.0, and 6.0 kHz bandwidth available; requires external speaker; built-in 117-volt a.c. power supply and 25 kHz calibrator. $499.95

SW-4A SHORTWAVE RECEIVER

Vacuum-tube design; tuning range 150-500 kHz plus 500-1500 kHz and 49, 41, 31, 25, 16, 13, and 11 meter international shortwave broadcast bands; direct frequency readout; S meter; crystal-lattice i.f. filter; phone jack on front panel; tone control; requires external speaker; built-in 117-volt a.c. power supply; $335.00

GALAXY

R-1530 COMMUNICATIONS RECEIVER

All-solid-state; tuning range 100 kHz-30 MHz in 500-kHz wide segments; dual-conversion with phase-lock first oscillator enabling visual resolution of frequency to less than 1 kHz; three built-in bandwidth selections including 500, 1500, and 6000 Hz; r.f. gain control and r.f. input attenuator; built-in 50 kHz calibrator; combination S and audio-level output meter; variable b.f.o.; reception modes AM, CW, upper and lower sidebands; crystal-lattice i.f. filters;

product detector; requires external speaker; supplied with 2.1 kHz crystal-lattice filter; built-in 117-volt a.c. power supply; may be operated from 18-volt d.c. supply. $1075.00

HEATH

GR-78 SHORTWAVE RECEIVER

All-solid-state; tunes from 190 kHz to 30.00 MHz; dual-conversion receiver circuit; bandspread tuning calibrated for either ham radio or shortwave international broadcast bands; S

meter; switchable automatic noise limiter and a.g.c.; standby switch; ceramic filters in i.f. stages; built-in collapsible whip antenna; external antenna jack; receiver muting connection; headphone jack on rear panel; may be operated from 117/240 volts a.c. or 12 to 15 volts d.c. with internal charging circuit—initial operation from built-in rechargeable nickel-cadmium batteries; claimed sensitivity is 7.5 kHz at 6 dB down; (kit only) $129.95 mail order

SB-313 SWL RECEIVER

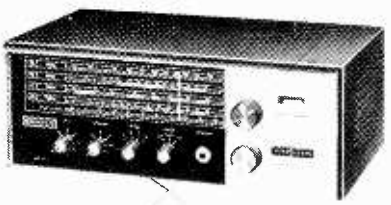
Covers nine switch-selected shortwave bands between 3.5 and 21.8 MHz. Receives SSB, CW,

and AM. Sensitivity 0.5 μV for 10 dB (S + N)/N for SSB operation. Audio output 4 W at 10% distortion. Supplied with 5-kHz crystal filter. Separate CW & SSB crystal filters optional. Has IC crystal calibrator providing markers every 100 kHz or 25 kHz. 8" x 12½" x 14" D. (kit) $339.95 mail order

SB-600. 6" x 9" 8-ohm spkr. & cabinet kit $19.95
SBA-301-2. CW filter $22.95
SBA-310-2. SSB filter $39.95

SW-717 COMMUNICATIONS RECEIVER

All-solid-state; operates from 117-volt a.c. line;



four bands cover 550-1500 kHz, 1.5-4.0 MHz, 4.0-10 MHz; and 10-30 MHz; S meter; front panel headphone jack; built-in speaker; AM or CW reception; variable b.f.o. pitch; automatic noise limiter; built-in rod antenna with provisions for external antenna; (kit only) $59.95 mail order

NATIONAL RADIO

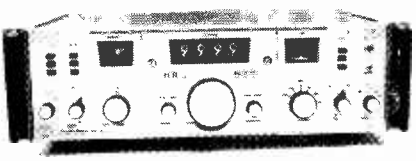
HRO-500 SHORTWAVE RECEIVER

All-solid-state; tuning range covers 5.0 kHz-30.0 MHz in sixty 500-kHz wide segments; dual-conversion with phase-lock first oscillator enabling visual resolution of frequency to less than 1 kHz; four built-in bandwidth selections

including 500. 2500. 5000, and 8000 Hz; r.f. gain control and r.f. input attenuator; selectable tuning ratio of either 10 kHz or 50 kHz per knob revolution; passband tuning of i.f. filter; built-in crystal calibrator; S meter; variable b.f.o.; reception modes: AM, CW, lower and upper single sidebands; product detector; rejection or notch tuning in i.f. strip; SO-239 antenna input connection; built-in 117-volt a.c. supply but may be operated from 12.6-volt d.c.; $1995.00

HRO-600 SHORTWAVE RECEIVER

All-solid-state with FET's and continuous coverage from 10 kHz to 30 MHz; phase-locked frequency synthesizer with three frequency-control plug-in options: Type 601 digital readout search v.f.o.; Type 602 Veeder-Root setup synthesizer; b.f.o.; combination calibrated S, r.f. input, and audio line-voltage output meter;



switchable a.g.c. with three options; antenna attenuator switchable 20 dB; headphone jack on front panel; built-in 117 230 volt, 47-420 Hz a.c. power supply.

Main frame $2900.00
HRO 600/601. VFO search version $3380.00
HRO 600/602. Synthesizer version. ... $3732.00
HRO 600/604. Synscan (special order). $4235.00
Various accessories available, including spare parts kits.

PANASONIC

RF-1260 SHORTWAVE RECEIVER

In addition to standard AM & FM broadcast bands, design covers both high- and low-VHF Public Service bands. along with marine and 6 to 18 MHz shortwave band. Features 1.5 W output; 5" speaker; squelch control. Operates from 117 V a.c. or four "C" cells. $109.95

RF-1700 SHORTWAVE RECEIVER

Similar to the Model RF-1260 but has 8 bands (has additional aircraft and another shortwave band). Shortwave bands covered are 4.5 to 12 and 12 to 26 MHz. 1.8 W output. Requires six "C" cells $134.95

RF-5000A SHORTWAVE RECEIVER

Covers 8 SW bands, 1.6-30 MHz, as well as standard AM, FM. and low-band broadcast bands; features b.f.o. switch; automatic noise

limiter; bandwidth and bass/treble controls; a.f.c. switch; output power 2 watts; operates from 117-V a.c. or six "D" cells. $349.95

RADIO SHACK

DX-150B SW RECEIVER

All-solid-state with FET r.f. stage; tuning range 535 kHz-30.0 MHz; single-conversion circuit;

bandspread tuning of 80/75, 40, 20, 15, and 10 meter ham bands; antenna trimmer; r.f. gain control; switchable automatic noise limiter; b.f.o.; product detector; headphone jack on front panel; fast or slow a.g.c. switching; to be used with external voice-frequency speaker; built-in 117-volt a.c. power supply but may be operated from 12-volt negative-ground d.c. supply; $139.95

ZENITH

ROYAL D-7000Y SW RECEIVER

Features an adjustable weather band and ten other bands. Has a bandspread of 161-164

MHz for all weather stations; AM & FM broadcast coverage; 150-400 kHz longwave band; 1.6-3.5, 3.5-9, 9.4-10.1, 11.4-12.33, 14.6-15.8, 17.1-18.5, and 20.6-22.4 MHz shortwave bands. Operates from 117/230 V a.c. or battery (9 "D" cells). Includes time-zone scale, logging scale, azimuth scale, and 6" oval speaker. Features BFO that decodes SSB broadcasts. $299.95

ROYAL E94Y SW RECEIVER

Covers AM and FM broadcast bands; VHF-Lo, VHF-Hi, and UHF public service bands, and VHF aircraft band (108-135 MHz); has earphone and 4" speaker; a.c. or battery operation (four "D" cells); 8⅜" H x 11⅞" W x 4⅛" D. 5½ lbs without batteries. $99.95

ROYAL D52Y SW RECEIVER

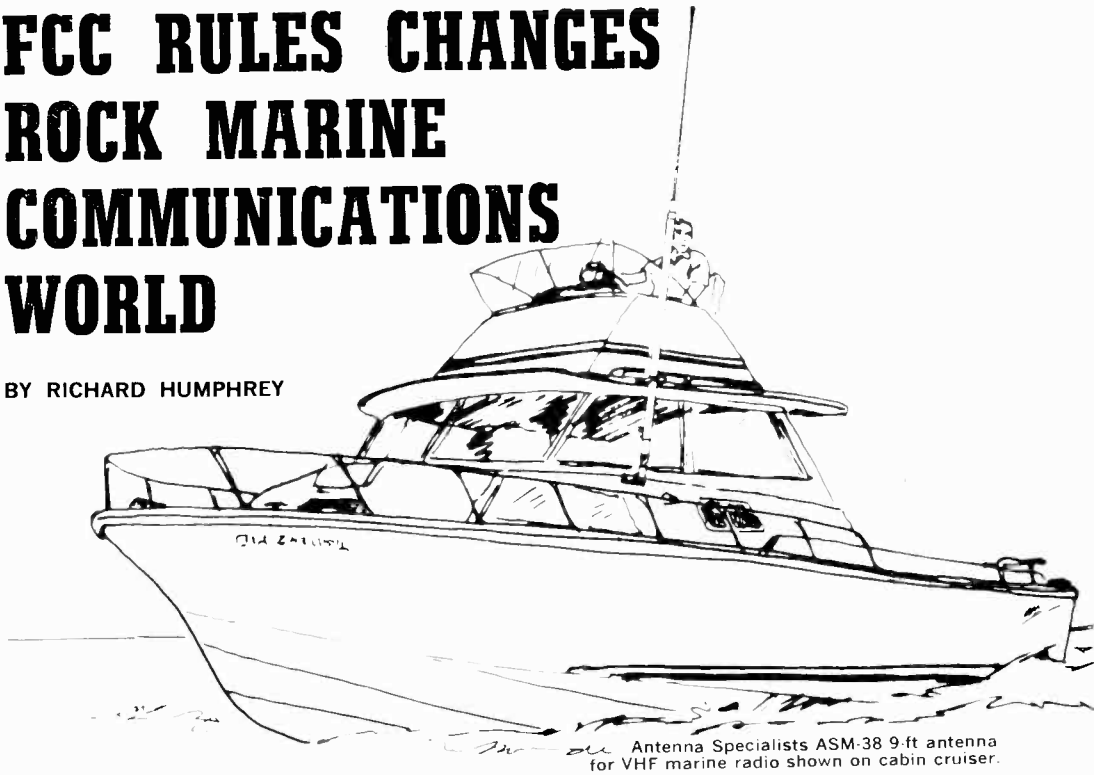
Covers 23 PSB bands including three weather bands as well as AM and FM broadcast bands; a.c. or battery operation (four "AA" cells); earphone or speaker output; telescoping FM/PS antenna; 5⅝" H x 8¾" W x 3½" D. $44.95

Don't forget . . .

If you need additional information on any of the products listed in this handbook, don't hesitate to write directly to the manufacturers. They will be more than pleased to help. (See company address list beginning on page 8.)

FCC RULES CHANGES ROCK MARINE COMMUNICATIONS WORLD

BY RICHARD HUMPHREY



Antenna Specialists ASM-38 9-ft antenna for VHF marine radio shown on cabin cruiser.

SPURRED by the congestion and interference on the 2-3 MHz marine band caused by America's swollen pleasure boating population, the Federal Communications Commission began in the mid-60's to sell a new philosophy of marine communications to the world. The result has been some of the most dramatic changes in over 50 years and marine communications which are finally making sense.

By making use of the line-of-sight characteristic of VHF, reducing the legal output power from 50 to 25 watts, and writing some hard-nosed rules and regulations, the Commission has succeeded to a great extent in separating "distance" and "local" traffic and divorcing "commercial" from "non-commercial" communications.

Late in '68 and early in '69 it expanded the existing VHF/FM (156-162 MHz) marine band from 18 channels to 38 (adding one "broadcast" channel which it intended as a combined weather, local conditions, and navigational advisory service) and included some features to lure the nation's pleasure boaters from the 2-3 MHz band to the VHF band. The FCC also subdivided the VHF/FM band by limiting the use of certain frequencies to port areas, others to commercial traffic only, still others to pleasure boat communications only, and created a new marine distress frequency (channel 16, 156.8 MHz) which was unique in that it applied only to American waters.

In expanding to 38 transmit-and-receive channels plus the one broadcast frequency, the Commission faced some problems. Because we have literally run out of radio room, the 38 channels could occupy no more space than the former 18. This meant the channel spacing had to be reduced from 50 kHz to 25 kHz. But this increased the possibility of adjacent-channel interference. As a result, the FM deviation had to be reduced from ± 15 kHz ("wide-band" FM) to ± 5 kHz ("narrow-band" FM). This, in turn, reduced the so-called "capture effect" of FM. An FM receiver tends to accept or "capture" the strongest signal and eliminates any weaker signal on the same frequency. When the FM "swing" is reduced so is the capture effect. This means that signals almost as strong as the one you want to hear will occasionally feed through and "capture" your receiver. It's not all that bad at the present time. Later, as more boats are equipped with FM transceivers, it may become a problem. It must be noted, how-

FM MARINE-BAND FREQUENCIES

Channel Number	Frequency (MHz) Ship	Coast	Points of Communication
		Distress, Safety & Calling	
16	156.800	156.800	Ship/ship, ship/coast
		Intership Safety	
6	156.300	156.300	Ship/ship only
		Port Operations	
65	156.275	156.275	Ship/ship, ship/coast
66	156.325	156.325	"
12	156.600	156.600	"
73	156.675	156.675	"
14	156.700	156.700	"
74	156.725	156.725	"
20	157.000	161.600	"
		Navigational	
13	156.650	156.650	Ship/ship, ship/coast
		Environmental	
15	—	156.750	Coast/ship broadcast
		State Control	
17	156.850	156.850	Ship/coast only
		Commercial	
7	156.350	156.350	Ship/ship, ship/coast
67	156.375	—	Ship/ship only
		Non-Commercial	
68	156.425	156.425	Ship/ship, ship/coast
9	156.450	156.450	"
69	156.475	156.475	Ship/ship, ship/coast
70	156.525	—	Ship/ship only
71	156.575	156.575	Ship/ship, ship/coast
72	156.625	—	Ship/ship only
78	156.925	156.925	Ship/ship, ship/coast
		Public Correspondence	
24	157.200	161.800	Ship/public coast
84	157.225	161.825	"
25	157.250	161.850	"
85	157.275	161.875	"
26	157.300	161.900	"
86	157.325	161.925	"
27	157.350	161.950	"
87	157.375	161.975	"
28	157.400	162.000	"

2-3 MHz MARINE-BAND FREQUENCIES

Frequency (kHz)	Emission	Remarks
2003.0	A3, A3A, A3J, A3H	Gt. Lakes only
2065.0	A3A, A3J	—
2079.0	A3A, A3J	—
2082.5	A3A, A3J	—
2093.0	A3A, A3J	Commercial fishing only, ship/ship

8	156.400	—	"
9	156.450	156.450	Ship/ship, ship/coast
10	156.500	156.500	"
11	156.550	156.550	"
77	156.875	—	Ship/ship only
18	156.900	156.900	Ship/ship, ship/coast
19	156.950	156.950	"
79	156.975	156.975	"
80	157.025	157.025	"
88	157.425	—	Ship/ship only

2096.5	A3A, A3J	Business, operations
2142.0	A3, A3A, A3J, A3H	Daytime, ship/ship, Pacific Coast north of 42°N only
2182.0	A3, A3H	International Distress & Calling
2203.0	A3A, A3J	Gulf of Mexico only
2638.0	A3, A3A, A3J, A3H	—
2738.0	A3, A3A, A3J, A3H	All areas except Gt. Lakes, Gulf of Mex.
2670.0	A3, A3A, A3J, A3H	—
2830.0	A3, A3A, A3J, A3H	Gulf of Mexico only

ever, that the users of land mobile VHF/FM communications have been using narrow-band (±5 kHz) FM for years without too much trouble.

The FCC then turned its attention to the overcrowded 2-3 MHz marine band. The Commission already had regulations (§§83.356 & 82.258) which prohibited the use of 2-3 MHz frequencies when the 156-162 MHz FM band would provide effective communications. But few people knew it existed. To bring the point home—and to provide a further "inducement" for pleasure boatmen to switch to the FM band—the FCC wrote § 83.351, which says, in part, that ". . . a ship station shall first attempt to communicate on the appropriate VHF channels" before using 2-3 MHz frequencies.

The FCC then began the complex job of phasing out double sideband in the 2-3 MHz band in favor of single sideband. To make the separation between distant (2-3 MHz) and local (VHF/FM) communications even more definite, the following was required after January 1, 1972: *double* sideband transceivers could not be installed on vessels unless these radios had been licensed before that date, had been aboard another boat, and had been brought aboard a new boat and had been continuously owned by the same person. Even then, they would become illegal after January 1, 1977.

Further, no new installations of *single* sideband radios would be permitted after January 1, 1972 unless the boat had a licensed VHF/FM radio already on board. To allow amortization of existing 2-3 MHz double-sideband equipment, the FCC allowed those sets which were licensed before January 1, 1972 to be used until January 1, 1977.

Presently, all single-sideband equipment must be capable of three kinds of emission: SSB *suppressed* carrier (A3I) where the carrier is at least 40 dB below PEP; SSB *reduced* carrier (A3A) where the carrier is 6 dB ±2 dB below PEP; and SSB *full* carrier (A3H) where the carrier is between 3 and 6 dB below PEP. A3H or SSB full carrier is termed "compatible sideband" or "AM" in the marine market and is the only form permitted on 2182 kHz, the International Calling & Distress Frequency in the 2-3 MHz band. The major use of A3H will be in communicating with the "Grandfather clause" double-sideband rigs still on the air during the January 1, 1972 to January 1,

1977 transition period. The reason for the inclusion of A3A (SSB reduced carrier) is to give Public Correspondence (Marine Ship-to-Shore Operator) stations enough carrier for their automatic frequency-control circuits to latch onto and also to activate their automatic monitors, which let the operator know there is traffic on the channel.

It's doubtful if there will be many of the outmoded double-sideband rigs on the air once there is an appreciable number of single-sideband radios in use. Not only does an SSB signal chop double sideband to pieces, but the human element will operate to increase the dropout rate. While there's a requirement that single-sideband transmitters be able to put out SSB full carrier (A3H), there's no law that says the boat owner must *use* it. If Good Old Charley wants to use his double-sideband gear to break in on a QSO between two maritime sidewinders and the two don't feel like talking to Charley and refuse to switch to A3H you're going to have one frustrated character on your hands . . . one that's not going to stay on double sideband very long.

At first, there was some frustration and considerable resentment among pleasure boatmen against the requirement that if they wanted 2-3 MHz SSB radios they first had to install and license a VHF/FM transceiver. Their attitude was that they were being forced to buy two marinephones to do the same communications job that one marinephone did formerly. This, they said, was an "unreasonable financial burden." But once they used FM and found out that it served 90%-or-better of their communications needs, most pleasure boaters admitted they didn't need or want 2-3 MHz equipment.

Commercial shippers, of course, have been using the 156-162 MHz FM band for years. As a matter of fact, many companies operating in port areas—tugboats, workboats, feeder tankers, and the like—depend so much on this quick means of contacting their boats directly from their own base stations (rather than resorting to working through the Marine Operator) that they'd be out of business without it.

The nation's pleasure boater's may find that they'll be out of business even *with* the FM band unless they can institute some form of self-discipline to keep traffic to a minimum and stop stepping on each other's tongue. ◈

MONITORING THE PUBLIC SERVICE BANDS

POLICE, FIRE, AND WEATHER REPORTS ATTRACT A WIDE LISTENING AUDIENCE.

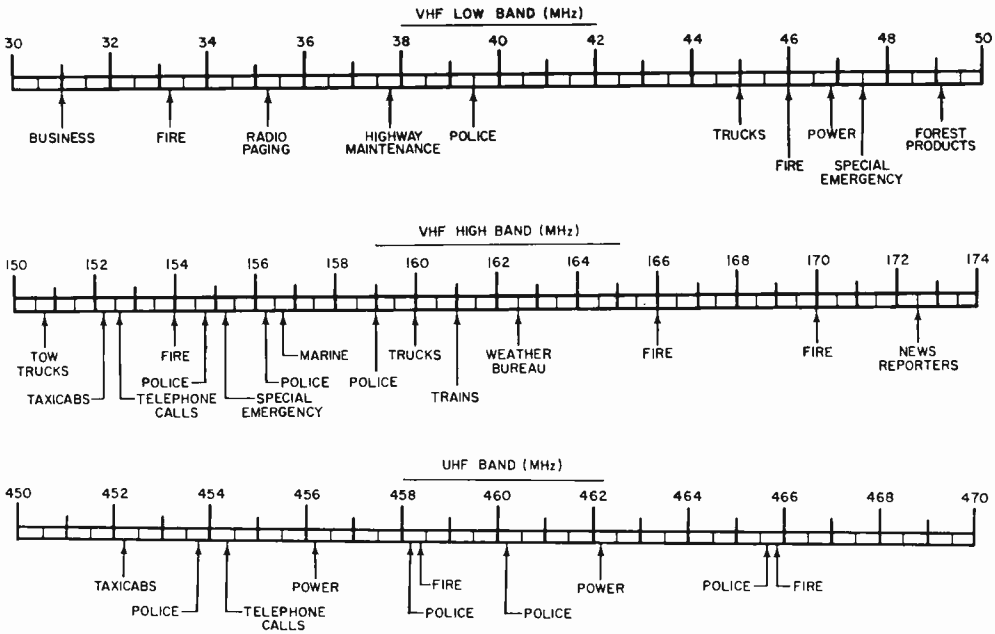
BY MATT P. SPINELLO

TELEVISION soap operas are beginning to take a back seat to a new form of enlightenment, entertainment, and news-oriented communications. Monitoring the Public Service Radio bands is fast becoming a major hobby in households throughout the country. Thousands have turned to "listening in" on Public Service transmissions that provide "instant" news. The transmissions spotlight crime, disasters, and weather conditions.

The desire to "eavesdrop" on Police and Fire activity, weather reports, and mobile telephone calls has created a multimillion-dollar annual market for manufacturers of VHF/UHF monitoring receivers. Judging by past sales and the prediction of near $100 million in receiver sales within a three-year period, the "fad" would seem to have stabilized itself into a full-time hobby activity similar to that of shortwave listening but by an entire community.

Public Service monitoring buffs range from famous Boston Pops conductor Arthur Fiedler to little old ladies in rocking chairs, CB'ers, Amateur Radio operators, and perhaps your neighbors. Monitors are becoming as common in the kitchen as AM-FM broadcast receivers and are often used more frequently. Many manufacturers now include the Police, Fire, and Weather bands on their broadcast receivers. From an industry that was originally dominated by two firms, there are now close to 30 manufacturers producing monitor receivers.

To some, monitoring the Public Service frequencies is a form of entertainment, satisfying curiosity. More often, the listener is concerned with crime in the area. Sales skyrocketed in one community following civil disorders. Reasons for purchasing monitor receivers are as varied as those who buy them. Some women monitor the Police frequencies in their areas with definite purpose.



Frequency allocations in the VHF/UHF Public Service Bands.

If a Police transmission indicates there is a would-be attacker loose in the neighborhood, children are kept close to home and neighbors are notified. Many offenders have been apprehended because alert monitor listeners have picked up the description of suspects, or a license number from a transmitted report, and later notified the Police after spotting the suspect and/or vehicle. An Indiana woman listened as Police cars were dispatched to a bank robbery across the street from her home. The bandits were gone when the Police arrived, but the woman handed them the license number of the getaway car and the robbers were apprehended.

Other monitoring buffs listen to pass the time of day or night. Dispatchers sometimes pass on dull assignments regarding an abandoned car or a bat in the attic. However, when a shooting is announced, a request for an ambulance, or the report of someone being held at gunpoint, Police business can become highly dramatic, without the pat lines of the TV performer and no commercials in between. During such activity, the monitoring public gets a truer picture of where its tax dollars are being spent and by what means they are being protected as they listen from the comfort of their homes.

Monitoring receivers are legal according to an interpretation of FCC Rules. The Commission does not prohibit listening but frowns on use of the material for profit. It prohibits anyone from making *any* private use of information heard but not directed to them. In three or four states there are antiquated laws which prohibit installation of monitors in vehicles. One state's law threatens confiscation and/or destruction, another charges $25 per year for a mobile installation permit. Police officials have stated that the law is rarely enforced, but is there "if needed." A typical example requiring enforcement may be a fire chaser who seems to arrive at every scene, stumbling over hoses and firemen in an attempt to become part of the action. Another may include an individual who frequently arrives on the scene and extends his nose an inch too far into Police business.

VHF/UHF Public Service monitoring is not confined to Police and Fire activity. There are frequency allocations in three bands: VHF Low Band, 30-50 MHz; the VHF High Band, 148-174 MHz; and the UHF Band, 450-470 MHz. Within the confines of those bands are thousands of transmissions aired daily. They include calls generated by police, fire, weather, marine, ship-to-shore, security patrol, business,

utility, train and business transmitters.

In order to monitor more than one frequency at a time in the early days of VHF/UHF reception, it was necessary to continually tune a variable receiver up and down the band. That technique did not guarantee that the operator would locate a station unless it happened to be transmitting as he tuned. It was a search-and-go procedure that created much frustration. The situation improved with the introduction of crystal-controlled receivers, but not much. Most monitors were offered with two or three channel positions.

Scanning Monitors. The introduction of the *scanner* monitor/receiver revolutionized the entire industry. In operation, the receiver "scans" the frequencies (usually with sequentially flashing lights) and locks in on the one that is transmitting. When the transmission ends, it moves on to the next one down the line to seek out another signal. Some scanners employ an adjustable rate of scanning to slow down or speed up the rate to as much as half a second through eight different frequencies. If there are no transmissions, the scanning continues to repeat the process until one appears. In effect, the operator is monitoring all eight channels at once, without any tuning on his part. Another feature on scanner monitors allows the listener to lock in one or more favorite channels so that the scanner will bypass others, as selected.

Of the equipment types available, many offer at least eight-channel monitoring. As many as 16 crystals can be installed in some models; or by preference, specific receivers can be purchased for monitoring 1, 2, or 4 channels. There are also scanner monitors that will scan simultaneously all three bands: VHF Low, VHF High, and UHF.

Manufacturers offer a wide variety of scanners for mobile installations that can be easily mounted under the dashboard. Some of them are ac/dc powered so they can be operated from the power line as well. Small converters are available that operate through mobile CB radios; others will turn a basic AM-FM radio into a Public Service receiver. A battery-operated unit, measuring a mere 6″ × 2.5″ × 1″, meets portable needs.

Frequencies in Your Area. There are a number of ways to learn which frequencies are in use in your area by various Public Service organizations. Dealers who handle scanner monitor/receivers usually make it their business to know the frequencies in their own coverage area and are happy to pass on the information; it helps sell receivers!

Depending on where you live, you may be able to obtain the Police and Fire frequencies from the departments. The Detroit Police Department, for example, sends out thousands of Police Radio Code Cards to those who request them through the mail.

In the major metropolitan areas you can fill several crystal sockets to monitor just the Police. The low band may contain frequencies for State Police and Sheriff Department message handling, while the local Police may have a number of frequencies in the VHF High Band. The Chicago Police Department, for example, is licensed for 19 frequencies. You may want to sample a few of the more active law-enforcement channels and draw the rest from other area activity.

The U.S. Department of Commerce has installed more than 60 VHF Weather Service Stations in metropolitan areas and encourages the public to stay tuned. The network disseminates weather information and disaster warnings on a 24-hour basis. It also transmits temperature, humidity, and other pertinent facts. The two frequencies employed nationwide for the continuous transmission of weather information are 162.55 and 162.40. Your dealer should know which is used in your area. And the Coast Guard requires monitoring of Channel 16 (156.8 MHz) by boats equipped with two-way VHF radio.

If you are inquisitive about how airport towers handle the traffic jam up in the sky, a scanner can tune you into both sides of the air-to-ground conversation on different frequencies. Or, if you really want to know whether utility companies and highway departments are doing their jobs, there are crystals to match their operations.

A Public Service monitor can be a useful addition to any communications shack. It can wile away the hours in dramatic fashion when the action gets heavy, and may even give you a chance, now and then, to help someone in need or aid authorities. Thousands are turning on and tuning in; many of them listening for the fun of it, others depending on it as an audible "security blanket." ◈

POLICE & FIRE Monitor Receivers

ANTENNA SPECIALISTS

MONITOR PREAMPS

Will provide 16 dB broadband amplification. Designed for vehicular use. Will operate from 12-9

volt battery (not supplied). With mobile bracket and cable. 5" x 4" x 2".

MON 25. VHF high-band $29.95
MON 26. VHF high & low bands $39.95
MON 28. UHF band $29.95

CHANNEL MASTER

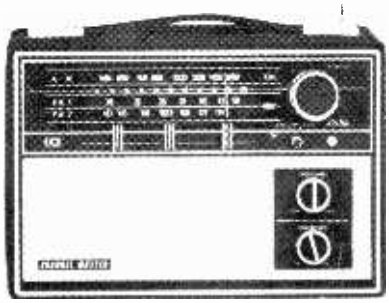
6256 MONITOR RECEIVER

Four-band portable covering AM, FM, high and low VHF public service bands, plus weather

service; features local/distance switch, slide controls for squelch, volume, and tone; built-in AM and telescoping FM and PSB antennas; a.c. or battery operation (six "C" cells); 7¼" H x 10¼" W x 3¼" D. $64.95

6255 MONITOR RECEIVER

Three-band portable covering AM, high and low



VHF public service bands, plus weather service; features local/distance switch; built-in AM and telescoping PSB antennas; a.c. or battery operation (six "C" cells); squelch control; integrated i.f. amplifier; 6½" H x 9¾" W x 4" D. $49.95

ELECTRA

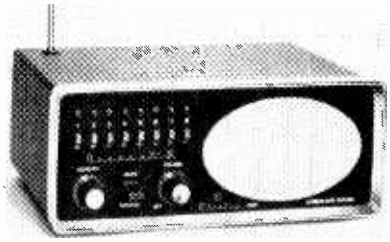
"JOLLY ROGER" SCANNER

Automatic scanning monitor receiver plus AM radio; two crystal-controlled scanning channels; unit switches to AM automatically if no signals on PSB; sensitivity 1 μV (VHF), 2 μV (UHF); frequency range 150-174 MHz with 12 MHz spread; 450-470 MHz with 20 MHz spread; scan

rate 10 channels/sec; operates from four "D" cells or 117-volt a.c.; comes with a.c. module, earphone, and telescoping antenna. 6" x 8" x 3½"; 2½ lbs with batteries. $79.95 (crystals $5.00 each)

JR-1H. VHF (150-174 MHz) version.
JR-1U. UHF (450-470 MHz) version.

BEARCAT III
Scanning receiver featuring interchangeable plug-in r.f. modules to cover any two of the

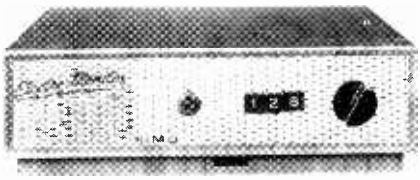


three public safety/business bands (high, low, and u.h.f.) including the new 470-512 MHz frequencies, or single band; with two-band operation any combination of eight channels may be monitored; eight plug-in crystals eliminate complex wiring changes; complete band coverage without frequency-spread limits; quartz-crystal i.f. filters; solid-state LED channel indicator lights; built-in 3" x 5" front-mounted speaker; available in six models, complete with installed r.f. modules, mobile mounting bracket, and cords for 117-volt a.c. and 12-volt d.c.; price range $139.95-$159.95 (less crystals ($5.00 each); additional r.f. modules $20.00 each

ELECTRO-MONITOR

AL-1 AUTO-ALERT FM CONVERTER
Will receive any single FM carrier in high or low bands. Operates in conjunction with AM car radio. Low band is 25-54 MHz; high band is 150-174 MHz. 12-volt negative-ground operation. Has built-in squelch circuit. 3" H x 6" W x 7½" D. $54.95
AL-2. Same as AL-1 except will receive a pair of FM carriers within 1% frequency separation of each other. $64.95

All receiver models are FM monitor designs with at least 2 W of audio output; single "on-off-volume" control; front-panel mounted speaker. Can be used on fully rechargable Ni-Cad battery pack. Adjustable squelch control; carrying handle; telescoping antenna. Comes in wood-grained-vinyl laminated on steel cabinet. 117V a.c. or battery operation. 10¼" x 3¼" x 9¾" D. Low Band (25-54 MHz)—selectivity (maximum attenuation) 6 dB at ±14 kHz, with minimum attenuation 60 dB at ±60 kHz. Spurious response 50 dB; sensitivity 0.5 μV for 20 dB quieting; squelch threshold 0.3 μV. High Band (140-180 MHz)—selectivity same as for low band; sensitivity 1.0 μV for 20 dB quieting; squelch threshold 0.6 μV.
EM-1. Can receive any FM carrier in the high or low bands. $109.95
EM-2. Will receive any pair of FM carriers within 1% frequency separation of each other. A manual switch selects either one. $119.95
EM-3. Will receive three FM carriers within 1% frequency separation. Manual switch selects the three frequencies. $129.95
EM-HI/LO. Designed to receive any two frequencies (high or low) with more than 1% frequency separation. Manual switch is used to switch from one frequency to another frequency. $129.95
EMS. Will monitor two constant frequencies Hi/Hi, Hi/Lo, Lo/Lo. Does not have switching capabilities. $129.95
EMS-S. Will receive any two FM carriers indi-



vidually and simultaneously. A manual switch provides selection. $149.95
EMS-9/6. Will receive six FM carriers individually via a selector switch and also provides nine pairs of carriers for simultaneous operation. Two sets of FM carriers with a maximum of 1% frequency separation are allowed. $199.95

HEATH

GR-110 VHF SCANNING MONITOR
Covers any 9-MHz segment of 146-174 MHz VHF high band. Sensitivity 1 μV for 20 dB (S + N)/N; adjacent-channel rejection −40 dB. Scans approx. 17 ch/sec; 50 ohm input; 2 W audio output; 8 crystal frequencies. Built-in a.c. and d.c. supplies. Digital channel readout. Manual or automatic scanning; priority channel override. (Kit) $119.95 mail order
GRA-110-1. Crystal certificate, ppd $4.95

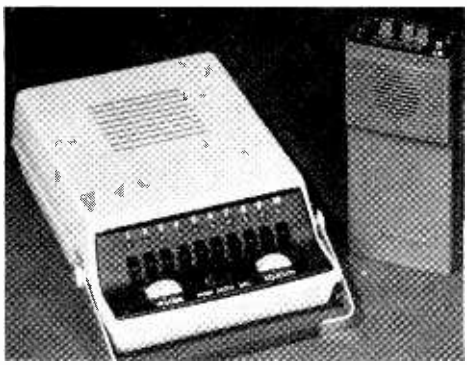
GR-88 MONITOR RECEIVER
Portable design. Covers fire, weather & police bands from 152 to 174 MHz. Sensitivity 2 μV for 20 dB (S + N)/N. Battery operated (six 1.5 V cells). Has 3" speaker, 250 mW audio output at 10% distortion. 7½" x 8¾" W x 3½" D. (kit) $49.95 mail order

GR-98 AIRCRAFT MONITOR
Similar in design to Model GR-88 except covers aircraft frequencies 108-136 MHz. Sensitivity 1.6 μV for 10 dB (S + N)/N. (kit) $49.95 mail order
GRA-88-1. An a.c. power supply for both GR-88 and GR-98. (kit) $8.50

HY-GAIN

MONITOR ANTENNAS
Manufacturer offers complete line of monitor antennas for both mobile and base-station applications covering low-band, VHF, UHF, as well as all three bands. Mobile antennas are available with roof-mount, trunk-lip mount or magnetic-mount in all four types. All use 17-7ph stainless-steel whips, Cyclolac plastic, and chrome-plated brass base fittings. Prices range from $8.95-$26.95. Base units come in several configurations including ground planes, yagis, colinears, and receiver-mounted whips. Prices range from $1.98 to $29.95

618 10-CHANNEL MONITOR
Covers UHF, high- or low-band VHF by means of plug-in modules; can be programmed for any multiband combination at any time; flip-top case for access to r.f. module and crystal



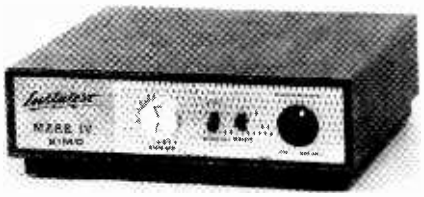
installation (uses 10.7-MHz i.f. crystals); comes with d.c. power cord, antenna, carrying case, handle, and built-in automatic charger for use with internal battery pack (standard "AA" cells, Ni-Cad, mercury, or alkaline batteries, not supplied); 2.5″ x 5.5″ x 8″. With one r.f. module $129.95
Additional r.f. modules; $24.95
MODEL 622. A.c. adapter; $9.95
MODEL 621. Jerk-and-run style mobile mount; molded connectors; security lock; $9.95

625/626 POCKET SCANNER
VHF/UHF pocket scanner; four channels; automatic or manual scan; channel-1 bypass; built-in antenna; a.f.c. on all bands for operation with any 10.7-MHz i.f. crystal; 60-dB adjacent-channel rejection; selectivity 60 dB at 20 kHz; 3-position volume control; squelch control; earphone jack; leather carrying case, external VHF or UHF antenna, and battery charger available at extra cost.
MODEL 625. 150-170 MHz; $149.95
MODEL 626. 450-470 MHz; $149.95

INSTALERT

Company has extensive line of alerting receivers covering Low Band (25-54 MHz); High Band (152-174 MHz); and UHF Band (430-512 MHz) available in DT Series only. All units have built-in siren; wood-grained cabinets; self-return switch on front panel (resets receiver to tone alert operations). Front-panel mounted speaker. 2 W continuous audio output. Has carrying handle, telescoping antenna, 117 V a.c. and 13.8 V battery operation. 10¼″ x 3¼″ x 9¾″ D.

MARK IV DT SERIES RECEIVERS
Deluxe alerting receivers with dual-conversion superhet circuitry. Selectivity—maximum attenuation 6 dB ±5 kHz; minimum attenuation 60 dB ±25 kHz. Spurious response 60 dB. Sensitivity: 0.4 μV (Low Band); 0.8 μV (High Band) for 20 dB quieting. Squelch threshold 0.25 μV (Low Band); 0.5 μV (High Band).
DT-M. Monitor. $131.00
DT-100. Single-tone. $141.00

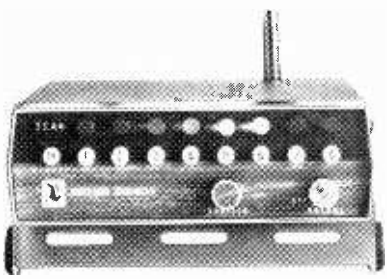


DT-200. Two-tone. $151.00
DT-300. Three-tone. $161.00
DT-400. Four-tone. $171.00

MARK IV ST SERIES RECEIVERS
Standard alerting receivers. Selectivity—maximum attenuation 6 dB ±14 kHz; minimum attenuation 60 dB ±60 kHz. Spurious response 50 dB. Sensitivity: 0.55 μV (Low Band); 1.10 μV (High Band) for 20 dB quieting. Squelch threshold 0.3 μV (Low Band); 0.6 μV (High Band).
ST-M. Monitor. $121.00
ST-111. Single-tone. $131.00
ST-2. Two-tone. $141.00
ST-3. Three-tone. $151.00
ST-4. Four-tone. $161.00
Other models available on request.

E.F. JOHNSON

DUO-SCAN MONITOR
Monitors low- or high-band v.h.f. FM (30-50, 150-174 MHz); crystal programming permits monitoring any combination of up to 8 low- or



high-band channels; base station or mobile use: 117-volt a.c. or 12-volt negative-ground d.c. input; all-solid-state; dual-conversion with two ceramic filters; squelch control; noise-operated squelch; manual selection of channels or scanning selection with lockout of any channels; scan, channel selector indicator lights; external speaker jack; SO-239 antenna connector; $169.95

HIGH-BAND, UHF. Same as low, high-band model except monitors high-band VHF and UHF (150-174, 450-470 MHz). $179.95

MONO-SCAN MONITOR (High Band). Same as Duo-Scan monitor except monitors 8 high-band VHF (150-174 MHz) channels only. $139.95

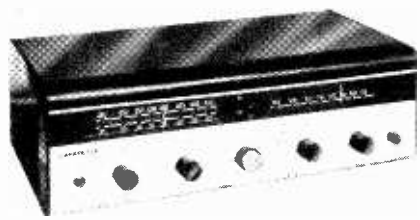
MONO-SCAN MONITOR (UHF). Same as Duo-Scan monitor except monitors eight UHF (450-470 MHz) channels only. $159.95

LAFAYETTE

MICRO-P-100A MONITOR RECEIVER
All-solid-state; single-conversion receiver available in two tuning ranges: Model P-50A for 30-50 MHz and Model P-100A for 152-174 MHz; ratio detector for narrow-band FM reception; IC in i.f. stages; ceramic mechanical filters in i.f. stages; manual tuning plus two crystal-controlled receive channels; squelch; mobile mounting bracket; built-in 117-vo t a.c. power supply; may be operated from 12-volt negative-ground d.c. suppply; built-in speaker; portable battery pack available as optional extra; $79.95
MICRO P-450. Same as Micro P-100A except for 450-470 MHz. $79.95

PF-200A MONITOR RECEIVER
All-solid-state; single-conversion receiver with FET r.f. stage; independent tuning of 30-50 MHz and 152-174 MHz ranges; ratio detector for narrow-band FM reception; IC's in i.f. stages; squelch; headphone jack on front panel; four crystal-controlled receive channels (two in low and two in high band); tape-recorder output jack; built-in speaker and 117-volt a.c. power supply; ceramic mechanical filters in i.f. stages; $99.95

PF-300 POLICE/FIRE MONITOR
Three-band (UHF/VHF/HF) FM Public Service receiver with crystal-control or tunable fre-



quency selection. Covers 30-50 MHz; 144-174 MHz; 450-470 MHz. Adjustable broad or sharp selectivity on all bands; 1 μV sensitivity. 1.5 W output. 117 V a.c./12 d.c. operation. Black cabinet with brushed aluminum panel. 13⅜" x 7⅛" D x 5". $149.95

MONITORSCAN-8 SCANNER
Eight-channel VHF monitor/scanner; double-conversion superhet circuit; 0.5 μV for 20 dB

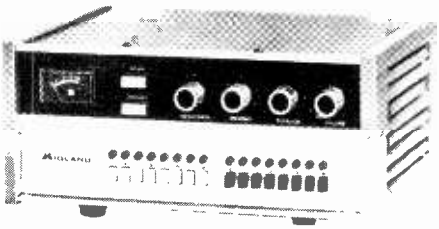
quieting; 8 front-panel LED's indicate active channel; has both automatic scanning/manual selection modes; front-panel lockout button for selective programming each channel; built-in speaker; built-in telescoping antenna; PL-259 connector for external antenna; 117-volt. a.c. or 12-volt d.c. operation for base or mobile installation; for 150-160 MHz or 160-170 MHz (specify); $99.95

PORTASCAN-4 SCANNER
Pocket-sized, portable 4-channel VHF FM scanning monitor; automatic sequential scanning on any four frequencies or manual selection; push-button bypass priority switch; dual-conversion superhet receiver; sensitivity 1 μV for 20 dB quieting; four LED flashing indicator lights; squelch control, built-in antenna; operates from four "AA" cells; rechargeable batteries and recharger available; for 150-160 MHz or 160-170 MHz (specify); $99.95

MIDLAND

13-906 PORTABLE SCANNER
Monitors any four channels in 152-159 MHz band or can be adjusted to cover any 7-MHz portion of 150-170 MHz band; automatic scanning rate 8 ch/sec; manual option; dual-conversion superhet receiver; LED scanning indicators; battery operation or 6-volt a.c. adapter; built-in antenna; jacks for battery charging, earphone, and external antenna; $119.95

13-950 TRI-BAND SCANNER
Covers 8 channels each in UHF, low- and high-band PSB; automatic electronic tuning circuit;



adjustable memory circuit; S meter; operates from 117-volt a.c. or 12-volt d.c.; adjustable scanning rate 8-24 ch/sec; 16 push-button lockout of any channel or combination of channels; dual-conversion superhet; 11" W x 4⅝" H x 9¼" D; $279.95

13-940 DUAL-BAND SCANNER
Covers 144-174 MHz high and 30-50 MHz low bands; automatic electronic tuning circuit; adjustable scanning rate 8-24 ch/sec; push-button lockout of any channel or combination of channels; automatic or manual scanning; individual channel indicator lights 117-volt a.c. or 12-volt d.c.; comes with telescoping antenna; 11" W x 4⅝" H x 9¼" D; $219.95
13-944. Same except covers 144-174 MHz and 450-470 MHz UHF bands; $219.95

13-930 MOBILE SCANNER
Covers 144-174 MHz high and 30-50 MHz low bands; "Rangematic" circuit monitors any combination of channels; automatic electronic tuning circuit; full scanning controls; adjustable scanning rate 8-24 ch/sec; automatic/manual operation; push-button lockout; 117-volt a.c. or 12-volt d.c. operation; includes telescoping antenna and mobile mounting bracket; 6⅝" W x 2⅝" H x 9¼" D; $199.95
13-934. Same except covers 144-174 MHz and 450-470 MHz UHF bands; $199.95

13-914 MOBILE/PORTABLE SCANNER
Monitors 4 VHF channels in 452.5-467.5 MHz range; bypass switch to skip broadcast stations; variable squelch; channel selector switch permits individual channel programming in manual mode; 12-volt d.c. or portable with optional 13-913 d.c. power pack; 6 5/16" x 1 5/8" x 7 9/16"; $124.95
13-912. Same except covers VHF high band; $99.95

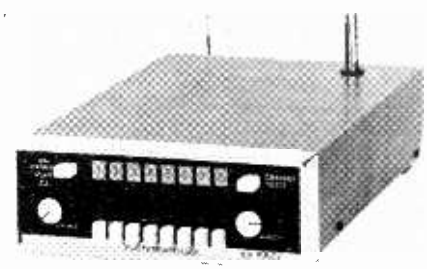
13-908 MONITOR/BC RECEIVER
Covers standard AM broadcast band plus 167-175 MHz, 158-167 MHz, 150-158 MHz high band VHF; accepts up to 3 (optional) crystals in 148-175 MHz band; battery condition meter; built-in antennas; a.c. adapter jack; comes with carrying strap; 6" H x 2 5/8" W x 1 1/2" D; $49.95

PACE

SCAN 108 SCANNER
Single-band, 8-channel scanning monitor; channel lockout control; IC's; built-in 117-volt a.c. and 12-volt d.c. power supplies; built-in speaker plus jacks for remote speaker or remote antenna; telescopic desk-type antenna supplied; scan rate 20 channels per second; sensitivity 0.6 μV for 20 dB quieting; 8 channel lights; three models: (108L, 20-50 MHz, $139.95

108H, 140-172 MHz, $139.95; 108U, 450-470 MHz, $139.95); crystals not supplied

SCAN 208 SCANNER
Two-band simultaneous scanning monitor; special programming switches; individual lockout



controls; 117-volt a.c. and 12-volt d.c. power supplies; 8 channels and indicators lights showing channel being monitored; IC's; scan rate 20 channels per second; telescopic desk-type antenna. plus connector for external antenna; built-in speaker plus remote jack; covers 25-50 and 140-174 MHz; crystals $4.95 each; $169.95

SCAN 308 SCANNER
Three-band simultaneous scanning monitor; 25-50 MHz (tuned to 30-39 MHz unless specified). 144-175 MHz (tuned to 152-164), 450-512 MHz (tuned 450-465); plug-in crystals (low-band, #101-532; high-band. #101-542; u.h.f. band #101-603—specify frequency in each case); 117-volt a.c. and 12-volt negative ground d.c. inputs; sensitivity 0.7 μV for 20 dB quieting; eight automatically scanning channels, with all 16 capable of being programmed for any of the three bands; 8 channel lights; telescopic desk-type antenna; pin-plug connector for mobile or external antenna; built-in speaker plus jack for remote speaker; scan rate 20 channels per second; two power cords supplied; crystals $4.95 each; $199.95

SCAN 10-4H SCANNER
Four-channel high VHF scanning receiver; a.c./d.c. operation; tuned for 154-162 MHz; comes with all cords, mounts, and antenna; crystals not included; $89.95
SCAN 10-4U. Same except for UHF; tuned for 454-462 MHz; $99.95

SCAN-216 SCANNER
Two-band (UHF & VHF high) scanner; 16 channels with 8-channel readout; comes with desk mount, locking mobile mount; a.c./d.c. operation; tuned for 450-462 MHz and 152-164 MHz; crystals not included; $179.95

PANASONIC

RF-1060 MONITOR RECEIVER
Three-band design covering high-VHF band plus standard AM and FM broadcast bands; features

squelch; tone control; a.f.c. switch; 4" speaker; operates from 117-V a.c. or four "C" cells. $54.95

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PEARCE-SIMPSON

CHEYENNE 8 FM SCANNER

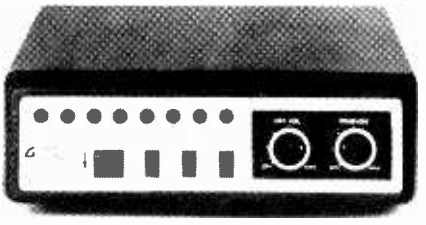
VHF-FM Hi-Band scanner. 117 V a.c. or 12 V d.c. power supply. Dual-conversion receiver with ceramic filter. Scans 8 crystal-controlled channels automatically or manually. Has one priority channel. Bypass capability on all channels and adjustable scanning rate. $149.95

CHEROKEE 8 + 8 FM SCANNER

VHF-FM Hi-Band Low-Band scanner. 117 V a.c. and 13 V d.c. input. Dual-conversion receiver with ceramic filter. Has 16 crystal sockets, 8 Hi-Band, 8 Low-Band, and bypass. Has automatic or manual scanning, adjustable scanning rate, and priority channel. $179.95

GLADDINGS HISKAN FM SCANNER

VHF-FM Hi-Band (144-175 MHz) scanner. 117 V a.c. or 12 V d.c. power supply. Dual-conver-



sion receiver. Scans any eight crystal-controlled channels. Has one priority and one bypass channel. Manual or automatic scanning option by flick of a switch. $114.95

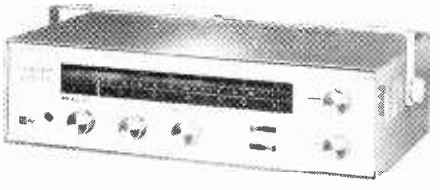
COMANCHE 16 FM SCANNER

VHF-FM Hi-Band/Low-Band scanner. 117 V a.c. and 12 V d.c. input. Dual-conversion receiver with ceramic filter. Scans 16 crystal-controlled channels either automatically or manually. Can handle as many as 16 Hi-Band channels and 8 Low-Band channels. Has bypass capability on all channels, one priority channel, and adjustable scanning rate. $199.95

RADIO SHACK

PRO-2B MONITOR RECEIVER

Solid-state; single-conversion receiver; independent tuning of 30-50 MHz and 152-174 MHz



ranges; ratio detector for narrow-band FM reception; squelch; headphone jack on front panel; four crystal-controlled receive channels (two in low band and two in high); color-coded slide-rule dial; built-in speaker; built-in 117-volt a.c. power supply, but may be operated from 12-volt d.c.; mobile mounting bracket; $109.95

PRO-7A MONITOR RECEIVER

Solid-state scanning receiver for 148-174 MHz; automatic or manual selection of up to 8 channels; lighted channel indicators; crystal

filter; IC/FET circuitry; built-in speaker; d.c. gated squelch; 2-second scan delay; channel lock-out; 117-volt a.c. or 12-volt d.c.; #20-167; $119.95

PATROLMAN-3 MONITOR RADIO

Tunes AM, 450-470 MHz, 144-174 MHz for PSB, weather, 2-meter ham, and broadcast bands; separate tuning controls; window-type rotary dial; adjustable squelch control; takes 4 penlight cells (included); earphone; optional a.c. adapter $4.95; 8½" x 5½" x 2¼"; $49.95

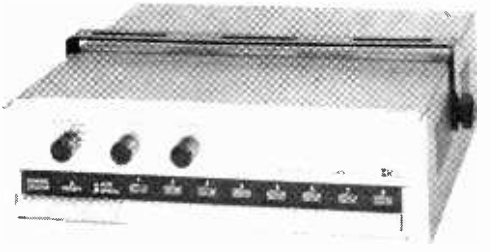
PRO-77 DUAL BAND SCANNER

Automatic scanning of 8-crystal-controlled channels; covers 30-50 and 148-174 MHz bands; channel lock-out, skipper, 2-second scan-delay circuits; speed 10 ch/sec; a.c. or 12-volt d.c. negative-ground operation; optional manual channel selection; 3" x 7½" x 9½"; $149.95

PRO-7. Same as PRO-77 except for 148-175 MHz only; $119.95

PRO-88 DUAL-BAND SCANNER

Covers 148-174 and 450-470 MHz bands; monitors any 8 frequencies in either band or in



any combination; front-panel selectable priority control; crystal filter; 2-second scan delay; speed 12 ch/sec; sensitivity 0.5 μV on VHF, 1.0 μV on UHF for 20 dB quieting; has tape, headphone, and antenna jacks; comes with mobile mounting bracket, cables, and plugs. 117-volt a.c. or 12-volt d.c. negative-ground operation; 3¼" x 9⅝" x 10¾"; $199.95

POCKET-SCAN

Battery-operated; covers 144-175 MHz; manual or automatic channel selection; sensitivity 0.75 μV for 20 dB quieting; speed 10 ch/sec; adjustable squelch; built-in wire loop antenna and dynamic speaker; uses two 9-volt batteries

or 12-volt negative-ground source; 5½" x 2¾" x 1¼"; $99.95
270-1532. D.c. auto adapter cable; $6.95

REGENCY

TMR-2MW MARINE MONITOR
Dual-channel, crystal-controlled marine receiver for monitoring channel 16, plus push-button access to weather information; tone decoding

facility on weather channel; operates on a.c. or d.c.; supplied with a.c. power cord, mobile mounting bracket, detachable antenna, built-in 4" speaker; crystals included; $124.00

TME-8A SCANNER
Monitors 8 aircraft band channels with automatic tri-speed scan action; push-button program control; a.c. power cord; detachable antenna; built-in 3½" speaker; covers 118-136 MHz AM; crystals $6.50 each; $149.00

TMR-1W MONITOR
Single-channel weather receiver with push-button control for instant and continuous weather

information; reception within 30-40 mile radius of National Weather Service transmitter sites; a.c. or d.c. operation; has a.c. power cord, detachable antenna, and built-in 4" speaker; crystal included; $119.00

TMR-8A SCANNER
8-channel, push-button program controlled automatic signal-search aircraft band receiver (118-136 MHz AM); stops to cover active transmissions then resumes search; supplied with a.c.-d.c. power cords; mobile mounting bracket; detachable telescopic antenna, built-in 4" speaker; (Model TMR-1A single channel model $119.00); $149.00

TMR-12 MONITOR
12-channel monitor for high band (148-174 MHz-Model TMR-12H) or low band (30-50 MHz-Model TMR-12L); channels selected by 12-position switch; 117-volt a.c. or 12-volt d.c. operation; comes with a.c. and d.c. cords, mobile mounting bracket; crystals $4.95 each; $119.00

ACT-E-8H/U SCANNER
Two-band, 8-channel monitor receiver for high band and UHF; push-button program control; vinyl-covered cabinet; detachable telescopic antenna; remote speaker and external antenna connections; 117-volt a.c. operation; optional 12-volt d.c. cord available; crystals $4.95 each; $159.00
ACT-E-8H/L. Same except for high and low bands; $159.00

ACT-R-8H/L SCANNER
Two-band, 8-channel scanner for high and low bands; push-button program control; 117-volt a.c. or 12-volt d.c. operation; a.c. and d.c. cords and mobile mounting bracket included; crystals $4.95 each; $159.00

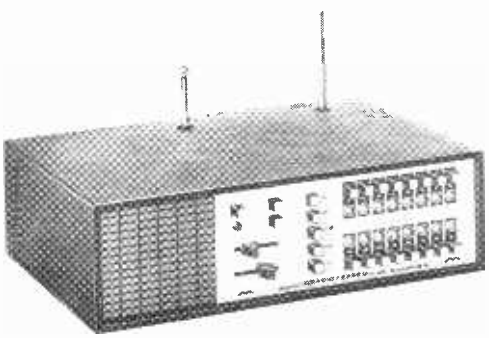
ACT-E-8H SCANNER
8-channel scanner for high band; push-button control; vinyl-covered cabinet; telescopic antenna; remote speaker and external antenna terminals; 117-volt a.c. operation; optional 12-volt d.c. cord available; crystals $4.95 each; $139.00
ACT-E-8L. Same except for low band; $139.00

ACT-R-8H SCANNER
8-channel high-band scanner; push-button program control; 117-volt a.c. or 12-volt d.c. operation; supplied with a.c. and d.c. cords and mobile mounting bracket; crystals $4.95 each; $139.00
ACT-R-8L. Same except for low band; $139.00

ACT-R-10H/L/U SCANNER
Three-band, 10-channel monitor for high band (148-174 MHz), low band (30-50 MHz), and UHF (450-470 MHz); push-button program control; 117-volt a.c. or 12-volt d.c. operation; comes with a.c. and d.c. cords and mounting bracket; crystals $4.95 each; $169.00

ACT-E-16H/L/U SCANNER
Three-band, 16-channel monitor receiver for high band, low band, and UHF; push-button program-control, tri-speed scanner; vinyl-covered cabinet; detachable telescopic antennas; remote speaker terminals and antenna jack; 117-volt a.c. operation; optional 12-volt d.c. cord available; crystals $4.95 each; $219.00

ACT-E-16H/L SCANNER
Two-band, 16-channel monitor receiver for high band and low band; push-button program con-



trol, tri-speed scanner; vinyl-covered cabinet; detachable telescopic antennas; remote speaker terminals and antenna jack; 117-volt a.c. operation; optional 12-volt d.c. cord available; crystals $4.95 each; $219.00

ROBYN

HI-BANDER SCANNER

Automatic scanning; dual-speed fast/slow or manual; covers 144-174 MHz (including 2-meter ham band); all-solid-state with 7 IC's; 117-volt a.c. or 12-volt d.c. operation; external speaker jack; built-in antenna; 50-ohm external antenna jack; wide-range dynamic speaker with high/low tone control; less crystals. Bandwidth 2 MHz, −3 dB. Scanning rate 13 ch/sec. Sensitivity 0.7 μV for 20 dB quieting; squelch sensitivity 0.3 μV. Selectivity 6 dB ±6 kHz. Power output 2 W at 5% dist. Image rejection 50 dB; adjacent channel rejection 70 dB. 10" x 2⅜" x 6½" D. $139.95

200 FM SCANNER

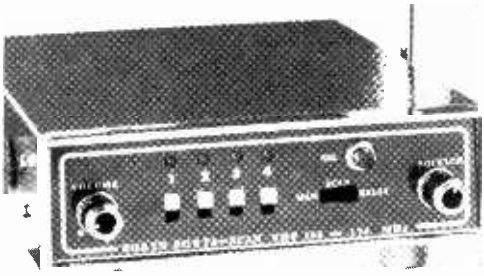
Dual-band VHF/UHF combination (144-174 MHz & 450-512 MHz) for base/mobile operation. Will operate from 12 V d.c. or 117 V a.c. Will scan 8 channels VHF, 8 channels UHF, or a mixture of both (16 channels). Has front-panel programming. $179.95

HL 8 + 8 FM SCANNER

Automatic 16-channel scanning with dual speeds (slow/fast) or manual covering low band (25-55 MHz) and high band (144-174 MHz). Will also cover 2 & 6 meter ham bands. Operates from 12 V d.c. or 117 V a.c. Sensitivity: low band 0.5 μV for 20 dB quieting; high band 0.7 μV. Image rejection 40 dB. Selectivity 6 dB ±6 kHz. Power output 2.5 W at 10% dist. Scanning speeds 8 and 13 ch/sec. Has front-panel programming. 8" x 3⅞" x 8½" D. $179.95

1000 PORTA-SCAN SCANNER

Will operate from 117-volt a.c., 12-volt d.c., or 8 standard penlite cells/rechargeable Ni-Cad battery; will recharge automatically on 117-volt a.c. or 12-volt d.c.; scans four VHF frequencies; comes with two power cords, telescoping antenna, shoulder strap, car-mounting bracket, penlite battery holder $109.95



SBE

SENTINEL SERIES SCANNERS

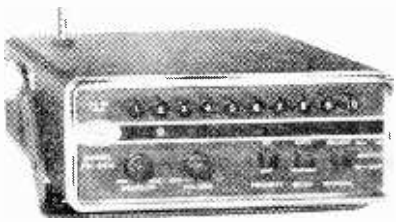
Receiver sensitivity 0.5 μV for 20 dB quieting; 0.3 μV for stop scan at band center; scan rate 10 ch/sec; audio output 3-4 watts; operating voltages 13.8-volt d.c. & 117-volt a.c.; 2¼" H x 6" W x 7½"D.

SBE-1SM. Low-band (30-51 MHz), high-band (144-171 MHz); 8 channels; frequency coverage 6 MHz (low), 8 MHz (high); $169.95
SBE-2SM. 144-171 MHz frequency range; 8 channels; frequency coverage 8 MHz; $149.95
SBE-3SM. 30-51 MHz frequency range; 8 channels; 6 MHz frequency coverage; $149.95
SBE-5SM. 450-470 MHz frequency range; 8 channels; 10 MHz frequency coverage; $159.95
SBE-6SM. 144-171 MHz; 450-470 MHz; 8 channels; frequency coverage 8 MHz (VHF), 10 MHz (UHF); $189.95

SONAR

FR-2517 SCANNER

Provides v.h.f. high-band scanning of 10 crystal-controlled channels; may be operated in manu-



al mode; receiver may be set up on priority channel for constant monitoring; squelch; supplied with antenna, mounting bracket; 117-volt a.c. and 12-volt d.c. power cables; $159.95 (For 25-50 MHz coverage use Model FR-2516; $159.95)

FR-2513 SCANNER

Twenty-four channel crystal-controlled FM monitor receiver for base or mobile use; narrow-band operation; squelch; all-solid-state; dual conversion; supplied with 117-volt a.c. and 12-volt d.c. cables, mounting bracket, but less crystals: $169.95 (For 25-50 MHz coverage use Model FR-2512; $169.95)

FR-104 SCANNER

Crystal-controlled; manual selection of 1 to 6 channels; set up for 25-50 MHz; similar model available for 150-175 MHz; all-solid-state; 117-volt a.c. power supply built-in; may also be operated from 12-volts d.c. and company's "Porta-Pak" battery supply available as optional extra; supplied less crystals; $140.00

FR-2526 MONITOR RECEIVER

Dual-channel non-restrictive programming of any combination of preselected channels. Will search and lock on any of 10 pre-programmed channels with any of the 10 channels switchable out of scanning sequence. Priority channel override. Manual selection using slow-scan technique. Features ceramic filter, 2 W audio output, plug-in crystals for instant channel change, noise-free squelch circuit, dual limiter and Foster-Seeley discriminator, tuned r.f. stage for image rejection. Transistorized power supply for 117-V, 50/60 Hz and 12 V d.c. negative-ground operation. Comes with antenna, a.c. and d.c. power cables, mounting bracket but less crystals. VHF/UHF. $189.95
FR-2528. Same except LF VHF $189.95
FR-2525. Same except UHF only $179.95

FR-2527 MONITOR RECEIVER

Dual-channel non-restrictive programming of any combination of preselected channels; manual switching of any 8 preselected crystal-controlled channels. Features 2 W audio output, ceramic filter, plug-in crystals, tuned r.f. stage for image rejection, temperature-compensated noise-free squelch, dual limiter and Foster-Seeley discriminator, and provisions for external speaker. Dual-purpose built-in power supply for 117-V a.c., 50/60 Hz and 12 V d.c. negative-ground operation. Comes with antenna, a.c. and d.c. power cables, mounting bracket, but less crystals. VHF/UHF. $159.95
FR-2529. Same except LF/VHF $159.95
FR-2524. Same except UHF only $149.95

TEABERRY

CRIMEFIGHTER MONITOR

Covers 30-50 MHz, 150-170 MHz, and 450-470 MHz bands; sensitivity (all ranges) 0.5 μV for 10 dB Sinad; audio output 2 watts; scanning rate 20 ch/sec; scanning stop sensitivity 0.5 μV; 8 channels; uses program card instead of crystals to select 8 frequencies from over 12,000 frequencies nationally; features 8 lock-

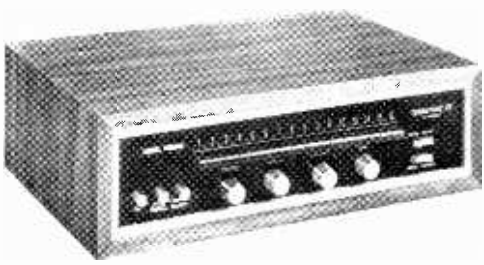
out switches, slide volume control, squelch switch, manual/automatic switch, and manual advance switch; 117-volt a.c. or 13.8-volt d.c. operation; 4" H x 10" D x 12" W; $199.00

"T"-SCAN POCKET SCANNER
Four-channel VHF-FM pocket scanner; locks in on selected frequency manually; bypass channel; dual-conversion; 60 dB adjacent-channel rejection; scan rate 16 ch/sec; has variable volume and squelch control; external phone jack; charging terminal; uses standard "AA" or rechargable batteries; 2⅝" W x 5½" L x 1⅜" D; $129.00

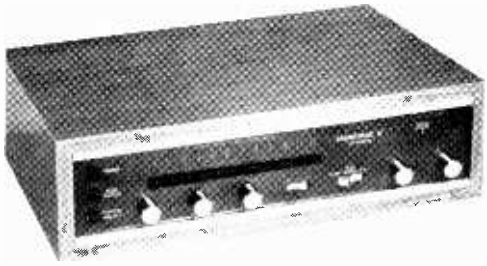
TENNALEC

TENNETRAC II SCANNER
Twelve-channel, three-band scanner; lighted push-button switches display channel seeking or automatic scanning; allows user to program each channel in or out of service; variable scan-rate control; channel selector switch for individual channel selection; for both mobile and fixed-station operation (d.c. power cord optional); $179.95
TENNETRAC III. Same except has four more channels; deluxe housing; $199.95

TENNETRAC IV SCANNER
Sixteen-channel, three-band scanner housed in all-wood cabinet with back-lighted front panel and channel display; program push-buttons for each channel; scan or individual channel selection; scan rate control; tone control; band indicators; local/distance switch; power "on" push-button; scan delay switch; optional remote control available extra; $219.95



TENNETRAC V FM/SCANNER
Combines FM band coverage with automatic switch plus twelve-channel, three-band scanner (same features as Tennetrac IV); separate volume controls for scanner and FM, back-lighted channel display and FM tuning dial; power "on" push-button; scan-speed control; scan delay; ceramic filters; optional operation of scanner only, FM only, or FM with scanner override; $249.95



4-CHANNEL PORTABLE SCANNER
Four-channel, hand-held unit; program switches for each channel; scan delay; earphone jack, multi-position telescoping antenna; operates from standard batteries; external power jack for optional a.c. power converter and battery charger.
TN-450. For UHF band; $119.95
TN-150. For VHF band; $119.95

AN IMPORTANT WORD ABOUT PRICES . . . . . .

Although we have made every effort to obtain current prices for all products listed in the Handbook, because of the dollar devaluations, the lifting of certain price controls, the "pass-along" of Phase IV, and the floating of Japanese and European currencies, ALL prices are subject to some adjustment. The prices you will find listed are the latest manufacturers and/or importers were able to supply before press time. . . . and are subject to change.

Hallicrafter's FPM-300 SSB/CW transceiver.

How to BECOME A HAM RADIO OPERATOR

Step-by-step tips on becoming a licensed radio amateur or "ham."

BY DON WATERS

AMATEUR RADIO is a very special, world-wide fraternity with nearly three quarters of a million members of just about every nation, race, and creed. It is one international activity in which all kinds of people from every walk of life can communicate with each other day in and day out without barriers of geography, political belief, or status. Kings and shopkeepers, celebrities and students, industrial giants and clerks, statesmen and housewives, scientists and truck drivers—all are truly equal on the amateur bands. This is the universal appeal of amateur radio. Hams pursue many interests, but this is the common denominator: people-to-people contact.

Amateur radio welcomes newcomers. Hams everywhere are eager to help others join their ranks. Our own Government has established a special license class to make it as easy as possible for any U.S. citizen, with no special knowledge or skill, to get on

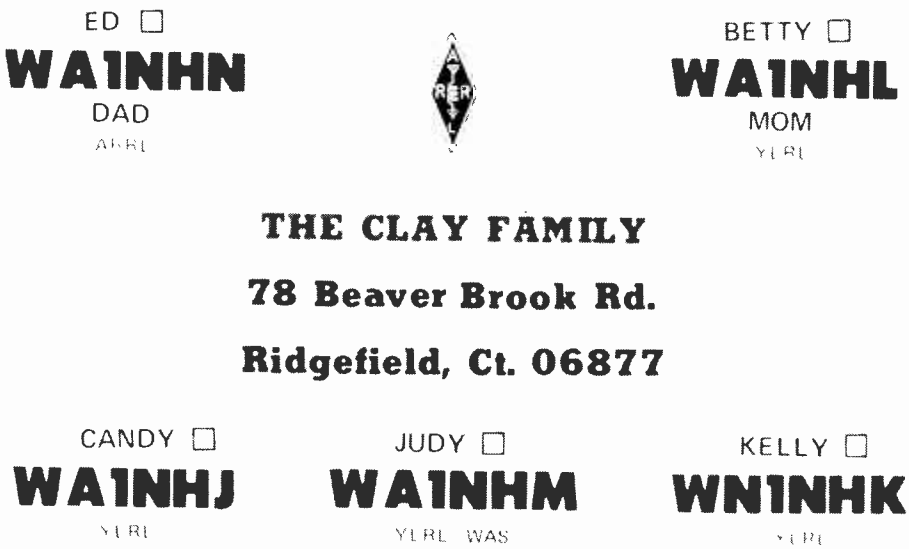
the air. This is the Novice license. The test is very simple, requiring only a five-words-a-minute mastery of International Morse Code and a rudimentary knowledge of radio theory and practice. It is free and can be administered by any amateur holding a General or higher license. The Novice license is good for two years and is not renewable (except after a one-year lapse) in order to encourage holders to move on to the higher license classes. Novice operating privileges on the air are limited, but liberal enough for many hams to feel that their Novice experience was the best part of their amateur "career." The reason is that the Novice license opens the door to a whole new world.

The equipment needed to get started is simple and inexpensive—under $100 will do it. You have several choices: you can buy a commercially built Novice station at modest cost; you can buy used equipment for much less; and with some help and a little aptitude you can either assemble a kit or build your own station from parts. There is a lot of literature available (at most radio equipment and electronics stores) to guide you, or, best of all, you can probably find a local amateur who will take you under his wing. There may even be an amateur radio club in your community which you can find out about through your newspaper. If not, you can probably locate a local ham by asking at a radio equipment and electronics store or by inquiring at your radio or television station, many of which have hams of their staffs. If none of this works, write the American Radio Relay League, Newington, Conn. 06111 and they'll give you the name of an amateur club or some individuals in your area.

Most amateurs agree that the easiest and best way to get into amateur radio is with the help of another ham or through a local club. Most amateur clubs offer periodic code and theory courses for prospective Novices, and these courses are usually free.

NASA Skylab II's Dr. Owen Garriott is W5LFL. When he was a junior high school student in Enid, Oklahoma, he and his father attended such a class together. He says, "My ham activities led to work at the local radio station and were an important factor in my decision to major in electrical engineering at the University of Oklahoma. Later, in the Radio Propagation Laboratory at Stanford University, it was while we were monitoring signals from Russia's Sputnik I that my continuing fascination with space was first stirred."

One suggestion most hams will make is: send to the American Radio Relay League for its "Gateway" set ($2.50), a series of manuals which include everything you need to get into amateur radio. The manuals are "How To Become A Radio Amateur," "The Radio Amateur's License Manual," "Learning the Radiotelegraph Code," and "Operat-



This QSL is unique in that all members of the Clay family are active hams.

ing An Amateur Radio Station." These manuals, over many years and many editions, have helped thousands of amateurs to get started (in many cases with no other help).

Amateur radio is often a family affair, but even so, the Clay family is unusual. All five of them are licensed hams. It all started when 9-year-old, fourth-grader Judy came home from school one day in California with a crude but thoroughly functional telegraph key she had made. By the time her math- and science-teacher mother had finished answering the youngster's questions about telegraphy and radio, they had decided to look into amateur radio together. Dad told them that if they passed the Novice test he'd supply the station equipment. That was the beginning. By the time Judy and Mom were ready to take on their General exam, Dad had caught the bug too. As a pilot he was already familiar with the code. All three became Generals at about the same time. With three members of the family talking ham radio, using flash cards they improvised for practice, and making up crazy jingles to memorize technical details, the other two girls were soon drawn in. Now Ed, WA1NHN and Betty, WA1NHL (Dad and Mom) both hold Advanced Class tickets and are actively interested in Slow-Scan TV, one of amateur radio's current exotic specialties. Candy, WA1NHJ, and Judy, WA1NHM, now 15 who started it all, are Generals, and 12-year-old Kelly holds a Technician license as WA1NHK.

"As a family activity," Betty says, "amateur radio has done a lot for us. It has helped give the girls confidence and opened up wonderful new experiences for them in the friends they have made in other countries." Ed adds, "Yes, and it has helped them in school, too, especially in Math and Geography."

Judy (front) with Ed, Kelly, Betty, and Candy Clay—the all-ham family—pose before some of the QSL cards in the family's ham shack.

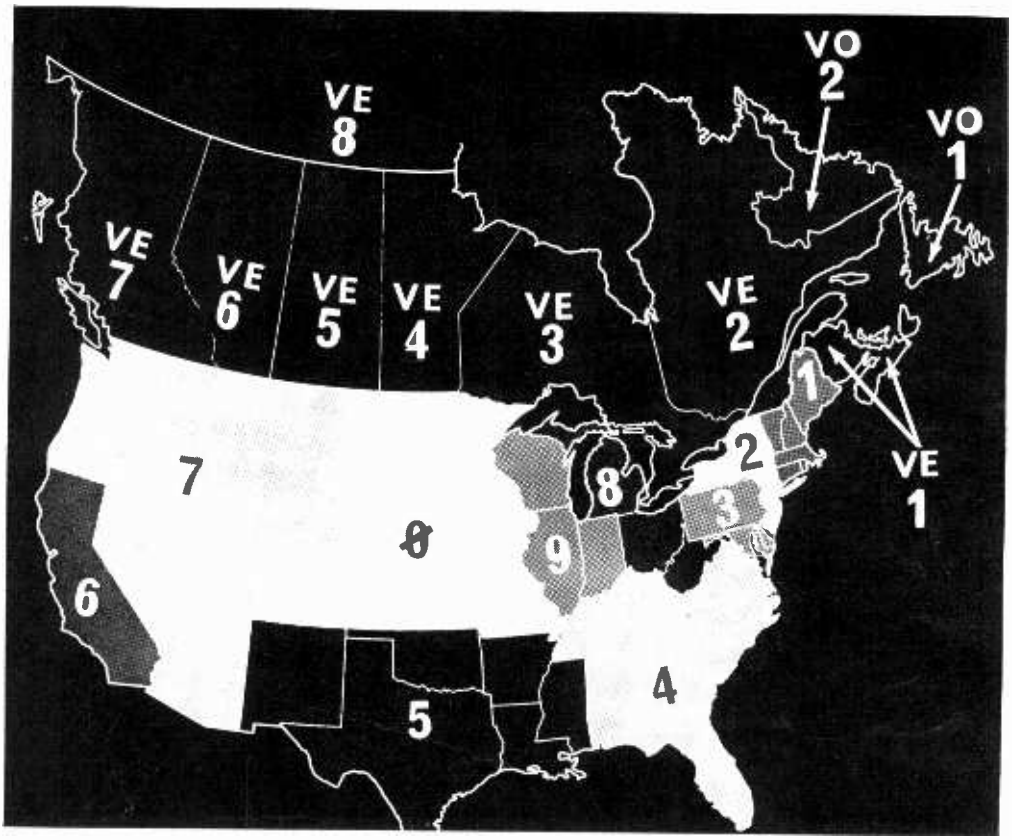
A chance contact with a British scientist on Galapagos Island in the Pacific stirred Judy's interest in the strange life of that island and Darwin's reports and theories stemming from his visit there.

With so much on-the-air activity now via radiotelephony or phone, and so many hams interested only in voice operation, some wonder why Morse Code proficiency is still a basic licensing requirement. Actually, there are several good reasons. Code is required under international treaty agreements, which are the basis for frequency allocations to amateurs. Even more important, code is still the most efficient way to get a radio signal through under difficult conditions. Code messages can often be "copied" when the jumble of voice trans-

W1AW CODE PRACTICE SCHEDULE

SPEED (W/M)	DAYS & TIMES*
10, 13, 15	Daily, 7:30 p.m.
5, 7½, 10, 13, 20, 25	Sun/Tues/Thurs/Sat, 9:30 p.m.
5, 7½, 10, 13, 20, 25	Mon/Wed Fri, 9:00 a.m.
35, 30, 25, 20, 15	Mon/Wed/Fri, 9:30 p.m.
35, 30, 25, 20, 15	Tues/Thurs, 9:30 a.m.

*EST except in summer, EDT.
Frequencies: 1.805, 3.58, 7.08, 14.08, 21.08, 28.08, 50.08, 145.588 MHz



The various amateur radio call areas in Canada and the United States.

missions on the air is almost indecipherable. And finally, code operation can be accomplished with simpler (and less expensive) equipment than needed for voice or phone.

Code still has a special appeal to many hams, for whom it is a primary mode of operation. Ed Clay says, "Our girls have always been more interested in CW (or code) than in voice, probably because it is a special language and because everyone is on the same level of communication except for differences in skill."

Getting started in amateur radio involves just two basic steps: acquiring your license and establishing your station. Here, in essence, is what that means and what you have to do.

The Novice License. In the United States the licensing agency for amateur radio is the Federal Communications Commission, which issues six classes of amateur licenses at progressively higher levels of proficiency, technical knowledge, and operating privileges. The Novice license, a kind of "learner's permit," is the first step. It is issued through the mail, there is no fee, and the test can be administered by any amateur holding a General class license or higher. It is available to any U.S. citizen and there is no minimum nor maximum age requirement. Novices literally run the age gamut from eight to eighty. The Novice test has two parts: a simple demonstration of the ability to send and receive Morse Code at five-words-per-minute, and a written portion with 20 multiple-choice questions. W1ENL, an old timer who has conducted many Novice classes very successfully, says, "If you can put in a half hour a day practicing code, you'll have the necessary five-words-a-minute code speed in 3 or 4 weeks." You can get that code practice in any of several ways: by working with a nearby ham friend, using practice tapes or records you can buy at most radio-electronics stores or order by mail, or by listening to ARRL's W1AW code-practice sessions.

The 20 multiple-choice written questions cover elementary theory, basic operating

practices, and basic amateur regulations. Here are some typical questions:

- Who is responsible for the proper operation of an amateur radio station?
- What are the emission privileges authorized to Novice Class licensees?
- How fast do radio waves travel in free space (in meters per second)?
- What are the characteristics of a good quality A1 emission?
- What is: Resistance? Inductance? Capacitance? What are the units of value for each?
- What is an insulator? A conductor? A semiconductor?

The FCC has recently adopted some new study questions which, for the first time, require a knowledge of simple circuit diagrams as part of the Novice examination.

The Novice Station. Any amateur radio station consists of just three basic components: a transmitter, a receiver, and an antenna. Nowadays, the transmitter and the receiver are often combined in one unit called a transceiver. The value of an amateur station can range from under $100 to several thousand dollars. Amateur radio can be compared to the hobby of photography in this respect; you can start out with a very simple camera costing very little, with fixed focus and one shutter speed. Eventually, you may graduate to increasingly elaborate, sophisticated, and expensive equipment. So it is with amateur radio gear.

"A piece of wire" will often suffice as a start for an antenna; bed springs and window screens have been rung into service by amateurs as improvised antennas!

Once you have your Novice "ticket," you're over the big hurdle. You're a member of the fraternity; you'll be on the air; and you'll have your own personal call letters which, if you become like other hams, will be as important to you as your name! And you'll be ready to think about moving on to the next step in order to open the door even wider because you'll be able to "work" more frequencies. You do not have to wait for two years either; you can take your General exam as soon as you're ready. But you will have to appear in person at an FCC examination point to do so.

If the language and basic technology of amateur radio seem strange to you at first and even a little formidable, just remember that thousands of people like you have already done it.

Then when you send out your first "CQ" over the air and suddenly hear someone calling YOUR call sign, you'll have a thrill you'll always remember! ◈

THE AMERICAN RADIO RELAY LEAGUE

More than 85,000 U.S. and Canadian radio amateurs belong to the ARRL which is also the headquarters society for the International Amateur Radio Union, made up of many similar societies in over 80 countries. ARRL was founded more than a half century ago by Hiram Percy Maxim, noted inventor, automotive pioneer, and ardent ham. The League's famous headquarters station is a memorial to him and bears his call letters, W1AW. The League functions as the amateur's own organization through 16 directors elected annually from each of 15 U.S. regions and Canada. It provides representation before government regulatory agencies and at international conferences involving frequency allocations and other matters affecting amateur radio. It publishes "QST," a monthly amateur technical journal; the "Radio Amateur's Handbook," an annual reference work (which, incidentally, is also widely used in the electronics industry and is one of the 25 all-time non-fiction best sellers); and a number of other specialty publications. Among these are the Gateway series, a group of manuals for beginners and newcomers: "How to Become a Radio Amateur," The License Manual," "Learning the Radio Telegraph Code," and "Operating an Amateur Radio Station." The League maintains an experimental and developmental laboratory, provides a Technical Information Service for anyone requesting help or information, and, finally, coordinates a wide variety of field activities and services. Anyone interested in amateur radio can be a member of ARRL, although full, voting membership is limited to licensed amateurs. Its headquarters is at 225 Main Street, Newington, Connecticut 06111.

Ham checks voltage and resistance in his rig with a battery-operated Hewlett-Packard 970A digital multimeter. This new probe has automatic ranging and overload protection circuit.

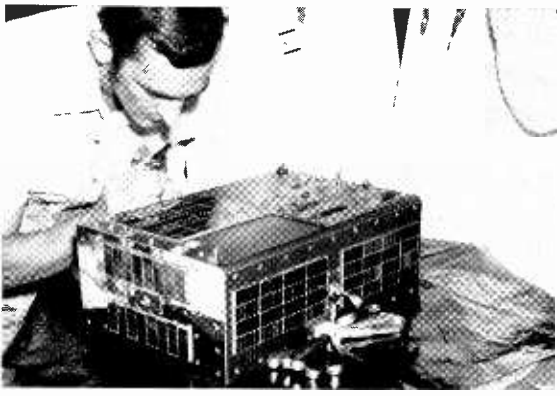
WHAT HAMS DO

Contests, message handling, distant transmissions, public service, and just plain "rag chewing," make amateur radio an exciting hobby.

AT one time, if you wanted to become a radio amateur, you had to build your own station: the transmitter, receiver, and antenna. Most early hams were "attic experimenters" because they wanted to be and builders because they had to be.

That tradition is still very much alive today even though most hams now rely on commercially produced gear for the major components of their stations. It is always a source of pride to point to something and say "I built that." There is also a dedicated body of hams whose primary interest is not so much on-the-air activity as it is tinkering, experimenting, and building. These are the people involved in amateur television, UHF and VHF, and space communications. The amateurs responsible for designing, producing, and arranging for launches of the several OSCAR satellites (an acronym for Orbiting Satellites Carrying Amateur Radio) are a case in point and the inheritors of a long tradition. The OSCAR satellites have become increasingly sophisticated and more usable by more amateurs. Currently there are hundreds of hams in dozens of countries who have logged many contacts around the world through OSCAR. The amateur satellite is also being used increasingly as a teaching aid in schools, affording students an opportunity for direct experience in space communications and supplementing courses in physics, math, and the social sciences. It is for just these reasons, in fact, that the government has allowed the OSCAR satellites to be carried as "hitch-hikers" on launch vehicles for its own satellites. The school program, with the assistance of local hams in each area, has been developed in cooperation with NASA. For them it is an ideal supplement to their own projects.

This is "Oscar 6," one of the series of ham satellites which are being used by amateurs to add distance to their world-wide contacts.



Another way in which many hams get some experience in building—and save money in the process—is in assembling pieces of equipment from the many fine kits available from several manufacturers. The results are usually excellent and the process of assembly is as nearly foolproof as possible.

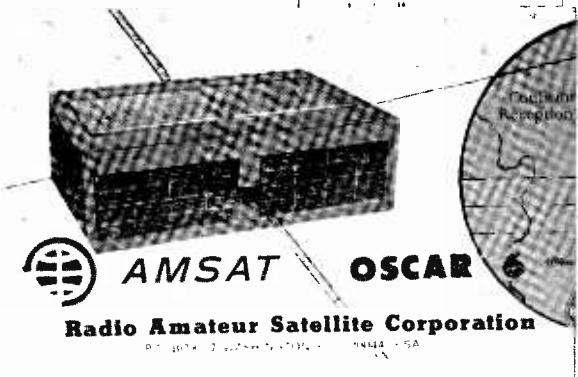
With the advances in the technology of amateur radio and the growing sophistication of amateur equipment, amateur activ-

ities and interests have moved in many directions. Hams have developed their own specialities. A glance at the regular columns and features in the various amateur publications will give a quick idea of the range and variety of this growing smorgasbord that is amateur radio today—DX (or distant contacts), contests, traffic (or message handling), mobile operations, and various kinds of public service activities—to name just a few.

One common bond that still exists in the operating preferences of just about every ham is "rag chewing." This is just getting on the air for conversations or QSO's with other hams. These can be in the next town, in another state, or across the world. This, in fact, is the real magic of amateur radio; the opportunity to "talk" with people everywhere and anywhere without regard for geographic, political, economic, or even language barriers. Whenever a ham sends out that "CQ" call he never knows who may answer. It could be a general, a U.S. Senator, the president of a big company, a theater celebrity, a king, or a high-school student. And always the rank or position makes absolutely no difference. When Ron, WA1MXP, a Connecticut high-school student, talks to K7UGA, it is "Barry," not Senator Goldwater. VR6TC is Tom—Tom Christian on lonely Pitcairn Island, great-great-great-great grandson of Fletcher Christian of "Mutiny On The Bounty" fame. JY1 is Jordan's King Hussein. W1EFW, Milt, is a bank president. And so it goes.

Distant Transmissions. Hams who pursue any of the many special interests in amateur radio can be pretty avid enthusiasts. In DX, for example, one "collects" contacts with distant countries and places—the more remote and exotic the better. One of the American Radio Relay League's oldest and most famous awards is the DXCC certificate, for verified contacts with one hundred or more countries. A "country," by amateur radio definition may be England or France or Japan. Or it may be a remote, unoccupied rock in the middle of the Indian Ocean.

The traditional acknowledgement of an on-the-air contact between two hams is the exchange of postcard-size QSL cards. Each ham has his own distinctive design, some very colorful and exotic, indeed. An old-timer may collect hundreds or even thou-



The QSL card sent out by Radio Amateur Satellite Corp. Technical details of satellite are given on the reverse side of card.

sands of different QSL cards and they make a very colorful display on the walls of his "ham shack" or station. A current fad in DX is low-power operation where skill, persistence, and patience are essential to get through over great distances with a small or weak signal. To the uninitiated, one of the strangest aspects of DX is DXpeditions, in which a group of hams or occasionally individuals will transport portable station equipment, often under great difficulty, by plane, ship, boat or whatever, to out-of-the-way places (sometimes an uninhabited island or coral atoll) in order to go on the air from a new or rare "country." When these DXpeditions occur, the resulting "pile-up" on the air from hundreds of hams seeking contact can be staggering.

But, as any DXer will tell you, it's all great fun, even when it involves hovering over the dials day and night.

Contests and Public Service. Another equally avid group of hams is the contesters. This activity is usually making the maximum number of contacts under specified conditions and specified time periods. Perhaps the best known and biggest ham contest is ARRL's Field Day, an annual event which takes place in June. Over a 24-hour period, weekend groups of hams set up portable stations in the field, using portable generators for power, under simulated emergency conditions, and log as many contacts as possible during the contest period. The emergency communications preparedness aspect of Field Day had a real test when 1972's Hurricane Agnes hit the Eastern United States during the contest. Many ham participants switched operations quickly and swung into action on a real emergency basis. Others who were not needed simply went on with the contest. There is even a

special contest for Novice licensees called the Novice Roundup.

One of the proudest traditions in amateur radio is its record of public service. This goes back to the very origins of the hobby and, in fact, is one of the foundations on which the amateur's access to the coveted frequencies is based under government regulations. At one time or another during his career almost every ham involves himself in some facet of public service. As one put it, "That's really what ham radio is all about." Public service takes many forms: emergency communications, traffic or message handling, communications for public events, communications in support of public and private agencies such as the Red Cross, and much more. During the Vietnam conflict, Senator Barry Goldwater's station, K7UGA, with the help of a number of other local hams, operated around the clock handling thousands of "phone patch" connections between servicemen in Southeast Asia and their families at home. Using a special procedure, the serviceman talks at an amateur station near his base through a telephone hook-up with his home in the States. Other amateurs have provided similar service for families of servicemen stationed in antarctic.

The Duke University Medical Center Amateur Radio Club in Durham, North Carolina, operates a unique public service program called Project Med-Aid, a daily world-wide, short-wave medical emergency service. Since 1966 it has provided often-dramatic on-the-air medical advice and assistance to hundreds of doctors in remote, isolated outposts in Central America, South America, and Africa. The Med-Aid station call letters are WB4BLK. There is also a foreign mission net by means of which ham missionaries around the world maintain contact with their home bases and with each other. The Eye Bank Net provides the essential fast communications necessary in bringing together donors and recipients of eye transplants on a continuing basis.

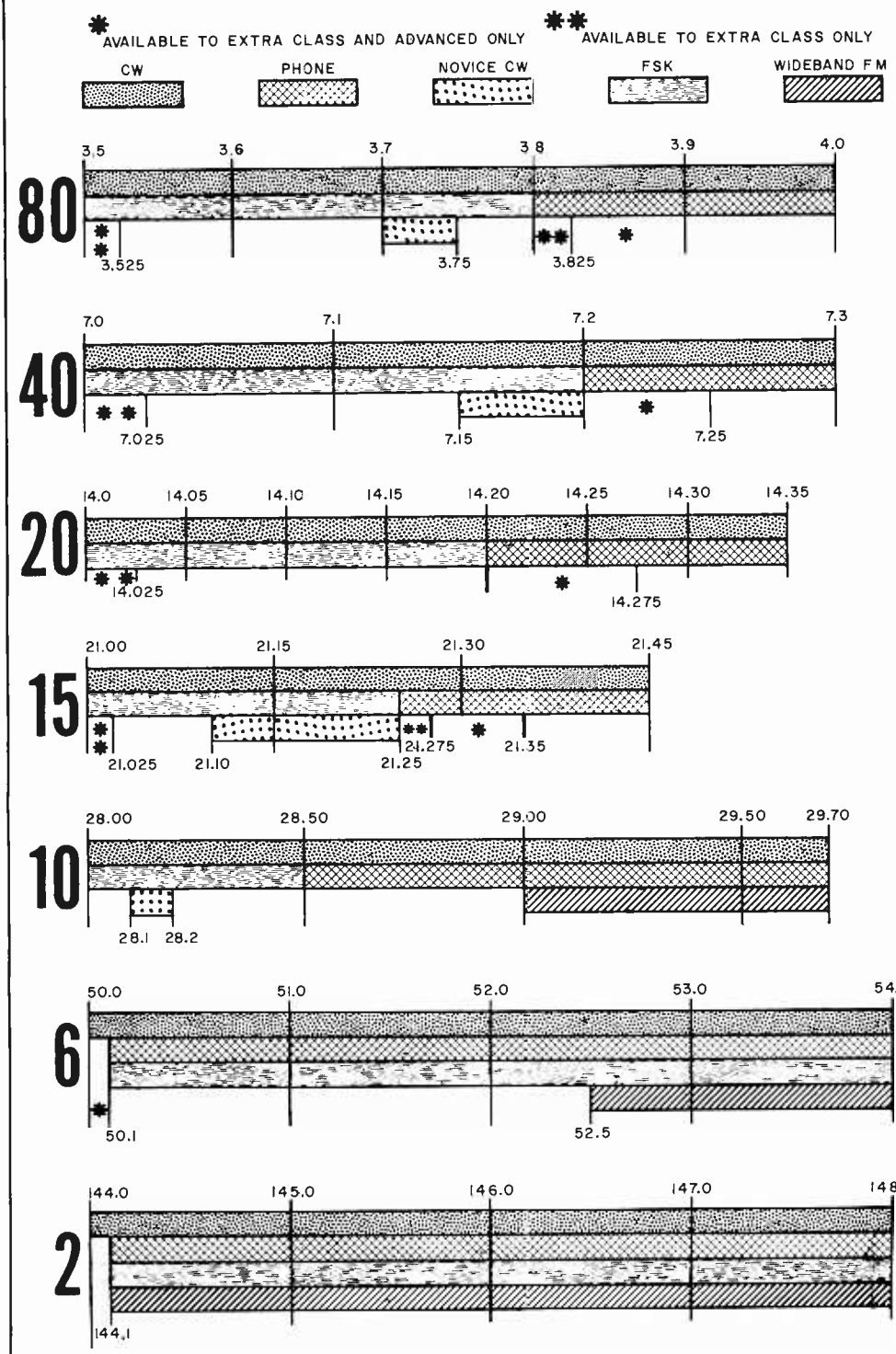
Much of the amateur public service activity occurs on a spontaneous, routine basis because hams are both available and active almost everywhere. However, for many years there has been a very large public service field organization covering various kinds of activities and coordinated by ARRL. More than 5000 elected or appointed amateur volunteers direct and supervise more than 30,000 registered amateur members of the Amateur Emergency Corps. These people spend many hours on a regular basis practicing and drilling in preparation for various kinds of emergencies. Every day hundreds of them meet on the air in established nets that are interconnected from coast to coast. They regularly handle hundreds of routine messages of all kinds for practice and as a service to others. Other groups are part of local and area civil defense organizations.

2-Meter FM. One of the liveliest fields of amateur interest is 2-meter FM and repeaters which utilize very compact, portable combination transmitters and receivers. Its short-range capabilities are extended by repeaters erected on high locations and maintained by amateur groups in most parts of the nation. A repeater receives and retransmits a signal so operators of 2-meter equipment can reach much greater distances. These units, which hams usually use in their automobiles, have made possible emergency communications ranging from road and route directions to another ham to summoning police and ambulances to accident scenes. With a device similar to a phone patch, hams can reach authorities via telephone at their headquarters. There are even now very small, hand-carried FM units which the ham can carry on his person and use wherever he is. Such a unit really is a miniature radio station containing all three of the basic elements: transmitter, receiver, and antenna, and all in a package no bigger than a camera.

Although over-the-air communication is the essence of amateur radio, hams are also a gregarious lot. They meet regularly at local amateur radio clubs in almost every area or community and at larger regional gatherings such as ham conventions and, less formally, at functions peculiar to amateur radio called "hamfests." Here there are technical presentations, discussions of various operating areas, commercial equipment displays, and a great deal of purely social activity. At such assemblies, amateurs keep up with current developments and activities and have fun at the same time. Often, on-the-air friends of many years will meet personally for the first time for an "eyeball QSO" or contact.

These are only some of the highlights of what hams do. The range of interests and activities is as varied as amateurs themselves. Amateur radio today is truly the hobby with something for everybody. ◈

PRINCIPAL RADIO AMATEUR BAND ALLOCATIONS



AMATEUR VHF FM OPERATION

The largest growth area in Amateur Radio since SSB.

BY DAVID F. PLANT, K9LAJ/2

Genave "GTX-200" 2-m FM transceiver.

Standard offers this hand-held 2-m unit.

IMAGINE walking down a street with a compact VHF FM "walkie-talkie" or driving along with a 10-watt transceiver under the dash of your car and having interference-free contact with a fellow ham perhaps a hundred or more miles away, at any time of night or day. Many thousands of amateurs are doing just that, and with rigs that often cost less than $250 new!

One of the secrets to this really fun aspect of ham radio is the *repeater*. This device, usually mounted atop a tall building or high area, receives incoming FM signals and retransmits them with greater power and range due to the repeater's high location. As you probably know, VHF signals generally travel just about line-of-sight.

Another reason that VHF FM operation is enjoying such popularity is the many high-quality, yet inexpensive mobile transceivers and walkie-talkies on the market. These units offer a great way to avoid the interference and fading conditions so often found on the lower frequency (HF) ham bands.

Choosing a Rig. All that is needed to begin enjoying FM is a transceiver and an antenna. Your local distributor's ham shack is a good place to begin. The salesman (usually a ham, by the way) can show you the different types of equipment and their various features.

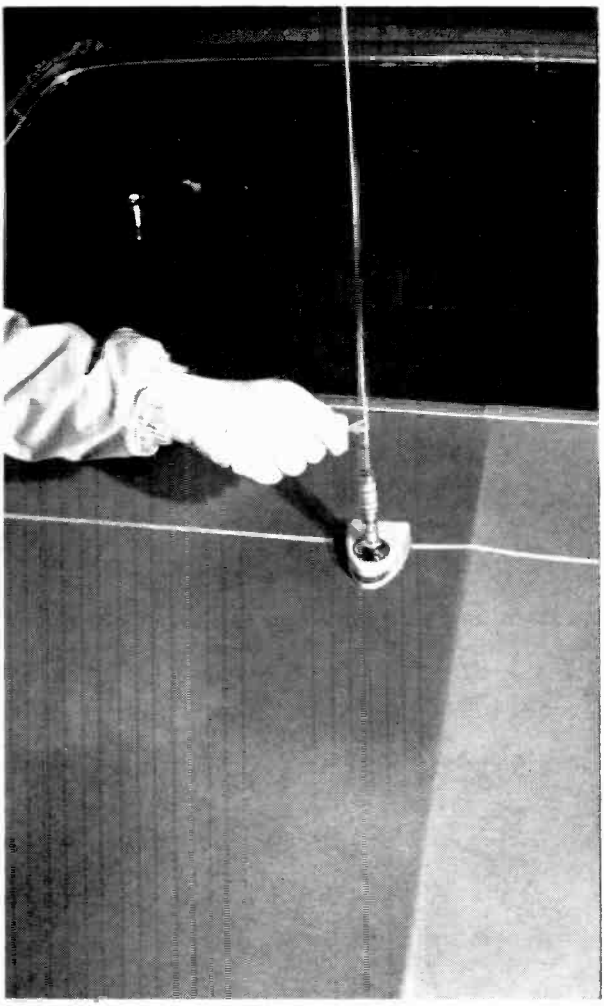
Basically, there are two types of transceivers—mobile/fixed-station units and hand held walkie-talkies. The hand-held units are great fun, but impractical if most of your operating will be fixed station or mobile. A few of the compact mobile transceivers do, however, have a low-power switch so they can be hand carried without carting 20 pounds of batteries.

As a general rule of thumb, better selectivity is of greater importance if you're located near a city because more channels, many of which are occupied by high-powered repeaters, are used. This would be less true farther away from cities. In this case, sensitivity would be the criterion.

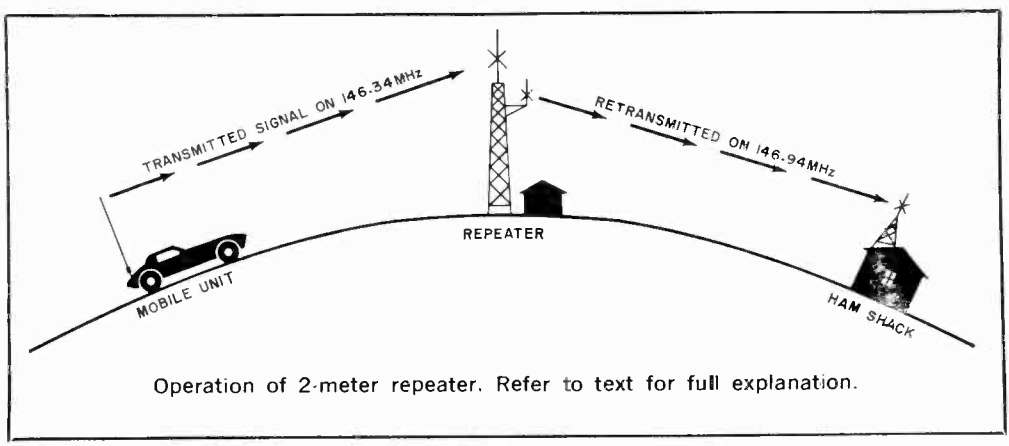
VHF FM is set up with fixed channels; crystal-control provides stability. The number of channels offered by the equipment should also be examined, as more switch positions would be required near the larger cities. Other considerations include transmitter power, appearance, and price.

Antennas. VHF FM operation is almost entirely vertically polarized and most hams use a simple whip antenna on their cars and an inexpensive ground-plane antenna at the home station. These antennas radiate and receive from all directions equally and do not require a rotator. Extended wavelength antennas are also available which add gain to transmitted and received signals. With antennas, in general you get what you pay for. Height is the most important single factor.

Repeaters. Repeater operation requires two frequencies, generally separated by 600 kHz on the popular 2-meter band. For example, one common repeater setup receives



Heath's 5/8 wavelength mobile whip for 2-meter FM operation. Model HWA-202-3



Operation of 2-meter repeater. Refer to text for full explanation.

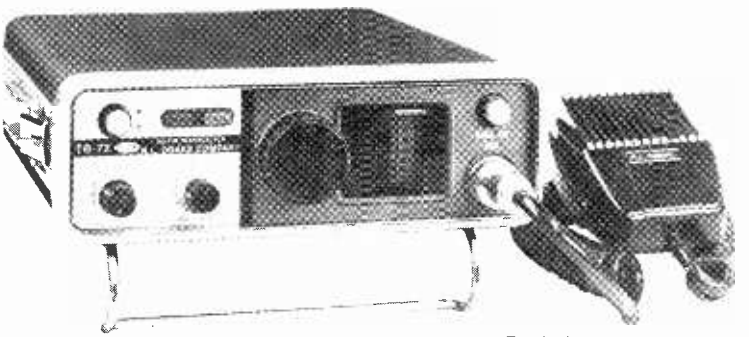
Heath's HA-202 amplifier for 2-meter applications.

on 146.34 MHz and retransmits on 146.94 MHz. Many transceivers are now supplied with this crystal pair and additional combinations can be ordered from crystal manufacturers. Radio clubs in your area are a good source of information on local repeater usage and channels.

There are two types of repeaters—open and closed. An open repeater is one that anyone on frequency can use. A closed repeater requires special encoding equipment in the transceiver to gain access, the details of which can be supplied by that particular repeater club. They, in turn, may ask for a donation of time or a few dollars to help support the maintenance of equipment, etc.

Simplex Operation. For local contacts there is no need to tie up a repeater. A special channel can be set aside for direct operation. This channel is on 146.52 MHz and has gained great popularity. The original frequency used for this type of operation was 146.94 MHz, but direct operation on that channel became difficult because of powerful repeaters on the same frequency.

Mountain-Topping. Because of the line-of-sight characteristics of VHF, operation of transceivers from high locations has always been a favorite activity of ham operators. FM has made this type of operation even more fun because there are many more amateurs monitoring specific frequencies. Now you will hear FM-er's operating from private planes, tall buildings (this writer's favorite is the Empire State Building in New York City), and mountain tops. With the increased elevation, many states can be worked with only a small walkie-talkie. ◈



Drake's TR-72 2-meter FM transceiver.

THE CHALLENGE OF SLOW-SCAN TV

Coast-to-coast tests show how it works.

BY RICHARD HUMPHREY

THE ARRIVAL of slow-scan television (SSTV) to the amateur radio bands is making incentive licensing a workable proposition for the first time since its inception. Since SSTV can be used only on the portions of 80 through 15 meters set aside for Extra and Advanced ticket holders (see Table I), books are being cracked and rusty fists are practicing CW as General and Technician licensees bone up for the FCC exams to upgrade their tickets.

In this article we will be discussing some of the technical aspects of SSTV. We conducted some SSTV tests, the results of which, along with our observations, will be presented. Finally, non-ham applications of SSTV will be discussed, as will the possible role the ham will play in perfecting the system.

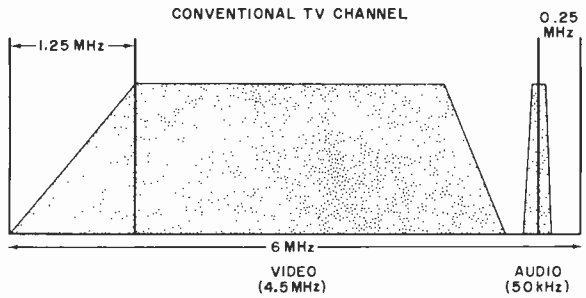


Fig. 1. The diagram shows the frequency ranges for signals on conventional TV.

Technical Data. Narrow bandwidth is the key to slow-scan TV. As a comparison, commercial, or home-type, TV channels are each 6 MHz wide (see Fig. 1), while SSTV is a mere 1100 Hz wide. The 525-line, 30-frame/second commercial system used in the U.S. requires a video span of roughly 4.5 MHz, even with the suppression of one sideband, a 50-kHz audio bandwidth, and guard bands between the audio and video and at each end of the channel to prevent interference. By contrast, SSTV employs audio-frequency subcarriers for sync and black-and-white, 8-second/frame picture rate, and only 120-128 lines/frame (see Table II for more complete details). This results in a modulating frequency spread of 1100 Hz as shown in Fig. 2.

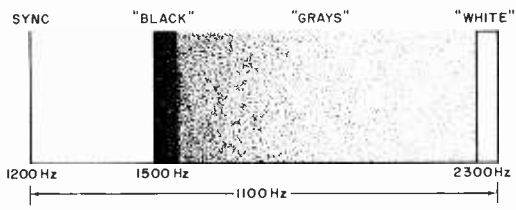
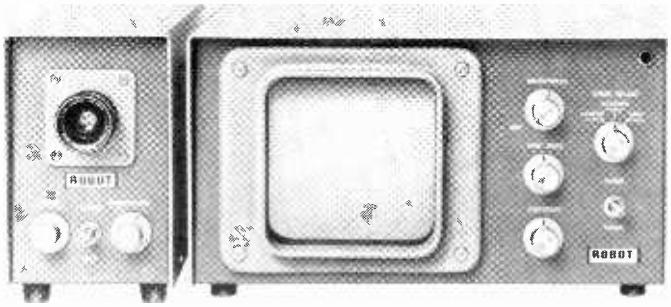


Fig. 2. The modulating frequency spread for slow-scan TV is about 1100 Hz with black at 1500 Hz and shades of gray in steps up to the white signal at 2300 Hz.

The width of the modulating frequency is dependent primarily on the number of lines per frame and the number of pictures per frame. By reducing both (via audio sync and black-and-white subcarriers), SSTV can be transmitted via SSB, it can be sent over conventional telephone lines without the need for special coaxial TV-quality cable, and it can be recorded on an *audio* tape recorder. With respect to the last, an inexpensive cassette recorder will do if the tape speed is constant.

The trade-off in SSTV for not being held to line-of-sight transmission and all other extras is that only "still" pictures can be transmitted and extra-fine detail is not possible. An example of an SSTV picture is shown in Fig. 3. Going back to Fig. 2 for the moment, sync pulses are on a 1200-Hz subcarrier; "black" rides on a 1500-Hz carrier (this means the sync signal is blacker-than-black, thus blanking out the retrace

Fig. 3. An 8-second time exposure of an SSTV picture shows good linearity.



The Robot Research, Inc., Model 80 SloScan camera is shown at left with the companion monitor and receiver Model 70 at right.

as the beam returns to the left of the CRT), and "white" is transmitted at 2300 Hz.

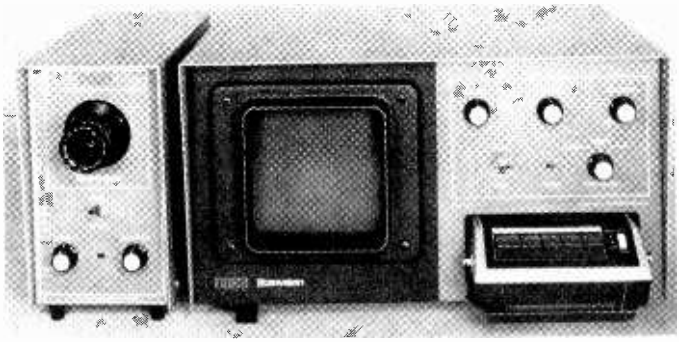
An SSTV signal, when heard on the air, sounds like a science-fiction movie soundtrack. A black-and-white line drawing or black letters on a white background (or vice versa) yields an audio signal that alternates between 1500 Hz and 2300 Hz, while the 1200-Hz sync subcarrier remains constantly on. When pictures with various shades of gray are transmitted, black, white, and audio will vary in step with the shades of gray at intermediate steps between 1500 Hz and 2300 Hz.

SSTV Tests. Our tests of the SSTV system were conducted coast-to-coast between Watsonville, California and Governor's Island, New York. The hookup was a combination of land-line (telephone) and microwave relay. The test was primarily intended to determine whether or not SSTV could be a workable tool in inland and maritime search and rescue work.

Using Linear Systems' "Scanvision" equipment on both ends and Linear Systems' Manager of Amateur Factory Services, Stuart E. Till, in California and an officer class of the National Search & Rescue School (including representatives of West Germany, Denmark, Canada, the U.S. Air Force, and U.S. Coast Guard) on the East Coast, test patterns, typescript text, and pictures of live subjects were exchanged. Here is some of the feedback from those tests:

Inevitably, there is an unconscious urge to compare SSTV picture quality with that of commercial broadcast pictures. However, one soon realizes that SSTV was never intended to provide commercial quality pictures, nor is such quality necessary. The 25-mm lens supplied with the camera provided the best picture quality. Subsequent tests with other lenses ranked a 35-mm unit high and a 180-mm one marginal. (This last lens was a "cheapie;" so, we cannot fault SBE's gear for the poor reproduction.)

The best lighting setup for three-dimensional subjects was two 300-watt bulbs with reflectors set at 45° on either side of the camera. For two-dimensional subjects (QSL



The SBE Scanvision, made by Linear Systems, Inc., features a built-in cassette tape recorder and 25-mm C-mount camera lens.

TABLE I—FCC SSTV AUTHORIZATIONS

Band Meters	Frequency Allocations (MHz) Extra	Advanced	General	Technician
80	3.800-3.900	3.825-3.900		
40	7.200-7.250	7.200-7.250		
20	14.200-14.275	14.200-14.275		
15	21.250-21.350	21.275-21.350		
10	28.500-29.700	28.500-29.700	28.5-29.7	
6	50.100-54.000	50.100-54.000	50.1-54.0	50.1-54.0
2	144.100-148.000	144.100-148.000	144.1-148.0	144.1-148.0

Note: SSB on all amateur frequencies; DSB (AM) on 6, 2, and up only. Novices have no SSTV rights. Simultaneous (SSTV on one sideband, voice on other sideband) transmission permitted on all listed amateur frequencies.

cards, numbers and letters, and the like), one 500-watt bulb in a reflector, positioned directly above the camera, yielded the best results. It might be argued that this is a lot of light with the camera between 2 and 3 feet from the subject, but it did let us stop the lens down to f/22, cut the camera brightness down, and come up with the best picture on the monitor.

The Bell System's fantastic space-age service made it necessary to spend more than three hours getting a connection that was free enough of line noise, distortion, and with high enough audio level to transmit a suitable picture. This is not to say that SSTV is more critical of line quality than is the human ear; we could not hear each other over the same lines. We did determine that while line noise could wipe out the picture completely, low audio could be countered by simply cranking up the brightness and contrast on the monitor/receiver.

SBE Scanvision camera with 25-mm lens is priced at around $500.

Finding the proper connections inside the telephone is best done with headphones (when you hear a dial tone, you have it). It is important to monitor the signal level on both the telephone line and the radio transmission to prevent cross-modulation in the first case and "splatter" in the second.

Whether a cassette recorder (such as SBE's built-in unit) or an open-reel recorder is used is academic. Tests with an outboard recorder operated at 3¾ and 7½ ips revealed little, if any, improvement over the built-in 1⅞ ips recorder with reference to picture quality. Good motor speed regulation with no "wow" is the key to recording slow-scan TV signals. Since SSTV operates at between 1200 and 2300 Hz, frequency response is relatively unimportant.

Other Uses For SSTV. Presently, the main user of SSTV is the radio amateur operator. The staff and class at the National Search & Rescue School came up with some non-ham applications. One was the transmission of search patterns to quasi-military groups not familiar with the international search and rescue terminology as taught by the SAR School. This could include the Civil Air Patrol which performs more than 75 percent of U.S. inland searches on a routine basis, as well as sheriff's offices and others. To a certain extent, it could include the U.S. Coast Guard Auxiliary.

TABLE II—SSTV SPECIFICATIONS	
Lines/frame*	128
Vertical scan time	8.5 s
Horizontal sync	5 ms
Vertical sync**	66 ms
Sync frequency	1200 Hz
Black frequency	1500 Hz
White frequency	2300 Hz
Bandwidth	1100 Hz

*Up to introduction of commercial equipment, was usually 120.
**Up to introduction of commercial equipment, pulses were usually 30 ms.

Using SSTV to transmit schematic diagrams and other technical data to remote installations, such as Loran sites, to provide engineering aid to technicians was another suggestion. Uses by law enforcement agencies, banks, and other security organizations in need of quick transmission of identification were yet other possible applications for SSTV.

In connection with search and rescue, we found that maps and nautical charts did not come through very well because of their lack of contrast and masses of small details. Typewritten text also suffered.

The Ham's Role. Slow-scan TV is at a stage where in-field operational experimentation is needed. This is one job at which the radio amateur is superlative. A body of literature on the use of different lenses (what about the feasability of a three- or four-lens turret, for instance?) for different jobs is needed. The same applies to lighting arrangements. Too, the possibility of using the interlacing technique to obtain better picture detail—at a reasonable price, of course—can be investigated. A host of other questions must be answered, and the ham is in the best position to do the necessary investigation and experimentation.

The fascination of sitting in a dark room looking at the face of the SSTV receiver's CRT cannot be denied. Whether it is worth from $600 to $1000 to do it, not to mention the skull-cracking to get your Extra or Advanced ticket, is up to you. Of course, if you do not mind putting together your own system from basic components, you can probably reduce the cost considerably. ◈

TIME CONVERSION WITHIN U.S.A.

Universal Time (Greenwich Mean Time) (hours)	Eastern Daylight Time	Eastern Standard or Central Daylight	Central Standard or Mountain Daylight	Mountain Standard or Pacific Daylight	Pacific Standard Time
0000	8:00 p.m.	7:00 p.m.	6:00 p.m.	5:00 p.m.	4:00 p.m.
0100	9:00 p.m.	8:00 p.m.	7:00 p.m.	6:00 p.m.	5:00 p.m.
0200	10:00 p.m.	9:00 p.m.	8:00 p.m.	7:00 p.m.	6:00 p.m.
0300	11:00 p.m.	10:00 p.m.	9:00 p.m.	8:00 p.m.	7:00 p.m.
0400	Midnight	11:00 p.m.	10:00 p.m.	9:00 p.m.	8:00 p.m.
0500	1:00 a.m.	Midnight	11:00 p.m.	10:00 p.m.	9:00 p.m.
0600	2:00 a.m.	1:00 a.m.	Midnight	11:00 p.m.	10:00 p.m.
0700	3:00 a.m.	2:00 a.m.	1:00 a.m.	Midnight	11:00 p.m.
0800	4:00 a.m.	3:00 a.m.	2:00 a.m.	1:00 a.m.	Midnight
0900	5:00 a.m.	4:00 a.m.	3:00 a.m.	2:00 a.m.	1:00 a.m.
1000	6:00 a.m.	5:00 a.m.	4:00 a.m.	3:00 a.m.	2:00 a.m.
1100	7:00 a.m.	6:00 a.m.	5:00 a.m.	4:00 a.m.	3:00 a.m.
1200	8:00 a.m.	7:00 a.m.	6:00 a.m.	5:00 a.m.	4:00 a.m.
1300	9:00 a.m.	8:00 a.m.	7:00 a.m.	6:00 a.m.	5:00 a.m.
1400	10:00 a.m.	9:00 a.m.	8:00 a.m.	7:00 a.m.	6:00 a.m.
1500	11:00 a.m.	10:00 a.m.	9:00 a.m.	8:00 a.m.	7:00 a.m.
1600	Noon	11:00 a.m.	10:00 a.m.	9:00 a.m.	8:00 a.m.
1700	1:00 p.m.	Noon	11:00 a.m.	10:00 a.m.	9:00 a.m.
1800	2:00 p.m.	1:00 p.m.	Noon	11:00 a.m.	10:00 a.m.
1900	3:00 p.m.	2:00 p.m.	1:00 p.m.	Noon	11:00 a.m.
2000	4:00 p.m.	3:00 p.m.	2:00 p.m.	1:00 p.m.	Noon
2100	5:00 p.m.	4:00 p.m.	3:00 p.m.	2:00 p.m.	1:00 p.m.
2200	6:00 p.m.	5:00 p.m.	4:00 p.m.	3:00 p.m.	2:00 p.m.
2300	7:00 p.m.	6:00 p.m.	5:00 p.m.	4:00 p.m.	3:00 p.m.

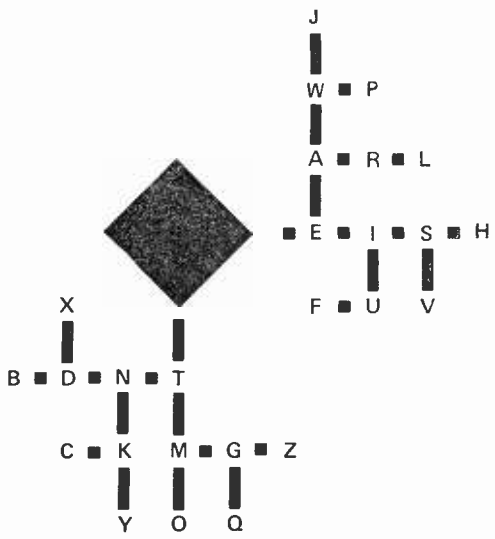
Learn Code Fast!

Try this simple and easy method of learning code alphabet for your Novice license exam.

TO use the Code Learning Chart (right) start at the diamond and follow the dots and dashes to the desired letter, moving horizontally for the dots and vertically for the dashes. Examples: E=dot, P=dot-dash-dash-dot. With this method, you should be able to memorize the entire code alphabet for your Novice ham license exam in an hour or so.

When practicing out loud, either with a friend or by yourself, remember that a dot is pronounced "dit" while a dash is a "dah." When "speaking" the code, the "t" in "dit" is not pronounced unless it comes at the end of a group. Thus, the letter "F" is pronounced "dididahdit."

Although the Chart does not include punctuation marks and other useful symbols, once you have mastered the alphabet, learning the additional material will come easily. Give it a try—and you will be ready to face the Code section fearlessly! ◈



A ·—	J ·———	S ···	1 ·————
B —···	K —·—	T —	2 ··———
C —·—·	L ·—··	U ··—	3 ···——
D —··	M ——	V ···—	4 ····—
E ·	N —·	W ·——	5 ·····
F ··—·	O ———	X —··—	6 —····
G ——·	P ·——·	Y —·——	7 ——···
H ····	Q ——·—	Z ——··	8 ———··
I ··	R ·—·		9 ————·
			Ø —————

Wait (AS) ·—···	Question Mark ··——··
Period ·—·—·—	Double Dash (Break) —···—
Comma ——··——	End of Message (AR) ·—·—·
Fraction Bar (/) —··—·	Invitation to Transmit —·—
Error ·····	End of Transmission (SK) ···—·—

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From the American Radio Relay League

Prefix	Country
A2, ZS9	Botswana
A5	Bhutan
AC3	Sikkim
AC4	Tibet
AP	Bangladesh
AP	West Pakistan
AX (See VK)	
BV	Formosa
BY	China, P.R.
C2, VK9	Nauru Island
C3 (PX)	Andorra
CE	Chile
CE9AA-AM, FB8Y, KC4, LA, LU-Z, OR4, UA1, VKØ, VP8, ZL5, ZS1, 8J	Antarctica
CE9AN-AZ (See VP8)	
CEØA	Easter Island
CEØZ	Juan Fernandez
CEØX	San Felix
CM, CO	Cuba
CN2, 8, 9	Morocco
CP	Bolivia
CR3, 5	Portuguese Guinea
CR4	Cape Verde Islands
CR5	Principe, Sao Thome
CR6	Angola
CR7	Mozambique
CR8, CR1Ø	Portuguese Timor
CR9	Macao
CT1	Portugal
CT2	Azores
CT3	Madeira Islands
CX	Uruguay
DA, DJ, DK, DL, DM	Germany
DU, DX	Philippine Islands
EA	Spain
EA6	Balearic Islands
EA8	Canary Islands
EA9	Rio de Oro
EA9	Ceuta and Melilla
EAØ (see 3C)	
EI	Republic of Ireland
EL	Liberia
EP	Iran
ET3, 9E, 9F	Ethiopia
F	France
FA (See 7X)	
FB8 (See FH8)	
FB8 (See 5R8)	
FB8 (See FR7)	
FB8W	Crozet Is.
FB8X	Kerguelen Islands
FB8Y (See CE9AA-AM)	
FB8Z	Amsterdam & St. Paul Is.
FC	Corsica
FD (See 5V)	
FE8 (See TJ)	
FF4 (See TU)	
FF7 (See 5T)	
FF8 (See TY)	
FF8 (See TZ)	
FF8 (See 5U7)	
FF8 (See XT)	
FF8 (See 6W8)	
FG7	Guadeloupe
FH8, FB8	Comoro Islands
FK8	New Caledonia
FL8	Fr. Somaliland
FM7	Martinique
FO8	Clipperton Island
FO8	Fr. Oceania
FP8	St. Pierre & Miquelon Is.
FQ8 (See TL)	
FQ8 (See TT)	
FQ8 (See TN)	
FQ8 (See TR)	
FR7	Glorioso Islands
FR7	Juan de Nova
FR7	Reunion
FR7	Tromelin
FS7	Saint Martin
FU8 (See YJ)	
FW8	Wallis & Futuna Islands
FY7	Fr. Guiana & Inini
G	England
GC	Guernsey & Dependencies
GC	Jersey Island
GD	Isle of Man
GI	Northern Ireland
GM	Scotland
GW	Wales
HA, HG	Hungary
HB	Switzerland
HBØ, HE	Liechtenstein
HC	Ecuador
HC8	Galapagos Islands
HE (See HBØ)	
HH	Haiti
HI	Dominican Republic
HK	Colombia
HKØ	Bajo Nuevo
HKØ	Malpelo Is.
HKØ	San Andres & Providencia
HKØ (See KS4B)	
HL, HM	Korea
HP	Panama
HR	Honduras
HS	Thailand
HT (See YN)	
HV	Vatican
HZ, 7Z	Saudi Arabia
I, IT	Italy
IS, IM	Sardinia
JA, JE, JR, JH, KA	Japan
JD, KG6I, KA1	Ogasawara Islands
JD, KG6I, KA1	Minami Torishima
JR6 (See KR6, 8)	
JT	Mongolia
JW, LA/P	Svalbard
JX, LA/P	Jan Mayen
JY	Jordan
K, W	United States of America
KA (See JA)	
KA1 (See JD)	
KA6 (See KR6, 8)	
KB6	Baker, Howland & American Phoenix Islands
KC4 (See CE9AA-AM)	
KC4	Navassa Island
KC6	Eastern Caroline Isls.
KC6	Western Caroline Isls.
KG1 (See 0X)	
KG4	Guantanamo Bay
KG6	Guam
KG6I (See JD)	
KG6R, S, T	Mariana Islands
KH6	Hawaiian Islands
KH6	Kure Island
KJ6	Johnston Island
KL7	Alaska
KM6	Midway Islands
KP4	Puerto Rico
KR6, 8, JR6	Ryukyu Islands
KS4	Swan Islands
KS4B, HKØ	Serrana Bank & Roncador Cay
KS6	American Samoa
KV4	Virgin Islands
KW6	Wake Island
KX6	Marshall Islands
KZ5	Canal Zone
LA, LG	Norway
LA/P (See JX, JW)	
LA/G (See 3Y)	
LA (See CE9AA-AM)	
LU	Argentina
LU-Z (See CE9AA-AM, VP8)	
LX	Luxembourg
LZ	Bulgaria
M1 (See 9A1)	
MP4B	Bahrein
MP4D, T	Trucial Oman
MP4M, VS9O	Sultanate of Muscat & Oman
MP4Q	Qatar
OA	Peru
OD5	Lebanon
OE	Austria
OH, OF	Finland
OHØ	Aland Islands
OJØ	Market
OK	Czechoslovakia
ON	Belgium
OQ5, Ø (See 9Q5)	
OR4 (See CE9AA-AM)	
OX, KG1, XP	Greenland
OY	Faroe Islands

Prefix	Country
OZ	Denmark
PA, PD, PE, PI	Netherlands
PJ	Neth. Antilles
PJ	St. Maarten, Saba & St. Eustatius
PK (See 8F)	
PX (See C3)	
PY	Brazil
PYØ	Fernando de Noronha
PYØ	St. Peter & St. Paul's Rocks
PYØ	Trindade & Martim Vaz Is.
PZ	Surinam
SK, SL, SM	Sweden
SP, 3Z	Poland
ST2	Sudan
SU	Egypt
SV	Crete
SV	Dodecanese
SV	Greece
TA	Turkey
TF	Iceland
TG	Guatemala
TI	Costa Rica
TI9	Cocos Island
TJ, FE8	Cameroun
TL	Central African Rep.
TN	Congo Rep.
TR	Gabon Rep.
TT	Chad Rep.
TU	Ivory Coast
TY	Dahomey Rep.
TZ	Mali Rep.
UA, UK1, UK3, UK4, UK6, UV, UW1-6, UN1	European Russian S.F.S.R.
UA1	Franz Josef Land
UA1 (See CE9AA-AM)	
UA2, UK2F	Kaliningradsk
UA, UK9, UV, UW9, Ø	Asiatic R.S.F.S.R.
UB5, UK5, UT5, UY5	Ukraine
UC2, UK2A/C/I/L/O/S/W	White R.S.S.R.
UD6, UK6C/D/K	Azerbaijan
UF6, UK6F/O/Q/V	Georgia
UG6, UK6G	Armenia
UH8, UK8H	Turkoman
UI8, UK8	Uzbek
UJ8, UK8J/R	Tadzhik
UL7, UK7	Kazakh
UM8, UK8M, N	Kirghiz
UO5, UK5O	Moldavia
UP2, UK2B/P	Lithuania
UQ2, UK2G/Q	Latvia
UR2, UK2R/T	Estonia
VE, VO	Canada
VK, AX	Australia (inc. Tasmania)
VK	Lord Howe Island
VK4	Willis Islands
VK9 (See C2)	
VK9N	Norfolk Island
VK9, AA-MZ	Papua Territory
VK9, AA-MZ ..	Territory of New Guinea
VK9X	Christmas Island
VK9Y	Cocos Islands
VKØ (See CE9AA-AM)	
VKØ	Heard Island
VKØ	Macquarie Island
VO (See VE)	
VP1	British Honduras
VP2E, K	Anguilla
VP2A	Antigua, Barbuda
VP2V	British Virgin Islands
VP2D	Dominica
VP2G	Grenada & Dependencies
VP2M	Montserrat
VP2K	St. Kitts, Nevis
VP2L	St. Lucia
VP2S	St. Vincent & Dependencies
VP3 (See 8R)	
VP4 (See 9Y4)	
VP5 (See ZF1)	
VP5 (See 6Y5)	
VP5	Turks & Caicos Islands
VP6 (See 8P)	
VP7	Bahama Islands
VP8 (See CE9AA-AM)	
VP8	Falkland Islands
VP8, LU-Z	So. Georgia Is.
VP8, LU-Z	So. Orkney Is.
VP8, LU-Z	So. Sandwich Is.
VP8, LU-Z, CE9AN-AZ	So. Shetland Is.
VP9	Bermuda Islands
VQ1	Zanzibar
VQ2 (See 9J2)	
VQ3 (See 5H3)	
VQ4 (See 5Z4)	
VQ5 (See 5X5)	
VQ8, 3B6, 3B7 ..	Agalega & St. Brandon
VQ8, 3B8	Mauritius
VQ8, 3B9	Rodriguez Island
VQ9	Aldabra
VQ9	Chagos Islands
VQ9	Desroches
VQ9	.Farquhar
VQ9	Seychelles
VR1	British Phoenix Islands
VR1	Gilbert & Ellice Isls. & Ocean Island
VR2	Fiji Islands
VR3	Fanning & Christmas Is.
VR4	Solomon Islands
VR5	Tonga Islands
VR6	Pitcairn Island
VS1, 9M4, 9V1	Singapore
VS1, 9M2 (See 9M2, 4)	
VS2 (See 9M2)	
VS4, ZC5 (See 9M6, 8)	
VS5	Brunei
VS6	Hong Kong
VS9K	Kamaran Is.
VS9A,P,S, 7O	South Yemen
VS9M (See 8Q)	
VS9O (See MP4M)	
VU	Andaman & Nicobar Isls.
VU	India
VU	Laccadive Islands
W (See K)	
XE, XF, 4A, 6D	Mexico
XF4, 6D4	Revilla Gigedo
XP (See OX)	
XT	Voltaic Rep.
XU	Cambodia
XV5 (See 3W8)	
XW8	Laos
XZ2	Burma
YA	Afghanistan
YB (See 8F)	
YI	Iraq
YJ, (FU8)	New Hebrides
YK	Syria
YN, YNØ,HT	Nicaragua
YO	Rumania
YS	Salvador
YU, YT	Yugoslavia
YV, 4M	Venezuela
YVØ	Aves Island
ZA	Albania
ZB1 (See 9H1)	
ZB2	Gibraltar
ZC4 (See 5B4)	
ZC5 (See 9M6, 8)	
ZD1 (See 9L1)	
ZD2 (See 5N2)	
ZD3	The Gambia
ZD4 (See 9G1)	
ZD5, ZS7, 3D6	Swaziland
ZD6 (See 7Q7)	
ZD7	St. Helena
ZD8	Ascension Island
ZD9	Tristan da Cunha & Gough Island
ZE	Rhodesia
ZF1, VP5	Cayman Islands
ZK1	Cook Islands
ZK1	Manihiki Islands
ZK2	Niue
ZL	Auckland Is. & Campbell Is.
ZL	Chatham Islands
ZL	Kermadec Islands
ZL, ZM1-5	New Zealand
ZL5 (See CE9AA-AM)	
ZM1-5 (See ZL)	
ZM6 (See 5W1)	
ZM7	Tokelaus
ZP	Paraguay
ZS1, 2, 4, 5, 6	South Africa
ZS2	Prince Edward & Marion Is.
ZS3	Southwest Africa
ZS7 (See ZD5)	
ZS8 (See 7P8)	
ZS9 (See A2)	
1S	Spratly Is.
3A	Monaco
3B6, 3B7, 3B8, 3B9 (See VQ8)	
3C (EAØ)	..Equatorial Guinea
3CØ	Annobon
3D6 (See ZD5)	
3V8	Tunisia
3W8, XV5	Vietnam
3X (7G)	Rep. of Guinea
3Y LA/G	Bouvet Island
3Z (See SP)	
4A (See XE)	
4M (See YV)	
4S7	Rep. of Sri Lanka
4U	I.T.U. Geneva
4W	Yemen
4X, 4Z	Israel
5A	Libya
5B4, ZC4	Cyprus
5H3, VQ3	Tanganyika
5N2, ZD2	Nigeria
5R8, FB8	Malagasy Rep.
5T	Mauritania
5U7	Niger Rep.
5V	Togo Rep.
5W1, ZM6	Western Samoa
5X5, VQ5	Uganda
5Z4, VQ4	Kenya
6D (See XE)	
6O1, 2, 6	Somali Rep.
6W8, FF8	Senegal Rep.
6Y5, VP5	Jamaica
7G1 (See 3X)	
7O (See VS9A)	
7P8, ZS8	Lesotho
7Q7, ZD6	Malawi
7X, FA	Algeria
7Z (See HZ)	
8F, PK, YB	Indonesia
8J (See CE9AA-AM)	
8P, VP6	Barbados
8Q, VS9M	Maldive Islands
8R, VP3	Guyana
8Z4	Saudi Arabia/Iraq Neutral Zone
8Z5 (See 9K3)	
9A1, (M1)	San Marino
9E, 9F (See ET3)	
9G1, ZD4	Ghana
9H1, ZB1	Malta
9J, VQ2	Zambia
9K2	Kuwait
9L1, ZD1	Sierra Leone
9M2, 4	West Malaysia
9M4 (See VS1)	
9M6, 8	East Malaysia
9N1	Nepal
9Q5, OQ5, Ø	Rep. of Zaire
9U5	Burundi
9V1 (See VS1)	
9X5	Rwanda
9Y4, VP4	Trinidad & Tobago

AMATEUR LICENSING

WHERE EXAMINATIONS ARE HELD

FCC FIELD ORGANIZATION

The Federal Communications Commission maintains an extensive Field Engineering Bureau, which among many other duties conducts examinations for radio operator licenses. There are 24 district administrative offices, as follows:

Boston, Mass.	Houston, Tex.	Kansas City, Mo.
New York, N. Y.	Dallas, Tex.	Chicago, Ill.
Philadelphia, Pa.	Los Angeles, Calif.	Detroit, Mich.
Baltimore, Md.	San Francisco, Calif.	Buffalo, N. Y.
Norfolk, Va.	Portland, Ore.	Honolulu, Hawaii
Atlanta, Ga.	Seattle, Wash.	San Juan, P. R.
Miami, Fla.	Denver, Colo.	Anchorage, Alaska
New Orleans, La.	St. Paul, Minn.	Washington, D. C.

Examinations are given frequently at the above offices, as well as at the following five suboffices.

Savannah (branch of Atlanta)	San Diego (branch of Los Angeles)
Tampa (branch of Miami)	Mobile (branch of New Orleans)

Beaumont (branch of Houston)

Examinations are held four times a year at:

Albany, N. Y.	Grand Rapids, Mich.	Phoenix, Ariz.
Birmingham, Ala.	Indianapolis, Ind.	Pittsburgh, Pa.
Charleston, W. Va.	Knoxville, Tenn.	St. Louis, Mo.
Cincinnati, Ohio	Little Rock, Ark.	Salt Lake City, Utah
Cleveland, Ohio	Louisville, Ky.	San Antonio, Tex.
Columbus, Ohio	Memphis, Tenn.	Sioux Falls, So. Dak.
Corpus Christi, Tex.	Milwaukee, Wis.	Syracuse, N. Y.
Davenport, Iowa	Nashville, Tenn.	Tulsa, Okla.
Des Moines, Iowa	Oklahoma City, Okla.	Williamsport, Pa.
Fort Wayne, Ind.	Omaha, Nebr.	Winston-Salem, N. C.
Fresno, Calif.		

Examinations are held twice a year in the following:

Albuquerque, N. M.	Jacksonville, Fla.	Salem, Va.
Boise, Idaho	Juneau, Alaska	Spokane, Wash.
El Paso, Texas	Ketchikan, Alaska	Tucson, Ariz.
Fairbanks, Alaska	Las Vegas, Nev.	Wichita, Kans.
Hartford, Conn.	Lubbock, Texas	Wilmington, N. C.
Jackson, Miss.	Portland, Me.	

This makes a total of 77 cities in which examinations for amateur radio operator licenses are held at least as often as twice a year.

ADDITIONAL EXAMINING POINTS

There are additional cities visited by traveling FCC inspectors for the purpose of giving examinations, but since such visits are made only once each year it is not required that an applicant for General Class appear for a personal examination just because he happens to live within 175 miles of these auxiliary cities. However, since examinations are thus conveniently available to applicants in those vicinities, they are urged to appear for personal examination. Also, applicants living within 175 miles of one of the examining points mentioned earlier, and thereby required to appear for examination instead of taking it by mail may find one of the cities named below a more convenient place for travel.

Annual examinations are held in:

Bakersfield, Calif.	Hilo, Hawaii	Lihue, Hawaii
Bangor, Maine	Helena, Mont.	Marquette, Mich.
Billings, Mont.	Jamestown, N. D.	Rapid City, S. D.
Great Falls, Mont.	Klamath Falls, Ore.	Wailuku, Hawaii

Examinations are also conducted occasionally by the District Communications Officer, U.S. Naval Station, Guam.

AMATEUR RADIO Equipment

ANTENNA SPECIALISTS

HM-177 2-M MOBILE ANTENNA

Snap-in mount with 3 dB gain over quarter-wave whip; 100-watt power rating; v.s.w.r. 1.5:1 or better; input impedance 50 ohms; d.c.-grounded, shunt-fed PVC jacket-weatherproof shock resistant transformer; omnidirectional radiation pattern when roof mounted; UHF connector; whip 47½" max., full antenna 56" max.; solderless antenna connection; $30.79

HM-178. Same except trunk-mount type; $34.29

HM-179 2-M MOBILE ANTENNA

Snap-in mount with 3 dB gain over quarter-wave whip; 100-watt power rating; v.s.w.r. 1.5:1 or better; input impedance 50 ohms; ⅝ wavelength; low-loss, waterproof transformer; stainless-steel spring; 17-ft RG-58/U cable; UHF connector; 54" max. length including spring & base; $23.99

HM-180. Same except trunk-mount type; $27.39

HM-187. Same except magnet-mount type; $33.25

HM-7A 2-M BASE-STATION ANTENNA

Medium-power ground-plane antenna; vertical radiator of chrome-plated brass tubing; radials are removable stainless-steel rods; mounts on any mast up to 1¼" o.d.; input impedance 50 ohms; power capability 100 watts; unity gain; bandwidth ±2 MHz; v.s.w.r. less than 1.5:1; 17¾" at 144 MHz; radial length 26"; rated wind velocity 100 mph; $9.29

HM-17 2-M BASE-STATION ANTENNA

Half-wave antenna; 3 dB gain over quarter-wave ground plane; mounts on masts up to 1¼" o.d.; input impedance 50 ohms; v.s.w.r. less than 1.5:1; max r.f. power 100 watts; SO-239 termination, will accept UHF connector; d.c. ground; radiating elements copper and nickel coated; radials stainless steel; 47¼" long at 144 MHz; rated wind velocity 100 mph; $30.79

CLEGG

FM-27-B 2-M FM TRANSCEIVER

Continuous 146-148-MHz coverage; reset capability approximately 1 kHz; three tuning controls, 146-147 MHz range, plus two bar knobs to select desired channel; features "Crystiplexer" frequency control for equivalent of 400 channel receiver and 400 channel transmitter (with 5-kHz channel spacing) coverage (160,000 possible combinations); 12 to 14 volt d.c. power required; comes with anti-theft mobile mount; 7⅜" x 3½" x 9¼" D; $479.95

DRAKE

2-C RECEIVER

Vacuum-tube design; bandspread tuning 80/75, 40, 20, 15, and 10 meter ham bands; triple-

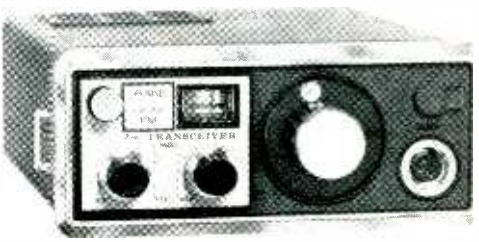
conversion receiver with crystal-controlled first local oscillator; will also tune any 500-kHz range between 3.0-30.0 MHz by inserting accessory crystal; antenna trimmer and preselector; r.f. gain control; S-meter; product detector; three selectivity options including 400 Hz, 2400 Hz, and 4800 Hz at 6 dB down; requires external speaker; built-in 117-volt a.c. power supply; $295.00

TR-72 2-METER FM TRANSCEIVER

Solid-state with 23-channel capability, 2 supplied r.f. output 10 watts min., 1 watt in low-power position; power source 13.8 volts d.c.; automatic v.s.w.r. protection circuit; crystal-controlled double superhet; sensitivity 0.35 μV/20 dB quieting; supplied with mike d.c. power cord, mobile mounting bracket, and desk mount stand. 7⅛" W x 2⅜" H x 9⅛" D. $320.00

TR-22 2-METER FM TRANSCEIVER

Mobile, base, portable solid-state transceiver

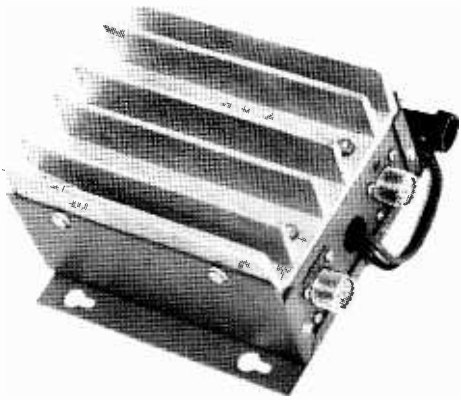


with six channels, 3 supplied; r.f. power output nominal 1 watt; operates on external 12-volt d.c. or Ni-Cad batteries; crystal-controlled double-conversion superhet receiver; sensitivity 0.5 μV/20 dB S+N/N; built-in telescoping antenna with external provision; built-in battery charger; includes mike, shoulder carrying case, 120-volt a.c. and 12-volt d.c. power cords, and ten Ni-Cad batteries. 5⅜" W x 2-5/16" H x 7⅛" D. 3¾ lbs. $219.95

DYCOMM

MODEL "D" 2-M FM BOOSTER

For those needing up to 60 W output; 35 watt minimum output and greater than 50 W for



10 watt input; current maximum 6.5 A at 14 volts; nominal current 4-5 A at 13.8V; operates as "local" from 20-50 miles; designed for all 8-17 watt rigs; 3" x 4" x 6"; $99.95

MODEL "C" 2-M FM BOOSTER

Designed for 15-10 watt rigs; will provide 15-30 watt output; 13 watt maximum input drive capability for 30 watts; 15 watt output for 5 watt drive; typically 25 watt output for 10 watt drive; maximum current 3.5 A at 14.0 V; 3" x 4" x 4"; $69.95

GENAVE

GTX-10 2-M FM TRANSCEIVER

Frequency range 144-148 MHz; power output 10 watts nominal; output impedance matches standard 50-ohm ham antennas; full 10-channel capability; can be operated as portable with accessory HamPak; 12-volt d.c. negative-ground; unit includes 146.94 MHz (remaining 9 channels factory or owner installed at additional cost); current drain 0.09 A receive, 1.5 A transmit (hi), 0.8 A (low); double-conversion, crystal-controlled superhet receiver; audio output 1.5 watts; modulation acceptance 7.5 kHz; squelch threshold 0.5 μV max. 9" D x 6½" W x 2½" H. $199.95

HAMPAK. Can be bolted to GXT-10 to form single unit; requires ten "D" cells (not included); comes with carrying handle, rigid antenna, and microphone clip. $39.95

GXT-2 2-M FM TRANSCEIVER

30 watts nominal output power, 25 watts minimum at 14 volts d.c.; push-button channel selection for each of 10 channels; includes 146.94 MHz (remaining 9 channels factory or owner installed at extra cost); current drain 0.09 A (receive), 5.0 A transmit (hi), 1.7 A (low); double-conversion, crystal-controlled superhet receiver; audio output 1.5 watts; squelch threshold 0.35 μV max. 9" D x 6½" W x 2½" H. $249.95

GXT-200 2-M FM TRANSCEIVER

Features separate controls for independent transmit/receive frequency selection; 30 watts nominal output power, 25 watts minimum at 14 volts d.c.; switch for lock-in of pre-selected frequency pairs; has ten transmit & ten receive channels for 100 possible channel combinations; includes 146.94 MHz (remaining frequencies installed by factory or owner at additional cost); 12-volt negative-ground operation; double-conversion, crystal-controlled superhet receiver; audio output 1.5 watts; squelch threshold 0.35 μV maximum; image rejection 45 dB; spurious rejection 50 dB; selectivity ±8 kHz. 3 dB; 9" D x 6½" W x 2½" H. $259.95

LAMBDA/16 PORTABLE ANTENNA

Rigid unit; angled for rear plug-in; ultra-lightweight for portability; comes with BNC mount. $15.00

LAMBDA/25 FLEXIBLE ANTENNA

Continuously loaded VHF communications antenna designed for use with portable units; withstands rough handling; completely insulated and "short-proof"; comes with BNC mount. $15.00

LAMBDA/9 MAGNETIC MOUNT

Designed for temporary installation; magnet adheres to any flat steel surface at any legal speed; supplied with 25 feet RG/58 coax cable and connectors. $15.00

LAMBDA/17 BASE STATION ANTENNA

Heavy duty ground plane; vertically polarized; for communicating with ground vehicles and aircraft; pre-tuned; full 3-dB gain; mounts on 1½" pipe; stainless-steel radiator and radials; 38" radiator, 24" radials; comes with 50 feet low-loss RG/8 coax cable and connectors. $45.00

MARINE/GAIN-50 ANTENNA

Provides 3-dB gain for 25-watt radiotelephones for 50 watts effective transmit power; comes with cable connector and lay-down quick-release base; made of high-durability, corrosion-proof white fiber glass and polyurethane encapsulation; does not require antenna ground plate. $34.95

MARINE/GAIN-100

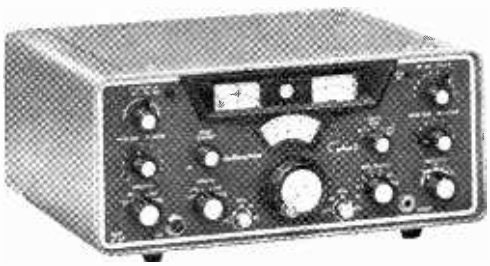
Provides 6-dB gain for 25-watt radiotelephones for 100 watts effective transmit power; comes with cable, connector, and chrome base with quick-release ratchet; made of high-durability corrosion-proof white fiber glass and polyurethane encapsulation; does not require ground plate. $79.95

HALLICRAFTERS

FPM-300 SSB/CW TRANSCEIVER
Designed for fixed, portable, and mobile use; extended v.f.o. range (600 kHz) with full frequency coverage 80 through 10 meters; self-

contained universal a.c. and d.c. power supply system; selectable upper or lower sideband, CW or RTTY; continuous service with 2-tone CW-SSB-RTTY (50% duty cycle); 250 watts p.e.p. input on SSB, 180 watts on CW, 90 watts on RTTY; receiver sensitivity 1 mV for 15 dB S/N; selectivity 2.0 kHz; IM 60 dB below two equal 10-mV signals; built-in 100/25 kHz crystal calibrator; solid-state plus two tubes; 5½" x 12" x 11"; $625.00
MR-300. Mobile installation kit; ruggedized design for universal mounting with heavy-duty cables; $20.65
HA-60. Power amplifier blower kit for cooling PA section; $39.95

CYCLONE III SSB/CW TRANSCEIVER
Five-band (80 through 10 meters) transceiver; 550 watts p.e.p.; selectable upper or lower sideband, CW or RTTY; power-tube balancing circuit; 100/25 kHz crystal calibrator; patented



receiver incremental tuning for ±3 kHz adjustment of receiver frequency independent of transmit frequency; internal adjustment panels; a.g.c. attack; carrier balance, three VOX controls; S-meter adjust and CW side-tone volume; rear panel input/output connections for phone patch, accessories, and power supply; 7" x 14⅞" x 15"; $995.00
PS-500A-AC. Power supply for 110-220 V, 50/60 Hz operation; includes 3.2-ohm speaker; $129.95

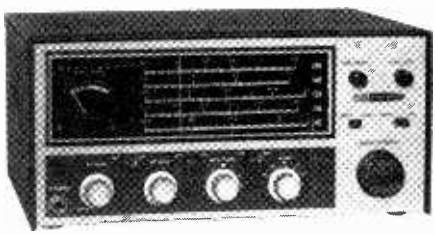
HEATH

HW-7 "MINI-RIG" TRANSCEIVER
Three-band, low-power CW transceiver with VFO and provision for crystal transmit operation.

Covers 40, 20 & 15 meter bands. Sensitivity 1.0 μV for readable copy. Has 3 W input power on 40 meters; 2.5 W on 20 meters; 2 W on 15 meters. Has built-in sidetone & power meter. Battery operated. 4¼" x 9¼" x 8½" D. (kit) $69.95 mail order
HWA-7-1. 117 V a.c. power supply (kit) $14.95

SB-303 HAM-BANDS RECEIVER
All-solid-state with MOSFET's and IC; bandspread tuning of 80/75, 40, 20, 15, and 10 meter ham bands; single-conversion receiver with crystal-lattice filter; antenna trimmer and preselector; r.f. gain control and r.f. attenuator; S meter; 400-Hz and 3750-Hz crystal-lattice filters available as optional extras for three-position selectivity; variable b.f.o.; product detector; fast and slow a.g.c. selectable from front panel; operative in four modes; AM, CW, and upper and lower single sideband; 25- and 100-Hz calibration marker; receives 15-MHz WWV for exact calibration; speaker and/or headphone selection from front panel; may also be used for RTTY reception; transceive capability with company's Models 400 or 401; RCA phono antenna connector; requires external speaker; direct frequency readout better than 1 kHz; built-in a.c. power supply; (kit only) $319.95 mail order

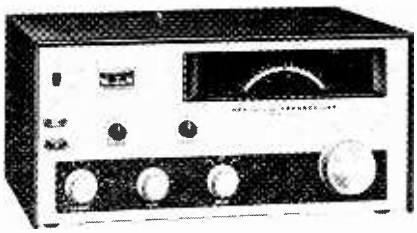
HR-10B HAM-BANDS RECEIVER
Vacuum-tube design; tuning range covers only 80/75, 40, 20, 15, and 10 meter ham bands; single-conversion receiver circuit with crystal-lattice filter; claimed selectivity is 3.0 kHz at 6 dB down and 9.0 kHz at 40 dB down; S meter; r.f. gain control; antenna trimmer; accepts company's 100-kHz crystal calibrator—on/off switchable from front panel; fine-tuning adjustment of oscillator possible to reset to band-



spread scale calibration; b.f.o.; noise limiter; headphone jack on front panel; requires external speaker; RCA phono antenna connection; built-in 117-volt a.c. power supply; $79.95 mail order

HW-16 NOVICE CW RIG
Operates on first 250 kHz of 80, 40, and 15 meter bands. Has adjustable input from 50 to

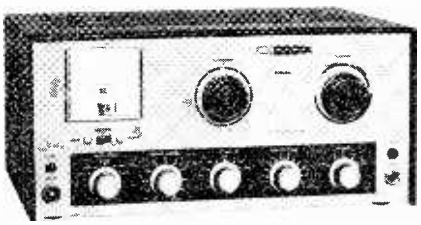
90 W; crystal-control transmit with VFO receiver tuning; provision for external VFO. Grid block



keying. Break-in with automatic antenna switching and receiver muting. Output impedance 50 ohms, unbalanced. SWR less than 2:1. Receiver sensitivity 1 μV for 10 dB (S+N)/N; selectivity 500 Hz at 6 dB down. Frequency coverage 3.5-3.75 MHz, 7.0-7.25 MHz, and 21.0-21.25 MHz. 117 V a.c., 50/60 Hz. 6½" H x 13¾" W x 11½" D. (kit) $99.95 mail order

DX-60B PHONE/CW TRANSMITTER

75 W CW input for Novice operation; full 90 W phone or CW for General license holders.



Pi output for tune-up into any 50-75 ohm resistive load. Has drive level control, grid plate current meter, and drive tune control for proper tune-up for maximum output, minimum harmonics. Has four crystal sockets and provision for operation with external VFO. Easy to assemble (VTVM needed for alignment). Band coverage 80 through 10 meters. 117/240 V a.c., 50 60 Hz. 6½" H x 13¾" W x 11½" D. Less crystals. (kit) $79.95 mail order

HW-202 2-M FM TRANSCEIVER

Solid-state 10-watt transceiver designed to operate into an infinite v.s.w.r; push-button selec-

tion of 6 transmit/6 receive frequencies for 36-channel capability over 1-MHz segment from 143.9-148.3; includes gimbal bracket mobile mount, push-to-talk mike, and 12-volt hook-up cable. (kit) $179.95 mail order

HWA-202-2 Tone Burst Encoder. Permits push-button selection of four tones, fully adjustable for frequency and duration. Fits behind removable front-panel bezel on transceiver. (kit) $24.95 mail order

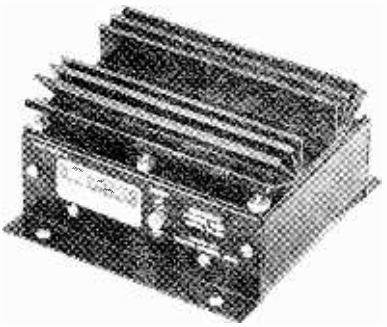
HWA-202-1 Regulated A.C. Power Supply. Gives transceiver base-station capability. (kit) $29.95 mail order

HWA-202-3 ⅝-wave mobile whip for use with transceiver. $17.95 mail order

HWA-202-4 Fixed-station antenna for use with transceiver. $15.95 mail order

HA-202 2-METER AMPLIFIER

Designed to improve fringe-area operation of mobile 2-meter FM transceivers; can be used



with any 2-m exciter delivering 5-15 watts; boosts output to 40 watts nominal; 7 A max. drain from 12-volt d.c. system; solid-state circuitry; internal changeover relay and relaxed circuitry automatically switches for transmit receive modes; comes with connecting cable and antenna jacks. (kit) $69.95 mail order

HUSTLER

4-BTV STATION ANTENNA

Vertical design covering 10-15-20-40 meters; s.w.r. 1.6:1; solid 1" fiberglass trap for electrical and mechanical stability; heavy-duty aluminum mounting bracket; low-loss high-strength insulators; 1¼" heavy wall high-strength aluminum throughout; has ⅜"-24 stud at top to accept RM-75 or RM-75-S Hustler resonator for 75-m operation; feed with any length 50-ohm coax; ground mount with or without radials, roof mount with radials; 21 ft, 5 in; $49.95

MASTS

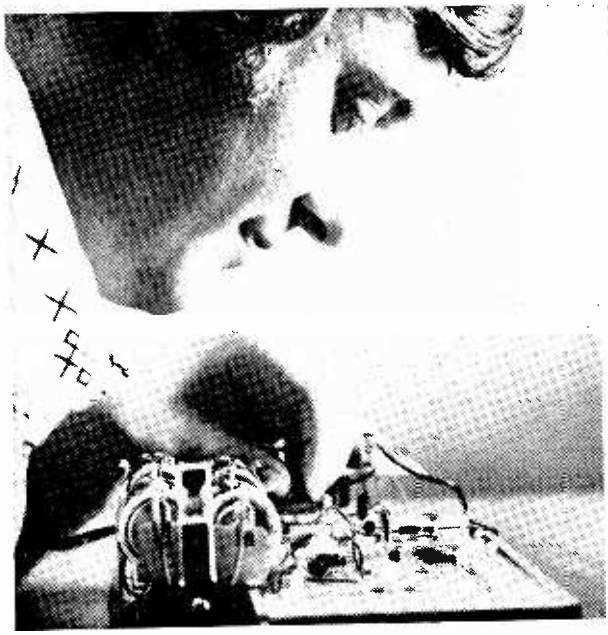
Foldover mast for quick and easy interchange of resonators or entering garage; in operation mast is held vertical in shakeproof sleeve clutch; 54" mast serves a quarter-wave 6-meter antenna; stainless-steel base has ⅜"-24 threads to fit mobile ball or bumper mount;

MO-1. For deck or fender mounting; fold is at roof line 15" above base; $14.95

MO-2. For bumper mounting; fold is at roof line 27" above base; $14.95

G3-144 2-M ANTENNA

Base-station ⅝ wavelength, 2-meter antenna; 3.4 dB gain; vertical polarization; radials for complete decoupling; enclosed non-radiating matching transformer; s.w.r. at resonance 1.5:1;



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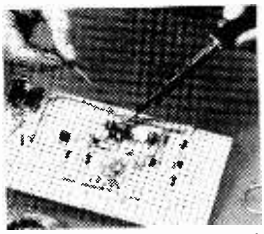

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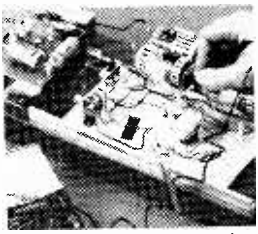

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CIRCLE NO. 2 ON READER SERVICE CARD

1974 Edition

power rating 200 watts FM; height 48 in; $18.95

2-METER MOBILE ANTENNAS

Frequency coverage 143-149 MHz; 5/8 wavelength; 3.4 dB gain over quarter-waver mobile; power rating 200 watts FM; 52" antenna mounts on any flat surface in 3/4" hole; includes impact spring, 17-ft RG-58/U, and PL-259; antenna removable from mount; BBL-144; $29.95

MODEL BBLT-144. Same except for no-holes trunk lip mount; $34.95

CGT-144 2-METER MOBILE ANTENNA

Frequency coverage 143-149 MHz; 5.2 dB gain over quarter-wave mobile; s.w.r. at resonance 1.1:1; power rating 200 watts FM; 86" colinear array; no-holes installation on side or edge of trunk lip; comes with 17-ft RG-58/U and PL-259; $37.95

SF-2 2-METER MOBILE ANTENNA

Two-meter, 51" antenna; 3.4 dB power gain over quarter-wave antenna; adjustable for lowest s.w.r.; 3/8"-24 base fits wide range of mounting hardware (not included); $11.95

ICOM

IC-20 2-M FM TRANSCEIVER

Coverage 144-148 MHz in twelve channels (five supplied: 94/94, 34/94, 22/82, 28/88, 52/52); r.f. power output, 10W variable to 1W; MOSFET r.f. amplifier and FET mixer; double superhet receiver; sensitivity 0.4 μV for 20 dB quieting; S + N/N 30 dB at 1 μV input; audio power output 1.5 W; 7/8" H x 6 1/8" W x 8 1/2" D. $319.95

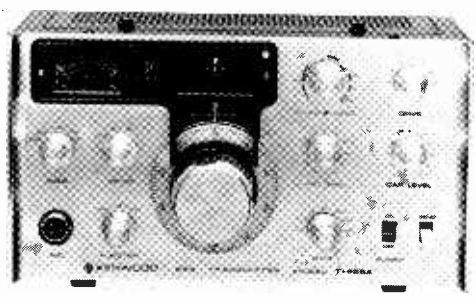
IC-22 2-M FM TRANSCEIVER

Coverage 144-148 MHz in 22 channels (five supplied: 94/94, 34/94, 22/82, 28/88, 52/52); mobile r.f. power output, 10W (hi), 1W (low); double superhet receiver; sensitivity 0.4 μV for 20 dB quieting; audio output power 1-watt, 4" speaker; input signal strength and output power meter; $289.95

KENWOOD

T-599A TRANSMITTER

Hybrid design, solid-state and 3 tubes; built-in universal power supply; full metering; AM, SSB, CW operation; 1-kHz frequency readout; VOX with delay, sensitivity, and anti-VOX adjustments; built-in semi-automatic CW with sidetone; built-in calibrator function when used with companion R-599A receiver; full 10-80 meter coverage; TVI protection; 200 watts p.e.p. nominal input; tube-saving "tune" position; built-in cooling fan; selectable low or hi mike impedance; power outputs: 120 watts p.e.p. into 50 ohms for SSB (3.5-21.0 MHz), 100 watts (28.0 MHz); 40 watts nominal into 50 ohms for AM; speaker, 2-meter converter, 6-meter converter available at additional cost; 10.5" W x 5.5" H x 12.2" D; $459.00

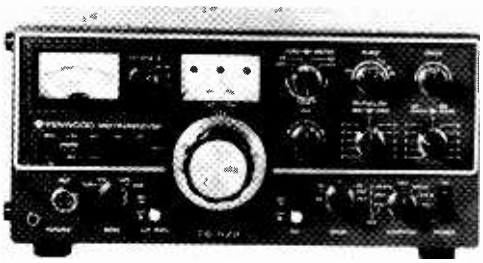


R-599A RECEIVER

Companion receiver to T-599A transmitter; solid-state; full 10-160 meter coverage; AM, SSB, AM.N, CB, FM reception; selectable a.g.c.; built-in calibrator; monitor T-599A frequency to calibrate transmitter; squelch circuit; 1-kHz frequency readout; cross-channel operation with T-599A; automatic or manual selectivity selection; built-in SSB/8-pole, CW/8-pole, and AM filters; five built-in fixed-frequency channel positions; will accept 2- and 6- meter converters; built-in power supply for 115/230-V a.c. or 12-V d.c. operation; built-in WWV reception; S meter; 10.125" W x 5.50" H x 12.25" D; $439.00

TS-520 TRANSCEIVER

Five-band transceiver for SSB or CW; built-in a.c. and 12-volt d.c. power supplies; built-in

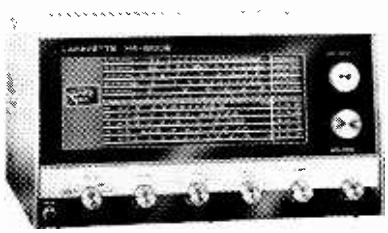


VOX with adjustable gain, delay, and anti-VOX; 1-kHz dial readout; built-in noise blanker and RIT circuit; 8-pole crystal filter; 25-kHz crystal oscillator; provision for optional CW filter; break-in CW with sidetone; solid-state except for final section; built-in fixed channel operation (4 channels); provisions for use with VHF transverter; selectable SSB; push-button WWV reception; external v.f.o., external speaker, and CW filter available at additional cost; $599.00

LAFAYETTE

HA-600A RECEIVER

General-coverage receiver with tuning range



150-400 kHz, 550-1600 kHz. and 1.6-30.0 MHz; all-solid-state with FET's; single-conversion receiver circuit with mechanical filter; S meter; series-gate noise limiter; variable b.f.o.; tape-recorder output jack; bandspread tuning of 80 75, 40, 20, 15, and 10 meter ham bands; logging scale on bandspread dial; product detector; headphone jack on front panel; requires external speaker; r.f. gain control; may be operated from 117-volt a.c. or 12-volt d.c.; $119.95

HA-800B RECEIVER
All-solid-state; six-band SSB AM CW receiver covering 80 through 6 meter bands; dual-conversion on all bands; 100-Hz crystal calibrator; illuminated S meter; two 455-kHz mechanical filters; series-gate automatic noise limiter; tuned r.f., mixer, and oscillator stages have FET's; automatic r.f. overload protection; product detector plus varactor as crystal calibrator; fine tuning of SSB CW signals; accessory socket for access to audio output for external speaker, receiver muting line. and 12-volt d.c. input; headphone jack; tape-recording jack; 1 μV sensitivity on all bands; selectivity −6 dB at ±6 kHz; 117-volt a.c. or 12-volt negative-ground d.c.; $129.95

NORTRON

SS MARK IV SSTV MONITOR KIT
Monitor screen, 3" square, displays 8-second SSTV picture from 1200-2300 Hz video-modulated audio source; solid-state except for CRT; requires 5¾" x 3½" x 13" deep cabinet; without cabinet; (kit) $119.95

PEARCE-SIMPSON

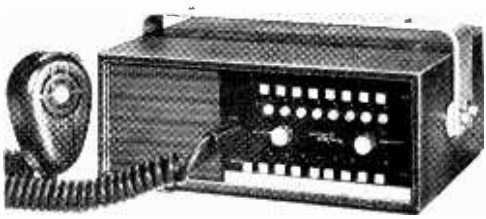
GLADDING 25 2-M FM RADIO
Mobile or base-station use; 12-volt d.c.; 117-volt a.c. supply optional extra; six channels can

be switched separately to transmit/receive (crystals for 3 channels included); sensitivity 0.3 μV for 12 dB SINAD; transmit power 25 watts with 1-watt switch; solid-state receiver; solid-state transmitter with tube driver and final; $249.95

REGENCY

HR-2B MOBILE TRANSCEIVER
Covers 12 channels in 144-148 MHz band; 13.8-volt d.c. negative-ground input; 15 watts r.f. output; low power switch; 5-watt audio output; optional a.c. power supply and amplifier available; $229.00

HR-2MS MOBILE TRANSCAN
Covers 8 channels in 144-148 MHz band; 13.8-volt d.c. negative ground input; 15 watts r.f.



output; 5 watt audio output; optional a.c. power supply and amplifier available $319.00

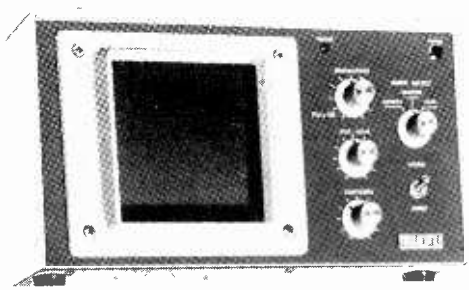
HR-212 MOBILE TRANSCEIVER
Covers 12 channels in 144-148 MHz band; 13.6-volt d.c. negative-ground input; 20 watts minimum r.f. output; 5 watt audio output; $259.00

HR-6 MOBILE TRANSCEIVER
Covers 12 channels in 52-54 MHz band; 13.8-volt d.c. negative-ground input; 25 watts minimum r.f. output; 5 watt audio output; $239.00

HR-220 MOBILE TRANSCEIVER
Covers 12 channels in 220-225 MHz band; 13.8-volt d.c. negative-ground input; 10 watts r.f. output; 5 watts audio output; $239.00

ROBOT

70A SSTV MONITOR
Monitor screen, 6.5" diagonal, displays 128-line, 8-second SSTV pictures from 1200-2300 Hz



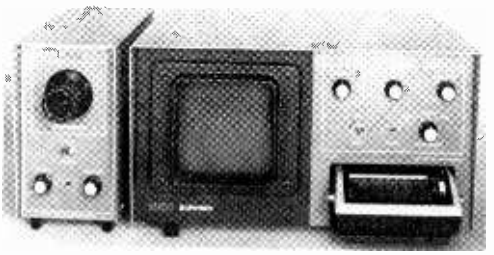
video-modulated audio source with 40 mV-10V signal; receive/transmit switch; tuning indicator; solid-state except for CRT; 13½" W x 12¾" D x 7¾" H; $295.00

80A SSTV CAMERA
Vidicon camera tube and sampling circuits; contrast and brightness controls; produces audio FM SSTV signals with sync inserted; connections for fast-scan 15-frames/sec; lens not included; $295.00
Lens A; wide angle; $49.00
Lens B; medium; $25.00

SBE

SCANVISION SSTV MONITOR

Monitor screen, 5⅜" diagonal, displays 128-line; 8-second SSTV pictures from 1200-2300



Hz video-modulated audio source with 40mV-10 V signal; video-select switch; video-voice switch; includes push-button cassette tape recorder; 16⅞"W x 12 1/16" D x 9 5/16" H; $529.95

SCANVISION SSTV CAMERA/LENS

Vidicon camera tube and sampling circuits; contrast, brightness, and reverse controls; produces audio FM SSTV signals with sync inserted; fast-scan output; supplied with 25-mm f/1.9 lens; $469.95

SB-144 2-METER TRANSCEIVER

144-148 MHz coverage in 12 channels; 10 watts power output; F3 emission; max. frequency deviation ±15 kHz; phase modulation; antenna impedance 50 ohms; double-conversion superhet receiver; sensitivity 1 μV for 20 dB quieting; 2 watts audio output at 10% distortion; selectivity ±12.5 kHz at —6 dB; ceramic-type filter; 13.8-volt d.c. negative ground; comes with crystals for Channels #1, #2, #3 (146.34/146.94, 146.94/146.94; 146.16/146.76 MHz). 6 11/16" W x 2⅜" H x 9 1/16" D; $260.00

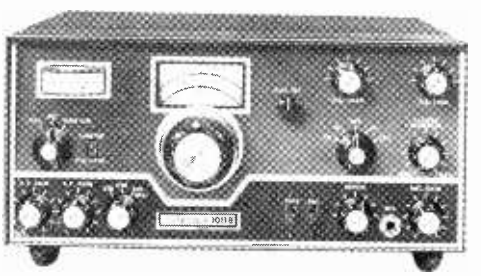
SBE-450TRC TRANSCONVERTER

Permits 450-MHz operation from any 2-meter transceiver; passive device driven by the 144-MHz transceiver; power output on 450 MHz 40% of 144-MHz drive power; frequency multiplying factor = transceiver frequency × 3; has microphone input/output, VHF input/antenna, UHF antenna, and d.c. power connectors; 2¼" H x 4" W x 9" D; $179.95

SILTRONIX

1011-B SSB/AM TRANSCEIVER

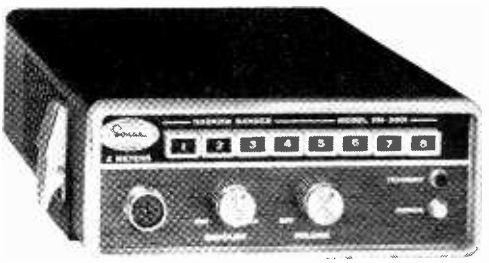
Covers 10-meter ham band (28.0-28.5, 28.5-29.0, 29.0-29.5, 29.2-29.7 MHz) and 11-meter Citizens Band (transmitter relay circuitry inoperative in CB position); 260 watts p.e.p. input, 180 watts CW input, 150 watts p.e.p. output, 60 watts AM input, 30 watts carrier output; sideband suppression 50 dB, carrier suppression 60 dB; has selectable upper- and lower sideband; S meter for receiver/PA, cathode meter for transmitter tuning; audio response flat ±3 dB 300-4000 Hz in both transmit/receive; a.n.l.; built-in a.c. power supply and speaker; 117-volt, 50/60 Hz; provision for plug-in VOX, external v.f.o. headphones, and linear. 5½" H x 13" W x 11" D. $529.00



SONAR

FM3601 2-M FM XMITTER/RECEIVER

2-meter FM transmitter/receiver; 8 channels with push-button switching 144-148 MHz; solid-



state; 8-10 watts r.f. output; receiver sensitivity at least 0.5 μV/20 dB quieting; selectivity 16 kHz at 3 dB; supplied with mike and two pairs of crystals. 6¾" W x 2⅝" H x 9" D. $299.95

PS-2923. A.C. Power Supply. Regulated power supply for FM3601 transmitter/receiver; attaches mechanically to unit, serving as pedestal mount. $39.95

STANDARD

851TH 2-M BASE/MOBILE UNIT

Twelve-channel base/mobile FM transceiver; frequency range 143-149 MHz; channel spread 2 MHz maximum; input power 13.8 volt d.c. negative ground ±20%; all-solid-state circuitry; power output into 50 ohms 25 watts; comes with dynamic microphone; 146.94 Tx/Rx (national calling channel) crystals; 2½" H x 6⅞" W x 11" D; $589.00

RPT-1 REPEATER

Frequency range 144-148 MHz; one channel; input power 13.8 volt d.c. negative ground ±10%; power output 10 watts into 50 ohms; spurious and harmonic attenuation 55 dB minimum; time out timer adjustable 0.1-3 min; carrier delay adjustable 0.1-5 sec; remote control and ID inputs; 5¼" H x 19" W x 9" D; $695.00

826MA BASE/MOBILE UNIT

Frequency range 143-149 MHz; 12 channels; channel spread 2 MHz maximum; input power 13.8-volt d.c. negative ground; all-solid-state circuitry; power output into 50 ohms 0.8 or 10 watts; comes with crystals for four channels

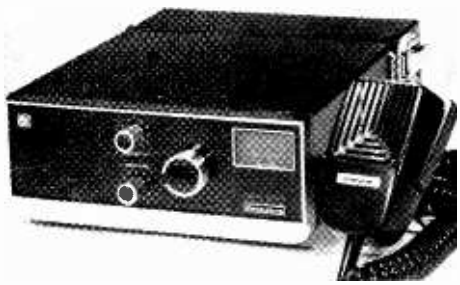
(national calling, repeater, repeater, and alternate calling); dynamic microphone; 2½" H x 6⅞" W x 9" D; $398.00

146A HAND-HELD 2-M UNIT
Frequency range 143-149 MHz; 5 channels; channel spread 2 MHz maximum; input power 12.5-volt d.c. negative ground; all-solid-state circuitry; power output 2 watts into 50 ohms; has internal dynamic mike and internal 2" dynamic speaker; comes with crystals for two channels (national calling and one repeater); 9" H x 3" W x 1⅝" D; 32 ounces including batteries; $289.95
SR-CSA. Base charger; $38.00
SR-CPT3644. Carrying case; $9.50
SR-CMA. Mobile adapter; $13.00
SR-C-TN-3. Tone squelch board; $83.00

14U 2-METER BASE STATION
Frequency range 143-149 MHz; 22 channels; channel spread 2 MHz maximum; input power 13.8 volts d.c./117 volts a.c.; power output into 50 ohms 1, 3, or 10 watts; comes with five channel crystals installed (national calling, three repeater, and one simplex); all-solid-state circuitry; dynamic microphone; 4⅞" H x 11¾" W x 10¼" D; $595.00

SWAN

FM-2X 2-M FM TRANSCEIVER
Covers 144-148 MHz in 12 channels; comes with crystals installed for channels ±1, ±2,



and ±3; push-to-talk mike controls transmitter; r.f. power output 10 watts nominal; dual-conversion superhet receiver; 117-volt, 50/60 Hz or 13.5 volt d.c. ±10%; comes with mike, antenna connector plug, spare fuses and lamps. a.c. power supply, d.c. power cord with fuse holder; 8¼" x 7" x 3"; $298.95

TV-2C TRANSVERTER
240 watt SSB receiving and transmitting converter for 2-meter band; designed to be used with company's 500CX, 500C, 500, 350, 350C. 400, 250 and 250C transceivers; features front-panel switch which controls all associated circuits to permit either transverter or transceiver operation; single a.c. power supply handles both transverter and transceiver; 13" W x 5½" H x 11" D; $359.95

FM-1210 TRANSMITTER/RECEIVER
Frequency coverage 144-148 MHz; 144 channels (12 receive, 12 transmit independent switching); includes 8 crystals (transmit 146. 22, 146. 32, 146. 76, 146. 94; receive 146. 28, 146. 88, 146. 76, 146. 94); 10 watts nominal r.f. output power; dual-conversion superhet receiver; 117-volt, 50/60 Hz a.c., 13.5-volt d.c.; comes with dynamic mike, antenna connector plug, spare fuses and lamps, a.c. power supply, d.c. power cord, and mobile mounting bracket; 8¼" x 7" x 3"; $468.95

VHF-150 2-M AMPLIFIER
150-watt, 2-meter amplifier; will operate in class C for FM or CW. or class B for SSB; 180 watts p.e.p. input SSB, 150 watts d.c. input on CW or FM; frequency range 143-149 MHz; requires approximately 2 watts for full output; meter reads plate current and relative output; built-in 117- or 230-volt a.c. input with proper line cord; d.c. operation with addition of 14C d.c. converter; 13" W x 5½" H x 11" D; $299.95

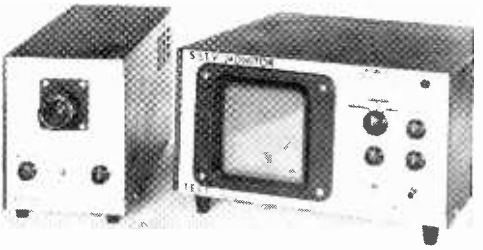
500CX SSB/CW/AM TRANSCEIVER
Five-band, 550-watt SSB, CW, AM transceiver; features amplified a.g.c., built-in 25/100 kHz calibrator; CW sidetone oscillator; amplified a.l.c.; shifted CW carrier; solid-state v.f.o.; single conversion design; covers 80-40-20-15-10 meter bands; extended frequency coverage for MARS with plug-in Model 510X crystal-controlled oscillator; power rating 550 watts p.e.p. input in SSB, 360 watts CW input, 125 watts AM input; receiver sensitivity 0.5 μV at 50 ohms for 10 dB S + N/N; a.n.l.; audio response virtually flat from 300-3000 Hz; $529.95
117-XC. Matching a.c. power supply with built-in speaker and headphone jack; $109.95

250C SSB/CW/AM TRANSCEIVER
Frequency range from 50-54 MHz (6-meter band); 340 watts p.e.p. input in SSB, 180 watts input in CW, 75 watts input in AM; has built-in 250-kHz calibrator; receiver sensitivity 0.1 μV; receiver noise figure 3 dB; 8-pole crystal lattice filter; audio response virtually flat from 300-3000 Hz; $429.00
117-XC. Matching a.c. power supply with built-in speaker and headphone jack; $109.95
210. External v.f.o. for full coverage of 50-54 MHz band; bandspread tuning covers 500-kHz segment with 5-kHz increments; built-in relay switch; $109.95

SS-100 SSB/AM TRANSCEIVER
Five-band; frequency range (80-40-20-15-10 meters) plus 10-MHz WWV receive; solid-state; power input 100 watts p.e.p. SSB on all bands; 100 watts d.c. input CW on all bands; 100 watts continuous RTTY/SSTV; power 13.5 volts d.c. at 11 A (CW), average 3.5 A SSB transmit, 0.5 A receive; 12½" W x 6"H x 11½" D; $699.00
All of the transceivers in this line are available with a wide range of optional accessories. Write company for additional details.

TEEC

HCV-2A SSTV MONITOR
Monitor screen, 6.25" diagonal, displays 120-line, 8-second SSTV pictures from 1200-2300 Hz video-modulated audio source with 40 mV-10V signal; video-select, video-voice switch;

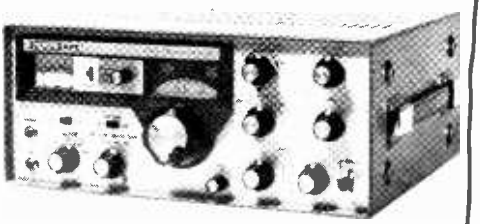


solid-state except for CRT; 14" W x 15½" D x 8¼" H; $325.00

HCV-1B SSTV CAMERA
Vidicon camera tube; contrast, brightness, and reverse controls; fast-scan output; without lens $295.00; with lens $325.00

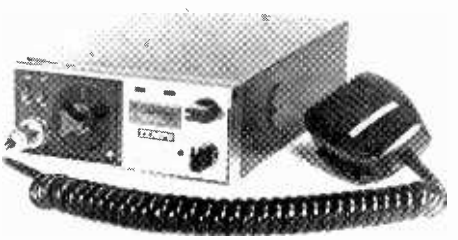
TEMPO

ONE SSB HAM TRANSCEIVER
Five-band coverage (80 through 10 meters); 300 watts p.e.p. input on SSB, 240 watts CW;



v.f.o. range 500 kHz (5-5.5 MHz); frequency readout 1 kHz; selectable upper and lower sideband; built-in 100-kHz crystal calibrator and VOX; transmitter a.l.c.; receiver sensitivity 0.5 μV input for 10 dB S/N; receiver clarifier control and a.g.c.; CW sidetone oscillator; audio output 1 watt at 10% distortion; separate a.c. or d.c. power supply required; 13¼" W x 5½" H x 11" D; $349.00
A.C. ONE. 117/220 volt, 50/60 Hz power supply $99.00
D.C. ONE. 12-volt d.c. power supply; $110.00
VF/1. External v.f.o.; $99.00

CL-146 2-M FM TRANSCEIVER
Twelve-channel capability; frequency range 140-160 MHz; r.f. power output 13 watts or 3 watts; power requirements 11-16 volts d.c., 13.8 volts d.c. nominal; negative ground; comes with one pair of transmit and receive crystals for

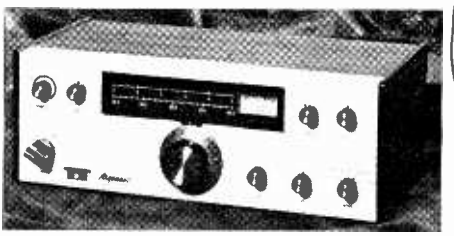


146.94 MHz simplex, dynamic mike with coiled cord; dual-conversion superhet receiver; 2 watts audio output with internal speaker; has RF Output/S/Receiver detector meter; provisions for external oscillator; monitor features; 2.36" H x 5.90" W x 7.66" D; $279.00
TCL-146-4A. Fully regulated 13.8-volt d.c., 4.0 amp power supply for converting CL-146 to base-station use; 120-volt a.c.; $39.00

FMH 2-METER TRANSCEIVER
Six-channel capability; 2 watts output; frequency range 146-148 MHz; supplied with two pair of crystals; 12-volt d.c.; built-in charging terminals for NiCad cells; has S/battery level meter; telescoping whip antenna; built-in speaker and microphone; dual-conversion superhet receiver; 8.5" L x 2.9" W x 2.0" D; 1.7 lbs with batteries (not included); $199.00

TEN TEC

ARGONAUT 5-BAND TRANSCEIVER
Covers 80, 40, 20, 15, and 10 meter amateur bands, SSB, and CW. Receiver sensitivity 0.5 μV for 10 dB (S + N)/N. Has S meter, a.g.c., CW sidetone, separate r.f. and a.f. gain controls. Frequency response 300-3000 Hz. Distortion 2%. Has built-in speaker, transmitter power in-



put 5 W d.c. and 5 W p.e.p. Features instant CW break-in electronically controlled; SWR bridge; TVI filter. Drift less than 100 Hz. Will operate from 12 V d.c. Overall size 4½" x 13" x 7". $288.00
MODEL 210. A.c. power supply. $24.95
MODEL 405. Linear amplifier. Designed to be used with Argonaut to produce 50 W into antenna. 4½" x 7" x 8". $149.00
MODEL 251. Power supply to operate both units $69.00

315 RECEIVER
Covers all amateur bands from 10 to 80 meters. Sensitivity 0.5 μV for 10 dB (S + N)/N. Features direct frequency reading: drift less than 100 Hz; 9 MHz crystal-lattice filter i.f. amp; 2.5 kHz bandwidth; automatic sideband selection; audio dist. 2%. Has internal speaker, T R mute jack; S meter; provisions for two-position audio, CW, filter accessory. 4½" x 13" x 7". $229.00
MODEL 235. CW audio filter, with 300 Hz bandwidth at —6 dB. $14.95

TRITON I SSB TRANSCEIVER
Operates on all ham bands 80-10 meters plus WWV; instant band change; 100-W input, all transmitter circuits pre-tuned; receiver bandwidth 2.5 kHz with 1.7 shape factor; MOSFET

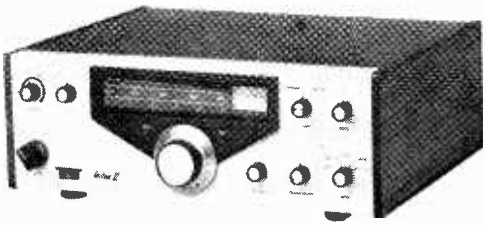
front-end; sensitivity 0.3 μV; direct frequency read-out; crystal calibrator with pulsed tone; offset tuning with light indicator; features modular plug-in boards, a.g.c., a.l.c. with indicator light, adjustable sidetone, built-in speaker, output jacks for external operation of separate receiver and linear amp. $519.00

MODEL 251. Power supply; 9 A; 115/230 volt a.c. $69.00

MODEL 261. Same as 251 but with VOX and speaker. $99.00

TRITON II SSB TRANSCEIVER

Same as Triton I except 200 watts input. $606.00



MODEL 252. Power supply; 18 A; 115/230 volt a.c. $89.00

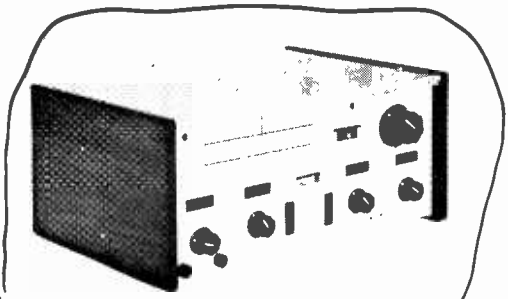
MODEL 262. Same as 252 but with VOX and speaker. $119.00

PM2B TRANSCEIVER

CW/AM/SSB reception; 1 μV sensitivity; selectivity 2 kHz at — 6 dB; stability 100 Hz drift, CW transmission. Covers 80, 40, and 20 meter bands. Battery operated (lantern-type battery). Can be operated with its self-contained v.f.o. or crystal-controlled. Overall size 4½" x 10⅜" x 7". $65.95

PM3A TRANSCEIVER

Similar to PM2B. Designed for 20 and 40 meter bands. 5 watts input. Has keyed antenna

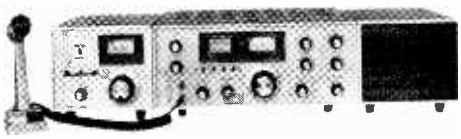


changeover with adjustable hold. $79.95

YAESU

FTdx401 SSB TRANSCEIVER

Frequency range 3.5-4.7, 7.0-7.5, 10.0-10.5 WWV,14-14.5, 21-21.5, 27-30 MHz; maximum



input power 560 watts p.e.p. SSB, 430 watts CW; sensitivity 0.5 μV for 10 dB S/N (SSB 14 MHz); audio output 1 watt 350-220 Hz; 117/230 volt, 50/60 Hz power source; comes with built-in power supply; built-in WWV 10-MHz band; built-in noise blanker; 25/100 kHz calibrators; VOX; clarifier; break-in CW with sidetone; 1-kHz readout; selectable SSB; cooling fan; 15¾" W x 6¼" H x 13¾" D; $599.00

VENUS SCIENTIFIC

SS-2 SSTV MONITOR

Monitor screen, 3¼" square; converts to scope for video signal viewing; Polaroid camera adapter; 10¾" W x 13" D x 5½" H; $349.00

CHU—TIME SIGNALS FOR EVERYONE

RADIO station CHU, geographically located in Canada and frequency spotted at 3330, 7335, and 14,670 kHz on the dial, has long been a favorite of hams, SWL's, and sportsmen. CHU announces EST (Eastern Standard Time) in French and English every minute. In addition to giving time signals, the CHU frequencies also provide a convenient reference standard for hams due to their proximity to the 80-, 40-, and 20-meter bands.

The basic signal format is a pulse each second, except for the 29th which is skipped to identify the half-minute mark and the 51st through 59th which are replaced by the voice announcement. During the first quarter of each minute, some of the pulses may be split; the number and positions of these pulses indicate the error between Universal Time (based on the Earth's rotation; it varies) and Atomic Time (a constant). This error is always less than one second.

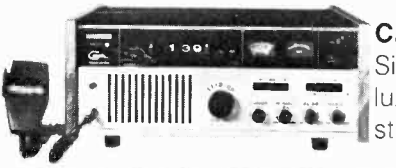
The staff of CHU welcomes reception reports. They ask that when making reports you include details of readability and interference, if any. All reports are acknowledged with the station's distinctive QSL card. Reports should be sent to: National Research Council of Canada, Ottawa, Ontario, Canada, K1A OS1, marked for the attention of the Time & Frequency Section.

If you would like more information about CHU, write to the same address and request a free copy of Time Service Bulletin No. B-27. This handy bulletin explains Universal Time and the Atomic Time relationship. —*D.J. Holford*

When You Have to Get On... SSB for the "Pro"

SPARTAN SSB
Compact, powerful mobile SSB with everything

GLADIATOR SSB
Power to dominate as you go, where you go



CENTURION SSB
Sideband power and luxury in a base station with clock

CB with Quality and Performance for All.

CONQUEROR/ CARAVELLE
23 Channel base that does it all

CLASSIC II
AC/DC mobile with class that talks

TRAVELLER II
Dependable mobile Go-Power

COMET 23
A stellar performer

REBEL 23+
Economy that does it right. With P.A. and meter

make it with Courier

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Pasadena, California 91105
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175 East William Street, Hopelawn
Perth Amboy, New Jersey 08861
Telephone: (201) 826-4700

CIRCLE NO. 6 ON READER SERVICE CARD

Introduction to CLASS-D CB RADIO

BY MATT P. SPINELLO

IN just fifteen years, Citizens Band radio has become, for millions of private citizens, one of the most exciting communications media ever allocated by the Federal Communications Commission. The FCC established the Class-D service at 11 meters in the frequency spectrum, with 23 channels available in the AM mode for two-way communications. With the introduction of single-sideband technology, users could select CB transceivers which would give them a two-way capability from a selection of 69 channels.

The Citizens Radio Service was introduced in 1958 to provide the average citizen with low-cost, limited-range voice communications. Unlike "ham" radio, a code or other examination is *not* required to obtain a CB license. However, it is illegal for CB'ers to emulate hams by transmitting long personal conversations or effecting long-distance communications. In operation, the system enables one to engage in two-way voice communications between other licensed local CB stations, a car and home or office, farm and tractor, dispatch center and service vehicles, among other fixed or mobile points.

Beyond the scope of general communications, however, an important role of CB developed as public-service assistance, especially in times of emergency.

The "excitement" of CB radio comes from a number of contributing factors. The Citizens Radio Service allows the licensing of any American citizen from age 18 without technical or theoretical knowledge of the type needed to obtain an Amateur (Ham) Radio license. On that basis alone, CB radio has served as the training grounds for many new Ham operators over the past 15 years.

The new licensee need not long feel a stranger to the Citizens Band. Thousands of CB clubs are spread throughout the U.S. and Canada. In addition, those interested in working closely with emergency teams, national in scope, will want to investigate the activities of Radio Emergency Associated Teams (REACT), headquartered in Chicago, Illinois and the Affiliated League of Emergency Radio Teams (ALERT) in Washington, D.C.

The Class-E Citizens Band. The FCC is currently finalizing its statistical data, reviewing comments received from CB'ers, and perhaps making ready to launch, some time this year, what may become the Class-E Citizens Band. The new service would provide 40 channels in the 224-225 MHz band at 25-kHz spacing. Licensing and eligibility for the service would be similar to those of the present Class-D band.

Among several petitions received last year by the Commission, applicable to the creation of the new Class-E band, some asked that power for Class E be limited to 100 watts and requested 80 operating channels. One petition asked that 27 MHz be used for "Hobby" (Class "H") only and that all emergency and call channel operations be swung to 220 MHz. The Electronics Industries Association (EIA), in its detailed proposal, also asked for 80 channels, 100 watts maximum power, and no alteration in the present rules for 27-MHz operation.

Strong opposition to a Class-E service has been voiced by amateur radio groups. Dominant objections concern future needs for the 220-MHz band for hams, and CB'er abuses (excessive chatting, nonlicensing, etc.).

All things considered and no matter what changes come, new or revised, the average CB'er continues to make use of his system on a two-fold basis: as his own personal or business communications link and as a public-service unit which can aid in any emergency. ◈

The Citizens Band Radio section is authored by Matt P. Spinello, KHC2060, who is CB columnist for Popular Electronics Including Electronics World.

How to obtain a "NO TEST" CB LICENSE

Legal radio communications without code or written exams.

APPLYING for a Citizens Radio license is not nearly as mind-boggling as one might think when taking a first look at FCC Form 505. In exchange for the privilege of operating a CB two-way radio on the air, the Federal Communications Commission merely asks that the applicant answer truthfully 20 questions and acknowledge his agreement and understanding of the Rules by his legal signature.

It is important that the latest Form 505 be used in making license application. There have been changes in the form over the years and supplies of the older versions may still be in the field. Use of the older forms may cause rejection of your original application, creating delays in the issuance of your license. The currently accepted Form 505 is dated July 1972. If it is not available from your equipment supplier, contact your nearest FCC Field Engineering Office which can be found in local telephone directories under "United States Government," or write directly to the Federal Communications Commission, Citizens Radio Division, Washington, D.C. 20554.

If your form is received from the Commission, included will be a copy of SS Bulletin 1001 (Feb. 1973). It is informative reading and should be filed for ready reference. On page 4 of the bulletin is an order form for Volume VI which contains Parts 95, 97 and 99 of the FCC Rules and Regulations (there is another order form attached to Form 505). It is recommended that the form be sent, as indicated, to the Superintendent of Documents with a check for $3.50, even before applying for a license. It is imperative that a licensee has read, understands, and is familiar with the rules as well as having a copy in his possession. The bulletin does indicate, however, that if the applicant has not yet received his copy of Part 95, he may still file his application if he states under "Remarks" on Form 505 that he has borrowed and read another licensee's copy in order to answer Item 11 in the affirmative.

A station license must be obtained from the FCC for operation of all types of CB transmitters having an input power exceeding 100 milliwatts. Transceivers in the latter category are usually of the "toy" walkie-talkie variety and cannot be used with a 5-watt CB system unless they meet certain technical specifications with regard to frequency control. If you plan to include the more professional walkie-talkies in your system, those with an input from 1 to 5 watts, they must be included in the number of transmitters requested in your application to the FCC.

License Fees. Your callsign, as issued by the FCC, will be valid for five years for a fee of $20 and renewable prior to expiration. Renewal requests should be made at least 60 days prior to expiration of the current license. New licensees will receive a copy of SS Bulletin 1001a, "How to Use CB Radio." CB communicators will find the 41-page booklet an informative guide to legal and proper communications. It should, in fact, be considered *must* reading by all individuals using CB channels.

Transmitters. The maximum number of transmitters that an individual CB'er can apply for without explanation, is six. It is important to include the total number of transceivers you feel you are going to need during the five-year license period.

If you find after you have been licensed that you require more transmitters than the total for which you made application, it will be necessary to file a new form, paying the applicable fee for a new, full five-year period. If a license is lost, a duplicate can be obtained from the FCC by applying for it on Form 505 with an attached statement as to how the original was lost.

Washington, D.C. nor to one of the field offices.

When you receive your license, post it somewhere near your base station where it can be examined by proper authorities should the need arise. Transmitter identification cards—FCC Form 452—or a photocopy of your license should be attached to each mobile unit used under

FCC FORM 505
JULY 1972

UNITED STATES OF AMERICA
FEDERAL COMMUNICATIONS COMMISSION
WASHINGTON, D C 20554

FORM APPROVED
BUDGET BUREAU NO 52-R0123

APPLICATION FOR CLASS C OR D STATION LICENSE IN THE CITIZENS RADIO SERVICE

1 Application for Class A station license must be filed on FCC FORM 400
2 Complete on typewriter or print clearly
3 Be sure application is signed and dated Mail application to Federal Communications Commission Gettysburg, Pa 17325
4 Enclose appropriate fee with application DO NOT SUBMIT CASH Make check or money order payable to Federal Communications Commission THE FEE WILL NOT BE REFUNDED EVEN IF THE APPLICATION IS NOT GRANTED Also, fee overpayments of $2 or less will not be refunded (No fee is required for an application filed by a governmental entity For additional fee details including exemptions, see Subpart G of Part I of the Commission's Rules) READ INSTRUCTIONS FOR EACH ITEM BEFORE FILLING IN THE APPLICATION — TYPE OR PRINT

DO NOT WRITE IN THIS BLOCK

1 (a) NAME OF APPLICANT
BUSINESS NAME (*if any*) OR, IF APPLYING AS AN INDIVIDUAL, GIVE LAST NAME
FIRST NAME (*if an individual*) MIDDLE INITIAL

1 (b) PERMANENT MAILING ADDRESS
NUMBER STREET
CITY STATE ZIP CODE
COUNTY

1 (c) BIRTHPLACE AND DATE (*See Instruction 4.*)
CITY STATE MONTH DAY YEAR

1 (d) IF APPLICANT IS AN INDIVIDUAL/DBA (*See Item 4*), INSERT TRADE NAME OR BUSINESS NAME

2 NAMES OF PARTNERS (*Do not repeat any name shown in Item 1*)
(a) LAST NAME FIRST NAME MIDDLE INITIAL

2 (b) BIRTHPLACE AND DATE (*See Instruction 4.*)
CITY STATE MONTH DAY YEAR

3 IF ITEM 1 SHOWS P O BOX OR RFD NUMBER, GIVE A LOCATION WHERE THE LICENSEE OR THE STATION MAY BE FOUND (*Do not give post office box or RFD number.*)
NUMBER AND STREET
CITY STATE

IF LOCATION CANNOT BE SPECIFIED BY STREET, CITY, AND STATE, GIVE OTHER DESCRIPTION OF LOCATION SUCH AS DISTANCE AND DIRECTION FROM NEAREST MAJOR ROAD INTERSECTION OR FROM NEAREST TOWN OR CITY

4 CLASSIFICATION OF APPLICANT (*See Instructions*)
☐ INDIVIDUAL ☐ ASSOCIATION ☐ GOVERNMENTAL ENTITY
☐ INDIVIDUAL/DBA ☐ CORPORATION ☐ OTHER (*Specify*)
☐ BUSINESS PARTNERSHIP

5 CLASS OF STATION (*Check only one.*) (*See Instruction 5.*)
☐ CLASS C STATION ☐ CLASS D STATION

CHECK APPROPRIATE BOXES — YES — NO

9 (a) IS EACH TRANSMITTER TO BE OPERATED AS A CLASS D STATION, OR AS A CLASS C STATION IN THE 72–76 MHz BAND, TYPE APPROVED OR TYPE ACCEPTED BY THE COMMISSION?
(b) IS EACH TRANSMITTER TO BE OPERATED IN THE 26–27 MHz BAND CRYSTAL CONTROLLED? (*If you have checked "NO" to both (a) and (b), attach detailed description See Subpart C of Part 95.*)

10 (a) WILL APPLICANT OWN ALL THE RADIO EQUIPMENT? (*If "NO" answer (b) and (c) below.*)
(b) NAME OF OWNER
(c) IF NOT THE OWNER OF THE RADIO EQUIPMENT, IS APPLICANT A PARTY TO A LEASE OR OTHER AGREEMENT UNDER WHICH CONTROL WILL BE EXERCISED IN THE SAME MANNER AS IF THE EQUIPMENT WERE OWNED BY THE APPLICANT?

11 HAS APPLICANT READ AND UNDERSTOOD THE PROVISIONS OF PART 95 DEALING WITH PROHIBITED COMMUNICATIONS AND USES?

12 DOES THE APPLICANT CERTIFY THAT THE STATION WILL NOT BE USED FOR RADIOTELEPHONE COMMUNICATION OVER A DISTANCE EXCEEDING 150 MILES, OR FOR THE EXCHANGE OF CHIT CHAT, IDLE CONVERSATION, DISCUSSION OF EQUIPMENT, OR HOBBY TYPE COMMUNICATIONS?

13 WILL ANY PERSON, OTHER THAN (1) THE APPLICANT, (2) MEMBERS OF HIS IMMEDIATE FAMILY LIVING IN THE SAME HOUSEHOLD, OR (3) HIS EMPLOYEES, OPERATE THE STATION? (*If "YES", attach a separate sheet listing the names and relationship of all such persons and give [illegible]*)

The License Form. A worksheet (an exact duplicate of the form you will submit to the FCC) is part of Form 505 for your convenience. Fill out the worksheet then transfer the information with typewriter or in ink to your application.

Mail the completed form with your check or money order (do not send stamps or cash) for $20 to the Federal Communications Commission, Gettysburg, Pa. 17325. *Do not* send the form to the Commission in your callsign. Most CB'ers prefer to tuck photocopies of the actual license in the glove box of their vehicles and fold others into the carrying cases of portable walkie-talkies. Form 452 must be procured from FCC Field Offices.

A final word of warning: It is not worth jeopardizing the privilege you are requesting by using your transmitter before receiving your license. As millions of users attest: it's worth the wait. ◈

NATIONAL CB EMERGENCY ASSOCIATIONS

How they can help you and others.

CITIZENS BAND radio-equipped motorists are now in much better position to get help for themselves or others in distress— with very little effort and without ever leaving their vehicles—thanks mainly to the organization and professionally guided activity of national emergency associations that have linked CB radio operators from coast to coast.

Highway Communications. REACT (Radio Emergency Associated Citizens Teams), under the sponsorship of General Motors Research Laboratories, has been involved in easing highway emergency communications problems since 1962. It is a nationwide organization of nearly 1500 volunteer groups. Totaling approximately 40,000 individuals who use their base-station equipment in the Citizens Radio Service to monitor Emergency Channel 9, they provide local two-way radio communications to motorists in response to emergencies.

REACT teams are prepared to provide supplementary communications. Effective local two-way radio communication has proved valuable whenever normal telephone service is interrupted because of fire, blizzard, earthquake, flood, hurricane, tornado, or other disasters. Through an understanding between the American National Red Cross and REACT National Headquarters, local teams are encouraged to participate in their community's pre-disaster planning.

What REACT Does. The REACT program does not supplant the organization of an existing club nor does it interfere with the regular routine. The club adapts REACT to its own procedures. Where no club exists, REACT may be put into effect immediately and without complicated planning and wasted time.

Although REACT is a plan oriented toward local community problems, there are major advantages in national organization. First, the national headquarters accumulates information on new emergency techniques from hundreds of other communities and passes it on to local chapters. Next, REACT headquarters, on behalf of local groups throughout the country, can work more effectively with other national emer-

The Metro Atlanta (Georgia) ALERT team is a representative group.

gency forces in coordinating proper use of Citizens two-way radio. And, finally, REACT headquarters effectively represents the best interests of Citizens Radio before the Federal Communications Commission and other governmental bodies on a frequent and continuing basis.

In action, a typical REACT team may be found in search of a downed aircraft, runaway youngster, or drowning victim, with each team member equipped with either mobile or portable hand-held CB transceivers. So equipped, he is in constant contact with the REACT monitoring base station. REACT members have served local authorities in situations as complex as providing clothing, food, and shelter to flood victims; manning boats, trucks and jeeps to evacuate families and pets threatened by floods, tornados, and hurricanes. In each instance, use of CB two-way radio between a temporary or permanent headquarters base station and each of the REACT team members serves as one of the most important elements of the rescue or service provided by the group.

Although not widely publicized, thousands of REACT volunteers in communities throughout the U.S. and Canada annually take on the tasks of helping local authorities control parade traffic and large crowd activities. Each Halloween REACT teams can be found patrolling in thousands of communities, working closely with police or sheriff's departments to keep tabs on vandalism, destruction, and shenanigans frowned on by the local community. The addition of anywhere from 20 to 200 radio-equipped "patrol cars" helps in keeping the peace, especially during times that overburden the limited number of law enforcement personnel. City, state, and national officials have applauded the volunteerism of REACT teams which have worked closely with them in times of need.

ALERT members come from all walks of life. Atlanta's Chester Head takes his turn monitoring Channel 9 after putting in a full shift manning a patrol car and handling traffic duties during rush hours.

ALERT CB base-station operator, Betty Lou Herlihy and her assistant, Ruth Meade, members of the Sandusky, Ohio Team 354, know how effectively the organization can work at the local level in all types of emergency and routine events.

Channel 9 Monitoring. REACT's most important full-time activity involves its 24-hour monitoring of Citizens Radio's Emergency Channel 9 by each team. In addition to teams rallying to aid in disasters or preplanned community activity, there is a REACT monitor listening to Channel 9 constantly in approximately 1500 communities throughout the United States and Canada.

A nurse returning home from a late night hospital shift can travel down lonely stretches of highway knowing that, in an emergency, help is as close as her microphone, if her vehicle is CB-equipped; Citi-

zens Radio on board a recreation vehicle traveling in unfamiliar territory offers occupants the assurance of aid should they become lost in a maze of highway interchanges or need assistance for their vehicle or person; and the alert CB'er who travels the same route daily can report to REACT monitors changes in road conditions, traffic tie-ups, and accidents which the monitor, in turn, can report to local authorities. Wherever one travels, he will probably be within range of a REACT monitor, or someone who can reach one, day or night.

Joining a REACT team in your area is a simple matter. Merely contact the local team or one of its members for information. If there is no active team in your community you may want to send for an application blank and start one. The main requirements are that you establish an effective local REACT monitor system, guarding the Official Emergency Channel 9 24-hours-a-day, 7-days-a-week; maintain an active membership of at least five Class D Citizens Radio operators; operate at all times in accordance with FCC rules and all local, state, and federal regulations; and submit a $5.00 charter fee as a new group, with annual dues of $1 per member.

For full details and Team Application blank, write REACT National Headquarters, 111 E. Wacker Drive, Dept. PE, Chicago, Illinois 60601.

ALERT

In a letter received at ALERT National Headquarters in Washington, D. C., a San Francisco woman asked: "Just exactly who and what are you people? What do you do? Are you some kind of night patrol?"

According to ALERT President Robert Thompson, KLM9374, team members throughout the United States assist people daily, "acting like helping others was just another commonplace, everyday experience, and in a most cheerful and friendly manner."

ALERT, an Affiliated League of Emergency (CB) Radio Teams is 10,000 members strong, represented in all 50 states by its 400 emergency teams. As one of the two largest national emergency organizations in the country, its goals extend far beyond the distribution of decals, arm patches, and paraphernalia that have all too often been the main inducement to join other so-called national organizations, the majority of which have disappeared almost as quickly as they were announced.

In addition to the administrative efficiency of its president, Robert Thompson, and his assistant, Diana Helmstetler, another key to ALERT's success is the site of its national headquarters in Washington, D. C. Strategically located to surround itself with federal agencies and national organiza-

NBC's "Today Show" carried a feature on the national REACT program, including an interview with REACT's Gerald Reese and Henry B. Kreer.

tions, ALERT offers its membership—and follows through with—a "your-voice-in-Washington" concept. Where other by-the-wayside national CB groups have promised to "take the CB'ers voice to Washington in great numbers," ALERT lives in the shadow of the governing bodies that generate federal law.

Alert's President Bob Thompson is undoubtedly one of the nation's most involved CB'ers. It is common to find him criss-crossing the U. S. visiting ALERT teams, speaking at national association gatherings, and problem-solving at trouble spots. Soft-spoken, but easily riled by negative conditions that threaten the orderly operation of the Citizens Radio Service, Bob admits that ALERT is not without problems—which he accepts as a part of any major organizational undertaking. He is convinced, however, that association in large numbers is what is needed to protect the rights of lawfully operating CB'ers; that a standardization of organizing and operating citizens' emergency teams is essential to effective utilization of team efforts; and that regular exchanges of information regarding how CB teams function as public-service organizations throughout the U. S., how proposed rules changes might affect the licensed CB user, and news specifically of interest to the Citizens Radio Service user, are essential in strengthening the bond between local, state, and national authorities and assistance-minded organizations such as ALERT.

This is the basic role of ALERT and REACT and the other smaller, less extensive CB associations.

Local Level. At the local level, ALERT extends an organizational hand to existing CB clubs and/or individuals who wish to utilize Citizens Radio frequencies more effectively, serve where needed with emergency communications and personal assistance, and organize with others who share a common interest.

To aid a local group, ALERT furnishes a suggested constitution and by-laws, a monthly newsletter, and national headquarter's assistance that can be programmed through ALERT's computer facilities. It also makes available an ALERT airplane which can be dispatched and used as a communications point or link.

ALERT works with local teams to aid in the organization of statewide ALERT associations which can more closely tie in with national headquarters in Washington. Consideration is also given to the "CB'er of tomorrow." ALERT feels that young adults, properly trained in the use of CB radio, will benefit Citizens Radio and the junior team member when he reaches licensing age. As a result of that commitment, a Junior ALERT Program is offered. Members are divided into two categories: ages 9 to 14 and 14 to 18. A junior member's parents need not be licensed CB'ers for him to participate in the program, but he must be sponsored by the local adult ALERT team and voted upon for acceptance by the junior team.

Bi-monthly Publication. To round out its package of services provided to team members, ALERT distributes bi-monthly its official publication, *ALERT 44*, (available to non-members by subscription). The magazine, while prepared mainly for ALERT team members, contains Citizens Radio news, views and comments of interest to all CB'ers or those considering use of CB 2-way radio.

A close analysis of any issue of *ALERT 44* reveals that the publication serves as the organization's most impressive promotion vehicle. In any given issue, the reader is exposed to 40 or 50 individual assistance reports, volunteer activity, and letters of praise from persons served through team efforts, on and off the air. Several responses extend kudos for help provided by ALERT members, ranging from flat tires that needed changing, to replacing fuel pumps or making necessary arrangements to have an auto pulled from a ditch.

A railroad praised the efforts of ALERT CB'ers in helping clear an intersection and handling communications following a train derailment. Local police, governmental agencies, the Red Cross, and other public-service groups have commended the organization's team efforts in providing food, clothing, shelter, and a necessary communication link through the use of CB radio in time of disasters—which have included snowstorms, floods, hurricanes, threatening fires, as well as comprehensive searches for lost children.

For detailed information on membership in the ALERT program write: ALERT National Headquarters, Suite 818A, National Press Building, Washington, D. C. 20004. ◈

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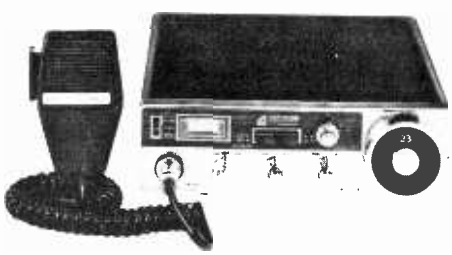

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CIRCLE NO. 14 ON READER SERVICE CARD

GETTING STARTED IN CB

A guide to selecting and installing Citizens Band equipment and operating techniques.

PICKING your CB components and then installing them as a system is half the fun. The other half begins when you master operational procedures and realize that applications for your new two-way facility are virtually unlimited as long as your brainstorms conform to FCC Rules and Regulations governing CB communications.

There are Citizens Band transceivers (combination transmitters/receivers), antennas, and accessories to fit every pocketbook. From walkie-talkies offering 1- to 23-channel operation, to mobile and base-station rigs covering 23 channels (some with single-sideband capability which offers an additional 46-channel selection), there is a system to meet any business, personal, or emergency need.

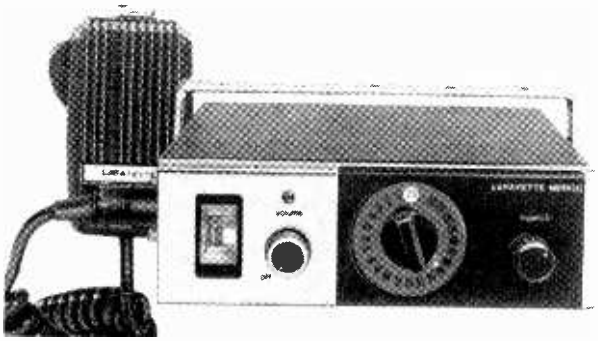
Selecting Equipment. First, decide how selective your system should be. Citizens Radio channels are used on a shared basis, so that CB's nearly 1-million licensees work from a maximum of the same 23 basic channels. You will not be tuned to the world, but transmissions from other licensees in your area may carry from 2 to 50 miles, depending on conditions—in effect, a party line! If, for example, you buy a transceiver with a maximum of three transmitting channels and those frequencies happen to be those most frequently used in your area, the system may be impractical. If, on the other hand, you intend to install a three-channel unit in your car for the express purpose of having it available for emergency use, then the three most-used channels in your area would suffice—but there are obvious advantages in having all 23 channels available at the flick of a tuning knob.

Printed circuits and transistorized miniaturization have made possible lightweight, full-featured transceivers which provide basic 23- plus 46-channel SSB operation and are smaller in size and about the same weight as an empty cigar box. While most of these units have been developed for mobile applications; many can be converted to ac operation by means of plug-in modules.

An array of larger base-station transceivers is available for CB use, the majority of them jam-packed with features offering maximum transmitting and receiving capability. Some rigs include microphone and r-f gain controls, noise limiters, transmitter and receiver fine tuning and built-in S-meter, SWR and power meter, and internal load meter. A few include a digital clock; some will turn the unit on or off at predetermined times.

The FCC requires that Class-D transmitters meet certain technical requirements, including a maximum input power of 5

Dynascan's "Cobra 21" CB transceiver.



Lafayette's "Micro 723" miniature CB transceiver covers all 23 CB channels using synthesis.

watts and an operating frequency tolerance of ±005%. The power output rating varies among manufacturers, but is generally from 3.5 to 4.5 watts. Walkie-talkies are available with input power ratings of 1, 2, 3, and 5 watts for use with other licensed mobile or base-station systems. The license-free variety of hand-held transceiver usually has an input of 100 milliwatts (1/10 watt) or less.

Most CB tuners for selecting transmitting channels are ganged with the receiver so that in choosing a transmitting channel you automatically tune the receiver to the same frequency. Some provide a separate tuner so that you can "fine tune" transmissions being received.

A squelch control is standard on all equipment. This control will quiet the receiver audio when set just beyond the point where the receiver background noise disappears. Any signal stronger than the noise level will restore the receiver to operation. The control may also be set higher so that only relatively strong signals will open the squelch. This will help eliminate signals weaker than those from stations in your own area.

CB Antennas. Your choice of a base-station antenna should be given careful consideration. The antenna will influence the range of your signal. As when choosing a transceiver, you will want to select your antenna on the basis of how you want the total system to perform.

Basically, you will choose from two antenna types: omnidirectional or beam. Omnidirectional antennas will spread your transmitted signal (and receive others) in all directions from your base station. For greater selectivity, more range, and the elimination of unwanted signals, the beam type, as its name implies, beams your signals by concentrating all power in a chosen direction. If you need a maximum, concentrated signal, the added cost of a beam is worth it. Keep in mind, however, that beam antennas are generally heavier, requiring a sturdy tower or guying of a rooftop pole mount. Also, most beams require an electric rotor so that the antenna can be turned in the direction of the signal. At least one manufacturer produces a beam antenna which controls the direction of the signal with electronic switching without physically rotating the antenna structure.

The antenna should be placed as high as possible. Maximum antenna height permitted is 20 feet above the mounting area.

Your choice of a mobile antenna should be based on need and preference. Several types are available in various configurations. Mobile antennas match their base-station big brothers with a loading coil to maintain the electrical length, but shortens it

Teledyne offers this Model RA-510 combining AM plus upper and lower single-sideband operating modes.

physically to anywhere between 2 and 4 feet. There are three basic types. For the greatest transmitting/receiving range, the ideal mount is centered on the roof of the vehicle. In this position, the body of the vehicle serves as a ground plane spreading the signal in an omnidirectional pattern. The old-fashioned 108″ whip antenna, which was generally mounted on the left rear fender, tended to propagate its strongest signal diagonally across the car and toward the right front fender. Thus, the center roof mount, which is shorter and less conspicuous, has been accepted by most users. They are more reliable and effective than the older whip types.

For those who would prefer not to drill even a small hole in their cars, a number of "no holes" mounts are available which attach easily, but securely, to an auto trunk lid. The antenna can be removed at any time without marring the body surface. For temporary service, there are gutter mounts which clip to a vehicle's rain gutter with the coaxial cable fed through a window.

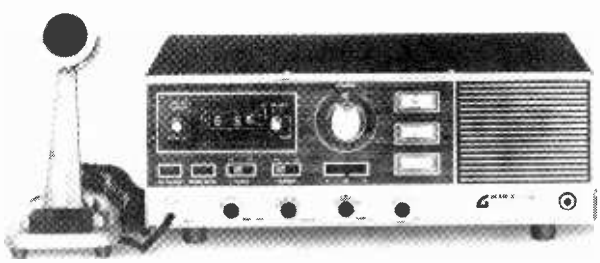
Two types of cable, with an impedance of 50 ohms to match CB antennas, are the RG-58/U and RG-8/U. Type RG-8/U is larger and costs more, but has less transmission loss. For example, with 100 feet of the smaller cable, RG-58/U, your line loss on transmit and receive could be as much as 50%. With RG-8/U that loss can be as low as 25%, which works out to several additional miles of transmitting and receiving coverage.

E.F. Johnson's streamlined "Messenger 250"

Installation Tips. Most mobile installations are made under the dashboard, centered for easy access to both driver and passenger. The compactness of today's models allow easy installation without interfering with the center seat. On a service vehicle the unit might be installed closer to the driver since he will be the only one using the system. Be sure that the spot you pick avoids entanglement of the mike cord with the brake and gas pedals.

Before drilling holes for mounting your transceiver under the dash, check to see that the underside will support the unit. Although you may have chosen a lightweight transceiver, the underside of your dashboard may well be a plastic vent for air conditioning and offer no access for applying a solid nut and lock washer to the support bolt. Self-threading screws may or *may not* support the unit.

Gutter and trunk-mount antennas are easily installed in short order. With a more permanent antenna in the center of your roof, a few precautions are in order. Drill the hole carefully and slowly, with little pressure on the drill so as not to break through the fabric headliner. In fact, a second person can help by pulling down on the liner from within the vehicle.

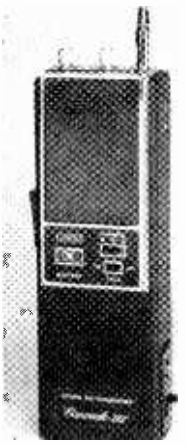


Pearce-Simpson's "Bearcat 23" base-station transceiver with lighted digital readout feature.

When you have centered the mounting hole, remove the interior ceiling-mounted light fixture and fish your antenna cable through the center hole. With this fixture removed, it is easier to trace and reach the cable to pull it through. Then remove the interior panel between the driver's door and rear passenger door (if there is one) and after fidgeting and fishing for a while, you can feed the cable (from your

vantage point where you removed the interior fixture) to the side of the car, down the side of the partition, and under the carpeting to the connection on the transceiver.

Operating Techniques. Now that you have both your mobile and base stations installed, obviously the first thing you will want to do is see if it perks. By all means turn the system on and start listening to transmissions. If you haven't received your license, that's all you can do at the moment: *listen!* If you attempt to transmit without a license you become a target for an FCC citation, followed by what could be a stiff fine, permanent revocation of the license you applied for but hadn't received, and, if the offense is serious enough, a jail term.



SBE's "Cascade III", a 3-channel 2-watt hand-held CB transceiver.

10 Code

10-1	Unable to copy your signal—change your location
10-2	Your signal is good copy.
10-3	Stop transmitting
10-4	Acknowledgement (okay-affirmative).
10-5	Relay this message.
10-6	Busy, stand by.
10-7	Leaving the air.
10-8	Back on the air and standing by.
10-9	Repeat your message.
10-10	Transmission completed, standing by.
10-11	Speak slower.
10-12	I have visitors.
10-13	Advise weather and road conditions.
10-19	Return to base.
10-20	What is your location? My location is ....
10-21	Call ..... by telephone.
10-22	Report in person to .....
10-23	Stand by.
10-24	Have you finished? I have finished.
10-25	Do you have contact with .....?
10-27	I am moving to channel .....
10-28	Identify your station.
10-30	Does not conform to Rules and Regulations:
10-32	I will give you a radio check.
10-33	Emergency traffic after this station.
10-34	Trouble at this station, please help.
10-35	Confidential information.
10-36	The correct time is .....
10-41	Please tune to channel .....
10-51	Wrecker or tow truck needed.
10-52	Ambulance needed.
10-53	Road blocked at .....
10-55	Intoxicated driver.
10-56	Intoxicated pedestrian.
10-57	Hit-and-run accident.
10-63	Prepare to make written copy.
10-64	Message for local delivery.
10-66	Message cancellation.
10-70	Fire alarm.
10-76	En route to .....
10-78	Need assistance.
10-82	Reserve lodging at .....

As you monitor the channels you should find that Channel 9 is silent unless an emergency situation is being handled by a REACT, ALERT, CB club, or emergency team member. Channel 9 is the official National Emergency Calling Channel and should be respected as such at all times. Use it only to report emergencies to a monitor or to help someone who is calling for assistance on that channel.

Millions of words have been written about operational procedures and techniques, yet an evening or two spent monitoring the band can probably teach a new licensee more about the "do's and don't's" than any words. There are, however, several points to keep in mind.

1. Before triggering the transmitter, remember that you are in the process of projecting your voice on the air in all directions anywhere from 4 to 50 miles. Sta-

Turner's "Super-Sidekick" mike.

tion identification must be given by both parties at the beginning and end of each contact.

2. Citizens Radio is subject to "skip" interference where signals may bounce up to 2000 miles as a result of ionospheric reflection. This type of interference will allow you to "listen in" on CB conversations from various parts of the country but, by FCC rule, you cannot communicate with any station beyond the 150-mile range of your station.

3. During your initial monitoring periods you are likely to hear "code" names on the air. Do not communicate with anyone who refuses to use a legal callsign. Legal operators will employ a call similar to yours; each should contain three letters and four numbers, such as KHC2060. A call could lead off with "KHC2060 calling KWW2222," after making sure channel is unused.

4. Use channels 10, 11, 12, 13, 14, and 23 for *interstation* communications. All other channels are for use by stations carrying your own callsign. Channel 9, as previously noted, should be used strictly for emergencies.

5. Stay within the 5-minute limit set forth in Part 95 of the Rules and Regulations. If you have additional information that must be relayed to your station and you have used up your time, clear the channel for 5 minutes to allow others to place their calls, then contact your station again once they have cleared and another 5 minutes have passed. This rule does not apply to units of the same station or to emergency communications.

6. Use *your* equipment and a *different* callsign if you qualify as a member of a duly licensed group activity such as REACT, ALERT, Civil Defense, the Red Cross, etc. You are then a mobile unit of the primary licensee.

Be prepared to use any CB channel in case of an emergency. Part 95.85 of the Rules permits the waiver of all restrictions where safety of life or immediate protection of property is involved.

7. Speak clearly, distinctly, with the microphone approximately two inches from your lips. Speak in a normal tone. Screeching produces the same effect at the other end.

8. Communication is simplified and efficient use of limited talk time is achieved through use of the "10-Code." Public Safety Officers and CB'ers use it. For example, 10-2 means reception is good; 10-4, acknowledged; 10-9 repeat.

Fanon's "Fanfare 100" mobile transceiver.

By following the basics outlined here, monitoring the band, and meeting with other CB'ers in your area to become familiar with operational procedures, conditions in your area, and to get to know others with a common interest, should equip you to get the most from your new Citizens Radio system. ◈

FREE PROMOTIONAL HELP FOR CB CLUBS

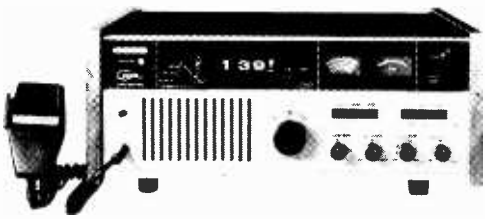
Hundreds of CB clubs have received free promotional material to spread the story of CB radio in their communities and to promote membership in their organizations. The comprehensive kits are being provided as a service to CB clubs and emergency teams by the Electronics Industries Association's Citizens Radio Section.

The free promotion kit includes an attractive easel display card complete with 100 explanatory pamphlets that fit into a dispensing pocket on the card. The club also receives a free rubber stamp individually made with the club name, address, and telephone number. The stamp is to be used to identify the club on both the easel card and information pamphlets and for club identification on its own materials. The kit also includes a publicity guide for obtaining local newspaper and radio coverage of the club's activities.

CB clubs interested in obtaining this free material while it lasts, should write on club letterhead and send it, complete with their club address and telephone number to: CB Club Kit, Room 700, 21 E. Hubbard St., Chicago, Ill. 60611.

SINGLE-SIDEBAND CB RADIO

More channels and greater transmitting distance attracts CB'ers to SSB gear.

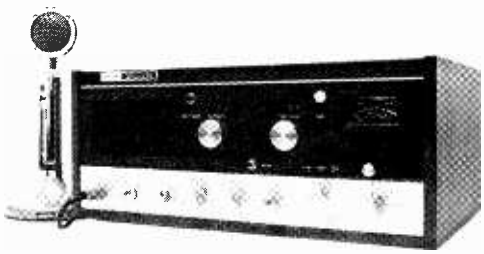


Courier's "Centurion" SSB base station.

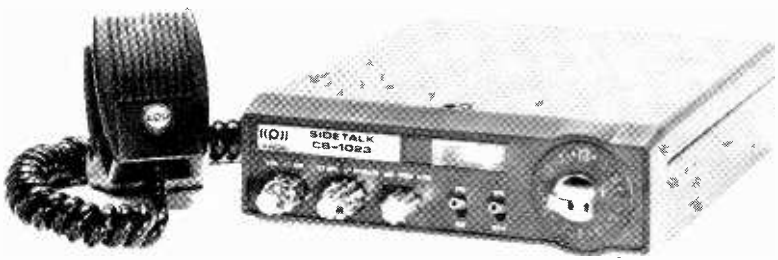
WITH single sideband (SSB), the CB'er communicates with less interference and better selectivity than with AM. He greatly increases the distance over which he can transmit and receive signals. And, in addition to the basic 23 AM channels, takes his choice from 46 SSB frequencies for an available total of 69 channels.

The Federal Communications Commission's Rules permit the use of either AM or SSB in the Citizens Radio Service. It is therefore unnecessary to modify a valid CB license, nor is a different or additional antenna system necessarily required to add the sideband capability. The current state-of-the-art has produced a galaxy of SSB equipment.

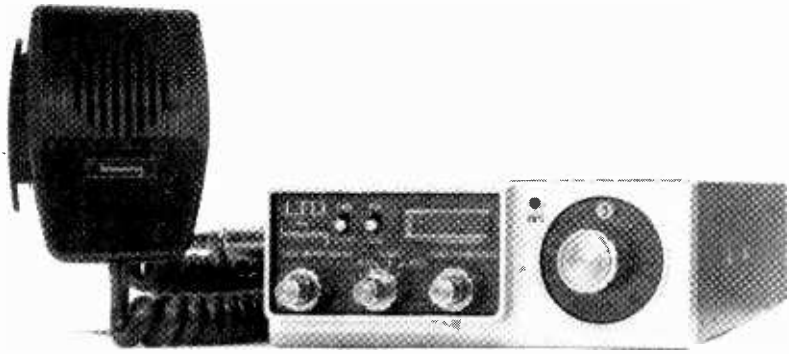
How It Works. In the simplest of SSB explanations, visualize in a transmitting function a carrier as a wide stripe of paint on the wall of your communications shack. Envision two shorter stripes with equal spacing on either side of the carrier; one will serve as the lower sideband, the other the upper sideband. Interject a 1000-Hz tone to modulate the transmitter. Each sideband now carries identical information; in this case the 1000-Hz tone. In normal use, the sidebands contain all the frequencies contained in the voice, making them highly



Tram's "Titan IV" SSB base station.



Pace offers its "Sidetalk" transceiver, CB-1023.



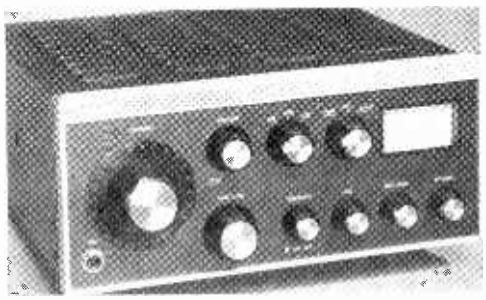
Browning's LTD single-sideband unit is ultra-compact.

complex. The carrier conveys no intelligence; it is present whether or not the transmitter is modulated.

The carrier portion of a conventional AM signal has a constant amplitude and is at a certain frequency. If a standard AM CB transceiver were fixed on channel 15, the frequency would be 21.135 MHz. By modulating the transmitter with a 1000-Hz tone, the actual width of the signal would be from 27.134 to 27.136. This would be true because of the 1000 Hz applied to the sidebands on either side of the carrier. Since both sidebands (not the carrier) carry the voice portion of the radio signal, and since both sidebands contain duplicate information, it should be possible to eliminate the carrier and one sideband and use this available power to strengthen the remaining sideband. This is the theory applied in single-sideband. The greater part of the usable power generated in an SSB rig is concentrated in the information sideband and sent to the antenna, as opposed to the standard AM signal which loses most of its power in the carrier.

There have been some misconceptions as to "power" that is applied in both AM and SSB transmitters. In the conventional AM CB transceiver, the FCC limits the *input power* into the final amplifier to a maximum of 5 watts. AM transmitters are thus rated in average power input: the final plate voltage times the final plate current. In contrast, single-sideband transceivers are measured by peak envelope power (PEP), which is the RMS value of the instantaneous *peak power input* (or output) to the SSB final. There is no direct comparison. Ten watts PEP is not the equal of twice 5 watts, but because it is sideband, 10 watts PEP has at least 8 *times* greater effective output as 5 watts of average power at 100% modulation. The result is that SSB transmitters are more powerful than AM transmitters.

Single-sideband operation has become more popular with the introduction of truly miniaturized mobile transceivers. Some early models were half again as large as standard AM mobile units. It's not uncommon to find AM/SSB transmit and receive mobile units now available in a package measuring a mere 6⅝" W x 2⅜" H x 9⅜" D, which is easily



Hy-Gain's Model 623 SSB transceiver.

mounted under-dash or installed in the glove box.

Base-station models, some of them ac/dc operated, are on the average comparatively larger and decked out with "plus" features. While none is objectionable to the eye, it would seem to be a sure bet that Mom would accept some transceivers that are attractively housed in wood-finish cabinets, which should complement any decor.

Without a doubt, single-sideband has opened a new world of communications for the Citizens Band radio licensee as a result of continual advances in the state-of-the-art. With an eye toward maximizing communications along professional lines, the swing is to single-sideband operations. ◈

TRAVEL FIRST CLASS
with this great new mobile

You'll get base station performance from the TRAM Diamond 60 SSB

TRAM DIAMOND 60 SSB

Here's quality, control and performance never available before in a mobile transceiver — features and performance normally found only in base station equipment. When you're on the move, the new TRAM Diamond 60 delivers reliable, punchy SSB-AM communications with unmatched voice quality and clarity. And it's only 6-5/8" w x 2-3/8" h x 9-2/3" d. This outstanding new mobile is a product of the superb design capabilities of Diamond Microwave Corporation and one of Japan's finest manufacturers. It is proudly offered by TRAM.

SPECIAL CAPABILITIES: Built-in features of the new TRAM Diamond 60 Mobile Transceiver provide completely automatic fail-safe transistor protection in case of broken, shorted or disconnected antenna. Professional quality SWR Meter to tell you just how good — or bad — your antenna is. Exclusive TTC (Transmitter Tone Control) to give you control of voice quality over a broad bass-treble range for rich, personalized tone. And you have transmitter frequency control a full 800 Hz on either side. All these features and more are brought to you in TRAM's new mobile unit without sacrificing the performance and quality — the super ears and punchiest legal transmissions — that have made TRAM known for the optimum in CB equipment. Really travelling First Class!

The TRAM Diamond 60 is designed to give you years of most useful and gratifying Mobile CB service. Mail the coupon below for detailed literature.

TRAM CORPORATION

Lower Bay Road, P.O. Box 187
Winnisquam, N.H. 03289 • Phone (603) 524-0622

Gentlemen:
Please send me complete information on the TRAM Diamond 60 SSB-AM Mobile Transceiver.

Name_____
Address_____
City_____ State_____ Zip_____

CIRCLE NO. 20 ON READER SERVICE CARD

THE BUSINESS RADIO SERVICE

BUSINESS BAND'S 2-WAY RADIO OFFERS GREATER COMMUNICATIONS RANGE AND LESS "PARTY LINE" INTERFERENCE THAN CB RADIO.

BUSINESS BAND two-way radio has been termed "an extension of management to create increased operational efficiency." The user who effectively employs a Business Radio system may amplify that statement by adding that "savings can be more than enough to make the system a self-liquidating investment."

A Roanoke, Virginia electrical contractor attests that a $25,000 savings per year by his use of two-way radio is a conservative estimate. He maintains two base stations, two remote-control dispatch units, and six mobile transceivers. His services include providing home builders with "everything but the plumbing." Two-way radio keeps him on top of each job situation, placing his work force where they are needed most.

In Cleveland, Ohio the Cuyahoga Metropolitan Housing Authority Security Service, a program for a 30,000-member community, coordinates its round-the-clock safety protection with two-way radio. The CMHA radio system includes 50 hand-held two-way radios, four mobile transceivers, a 450-MHz remote repeater base station, three remote base controllers, and three personal pagers. The security chief at the project coordinates the movement of his men and equipment from one of the 25 CMHA public housing estates to another or to respond quickly to a call for help.

The frequencies made available for BRS systems solve an almost unlimited variety of problem situations. At Snowbird Ski Resort in Alta, Utah, where annual snowfall reaches 450 inches, two-way radio coordinates a sophisticated Mountain Safety and Avalanche Control program. In Rapid City, South Dakota, two-way radio saved lives when the town was hit by floods in 1972. An emergency two-way radio network was created on the spot to coordinate activities among police, army, public works, fire departments, and volunteers.

In each of the applications mentioned, two-way radio was operated on VHF Low Band, VHF High Band, or UHF frequencies allocated by the Federal Communications Commission. In addition to business enterprises, the Business Radio Service bands are available to educational and philanthropic institutions, hospitals, clinics, medical associations, and clergymen. More than 200 channels have been allocated by the FCC for the BRS, which was first made available in 1957.

In business applications there are distinct benefits to be derived by choosing operation in the BRS rather than Citizens Radio. Under a BRS license, higher power is permitted by the FCC and frequencies are assigned individually to minimize the possibility of interference from nearby stations. (It is not uncommon, however, to find a operator licensed for both services, employing his BRS assignment for business purposes during the day; his CB station for emergency and personal communications at other times.)

BSR Considerations. Range of a BSR two-way radio system is determined by a number of factors and may extend over an area of from 5 to 85 miles. Qualifying under a specific category of license, selection of equipment and antenna height control the variables governing how far you can communicate effectively.

Taking into consideration the rule that

the FCC assigns but *one* channel per base station, it is a good idea to know in advance which frequencies are used least in an area. Dealers are aware of local conditions and can offer advice. The prospective user can also seek the aid of the FCC in obtaining the name and address of the applicable frequency coordinator chairman, who will analyze the buyer's needs and assure that competitive businesses will not be placed on the same channel.

Radio waves travel line-of-sight and since the curvature of the earth plays tricks on communications range, in addition to man-made obstructions that may impair the signal, it is important that these negative factors be considered when selecting a system. Depending into which category a licensee falls, he may be assigned a minimum of 3 watts to a maximum of 600 watts transmitter power. Unlike the CB antenna height limitation, a BSR user can erect a tower as high as may be needed (a most important consideration) as long as the installation complies with FAA regulations. Any tower above 100 feet, for instance, must have warning lights. Thus, geographical conditions, combined with the power of the system and antenna height determine the effective range.

Applying for a 5-year license in the Business Radio Service is similar to making application for a CB license, except that the FCC requires more detailed information. The current license fee is $20, although a new proposal asks that it be increased to $40 plus $5 for each transceiver. Form 400 is used for a BSR license application and is available from any FCC field office or from the Federal Communications Commission, Washington, D.C. Form 400 is also used to apply for a station license in any of the other industrial and land transportation services. One application will cover a base station and any number of mobile units under a BSR license, but a separate application is needed for additional base stations.

Channels are assigned by power limitations as well as the type of business they will serve. In the Low Band, 25-50 MHz, assigned power will range from 3 to 500 watts, depending under which category the applicant qualifies. The Low Band signal also carries the greatest distance and is ideally suited to flat or low terrain.

The VHF High Band, 150-174 MHz, has a very strong signal and is less susceptible to interference than the Low Band. Power limitations in this portion of the spectrum range from 3 to 600 watts maximum. Some of the 600-watt channel allocations require shared channel use.

The UHF Band provides some 110 channels from 461.05 to 469.95 MHz, with various power limits; most channels are shared with other services. From 470-512 MHz are 44 additional channels under shared use. Nearly 70% of 450-512 MHz band users are in the major metropolitan areas. UHF offers the strongest signal and is least affected by electrical and metal structure interference, but has the shortest range. To minimize that limitation, repeater stations mounted atop mountains or high buildings can greatly increase the range of a BRS system. For a low monthly fee, use of a community repeater is available in some areas. The user may find that with just 15 watts maximum power he will have coverage of 50 miles in all directions.

Pace's new AM business system base-station, Model BI-35.

You must be employed in a business or commercial activity to qualify for a Business Radio Service license, but not necessarily full-time. A part-time news photographer, for example, may employ a two-way

radio system of his own. There are specialty services available as well. For the most part, special service frequencies are like BRS and are often authorized in the same 3-band allocation. The difference is that, frequently, more power can be used and there is less station population per channel. A breakdown of the special services include:

Special Industrial Radio Service, Manufacturers Radio Service, Petroleum Radio Service, Power Radio Service, Relay Press Radio Service, Motion Picture Radio Service, Forest Products Radio Service, Taxicab Radio Service, Railroad Radio Service, and Motor Carrier Service.

There is a wealth of information available to those considering the use of the Business Service. The National Association of Business and Educational Radio (NABER) is the largest representative of organized BRS users in the country. In response to requests, they will forward information about NABER, a variety of pamphlets and brochures on business radio, and a copy of their monthly publication "Action." Address your inquiry to Mr. Val Williams, Vice President, NABER Headquarters, Dept. HB, 1330 New Hampshire Ave., N.W., Washington, D.C. 20036. NABER is also available to its membership ($15 per year) to aid in the processing of license applications and can save a licensee hundreds of dollars in the certification of antenna height required by the FCC. Civil engineers' fees range from $300 up; NABER draws the necessary information from a computer for $48-$50.

If you plan to operate in one of the specialty groups listed, a note to the Chief, Land Mobile Radio Services, FCC, Washington, D.C. 20402 will bring the name and address of the national association representing that service. Most groups will provide helpful material to BRS newcomers.

A monthly journal, "Communications," covers, in depth, the professional side of business communications. The publication is available by subscription. For more information, drop a note to Ms. Ruth Steinberg, Editor, Communications Publishing Corp., Dept. 74, 1900 W. Yale, Englewood, Colorado 80110.

More efficient coordination of personnel, more consistent signal range, more privacy in communications, and reduced channel sharing, all point to increased profits with the proper utilization of the Business Radio Service. ◈

Canada's TOURIST RADIO SERVICE

How to use your CB rig legally in Canada.

CITIZENS RADIO systems have rapidly become more than a common accessory to recreational vehicle travelers in recent years. Tourists motoring outside the boundaries of familiar geographical surroundings have found the use of CB radio "on the road" as essential as the telephone back home or at the office.

The Wally Byam Caravanners Club is one organization that has been employing CB radio in large mobile groups for more than ten years. As Airstream Travel Trailer owners who meet regionally and nationally each year in large clusters, CB radio has become their communications network while traveling and when camping in groups that make up a temporary city of as many as 10,000 trailers.

The Citizens Radio license provides the operator legal ground to temporarily use his system "enroute" in any state in the U.S.A., but does not give him authority to operate in other countries such as Canada and Mexico. There is no agreement between the U.S.A. and Mexico for such operation. The Department of Communications in Canada was the first, however, to offer licensing to U.S. licensees to operate their CB rigs over the border; the United States sat on that arrangement for several years, then finally established a reciprocal agreement to allow Canadian CB'ers the right to use their systems in the 50 states.

Any U.S.-licensed CB'er who contemplates entering Canada at any crossing point and would like to use his CB system (and certainly he should for convenience and safety), should make application for Canada's Tourist Radio Service license. Customs rules are hard and fast, and unless an American CB'er is licensed to operate his transceiver over the Canadian border, he may still enter the country, but his communications capability may not! Border inspectors are required to temporarily disable the transmitter in any mobile attempting to enter the country without a license. The disabling procedure may extend from banding the unit or physically removing it from the vehicle. It is not worth being without the ability to communicate on foreign ground for the little effort required to obtain a TRS permit.

The Department of Communications (Canada's FCC) recommends that the American CB'er make application 40-60 days prior to travel to ensure receipt of the TRS license before making the trip into the country. By application to the Regional Superintendent, Telecommunication Regulation, nearest to his Port of Entry into Canada, the CB'er need only supply his name, address, callsign, and the length of time he expects to be in the country.

There is no fee for the license and it remains valid for one year. It is renewable if the licensee will have a need to return to

CANADA'S REGIONAL SUPERINTENDENTS

Port of Entry	Nearest Regional Superintendent Telecommunications Regulation
1. All ports of entry in British Columbia	739 West Hastings Street Vancouver 1, B. C., Canada
2. All ports of entry in Alberta	Federal Building 9820 107th Street Edmonton, Alberta, Canada
3. All ports of entry in Saskatchewan, Manitoba, and Ontario from the Manitoba border east to and including Port Arthur	Revenue Building, Room 405 391 York Avenue Winnipeg 1, Manitoba, Canada
4. All ports of entry in Ontario except Port Arthur and ports of entry west of Port Arthur	55 St. Clair Avenue East Toronto, Ontario, Canada
5. All ports of entry in Quebec	Regional Administration Bldg. Montreal International Airport Dorval, Quebec, Canada
6. All ports of entry in New Brunswick, Nova Scotia, Prince Edward Island, and Newfoundland	Terminal Center Limited Building P.O. Box 42 1234 Main Street Moncton, N. B., Canada

Canada with the expectation of using his CB system. Upon receipt of the license, the licensee will note that his callsign is the same as his legally issued FCC number, but with an addition. The DOC allows the licensee to use his American call with the letters "XM" tacked on the end. The American callsign, KLJ8033, would be used in Canada as KLJ8033XM, and thus designated on all transmisions over the border.

Familiarization with General Radio Service rules is a "must" before attempting to operate your system in Canada. While GRS rules parallel the FCC's, there have been recent changes in General Radio Service regulations. It is therefore recommended that a copy be procured at the same time application is made. Equally important, once received, the TRS license should remain with the licensee at all time; it is not transferable. DOC rules regarding use of the service are clear; they are also enforced.

The simple requirement for licensing and authority to operate in Canada are well worth the effort to have the communications link available when you need it. ◈

RADIO WEATHER NETWORK

Location	Frequency
Akron, Ohio	162.55 MHz
Anchorage, Alas.	162.55
Astoria, Ore.	162.55
Atlanta, Ga.	162.55
Atlantic City, N.J.	162.40
Baltimore, Md.	162.40
Baton Rouge, La.	162.45
Brownsville, Texas	162.55
Boston, Mass.	162.40
Buffalo, N.Y.	162.55
Charleston, S.C.	162.55
Chicago, Ill.	162.55
Cleveland, Ohio	162.55
Corpus Christi, Texas	162.55
Dallas, Texas	162.40
Denver, Colo.	162.55
Des Moines, Iowa	162.55
Detroit, Mich.	162.55
Erie, Penna.	162.40
Eugene, Ore.	162.40
Eureka, Calif.	162.55
Ft. Worth, Texas	162.55
Galveston, Texas	162.55
Hilo, Hawaii	162.55
Honolulu, Hawaii	162.55
Hyannis, Mass.	162.55
Indianapolis, Ind.	162.55
Jacksonville, Fla.	162.55
Kansas City, Mo.	162.55
Lake Charles, La.	162.55
Los Angeles, Calif.	162.55
Miami, Fla.	162.55
Milwaukee, Wis.	162.40
Minneapolis, Minn.	162.55
Mobile, Ala.	162.55
Monterey, Calif.	162.40
Morehead City, N.C.	162.40
Mt. Huleakala, Hawaii	162.40
New London, Conn.	162.40
New Orleans, La.	162.55
New York, N.Y.	162.55
Norfolk, Va.	162.55
Oxnard, Calif.	162.40
Pensacola, Fla.	162.40
Portland, Maine	162.55
Portland, Ore.	162.55
Rockland, Maine	162.40
Sacramento, Calif.	162.40
Salt Lake City, Utah	162.55
San Diego, Calif.	162.40
Sandusky, Ohio	162.40
San Francisco, Calif.	162.55
Savannah, Ga.	162.40
Seattle, Wash.	162.55
Seward, Alas.	162.40
St. Joseph, Mo.	162.40
St. Louis, Mo.	162.55
Tampa, Fla.	162.55
Washington, D.C.	162.55
West Palm Beach, Fla.	162.40
Wichita, Kansas	162.55
Wilmington, N.C.	162.55

CB Transceivers

BROWNING

GOLDEN EAGLE MARK III SSB/AM

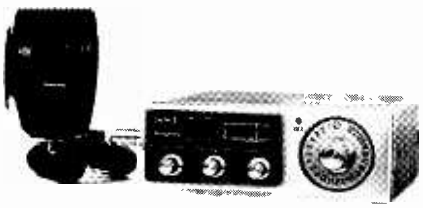
SSB transmitter provides AM performance plus single-sideband with full 15 watts p.e.p. output. Has 8-step crystal lattice filter to give up to 80 dB rejection of the unused portion of the channel to develop maximum voice power. Companion receiver offers adjacent channel rejection and high sensitivity. Electronic fine tuning. $650.00

GOLDEN EAGLE MARK III AM

AM—only base station; housed in walnut-grain cabinet; $235.00

SST MOBILE TRANSCEIVER

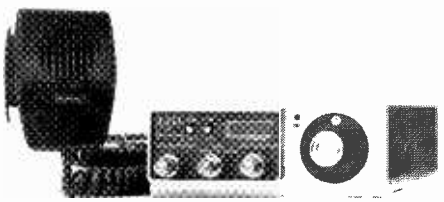
All-solid-state with a high-level, 5-stage IC speech compressor driven by 7.5 W of class-B



audio output. 3.5 W minimum r.f. power output; continuously variable delta tuning through 3 kHz; 23 channels (all crystals supplied); illuminated S/RF meter and channel selector. Designed to operate from either positive- or negative-ground supplies. Regulated power supply insures constant output from 11.5 V to 16 V. PA function. Comes with plug-in dynamic mike with coiled cord and bracket, multi-position mounting bracket, and tamper-proof mounting hardware. Under $179.95

LTD SSB/AM MOBILE TRANSCEIVER

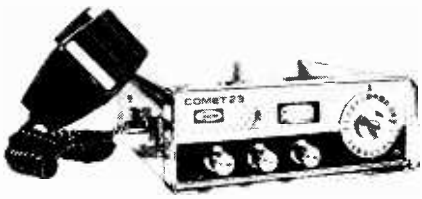
Solid-state unit covers all 23 channels plus upper and lower sidebands for 69-channel capability; 8 watts p.e.p. SSB r.f. output, 3.8 watts AM; features double superhet with frequency synthesis; adjacent-channel rejection 70 dB minimum; SSB sensitivity 0.25 μV/10 dB S + N + D/N + D; AM sensitivity 0.5 μV/12 dB S+N/N; 13.8 volt power supply; comes with mike, mounting bracket; 2.36″ H x 6.49″ W x 9.87″ D (less knobs); $359.95



COURIER

COMET 23 MOBILE TRANSCEIVER

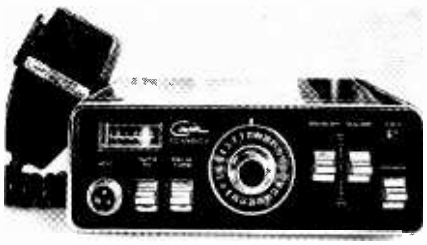
Mobile 23-channel, dual-conversion, solid-state transceiver. Uses 18 transistors, 7 diodes. Has



PA switch; external speaker jack; plug-in microphone; RF/S meter; automatic noise-limiter switch. Frequency range 26.965-27.255 MHz. 7″ W x 2¾″ H x 9½″ D. $199.95

CLASSIC II CB RADIO

Base station or mobile use: 117-volt a.c. or 12-volt negative or positive ground d.c input; all-



solid-state; 23 channel frequency synthesizer; dual-conversion receiver; series-gate noise limiter; squelch; delta tuning; high-level modulation; modulation indicator light; PA and external speaker jacks; SO-239 antenna connector; $219.95

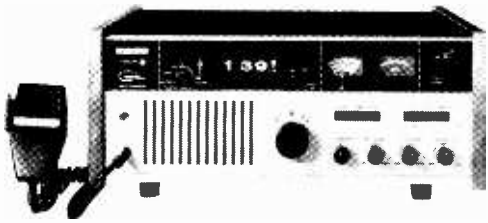
GLADIATOR SSB CB RADIO

Mobile 23-channel, dual-conversion SSB transceiver with 23 upper and 23 lower sideband

channels. Solid-state. Has "on-the-air" transmitter light; noise blanker; crystal filter and clarifier on both AM and SSB; PA switch; external speaker jack; RF/S meter. Has 31 transistors, 63 diodes, 2 thermistors. Plug-in microphone. 80 dB adjacent-channel rejection. Frequency range 26.965-27.255 MHz. 10½ W x 2¾" H x 11½" D. $429.95

CENTURION SSB CB RADIO

Base-station, 23-channel, dual-conversion SSB solid-state unit with 23 upper and 23 lower



sidebands. Has "on-the-air" transmitter light; noise blanker; RF/S power meter; built-in speaker; remote speaker jack; crystal filter and clarifier for both AM and SSB; plug-in microphone. 80 dB adjacent-channel rejection. Frequency range 26.965-27.255 MHz. $549.95

SPARTAN SSB CB RADIO

Mobile 23-channel, dual-conversion SSB transceiver with 23 upper and 23 lower sideband

channels; selectivity ±3.5 kHz at 6 dB; sensitivity 0.4 μV for 10 dB S/N; has crystal lattice filter on SSB and mechanical ceramic filter in AM operation; power output 15 watts p.e.p., 5 watts rms; has PA/CB switch; noise blanker; local/distance r.f. control; AM/USB/LSB selector switch; ±600 Hz clarifier; comes with detachable dynamic mike, all mounting hardware, and crystals for all channels. 7½" W x 2 5/16" H x 9½" D. $329.95

TRAVELER II MOBILE RADIO

Mobile use: 12-volt negative or positive ground d.c. input; all-solid-state; 23-channel frequency

synthesizer; single-conversion receiver with ceramic and mechanical filters; series-gate noise limiter; automatic i.f. noise blanking; squelch; noise-canceling microphone; S-meter; modulation indicator light; PA speaker output jack; SO-239 antenna connector; $159.95

CONQUEROR CB RADIO

Mobile or base station use; 23 channel with crystals provided; transmit-receive indicators;

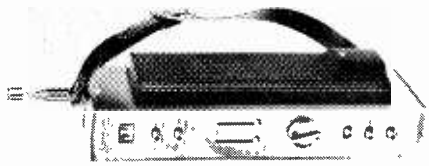
digital clock can turn on rig at preset time; r.f./S meter; public-address system; all-solid-state; provided with a.c. and d.c. cords and mounting bracket; $224.95

CARAVELLE CB RADIO

Mobile or base station use; same specifications as Conqueror but less digital clock; $199.95

CCT-3 PORTABLE TRANSCEIVER

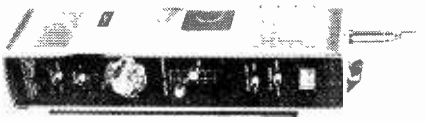
Mobile use; hand-held six-channel CB transceiver; channel 15 crystals supplied; 5-watt



power rating; single-conversion superhet receiver with a.g.c., automatic noise limiter and variable squelch; r.f./S meter can be switched to measure battery condition; battery-saver circuit extends life more than 50%; powered by 10 alkaline "AA" or 12 nickel-cadmium batteries (not supplied); detachable battery holder permits weight reduction; $109.50

CHAMPION 23, CCT-4 CB RADIO

Mobile use; hand-held 23-channel CB transceiver; crystals for all channels provided; 5-



watt power rating; receiver section is double-conversion superhet with a.g.c., automatic noise limiter, and variable squelch; sensitivity 0.25 μV for 10 dB S N; r.f. S meter can be switched to measure battery condition; battery-saver circuit extends life more than 50%; powered by 10 alkaline "AA" or 12 nickel-cadmium batteries (not supplied); detachable battery holder permits weight reduction; $174.75

REBEL 23 MOBILE RADIO

Solid-state, 23-channel mobile transceiver; features illuminated S/RF meter; adjustable squelch; selective dual-conversion superhet circuitry with ANL; illuminated selector dial; extension speaker switch; supplied with mike and crystals; positive- or negative-ground operation. 5⅞" W x 2" H x 8¼" D. $114.95

DYNASCAN

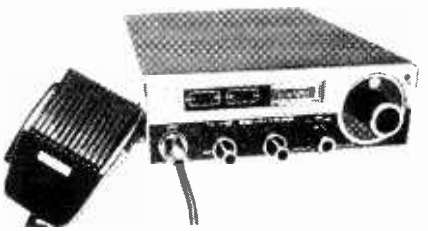
COBRA 28 CB RADIO

Mobile or base station use; 12-volt reversible ground; 117-volt a.c. power supply available for

base-station operation; 23-channel operation using frequency synthesizer; all-solid-state using one FET and two IC's; S meter also indicates relative power output on transmit; indicator lamp shows level of modulation; double-conversion receiver; adjustable squelch; a.g.c.; noise blanker; delta tuning; PA option, 3 watts to external speaker; universal mounting bracket supplied. Features emergency channel-9 automatic "Scan-Alert." Distress calls on channel 9 will come through no matter what channel you are on. 2½" x 6" x 8½". $179.95

COBRA 132 SSB CB RADIO

Features 23 AM and 46 SSB channels. Crystal



synthesizer. 13.8 V d.c. (positive or negative ground) operation. Power S meter. Transmitter has 5 W AM input & 15 W p.e.p. on SSB. Receiver sensitivity: SSB 0.25 μV for 10 dB (S + N) N (0.5 μV for AM). Has automatic gain control; adjustable squelch; noise blanker. Audio output 3 W at 8 ohms. PA capability. With mike. 2⅜" x 7½" x 10⅜" D. $339.95

COBRA 135 SSB CB BASE STATION

23 AM and 46 SSB channels. Features crystal synthesizer. Digital clock (117 V a.c.), meter showing relative power, signal-strength, and SWR. Transmitter input 5 W AM & 15 W p.e.p. for SSB. Receiver sensitivity 0.25 μV for 10 dB (S + N)/N for SSB (0.5 μV for AM). Double-conversion. Has automatic gain control; adjustable squelch; noise blanker. 3 W at 8 ohms

output. PA capability. Will operate on 117 V a.c. or 13.8 V d.c. (positive or negative ground). With mike. 5⅜" x 13⅜" x 12" D. $449.95

COBRA 21 CB RADIO

23-channel mobile unit featuring "Dyna-Mike" gain control for 100% modulation; crystal filter;

illuminated Power S meter; dual-conversion receiver; 60 dB adjacent-channel rejection; switchable ANL; adjustable squelch; a.g.c.; built-in speaker; PA external speaker jack; plug-in dynamic mike. 2½" H x 6" W x 7½" D. 3.5 lbs. $129.95

COBRA 29 CB RADIO

23-channel mobile unit featuring "Dyna-Mike" gain control for 100% modulation; crystal filter; illuminated Power S meter; double-conversion receiver; sensitivity 1 μV for 10 dB S + N/N; selectivity 6 dB at 4 kHz; adjustable squelch; a.g.c.; noise blanker; built-in speaker; PA/external speaker jack; plug-in dynamic mike. 2¼" H x 6⅞" W x 8½" D. 5½ lbs. $159.95

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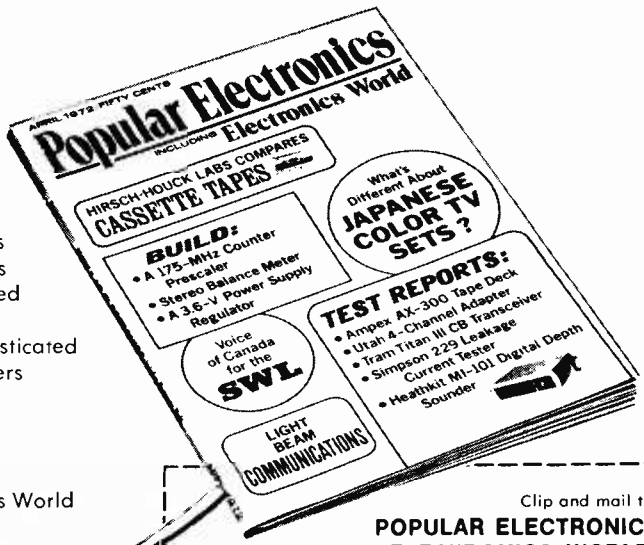

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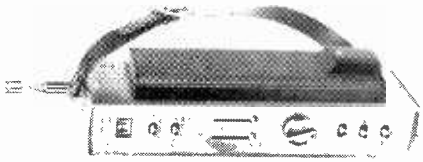
FANON

TEMPEST T-909 PORTABLE RADIO

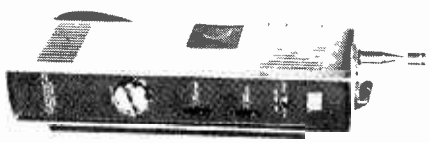
Mobile hand-held six-channel transceiver; channel 15 supplied; solid-state design includes



FET and IC's; detachable battery pack contains 10 "AA" cells or 12 nickel-cadmium cells (neither supplied); superhet receiver with tuned r.f. stage; a.g.c.; automatic noise limiter; adjustable squelch; slide-type controls; delta tuning; battery-saver circuit; S meter also indicates relative r.f. power output and battery strength; $109.50

TORONADO T-808 PORTABLE RADIO

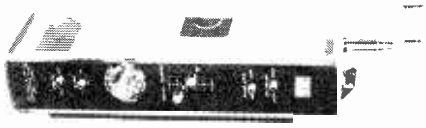
Same as Tempest but without slide controls,



battery-saver circuit, and delta tuning; $95.20

TRIUMPH T-1000 PORTABLE RADIO

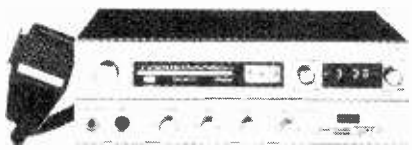
Same features as Tempest T-909 but also provides operation on 23 channels (crystals pro-



vided); dual-conversion receiver provides 0.25 μV sensitivity for 10 dB (S+N)/N. $174.75

FANFARE 700 CB RADIO

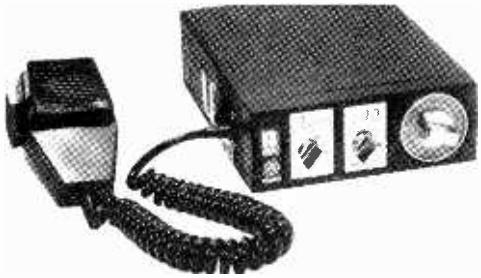
Base-station use, 117-V a.c. input. All-solid-state with IC and FET. Dual-conversion receiver. Fea-



tures delta tuning; 23-channel frequency synthesizer; noise limiter; squelch; combination S/relative power output meter; slide-rule dial. Has PA speaker output jack; headphone jack on front panel; digital clock with auto alarm. High-level modulation. SO-239 antenna connectors. $199.95

FANFARE 100 CB RADIO

Mobile 23-channel transceiver; comes with



crystals for all channels, dynamic microphone, all mounting hardware, external speaker switch; illuminated channel selector; illuminated S/RF meter; built-in noise limiter; power input at 13.8 V d.c. full 5 watts; positive- or negative-ground operation; has adjustable volume and squelch controls. $114.95

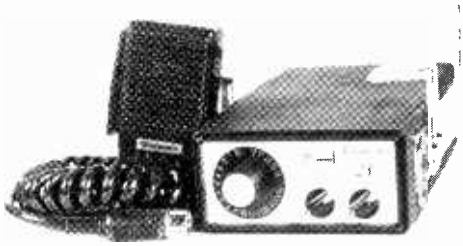
FIELDMASTER

MICRO MINI SIX MOBILE

Six-channel mobile transceiver; r.f. input power 2 watts, r.f. output 1.3 watts; receiver sensitivity 1 μV at 6 dB S/N; superhet receiver with r.f. amplifier, a.n.l.; squelch control; RF Power/S meter; comes with mobile rack, mike with coiled cord, 3½" speaker; 1⅞" H x 4" W x 7" D; $99.95

MICRO MINI 23 MOBILE

23-channels synthesized; 13.5-volt maximum power positive or negative ground; has channel



selector; volume control; squelch; r.f. input power 5 watts, r.f. output 3.5 watts; receiver sensitivity 1 μV at 10 dB S/N; comes with mobile rack; mike with coiled cord; 3½" speaker; $129.95

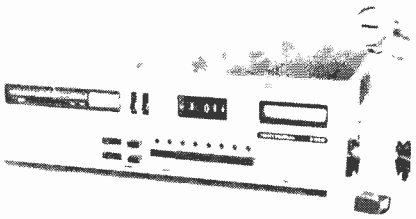
TR-18M MOBILE TRANSCEIVER

Synthesized 23-channel operation; dual-conversion superhet receiver; has a.n.l., variable squelch control; 13.5 volt positive or negative-ground operation; push-to-talk mike with PA capability; external speaker jack; 5²⁹⁄₃₂" W x 2¹³⁄₆₄" H x 8¹⁵⁄₁₆" D; $179.95

DUAL-BAND AM/SSB MOBILE

Covers 23 channels AM, 23 upper and 23 lower sideband; power input 15 watts p.e.p. SSB, 5 watts AM; 12-volt positive- or negative-ground operation; double-conversion superhet receiver; SSB r.f. gain control; a.g.c.; adjustable threshold squelch; noise blanker on SSB; frequency response 300-2500 Hz; audio output power 3 watts into 8 ohms; 2.5" H x 8.5" W x 11" D; $399.95

"PROFESSIONAL 2000" BASE STATION
23 channels AM, 23 upper and 23 lower sideband; power input 15 watts p.e.p. on SSB, 5



watts on AM, r.f. output 4 watts ±0.5 watt; press-to-talk dynamic mike; 117-volt, 50/60 Hz operation (external switch for 12.5-volt d.c. operation); features S/RF meter; receiver sensitivity 1 μV for 10 dB S+ N/N on AM, 0.5 μV for 10 dB S+N/N on SSB; 4 watts audio output for PA systems; delta tuning all channels; includes digital clock (hours, minutes, seconds readout); 8-channel scanner (150-170 MHz hi and 30-50 MHz low band); scanner audio output 1-watt (panel speaker); $595.00

HEATH

GW-14A CB TRANSCEIVER
Fixed or mobile operation: 12-volt negative ground d.c. input; 117-volt a.c. supply optional extra; all-solid-state; single-conversion receiver; 23 channels crystal-controlled requiring two crystals per channel (channel 9 supplied—crystal package for all channels available as optional extra); self-adjusting clipper-type noise limiter; squelch; S-meter and relative power-output or modulation-peak meter; high-level modulation; pi-network adjustment to match

antenna; RCA phono jack antenna connector; (kit) $89.95 mail order.

HY-GAIN

623 AM/SSB TRANSCEIVER
Covers 23 channels AM, 46 channels upper- and lower sideband; all plug-in glass boards; r.f. and audio gain controls; 15 watts tube output; illuminated S/RF/SWR meter; high-level plate modulation on AM; built-in mike preamp; noise blanker; illuminated channel selector; base or mobile operation; comes with power cables; $495.00

HY-RANGE I MOBILE
23-channel coverage; built-in mike preamp; illuminated channel selector; a.n.l.; automatic modulation control; operates from positive or negative ground; microphone, holder, and mobile bracket included; $114.95

HY-RANGE II MOBILE
23-channel coverage; continuous delta tuning; external speaker jack; PA/built-in mike preamp; illuminated channel selector; S/RF meter; a.n.l. with switch; automatic modulation control; operates from positive or negative ground; microphone and holder included, accommodates optional remote v.f.o.; $149.95

HY-RANGE III MOBILE
23-channel coverage; noise blanker plus a.n.l.; illuminated S/RF meter; PA/external speaker jack; built-in mike preamp; continuous delta tuning; modulation and receive indicator lights; adjustable antenna matcher; automatic modulation control; positive or negative ground operation; comes with plug-in mike and holder; will accommodate optional remote v.f.o.; $199.95

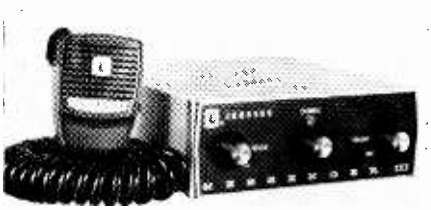
HY RANGE IV BASE TRANSCEIVER
23-channel coverage; continuous delta tuning; built-in mike preamp; tunable TVI filter; a.n.l. with switch; automatic modulation control; illuminated channel selector and S/RF meter; variable antenna tune control; modulation indicator light; wood-grain side panels; comes with plug-in mike; will accommodate optional remote v.f.o.; $199.95

HY-RANGE V MOBILE
23 channels AM plus 46 channels upper and lower sideband; noise blanker plus a.n.l.; PA/external speaker jack; antenna tune and load control with built-in bridge detector; full range clarifier; automatic modulation control; illuminated S/RF meter; r.f. gain control; positive or negative ground operation; comes with plug-in mike and holder; will accommodate optional remote v.f.o.; $329.95

SLIDER REMOTE V.F.O.
Plugs into socket on rear panel of any Hy-Range transceiver; operates AM and SSB; $79.95

E.F. JOHNSON

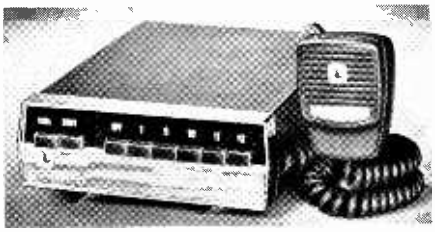
MESSENGER III
Mobile use: 12-volt negative ground d.c. input; 117-volt a.c. power supply and portable power pack available as optional extras; all-solid-state; dual-conversion receiver; 12 channels crystal-controlled requiring two crystals per channel (channel 9 crystal supplied); series-gate noise limiter; automatic i.f. clipping; modulation com-



pression and speech clipping; transmit indicator light; PA and external speaker output jacks; accepts company's "Tone Alert III" selective calling system; $159.95

MESSENGER 120

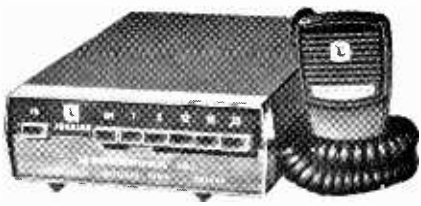
Mobile use: 12-volt negative ground d.c. input; 117-volt a.c. power supply available as optional extra; all-solid-state; single-conversion receiver; 5 channels crystal-controlled requiring two crystals per channel (push-button selected); series-gate noise limiting; squelch; modulation com-



pression; external speaker jack; call, standby, channel indicator, and power-on indicator lights; SO-239 antenna connector; compatible with "Tone Alert V" selective calling system; $149.95

MESSENGER 121

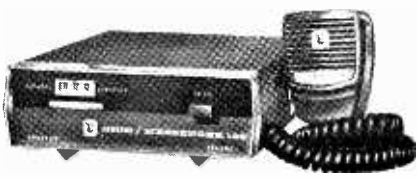
Mobile use: 12-volt negative ground d.c. input; 117-volt a.c. power supply available as op-



tional extra; 5 channels crystal-controlled requiring two crystals per channel (push-button selected); series-gate noise limiting; squelch; modulation compression; external speaker and PA functions; PA, channel indicator, and power-on indicator lights; SO-239 antenna connector; $119.95

MESSENGER 122

23-channel, 12 V d.c. negative-ground design. Receiver sensitivity 0.5 μV. Selectivity 6 dB at



6 kHz bandwidth; 60 dB at 30 kHz. Audio power 2.5 W. Supplied with 23 crystals for all 23 channels, mobile mounting bracket, and mike. 6¼" x 2" x 9" D. $139.95

A.c. power supply $32.95

External speaker $13.00

MESSENGER 123A

23-channel mobile CB transceiver. Features ceramic filter, 12-V d.c. negative-ground opera-

tion. Receiver sensitivity 0.5 μV. Selectivity 6 dB at 6 kHz bandwidth; 60 dB at 30 kHz bandwidth. Audio output 2.5 W. Transmitter audio frequency response 300-3000 Hz ±6 dB. Has illuminated S and relative power-output meters. Includes mobile mounting hardware, mike, and crystals for 23 channels. 2½" x 6¼" x 9⅝" D. $159.95

A.c. power supply $32.95

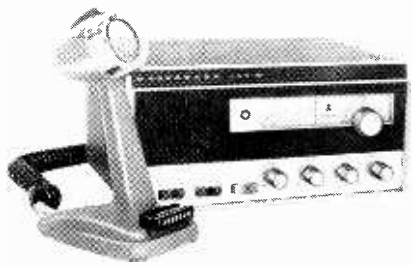
MESSENGER 125

Mobile use: 12-volt negative ground d.c. input; all-solid-state; single-conversion receiver; 5 channels crystal-controlled requiring 2 crystals per channel (push-button selected); series-gate

noise limiting; squelch; external speaker output jack; transmit indicator light; SO-239 antenna connector; $99.95

MESSENGER 124-M

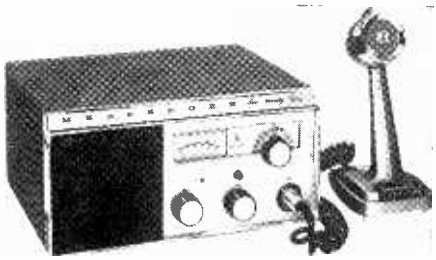
Base station or mobile use: 117-volt a.c. or 12-volt negative ground d.c. input; includes DRC (dual receive capability) which monitors either of two channels while operating on any other channel; all-solid-state; dual-conversion primary receiver with crystal filter; 23-channel frequency



synthesizer; separate monitor and primary receiver squelch controls; series-gate, front-panel switchable noise limiter; i.f. noise clipping; modulation compression; combination S, modulation percentage, SWR, and relative power-output meter; microphone gain control; choice of automatic-switching or light-alert-only monitor modes; tone control; transmit, monitor, power-on indicator lights; PA function; SO-239 antenna connector; $339.50

MESSENGER 223

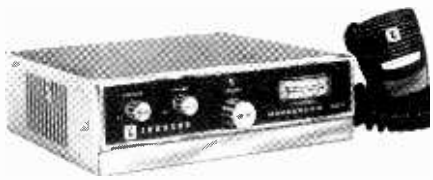
Base station only: 117-volt a.c. input; hybrid (vacuum tubes and solid-state); single-conver-



sion receiver; 23-channel frequency synthesizer; series-gate noise limiting; squelch; combination S meter and relative power-output meter; high-level modulation with peak clipping and filtering; transmit indicator light; SO-239 antenna connector; $240.00

MESSENGER 323

Mobile use: 12-volt negative ground d.c. input; 117-volt a.c. power supply and 12-volt portable



power supply available as optional extras; all-solid-state; 23-channel frequency synthesizer; dual-conversion receiver with special i.f. crystal filter; series-gate noise limiter; i.f. noise clipping; squelch; S meter and relative power-output meter; speech compression and audio clipping; PA speaker output jack; SO-239 antenna connector; accepts company's "Tone Alert" selective calling system; $249.95

MESSENGER 323-M

Mobile use: 12-volt negative ground d.c. input; 117-volt a.c. power supply available as optional extra; all-solid-state; dual-conversion primary receiver with crystal filter; DRC (dual receive

capability) monitors either of two channels while operating on any other channel; 23-channel frequency synthesizer; separate monitor and primary receiver squelch controls; series-gate noise limiter; i.f. noise clipping; combination S and power-output meter; choice of automatic-switching or light-alert-only monitor modes; transmit, monitor, power-on indicator lights; PA function; $289.95

MESSENGER 250

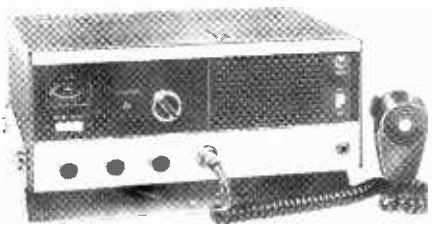
23-channel base station; 117-volt a.c. or 12-volt negative-ground d.c. operation; receiver sensi-

tivity 0.5 μV for 10 dB S + N N; selectivity −6 dB for 6-kHz bandwidth, −60 dB for 30-kHz bandwidth; audio output 3 W; transmitter audio frequency response 300-3000 Hz +1 dB, −16 dB; large, professional-style knobs; modern sloping control panel; illuminated channel selector and signal-strength/relative RF output meter; includes hand-held microphone, a.c. and d.c. power cables. 5.4" H x 11" W x 9.8" D. $239.95

LAFAYETTE

COMSTAT 25B CB RADIO

Base station or mobile use: 117-volt a.c. or 12-volt d.c. input; vacuum tubes with solid-state power supply; dual-conversion receiver; 23-



channel frequency synthesizer; delta tuning; squelch; S-meter and relative power-output meter; PA speaker output jack; headphone/external speaker jack on front panel; speech compression; modulation indicator light; SO-239 antenna connector; pi-network adjustment to match antenna; accepts company's "Priva-Com" selective calling system; $189.95

HB-23A CB MOBILE RADIO

Mobile use: 12-volt negative or positive ground input; 117-volt a.c. with optional power supply; solid-state; dual-conversion receiver with 0.7

μV sensitivity; automatic noise limiter; variable squelch; push-pull audio amplifier; automatic gain control; 23-channel frequency synthesis (16 crystals plus optional individual plug-in crystals for adding two channels per crystal); S-meter and relative power output meter; tuned 455-kHz mechanical filter; built-in PA speaker/earphone jack; built-in burglar alarm which operates with auto horn or other warning device; range-boost circuitry for increased average talk-power; includes dynamic push-to-talk mike, power cable, mounting bracket, crystals for channels 9, 13, and 19; $119.95

DYNA-COM 12A CB PORTABLE RADIO

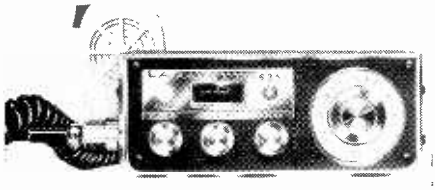
Hand-held, 12-channel crystal-controlled portable with provision for optional external mike/speaker; operates on self-contained battery pack with provision for external 12-volt d.c. battery source; battery eliminator/charger for operation on 117-volt a.c. available as optional extra; combination battery/r.f./S meter; front-mounted variable squelch and volume controls; range-boost circuitry; pi-network antenna output; PA switch; mechanical filter for sharp selectivity; superhet receiver and r.f. stage with 0.7 μV sensitivity; includes transmit/receive crystals for channel 10, telescoping whip antenna, leather shoulder strap; $99.95

DYNA-COM 23 CB PORTABLE RADIO

Hand-held, 23-channel crystal-controlled portable with external mike/speaker jack for remote mike operation; operates from 12 nickel-cadmium rechargeable batteries or 10 "AA" alkaline or dry-cell batteries; optional eliminator/charger permits 117-volt a.c. base-station operation; combined S meter/battery-condition indicator; automatic compressor range boost; 455-kHz mechanical filter; automatic noise limiter; variable squelch; PA facilities; dual-conversion superhet with r.f. stage and 0.7 μV sensitivity; supplied with all crystals; $149.95

HB-525F CB MOBILE RADIO

Mobile use: 12-volt positive or negative d.c. input; optional power supplies available to permit



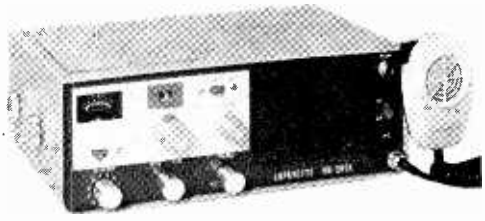
117-volt a.c., 6-volt d.c., or portable battery operation; solid-state; dual-conversion receiver with 455-kHz mechanical filter; 3-position delta offset tuning; series-gate noise limiting; variable squelch; range boost circuitry; PA amplifier; 4" x 6" speaker; TVI filter; illuminated S/power-output meter; lights for modulation and receiver operation; 23-channel frequency synthesizer; includes all crystals; mounting bracket, fused power cable, push-to-talk dynamic mike; $169.95

HB-625A CB MOBILE RADIO

Mobile use: 12-volt positive or negative ground d.c. input; 117-volt a.c. and portable power supplies available as optional extras; all-solid-state with IC's; dual-conversion receiver with mechanical filter; 23-channel frequency synthesizer; delta tuning; series-gate noise limiter; i.f. noise silencer circuit; squelch; S-meter and relative power-output meter; speech compression; PA and external speaker output jacks; transmit and modulation indicator light; antenna tuning adjustment; SO-239 antenna connector; $199.95

HE-20TA CB RADIO

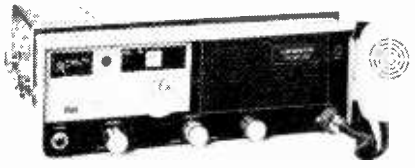
Base station or mobile use: 117-volt a.c. or 12-volt positive or negative ground d.c. input; all-



solid-state; single-conversion receiver with mechanical filter; 12 crystal-controlled channels requiring 2 crystals per channel (channel 9 supplied); independent tunable receiver covers all 23 channels; spotting switch to find transmit channel when using tunable receiver; series-gate noise limiter; squelch; S-meter and relative power-output meter; PA speaker output jack; headphone or external speaker output jack on front panel; high-level modulation; SO-239 connector; $129.95

TELSAT 924 CB RADIO

Mobile or base station use: built-in 12-volt d.c. and 117-volt a.c. supplies; solid-state; 23-chan-

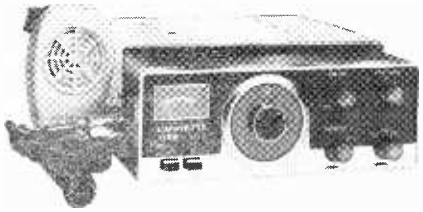


nel crystal-controlled (all crystals supplied) with built-in emergency channel-9 monitor; separate single-conversion monitor receiver with 0.7 μV sensitivity; dual-channel conversion receiver has 0.7 μV sensitivity; 3-position delta tuning provides ±1.5 kHz selectivity;

range boost circuitry; tuned 455-kHz mechanical filter; automatic S-meter/r.f. output meter; normal receiver/emergency monitor operation switch; dynamic push-to-talk mike and mounting bracket included; $179.95

SSB-50 SSB CB TRANSCEIVER

Mobile design (12.6 V); 23-channel crystal-controlled with 46 additional SSB modes of opera-



tion. Sensitivity 0.5 μV on AM (0.15 μV on SSB). Has 4-section lattice filter. Delivers 15 W p.e.p. effective talk power on SSB. Has automatic burglar alarm switch; CB/PA switch. With mike. 7¼″ W x 2⅞″ H x 9⅞″ D. $289.95

MICRO 723 CB TRANSCEIVER

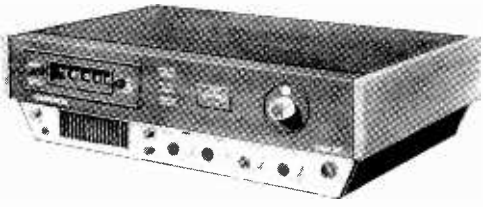
Mobile 23-channel frequency-synthesized transceiver; has "range boost" circuit, TVI filtering; dual-conversion superhet receiver; sensitivity 0.7 μV at 10 dB S/N; variable squelch control; a.n.l.; mechanical filter; S/relative output meter; dynamic push-to-talk microphone; for 12-volt positive or negative ground; $99.95

HB-700 CB RADIO/MONITOR

Mobile 23-channel CB transceiver/marine monitor receiver; crystal-controlled transceiver features "range boost" circuit; dual-conversion superhet; sensitivity 10 dB S/N; 1.5 kHz delta tune; ceramic i.f. filter; VHF FM monitor receiver is dual-conversion; sensitivity 1.0 μV for 20 dB quieting; has squelch controls for CB and VHF, S/relative power output meter; PA provisions; antenna tuning; provisions for separate CB/VHF antennas; comes with all crystals including 162.550 MHz weather channel, push-to-talk dynamic mike, and mobile mounting bracket; 12-volt positive or negative ground; $179.95

TELSAT 925 CB RADIO/MONITOR

Base-station transceiver with Channel 9 monitor receiver and digital alarm clock; Ch. 9 signal activates flashing light on front panel; dual monitor/transmission facilities, monitor

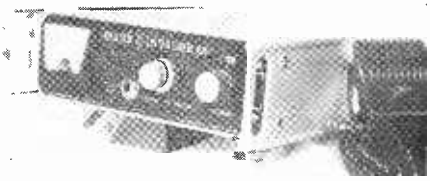


does not disable transceiver; transmitter has "range boost" circuit, adjustable antenna loading, TVI filter; main receiver dual-conversion superhet with 0.7 μV sensitivity; 1.5 kHz delta tune; variable squelch, switchable a.n.l.; monitor has own squelch; PA and tape recorder provisions; comes with crystals and push-to-talk dynamic mike; 117-volt a.c., 50/60 Hz operation; walnut-finished wood side panels; $229.95.

MARK

INVADER 23

Mobile use: 12-volt negative ground d.c. input; all-solid-state; dual-conversion receiver with mechanical filter; 23-channel frequency synthe-



sizer; series-gate noise limiter; combination S and relative-power output meter; PA speaker output jack; SO-239 antenna connector; $169.95

LANCER 23

Mobile use: 12-volt negative ground d.c. input; all-solid-state; dual-conversion receiver with

mechanical filter; 23-channel frequency synthesizer; series-gate noise limiter; squelch; combination S and relative-power output meter; SO-239 antenna connector; $139.95

MIDLAND

13-862 23-CHANNEL TRANSCEIVER

Synthesized 23-channel operation; full 5-watt r.f. input; dual-conversion receiver with tuned r.f. and a.g.c.; a.n.l., variable squelch; backlighted S/RF meter; luminous channel indicators; comes with plug-in mike, clip, and mounting bracket; 5⅛″ W x 2″ H x 9″ D; designed for under-dash mounting; $99.95

13-879 BASE-STATION TRANSCEIVER

23-channel operation; 117-volt a.c. or 12-volt d.c. operation; dual-conversion superhet receiver with variable squelch control; S/RF meter; front-mounted dynamic speaker; dynamic microphone; PA audio output 3 watts; $179.95

13-881 MOBILE/MONITOR TRANSCEIVER

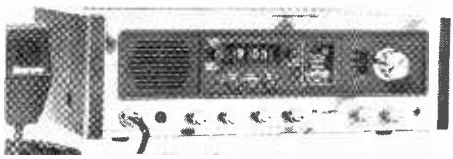
23-channel operation; 2-channel scanning; dual-channel selector permits scanning of any two CB channels, transmit on either by touch of switch; switchable a.n.l.; separate PA switch; variable squelch; lighted S/RF meter; channel selector dials; scanner action and TX lights;

dual-conversion superhet receiver; 13.8-volt nominal operation; 3½" dynamic speaker; push-to-talk dynamic mike; comes with mobile mounting bracket, mike mounting clip, hardware; 2⅞" H x 7⅞" W x 8⅞" D; $199.95

13-894 MOBILE SSB/AM TRANSCEIVER
Covers 23 channels on AM; 23 channels on upper or lower sidebands; 15 watts p.e.p.; 5 watts r.f. input with high level modulation on AM; SSB clarifier plus AM delta tune; dual detectors; noise blanker; lighted channel selector; vertical meter; includes push-to-talk microphone; d.c. power cord; mobile mounting bracket, hardware; 7" W x 2¼" H x 9" D; $299.95

13-896 SSB/AM BASE/MOBILE
23 channel AM, 23 upper SSB, 23 lower SSB operation; 117-volt a.c. or 9-15 volt d.c.; electronic switching; variable squelch; SSB clarifier/AM delta tune; PA output; built-in speaker; dynamic microphone; dual-conversion superhet with tuned r.f., a.n.l., and a.g.c.; r.f. output 3 watts; has built-in stand for tabletop use; comes with push-to-talk mike, mounting bracket, hardware, d.c. power cord; 7" W x 10½" D x 2¼" H (front), 3½" H (rear); $389.95

13-898 SSB/AM BASE STATION
Operates on AM, upper, and lower sidebands; illuminated digital clock with automatic turn-



on/turn-off; twin meters; 117-volt a.c. or 13.8-volt d.c. operation; built-in speaker; dynamic microphone; dual-conversion superhet; comes with a.c. and d.c. power cords, microphone, microphone mounting clip; cabinet with walnut finished hardwood sides; 15" W x 5¼" H x 10" D; $419.95

13-723 HAND-HELD TRANSCEIVER
Two-watt, 3-channel transceiver; call-signal tone; isolated chassis for safe mobile use; variable squelch; comes with Channel 11 plug-in crystals installed; takes 8 "AA" cells; jacks for battery charger, auxiliary power a.c. adapter, earphone; telescopic antenna; crystal-controlled superhet receiver with ceramic filter; 8" x 2⅞" x 2"; $54.95

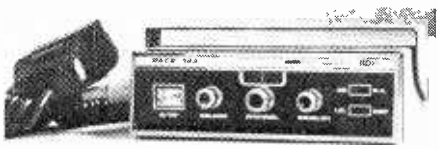
13-785 HAND-HELD TRANSCEIVER
Five-watt, 3-channel transceiver; dual power (5-W or 3-W r.f. input); call-signal tone for long-range alert; isolated chassis; battery level/S/r.f. meter; Channel 7 crystals installed; superhet receiver with tuned r.f., a.g.c.; operates from 8 "AA" cells; optional power supply systems include rechargeable Ni-Cad battery pack, 12-volt base-station supply, 12-volt d.c. auto cable; 2¼", 8-ohm speaker/microphone; 56" telescoping antenna; includes carrying case and earphone; 3" x 8" x 2⅞"; $119.95

13-724 HAND-HELD TRANSCEIVER
Two-watt, 3-channel transceiver; Channel 11 crystals installed; separate speaker and microphone; call-signal tone for long-range alert; battery condition meter; variable squelch control; inputs for optional a.c. power source, battery charger for Ni-Cad pack; all metal cabinet; 7¼" x 2¾" x 2¼"; $64.95

13-762 HAND-HELD TRANSCEIVER
Five-watt, 3-channel transceiver; Channel 11 crystals installed; battery saving hi/lo power switch; in-unit battery charger jack; takes 8 "AA" cells; isolated chassis for mobile use; variable squelch; external antenna and speaker jacks; comes with carrying case and shoulder strap; 9½" x 3¼" x 2"; $89.95

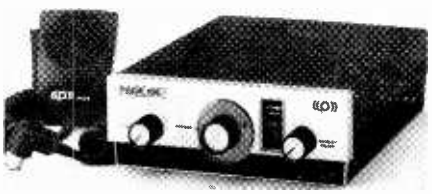
PACE

P123A MOBILE CB RADIO
Mobile use: 12-volt negative or positive ground 5 W d.c. input; 23-channel frequency synthesizer; all-solid-state; dual-conversion receiver; S and power-output meter; sensitivity 0.4 μV for 10 dB (S + N)/N; crystal-control; 3 watts class-B audio output (for PA); squelch; a.g.c.; series-



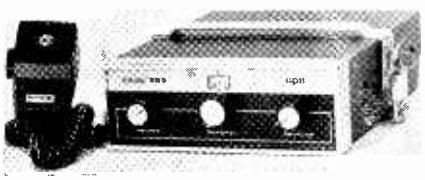
gate noise limiting; speech compressor; PA and external speaker jack; $149.95

2000-35 MOBILE CB RADIO
Mobile use: 12-volt negative ground d.c. input; all-solid-state; dual-conversion receiver; six crystal-controlled channels requiring 2 crystals per



channel; series-gate limiter; squelch; S-meter; high-level modulation; SO-239 antenna connector; accepts company's "Pace Private Call" selective calling system; $139.95

P223 MOBILE CB RADIO
5 W mobile unit; 12-volt negative ground d.c. input; 23-channel frequency synthesizer; dual-



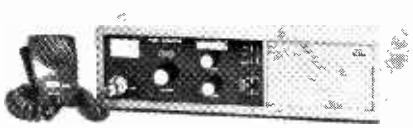
conversion receiver; sensitivity 0.8 μV for 10 dB (S + N)/N; crystal-control; 4 W class-A audio; squelch; a.g.c.; series-gate noise limiting; speech compressor. Has 6-section tuned filter. $119.95

SIDETALK 23 SSB CB TRANSCEIVER
23 synthesized AM channels plus 46 sideband channels. Features S/RF indicating meter; receive/transmit light; PA facilities; 50-ohm antenna impedance; 12 V d.c. operation; 5 W AM and 15 W p.e.p on SSB. AM sensitivity 0.5 μV for 10 dB (S + N)/N. Audio 3 W adj. Has built-in speaker and includes mobile mounting bracking, mounting feet for desk mount, and a high-level dynamic mike with detachable locking connector. 2½" x 8¼" x 10½". $359.95

2300 MOBILE CB RADIO
Mobile use: 12-V negative ground 5 W d.c. input; all-solid-state; dual-conversion receiver; 23-channel frequency synthesizer; series-gate noise limiter; squelch; sensitivity switch on front panel; S-meter; high-level modulation; PA speaker output jack; SO-239 antenna connector; ac-

cepts manufacturer's "Pace 5900" selective calling system; $199.00

DX2300B BASE STATION
Base station use only: 117-volt a.c. input; all-solid-state; dual-conversion receiver; 23-channel frequency synthesizer; series-gate noise limiter; squelch; separate S meter; speech compression; transmit and modulation indicator lights; external speaker output jack; switching from front panel; SO-239 antenna connector;



provision for 12-volt d.c. battery operation through minor wiring alteration; $239.95

SIDETALK 1023 AM/SSB MOBILE
Covers 23 synthesized channels on AM, 23 on upper, 23 on lower sideband; 15 watts p.e.p. SSB, 5 watts AM; double-conversion superhet receiver; features S/RF meter; transmit/receive indicating lights, jacks for PA and external speaker; input voltage 12-volt d.c.; comes with mobile mounting bracket and power cord for any 12-volt d.c. mobile installation; mounting feet for desk mount when used as base station (with optional Model 5804A regulated a.c.-d.c. power supply); dynamic mike; 7½" x 2" x 9½"; $329.95

MODEL 100AS
Mobile use: 12-volt negative or positive ground 5 W d.c. input; all-solid-state; 6-channel coverage (channels 9 and 11 installed); S and power-output meter; on-the-air and receive lights; plug-in

microphone; superhet receiver with crystal filter; high-impedance automatic gate self-adjusting noise limiter; sensitivity 0.5 μV for 10 dB S + N/N; SO-239 antenna connector; (Model 100 ASA with antenna $109.95); $99.95

2376A MOBILE CB RADIO
Mobile use: 12-volt negative ground d.c. input; all-solid-state; dual-conversion receiver; 23-

channel frequency synthesizer; noise limiter; squelch; i.f. noise blanking; SO-239 antenna connector; $169.95

CB-76 BASE/STATION UNIT
23-channel AM base-station transceiver; has S meter; local/distance control; solid-state; 5 watts input, 4 watts output; 117-volt, 60 Hz operation; audio output 2.5 watts; response 300-2500 Hz; double-conversion superhet receiver; 6" front-mount speaker; TVI shielding; comes with ceramic mike; 3.6" x 12" x 8.1"; $189.95

CB-10-2 MOBILE TRANSCEIVER
Three-channel CB mobile transceiver (Channel 9 crystals installed); 12-volt d.c. negative ground; superhet receiver with ceramic filter; plug-in mike; 1⅜" x 4⅜" x 6"; portable with optional PS308 battery pack; $69.95

PALOMAR

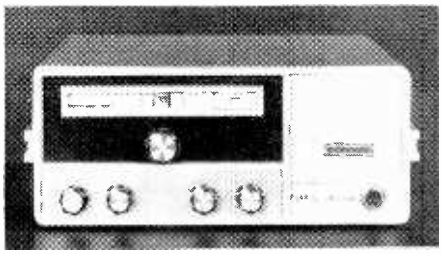
SKIPPER 73 SSB TRANSCEIVER
Hybrid-design SSB/AM uses dual-gate MOSFET front-end and tubes; covers 23 channels, with upper and lower sidebands for total of 69 channels; 15 watt p.e.p., 5 watt rms; features dual-

mode 8-pole ladder-type crystal filter; dual ANL; mike and 23 crystals included. $395.00

PEARCE-SIMPSON

GUARDIAN 23 CB RADIO

Base station or mobile use: 117-volt a.c. or 12-volt negative ground d.c. input; vacuum tubes



with solid-state power supply; dual-conversion receiver; 23-channel frequency synthesizer; series-gate noise limiter; squelch; r.f. gain control; combination S and relative-power output meter; modulation indicator light; external speaker output jack; tone control on front panel; SO-239 antenna connector; pi-network adjustment to match antenna; $299.95

TIGER 23B MOBILE CB RADIO

Mobile use: 12-volt negative ground d.c. input; all-solid-state with IC's; dual-conversion receiver

with ceramic filter; 23-channel frequency synthesizer; series-gate noise limiter; squelch; combination S and relative-power output meter; delta tuning; modulation indicator light; PA and external speaker output jacks; speech compressor; SO-239 antenna connector; $169.95

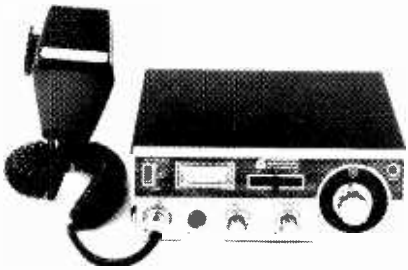
WILDCAT II MOBILE CB RADIO

Mobile use: 12-volt negative ground d.c. input; all-solid-state; single-conversion receiver; five crystal-controlled channels requiring 2 crystals per channel; series-gate noise limiter; squelch; transmit and modulation indicator lights; high-

level modulation; five-way meter reads r.f. output, signal-strength, receiver on, transmitter on, and modulation; ceramic filter; 117-volt a.c. power supply optional extra for base-station applications; $99.95

COUGAR 23 MOBILE CB RADIO

Mobile use: 13.5-volt d.c.; solid-state with FET and IC's; seven-way meter; r.f. noise blanker with manual override switch; built-in noise limiter; delta tune; noise canceling microphone; PA gain control; 23 channels (all crystals sup-



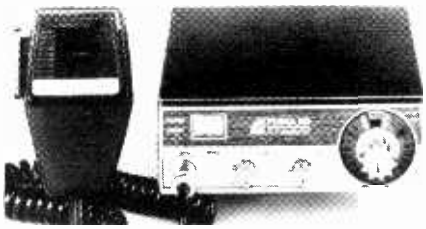
plied); includes plug-in microphone & hanger, external power cord, mounting cradle and hardware; $199.95

BEARCAT 23B CB RADIO

Base station or mobile use: 117-volt a.c. or 12-volt positive or negative ground d.c. input; all-solid-state with IC's; dual-conversion receiver

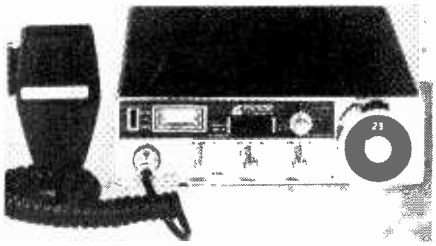
with ceramic filter; 23-channel frequency synthesizer; delta tuning; series-gate noise limiter; r.f. noise blanking; combination S and relative-power output meter; separate SWR reflected meter; squelch; transmit and modulation indicator lights; digital clock mounted on front panel may be used to turn on transceiver at preselected interval or ring alarm bell; headphone output jack on front panel; slide controls for volume, squelch, and SWR calibration; FET r.f. stage; SO-239 antenna connector; $269.95

PUMA 23 CB RADIO
Mobile or base station use: 12-volt d.c.; 117-volt a.c. supply optional extra; 23 channels (all



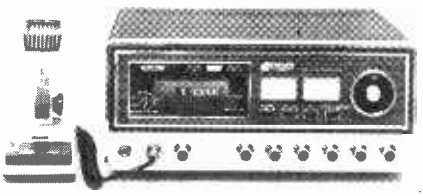
crystals included); sensitivity 0.5 μV; crystal filter; automatic noise limiter; full envelope modulation; noise-canceling microphone; quick-disconnect power plugs; lighted S/r.f. meter; variable-volume PA with plug-in jacks for PA and external speaker; $139.95

CHEETAH SSB TRANSCEIVER
Mobile use: 12-volt d.c.; 23 channels on AM, 23 channels upper sideband, 23 channels low-



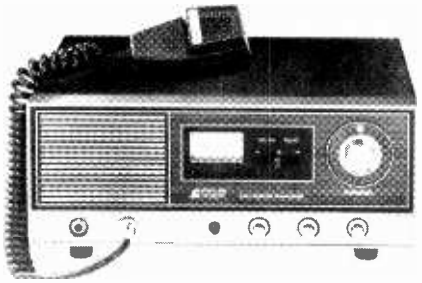
er sideband; 15 watts p.e.p. on single sideband; crystal-lattice filter; SWR meter; S r.f. meter; noise blanker; noise limiter; variable-volume PA; plug-in power; plug-in noise canceling microphone; plug-in jack for PA and external speaker; $379.95

SIMBA SSB TRANSCEIVER
Mobile or base station use: 117-volts a.c. or 12-volts d.c.; 15 watts p.e.p.; S/r.f./modulation meter; SWR bridge; r.f. noise blanker; lighted



digital clock with alarm to turn set on; PA and headphone jacks; variable r.f. gain control; desk microphone; built-in mike gain control; $489.95

LYNX 23 TRANSCEIVER
Base station or mobile use. 117 V a.c. or 12 V positive- or negative-ground d.c. input. Dual-conversion receiver with ceramic filter; 23 channels with all crystals included. Has built-in variable preamp; combination S/RF/modulation



meter; headphone jack on front panel; PA and loudspeaker jacks; $189.95

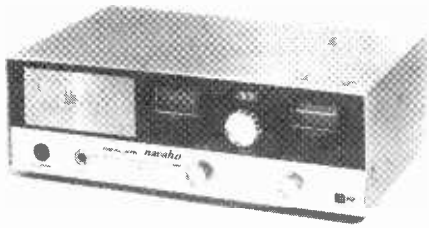
TOMCAT 23 CB RADIO
Mobile or base station use; 12-volt d.c.; 117-volt a.c. supply optional extra; 23 channels (all crystals included); sensitivity 0.5 μV; crystal filter; automatic noise limiter; full envelope modulation; noise canceling microphone; illuminated S/RF meter; $119.95

PANTHER SSB/AM RADIO
Mobile use; 12-volt d.c.; 23 channels on AM; 23 channels each upper and lower sideband; 15 watts p.e.p. on SSB; 5 watts input on AM; crystal lattice filter; S/RF meter; noise blanker; noise limiter; PA; plug-in power leads; plug-in noise canceling microphone; local/distance switch; $299.95

BENGAL SSB/AM RADIO
Base station or mobile use; 23 channels on AM; 23 channels each upper and lower sideband; 117-volt a.c. or 12-volt d.c.; 15 watts p.e.p.; 5 watts input on AM; S/RF; modulation meter; noise blanker; noise limiter; PA; variable r.f. gain control; built-in mike gain with variable control; $349.95

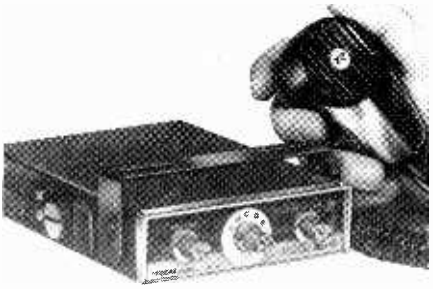
RADIO SHACK

REALISTIC NAVAHO TRC-23C
Base station or mobile use: 117-volt a.c. or 12-volt negative-ground d.c. input; all-solid-state;



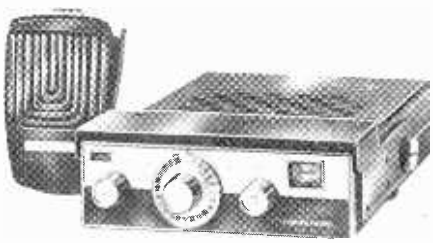
dual-conversion receiver 23-channel frequency synthesizer; series-gate noise limiter; squelch; combination S-meter and relative power output meter; external speaker output jack; headphone output jack on front panel; transmit indicator light; SO-239 antenna connector; $149.95

REALISTIC TRC-10A
Mobile use: 12-volt negative-ground d.c. input; all-solid-state; dual-conversion receiver; six channels crystal-controlled requiring two crys-



tals per channel; noise limiter; squelch; high-level modulation; SO-239 output connector; $84.95

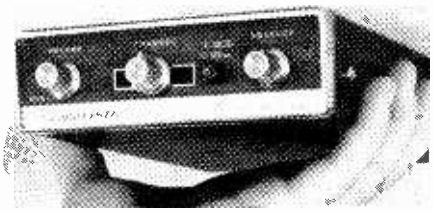
REALISTIC TRC-24A



Mobile use: 12-volt negative-ground d.c. input; all-solid-state; dual-conversion receiver; 23-channel frequency synthesizer; series-gate noise limiter; squelch; S-meter; PA speaker output jack; modulation indicator light; high-level modulation; pi-network adjustment to match antenna; SO-239 antenna connector; $159.95

REALISTIC MINI-23

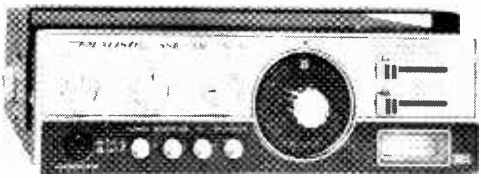
Solid-state; 12-volt d.c.; 23-channel frequency synthesizer; all crystals supplied; dual-conver-



sion receiver with ceramic filters for 40-dB selectivity and 1.0 μV sensitivity at 10 dB S+N/N; variable squelch; automatic noise limiter; 5-watt input; transmit modulation indicator light; illuminated channel selector; with mike; FCC Type Accepted; 1½" x 5¼" x 7⅞"; #21-136; $109.95

REALISTIC TRC-46 SSB/AM

Base/mobile transceiver with full AM and choice of upper or lower SSB operation; 15 watts p.e.p. in SSB, 5 watts AM input; sensitivity 0.5 μV AM, 0.2 μV for 10 dB S + N/N; has crystal lattice and mechanical filters; illuminated RF/S meter; illuminated channel selector switch; comes with mobile mounting bracket, separate a.c. and



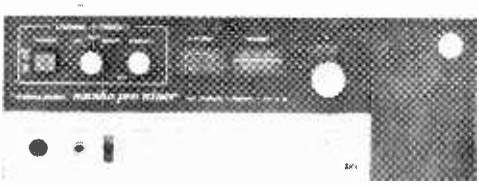
d.c. power cables; remote receiver volume control on mike; 120-volt a.c. and 12-volt d.c. operation; 2¾" x 8⅞" x 10½"; $329.95

REALISTIC TRC-47 SSB/AM

Mobile transceiver for 12-volt negative ground; provides 23 AM channels plus upper and lower sideband operation; all crystals included; 15 watts p.e.p. SSB, 5 watts AM input power; concentric volume and r.f. gain controls; rotary channel selector; AM sensitivity 1 μV, 0.5 μV SSB for 10 dB S N/N; comes with mobile mounting bracket, d.c. power supply cables, push-to-talk mike. 2⅛" x 7⅛" x 9⅛"; $229.95

REALISTIC NAVAHO PRO NINER

23-channel base station/mobile transceiver with Channel 9 monitoring; noise limiter; on-the-air



modulation lights; S/RF/SWR meter; lighted channel indicators; dual conversion; range boost for 100% modulation; sensitivity 1.0 μV for 10 dB S + N/N; comes with all crystals, plug-in mike with coiled cable, a.c./d.c. cords. 5" x 14¾" x 9". $219.95

REALISTIC TRC-101 TRANSCEIVER

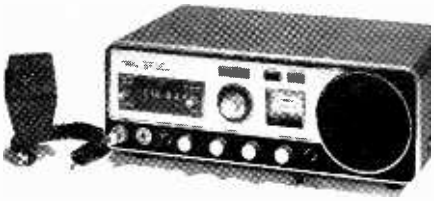
Hand-held portable; fine tuning control; separate speaker and mike; adjustable squelch;

a.n.l.; dual-conversion receiver; battery/RF meter; jacks for external antenna, speaker, mike, power and battery chargers; center loaded telescoping antenna; frequency synthesis for crystal control of all 23 channels; ten "AA" cells (included) required; carrying case; 10½" x 3⅝" x 2⅝"; $149.95

REGENCY

FORMULA 23 CB TRANSCEIVER

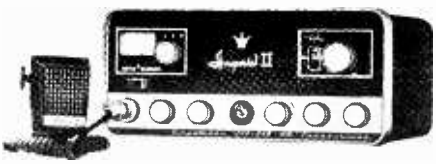
Base station or mobile use: 117-volt a.c. or 12-volt negative or positive ground input; all-solid-state; dual-conversion receiver; 23-channel fre-



quency synthesizer; delta tuning; series-gate noise limiter; squelch; combination S, true power-output, and SWR meter; transmit and modulation indicator lights; PA and external speaker jacks; headphone jack on front panel; built-in digital clock which may be used to turn transceiver on at any pre-set time; high-level modulation; SO-239 antenna connector; $189.00

IMPERIAL II CB RADIO

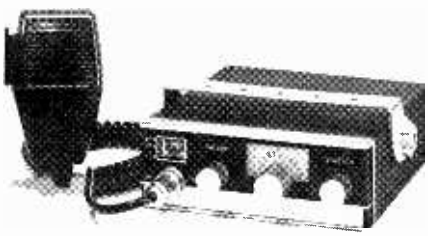
Base station or mobile use: 117-volt a.c. or 12-volt negative ground d.c. input; vacuum tubes;



dual-conversion receiver; 23-channel frequency synthesizer; delta tuning; series-gate noise limiter; i.f. noise blanker; squelch; transmitter operates in two modes—AM and double sideband with suppressed carrier; receiver operates in three modes—AM, lower and upper single sideband; r.f. gain control; combination S voltage and current metering of final amplifier; pi-network adjustment to match antenna; high-level clipping and filtering in AM modulator; SO-239 antenna connector; $359.00

SPRINT 23 II MOBILE CB RADIO

Mobile use: 12-volt positive or negative ground d.c. input; all-solid-state; dual-conversion re-



ceiver, 23-channel frequency synthesizer; series-gate noise limiter; squelch; combination S and relative power-output meter; PA and external speaker output jacks; FET r.f. stage; SO-239 antenna connector; $139.95

500 MOBILE CB RADIO

Mobile use: 12-volt negative ground d.c. input; 117-volt a.c. power supply and portable field

power pack available as optional extras; all-solid-state; twelve crystal-controlled channels requiring 2 crystals per channel; noise limiter; squelch; PA and external speaker output jacks; high-level modulation; SO-239 antenna connector; $99.95

ROBYN

K-123 CB TRANSCEIVER

Mobile use: 12-volt negative or positive ground input; all-solid-state with IC; dual-conversion receiver with mechanical filter; 23-channel fre-

quency synthesizer; series-gate noise limiter; squelch; combination S and relative power-output meter; PA and external speaker jacks; high-level modulation; FET r.f. stage; SO-239 antenna connector; includes Model 7000-BL three-way antenna and KP-500 PA speaker; $169.95

BB-123 CB TRANSCEIVER

Base or mobile use: 117-volt a.c. or 12-volt d.c. input; all-solid-state including one FET and one

IC; r.f. gain control; external speaker and PA jacks; 23 channels (plug-in crystals) dual-conversion receiver; ceramic filter; sensitivity 0.5 μV at 10 dB S N at 1 kHz; 3 watts audio output (for PA) with volume control; channel selector; squelch; automatic noise limiter; tone switch; power modulation light; volume on-off control; wood cabinet; 14½" x 6¾" x 9¾" D. $164.95

XL-ONE CB TRANSCEIVER
Mobile operation for negative- and positive-ground. 23-channel design; 5″ speaker bottom mounting; modulation indicator light (built into

meter); meter shows both power output & incoming signal strength. Dual conversion with mechanical filter & automatic noise limiter. External speaker & PA jacks; local/distance RF gain switch. Transmitter power input 5 W (3.5 W output with upward modulation); 100% modulation. Receiver sensitivity 0.6 μV for 10 dB S/N; adjacent channel rejection 50 dB; image rejection 45 dB. Power output 4 W max. 5⅞″ x 2⅜″ x 7⅛″. $124.95

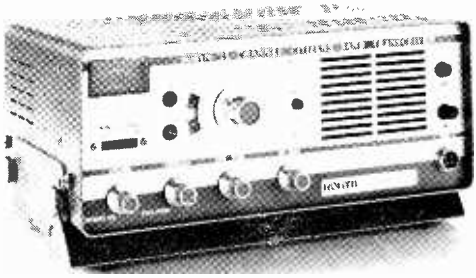
TR-123C CB TRANSCEIVER
Mobile use: 12-volt d.c. input; all-solid-state; 23-channel frequency synthesizer; dual-conversion

receiver; ceramic filter; sensitivity 0.5 μV at 10 dB S/N at 1 kHz; 3 watts audio output (for PA) with volume control; automatic noise limiter; 5″ built-in speaker; S and power-output meter; microphone with retractable cord; includes KP-500 PA speaker and three-way Model 7000-BL antenna; 2″ x 6″ x 7¾″; $179.95

SS-747 SSB CB TRANSCEIVER
SSB plus AM—23 AM channels & 46 SSB channels; 69 talking channels. Features base/mobile

(117 V a.c./12 V d.c.) operation. Develops 8 W p.e.p. with SSB & 3.5 W with AM output. Receiver sensitivity 0.25 μV for 10 dB S/N for SSB and 0.5 μV for AM. Selectivity: 2.2 kHz bandwidth at 60 dB down for SSB (8 kHz at 50 dB down for AM). Audio output 3 W at 10% distortion. Has SWR & signal-strength meters. 4″ x 11⅞″ x 9⅛″ D. $439.95

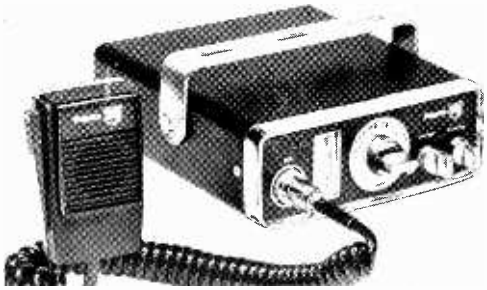
T-123B CB TRANSCEIVER
Base/mobile transceiver; 23 crystal-controlled channels; features delta tune; r.f. gain control;



Power/S meter; range-expand switch; PA/external speaker/phones jack; operates from 117-V, 50/60 Hz and 12 V d.c. negative-ground (positive-ground operation with wiring change); comes with two power cords; ceramic noise-canceling mike with retractable cord. 12″ W x 5″ H x 8½″ D. $209.95

ROYCE

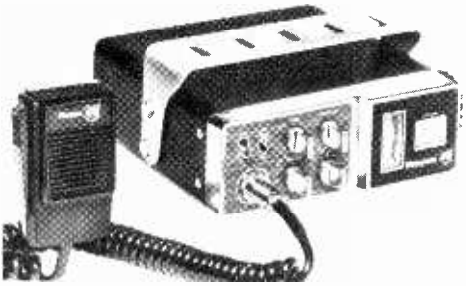
1-605 MOBILE TRANSCEIVER
Offers 23-channel operation; 3.4 watt nominal output; S/RF meter with color change lamp; electrical fine tuning; switchable noise limiter;



variable squelch control; dual-conversion superhet receiver with ceramic filter, tuned r.f., a.n.l., a.g.c.; sensitivity 0.5 μV for 10 dB S + N/N; selectivity 6 kHz at 6 dB down; spurious rejection 50 dB; audio output 4 watts; has mike jack, external antenna jack, PA speaker and external speaker jack, adjustable TVI trap. 6¼″ W x 2¼″ H x 6¾″ D; $169.95

1-602 MOBILE TRANSCEIVER
Synthesized 23-channel operation; 3.2 watts nominal output; S/RF meter with transmit/modulation lights; electrical fine tuning; switchable noise limiter; variable squelch control; dual-conversion superhet receiver with ceramic filter; sensitivity 0.5 μV for 10 dB S + N/N; selectivity 6 kHz at 6 dB; has 3½″ dynamic speaker; 4-watt PA output; external antenna, microphone, PA/ external speaker jacks; 6″ W x 2¼″ H x 8½″ D; $149.95

1-600 MOBILE TRANSCEIVER
Synthesized 23-channel operation; 3.2 watts nominal output; S/RF meter; dual-conversion superhet receiver with tuned r.f. stage and



ceramic filter; sensitivity 0.5 μV for 10 dB S + N/N; selectivity 6 kHz at 6 dB; has 2½" speaker; 6" W x 2⅛" H x 6½" D; $119.95

1-590 MOBILE TRANSCEIVER
Three-channel (channel-9 crystals factory installed) transceiver; 3.0 watts nominal output; separate power/transmit lights; slide-type squelch control; single-conversion superhet receiver with tuned r.f.; sensitivity 1.0 μV for 10 dB; selectivity 6.5 kHz at 6 dB; separate speaker and push-to-talk microphone; 2½" H x 4"W x 6½" D; $69.95

1-408 HAND-HELD TRANSCEIVER
Six-channel; 5 watt/2 watt input power; call alert signal system; 3-way battery/RF/S meter; PA switch; crystal-controlled superhet receiver; sensitivity 0.75 μV for 6 dB; comes with channel-11 crystals installed; carrying case, earphone with case; 9¼" H x 3⅛" W x 2⅛" D; $94.95

1-406 3-CHANNEL TRANSCEIVER
Combination 5 watt/2 watt, 3-channel unit (channel-11 crystals factory installed); separate speaker and microphone; four-way power source (eight "AA" cells. Ni-Cad rechargeable batteries; a.c. adapter; cigarette-lighter adapter for car/boat or truck); 9¼" H x 3⅛" W x 2⅛" D; $79.95
1-402. Similar to 1-406 except 2 watts input; 8" H x 3" W x 2⅛" D; $49.95

SBE

CAPRI SBE-2CB
Mobile use: 12-volt negative ground d.c. input;

all-solid-state; single-conversion receiver; five crystal-controlled channels requiring 2 crystals per channel (channel 11 supplied); series-gate noise limiter; squelch; external speaker output jack; transmit indicator light; SO-239 antenna connector; $89.95

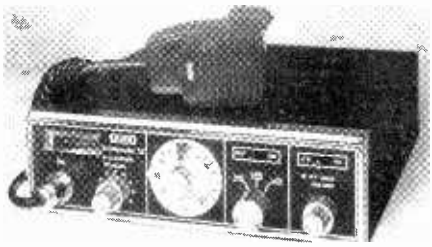
CORONADO SBE-1CB
Mobile use: 12-volt negative or positive ground d.c. input; all-solid-state; 23-channel frequency

synthesizer; dual-conversion receiver with ceramic mechanical filter; series-gate noise limiter; squelch; S-meter; PA speaker output jack; 117-volt a.c. power supply available as optional extra; pi-network output adjustment to match antenna; $179.95

CASCADE II
Mobile use: hand-held, self-contained power supply of 8 "AA" cells or 10 nickel-cadmium rechargeable cells (not supplied); 6 channels (crystals for channel 9 only); 5 watts with switch to reduce to 3 watts for extending battery life; fixed-station operation with optional

117-volt power supply that also recharges nickel-cadmium batteries; S-meter also indicates battery power and relative r.f. power output; adjustable squelch; all metal case; provisions for external antenna; PA function; $104.95

SIDEBANDER II SBE-12CB SSB MOBILE
Mobile design. Features "power pump" to increase talk-power to 15 W p.e.p. on SSB; solid-

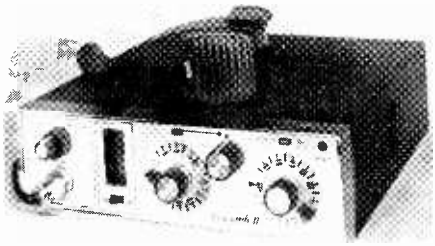


state switching in antenna changeover. Has meter calibrated 6 dB/S units and also monitors output power, AM modulation, and indicates "swing-up" on SSB. Can be used for PA

and is frequency synthesized. 13.8 V d.c. operation; optional 117 V a.c. power supply available. Receive sensitivity 0.5 μV for 15 dB (S + N)/N for SSB (1 μV for 10 dB (S+N)/N for AM). Audio output 3 W at 10% THD; for PA system 10 W at 8 ohms. Receive selectivity 6 dB at 2.1 kHz for SSB (6 dB at 3.5 kHz for AM). 2¼" x 7½" x 9½" D. With dynamic mike. $359.95

CORONADO II SBE-10CB TRANSCEIVER

Features "Twinthesizer"—has two 23-channel dials in addition to channel dial selector and electronic scanning circuits. Electronic scanner shifts frequency synthesizer back and forth between any set-in channel on either dial at 1-sec. interval. Strong signal will lock in. Ideal for channel-9 monitoring. 13.8 V d.c. operation with optional 117 V a.c. power supply



available. Transmitter power output 5 W (3 W ±0.5 W output); Receiver sensitivity 1 μV for 10 dB (S + N)/N; 2 W audio output (3 W for PA operation). With dynamic mike. 2½" x 8⅜" x 9⅜" D. $199.95

TRINIDAD SBE-11CB BASE STATION

23-channel double-conversion synthesized design with multimeter covering RF power, S units, and VSWR information. Features squelch control & PA capability. 5 W input power. Output 3 W ±0.5 W; receiver sensitivity 1 μV for 10 dB (S + N)/N; selectivity 6 dB at 5 kHz, 40 dB at 20 kHz, 60 dB at 40 kHz. Audio output 2 W at 10% dist. Supplied with mike and walnut wood cabinet. 5¾" x 17¾" x 8¾" D. $214.95

CATALINA II SBE-22CB MOBILE

Synthesized 23-channel coverage; 5 watts input; 13.8-volt d.c. operation at 1.5 A; 2-watt audio output; features backlighted channel indicator; send/receive switching; push-pull audio; squelch; noise limiter; comes with mounting bracket and dynamic mike with coiled cord; 1½" H x 6½" W x 7½" D; $119.95

CONSOLE II SSB/AM BASE STATION

Covers 23 channels AM, 46 channels SSB; 5-watt AM high-level modulation, 15-watt p.e.p. SSB; a.l.c. and a.g.c. on SSB; clarifier on AM and SSB; squelch; noise limiter; 117-volt a.c. operation but switches to 12-volt d.c. external power source if primary power fails; has "on-the-air" indicator; meter for Power/SWR/S; accepts VOX, noise blanker accessories; comes with dynamic mike with coiled cord; 5" H x 12" W x 10¼" D; $419.95

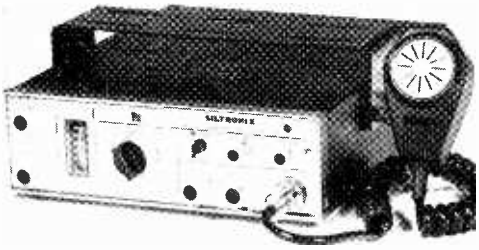
SIDEBANDER III SSB-ONLY UNIT

23-channel SSB-only, 15 watts p.e.p.; upper or lower sideband operation; has clarifier for exact tuning; r.f. gain control; noise limiter; squelch; panel meter for power output/signal strength; PA/hailer provisions; comes with dynamic mike and coiled cord; 13.8-volt d.c. at 1.8 A operation; 2 1/16" H x 5⅞"W x 8⅞" D; $289.95

SILTRONIX

SSB-23 SSB/AM TRANSCEIVER

Provides conventional AM, lower- and upper-sideband operation for 69-channel capability; suppressed carrier and automatic modulation

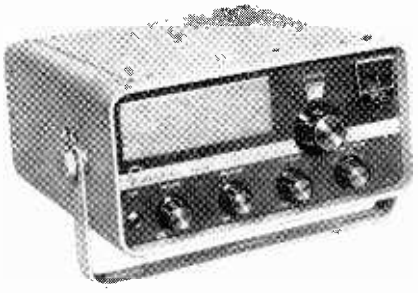


control on SSB; built-in high-frequency crystal filter; continuous variable fine tuning; r.f. attenuator; built-in PA/CB switch; single-conversion superhet on SSB, dual-conversion on SSB; sensitivity 0.7 μV at 10 dB S/N on AM, 0.2 μV on SSB; selectivity ±3 kHz at 6 dB, ±10 kHz at 50 dB on AM; audio output 2 watts at 10% distortion; adjustable 50- or 75-ohm antenna impedance; 13.8-volt negative-ground operation; 2½" H x 8" W x 11" D. $329.00

SONAR

FS-23 BASE/MOBILE RADIO

Base station or mobile use: 117-volt a.c. or 12-volt negative ground d.c. input; vacuum tubes;



dual-conversion receiver; 23-channel frequency synthesizer; delta tuning; series-gate noise limiter; squelch; r.f. gain control; nuvistor r.f. stage; high-level modulation; combination S and relative-power output meter; accepts manufacturer's VOX unit; ant. connector; $299.95

T-6 HAND HELD RADIO

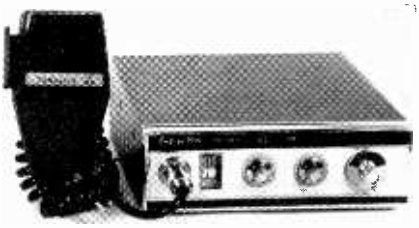
Mobile use: hand-held with self-contained battery power supply; six crystal-controlled channels requiring 2-crystals per channel (one pair supplied); single-conversion receiver; all-solid-

state; automatic noise limiter; squelch; high-level modulation; external microphone input jack; external antenna output jack; external speaker output jack; PA speaker output jack; combination meter reads battery condition and relative modulation; various power supplies and battery combinations available; $139.95

TEABERRY

FIVE BY FIVE MOBILE RADIO

Mobile use: 12-volt positive or negative ground d.c. input; all-solid-state with IC's; dual-conversion receiver with mechanical filter; 23-channel frequency synthesizer; series-gate noise limiter; squelch; combination S and relative-power output meter; PA and external speaker output



jacks; FET r.f. stage; modulation indicator lamp; high-level modulation; push-pull a.n.l.; SO-239 antenna connector; $169.00

MINI-T II CB RADIO

Mobile or base station use: 12-volt reversible ground or 117-volt a.c. with accessory power

supply; six channels (emergency channel 9 crystal supplied); automatic noise limiter; adjustable squelch; speaker and mike; $79.00

BIG-T CB RADIO

Base or mobile station use: 117-volt and 12-volt power cords supplied; 12-volt reversible ground; 23 channels; automatic noise limiter; front-panel phone jack; slide controls; transmit and modulation indicator lamps; adjustable squelch; mounting bracket included; $179.00

MODEL "T" BASE STATION

23-channel base station; 2.75 watts r.f. output (no modulation); receiver sensitivity 0.6 μV for 10 dB; selectivity 40 dB ±10 kHz at 455 kHz; audio output 5 watts; 117-volt a.c. operation; S/RF meter; PA output 5 watts; comes with desk microphone; external speaker jack; 11⅞" W x 8¼" D x 5⅛" H; $229.00

TN73'S MOBILE STATION

Synthesized 23-channel coverage; has illuminated S meter; low-noise r.f. stage; a.n.l.; adjustable squelch; external speaker jack; dual-conversion crystal-controlled superhet receiver; sensitivity 1 μV for 500 mW output at 10 dB S/N; 13.8-volt d.c. operation; comes with dynamic microphone; 5 11/16" W x 9⅛" x 2 1/16" H; $129.00

TELEDYNE

RA-510 SSB/AM TRANSCEIVER

Solid-state base or mobile unit for use on 23 AM channels plus 46 upper- and lower-single-sideband channels; effective SSB output power 8 watts, AM 3.5 watts min.; receiver is dual-conversion; has low-noise r.f. stage, r.f. gain control, a.g.c.; sensitivity 0.2 μV for 10 dB S + N/N; supplied with universal mobile mounting bracket, push-to-talk ceramic mike with coiled cord, a.c. and 12-volt d.c. positive- or negative-ground power cords, crystals for all channels. $349.95

TRAM

TITAN IIA CB BASE STATION

Base station use only: 117-volt a.c. input; vacuum tubes; dual-conversion receiver with mechanical filter; 23 crystal-controlled channels (crystals supplied); continuous tuning receiver with spotting switch; transmitter operates in AM or DSB suppressed-carrier modes; receiver operates in AM, upper sideband, or lower sideband modes; combination S, SWR, power to antenna, and power to dummy load meter; audio compression for true 100% modulation; fine-tune controls for receive and transmit functions on sideband mode; low-pass filter for TVI elimination; $498.00

TITAN IV SSB BASE STATION

Solid-state design except for a vacuum tube in power output stage of transmitter. Features tunable double-conversion receiver, single-sideband plus AM reception: squelch control; noise limiter. Crystal spotting in SB mode allows presetting dial correctly to either upper or lower sideband on the desired channel. Comes equipped with all 23 transmit crystals with ±0.0015% tolerance. Has multi-function meter to indicate S units, SWR directly, power into internal load, and power into antenna. Power input (SSB) 15 W p.e.p. Walnut cabinet with vinyl-clad steel top. 18¾" x 8⅛" x 11¾" D. With mike. $627.00

DIAMOND-60 SSB/AM MOBILE

Solid-state design with automatic fail-safe transmitter protection; covers 23 channels AM, 46 channels SSB; has transmitter tone control for changing audio tone over broad bass-treble range; 4 watts output on AM; 8 watts output on SSB, 15 watts p.e.p.; sensitivity 0.25 μV for 10 dB S + N/N (SSB); 60 dB adjacent-channel rejection; has multi-function meter (S/Power/SWR); built-in PA capability; 13.8-volts d.c. positive or negative ground; 2⅜" H x 6⅝" W x 9⅔"D; $389.00

CB Base Station Antennas

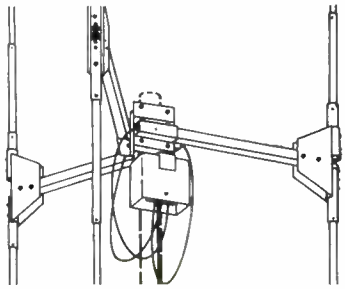
ANTENNA SPECIALISTS

MAGNUM M-81 ANTENNA
Half-wave antenna using "hi-Q" phasing transformer; four solid aluminum 54-in-long radials; company claims a 2.75-dB gain over quarter-wave ground plane; $26.89

MIGHTY MAGNUM III M-227 ANTENNA
Half-wave antenna using dual phasing coil to optimize impedance matching; four electrically shortened radials (60-in long); company claims 4.0-dB gain over ¼ wave ground plane; 17-ft high; uses firm's "Stati-Lite diamond" at top of radiating element to reduce receiver noise; less than 1.4:1 SWR; $37.89

M-223 ANTENNA
For boat or apartment house installation; uses stainless-steel whip; center-loaded; requires no metallic surface below antenna for efficient operation; 97 in.; $34.69

MS-119 BASE-STATION ANTENNA
Increases both directional and omni position gain. Has scanner control box. Electronic beam



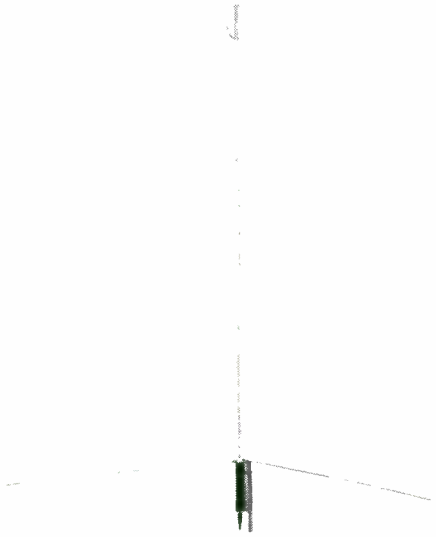
antenna provides 8.75 dB gain in each of the three directional positions and 5.75 dB in omni-directional mode. $99.95

M-400 STARDUSTER ANTENNA
27-MHz omnidirectional base-station design. Features full half-wave dipole, a vertical radiator, and three ultra-low-angle active radial elements. Has 5-dB gain. 17 ft. 6 in high and lateral space requirement less than 6 ft. $39.95

M-247 MOTOR HOME ANTENNA
Mobile home base-loaded antenna with spring; ground-plane kit; $24.75

M-246 MOTOR HOME ANTENNA KIT
Designed for fiberglass roof applications where a ground plane is difficult to establish. Consists of base-loaded CB mobile antenna, a universal plate-type camper vehicle mount, and a stainless-steel shock spring. $29.95

SUPER MAGNUM M-117 ANTENNA
Half-wave antenna using matching quarter-



wavelength radials; uses noise reducing d.c. grounded coil and has firm's curved static ball at the highest physical antenna point; company claims a 3.75-dB gain over ¼ wave ground plane; $33.89

M-216 BASE-STATION ANTENNA
Dual-polarity, 5-element beam for 27 MHz. Has 2" diameter stainless-steel 22-ft boom with wind rating of 100 m.hr. Features tunable gamma match on each polarity and has a vertical/horizontal control box. $159.95

M-417 POLECAT ANTENNA
Full half-wavelength (17-ft) radiator and hi-Q phasing coil. Has 1.5 to 1 VSWR. Three 1 16-wave radials provide low angle of radiation and 6-dB improvement in S/N. $19.59

CUSH CRAFT

SUPERFIRE
Cross-polarized antenna with 4 elements for vertical and 4 for horizontal radiation mounted on same boom; claimed forward gain is 12.5 dB; front-to-back ratio is 30 dB; 3-position coaxial

When the heat's on . . . cool it with Big Momma! She's loaded with the biggest, toughest coil in CB land. She swings a hefty whip, too—made of 17-7 PH stainless steel . . . coated with copper and nickel for super-conductivity that puts your signal into the air—not into heat. And her "Quick-Grip" mount with factory-connected 17 foot cable puts you in business in minutes.

Big Momma. If she burns out, we'll give you a new one. Period.

Big Momma

Model M-410 CB Mobile Antenna

the antenna specialists co.

® "Stripes of Quality"

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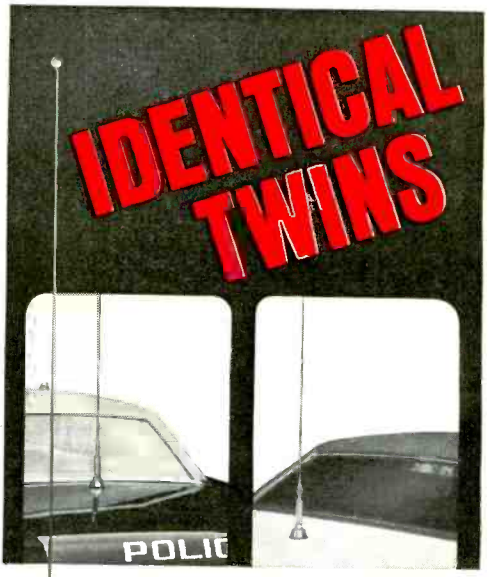

Professional or CB...we use identical components. You get identical performance.

Police communicators demand the things you want in a mobile antenna. Maximum range. Reliability. Long life. That's why A/S mobile CB antennas are built exactly like their professional counterparts—used by 9 out of 10 police vehicles. Put John Law's experience to work in your mobile.

M-176 Quick Grip® CB antenna.

the antenna specialists co.

® "Stripes of Quality"

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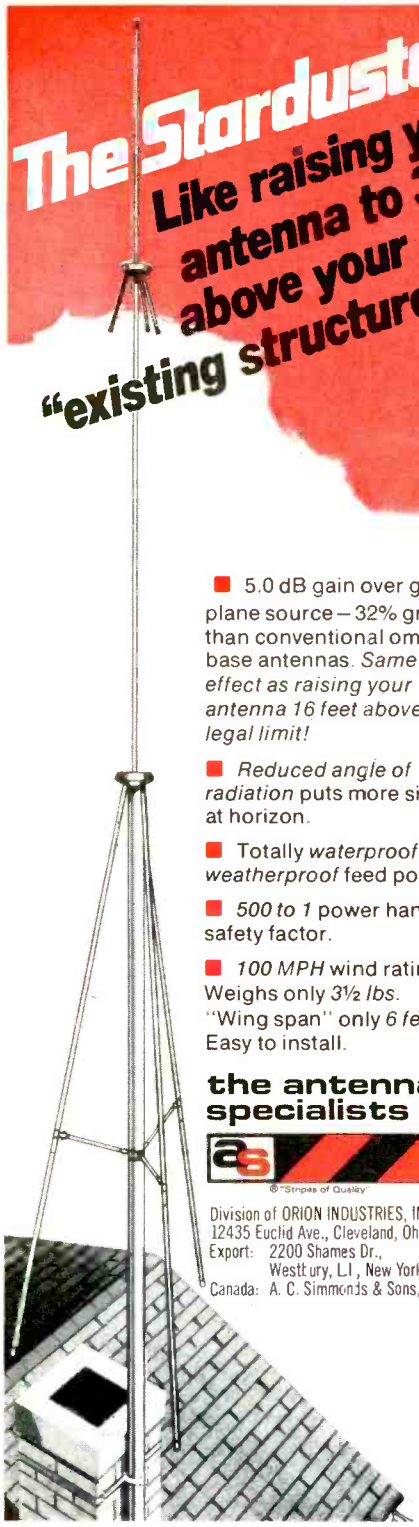
CIRCLE NO. 1 ON READER SERVICE CARD

The Starduster★

Like raising your antenna to 36′ above your "existing structure."



- 5.0 dB gain over ground plane source—32% greater than conventional omni CB base antennas. *Same effect as raising your antenna 16 feet above the legal limit!*
- *Reduced angle of radiation* puts more signal at horizon.
- Totally *waterproof, weatherproof* feed points.
- *500 to 1* power handling safety factor.
- *100 MPH* wind rating. Weighs only *3½ lbs.* "Wing span" only *6 feet.* Easy to install.

the antenna specialists co.

®"Stripes of Quality"

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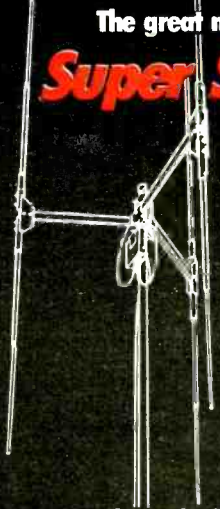
The great new Super Scanner



The only "two-antennas" antenna. It scans 360° in milliseconds with 5.75 dB gain. Or beams an 8.75 dB gain signal where and when you want it—instantaneously. (And you'll wish you had a radio as handsome as the control box!)

- ☐ New contemporary control console with blackout panel, simulated leather end panels.
- ☐ Compact size—radius just 3 feet. Wind rated in excess of 100 mph.
- ☐ Ideal for emergency teams—zero in on trouble spots instantly.

MODEL MS-119 Super Scanner electronic beam, incl. control console—sugg. price, $99.95

®"Stripes of Quality"

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CIRCLE NO. 1 ON READER SERVICE CARD

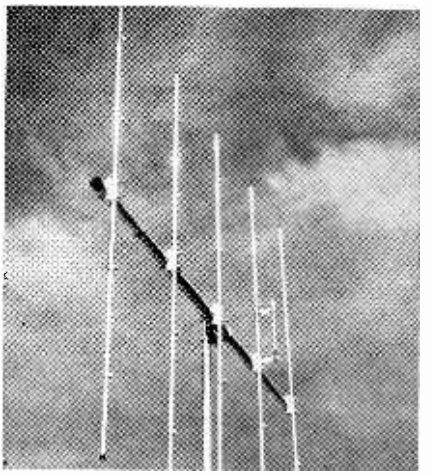
switch to select horizontal, vertical, or both polarizations available as optional extra; requires two separate 52-ohm coaxial feedlines; $119.50

RINGO
Half-wave antenna using exclusive "Power Ring" tuning; no radials; direct d.c. ground; 3.75 dB gain claimed over isotropic dipole; 17-ft, 10-in. high; CR-1. $23.50

TRIK STIK
All-purpose antenna for high or low monitor, CB, etc.; universal mount; TS-1; $10.95

HI-LO MONITOR STIK
Automatically receives high or low bands; universal mount; takes standard PL-259 fittings; MS-2; $19.95

BEAM ANTENNAS
Manufacturer offers vertically polarized beam antennas in the following configurations: 3 elements (8 dB forward gain), 4 elements (9.5 dB forward gain), and 5 elements (10.5 dB forward gain); claimed front-to-back ratios are 22, 26,



and 28 dB, respectively; also available is dual-beam stacking kit for mounting any two matching beams side-by-side, effectively raising radiated power by another 3 dB; price range $36.50-$76.50

In addition to above, manufacturer has various ground-plane antennas, apartment-house antennas, and lightning arresters.

HUSTLER

BEAM ANTENNAS
Manufacturer offers vertically polarized beam antennas for the following configurations: three elements (8 dB forward gain), four elements (9.4 dB forward gain); claimed front-to-back ratios are 20 and 28 dB, respectively; gamma matching; adjustable matching for better than 1.2:1 SWR; cast aluminum clamps and brackets; both beams lightweight; marketed as "Hustler Power Multiplier;" price range $37.95-$49.95

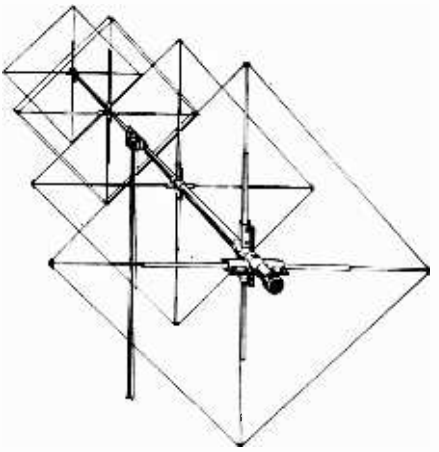
JAMRAM
Extended co-linear using capacitive loading collar enabling radiator length to be increased to 19-ft, 10-in. (0.64 wavelength); three quarter-wave radials; company claims 4.0 dB gain over isotropic dipole; d.c. path for lightning protection and rain static elimination; less than 1.2:1 SWR; $29.95

MODEL GP-1
Ground-plane antenna with 3 drooping radials; quarter-wave radiator; frequency-to-element length chart for converting antenna to monitor use in range 25-50 MHz included; $14.95

HY-GAIN

BEAM ANTENNAS
Manufacturer offers vertically polarized beam antennas for the following configurations: 3 elements (8.2 dB forward gain), 5 elements (10.0 dB forward gain), and a "Long John" 5 element (12.3 dB forward gain); claimed front-to-back ratios are 20, 22, and 31 dB respectively; also available is dual-beam stacking kit for mounting any two matching beams side-by-side, effectively raising radiated power by another 4 to 5 dB; also available is stacked 2's beam with forward gain of 9.3 dB and a front-to-back ratio of 18 dB; uses firm's beta match with claimed SWR of 1.05:1 or better; SWR of stacked beams is less than 1.4:1; price range $39.95-$129.95

BIG GUN II
Cubical quad; 4 elements; 14.5 dB claimed for-



ward gain; front-to-back ratio 38.7 dB; claimed SWR at resonance 1.2:1; polarity switch available to select vertical, horizontal, or circular radiation pattern (not supplied); $149.95

ELIMINATOR II
Cubical quad; 2 elements; claimed 9.0 dB forward gain; front-to-back ratio 30 dB; SWR at resonance is 1.24:1; polarity switch available to select vertical, horizontal, or circular radiation pattern (not supplied); wind survival exceeds 90 m/hr; $59.95

GOLDENROD
Half-wave antenna with three shortened and

curved radials; claimed 3.8 dB omnidirectional power gain; gold irridite finish; $22.95

CLR 2 BASE-STATION ANTENNA
Co-linear antenna with capacitive hat and 5/8 wavelength radiator; three quarter-wave radials; claimed 4.0-dB gain over isotropic dipole; d.c. path for lightning protection and rain static elimination; also available is "Golden CLR 2" model featuring heavy-duty construction for severe environments; gold irridite finish; price range $32.95-$44.95

PENETRATOR 500
5/8-wave (22 ft, 9½ in) radiator; 52-ohm match. Capable of handling 1500 W power. Colinear, double-matching-tuning and linear phasing. Four radials. Made of high-strength aircraft aluminum. $39.95

LAFAYETTE

HEAVY-DUTY CB ANTENNA
Four-element ground-plane CB antenna; all aluminum construction; 108" heat-treated radials and radiator; elements supplied in two 54" lengths joined by threaded coupling nuts; less mast and coax; $12.95

3-ELEMENT VERTICAL
Multiplies power 8 times; high-gain, directional pattern; forward gain 8 dB, front-to-back ratio 25 dB; front-to-side 40 dB; 50-ohm feedline match; comes with bracket for vertical or horizontal mounting; 1¼" o.d. aluminum boom 8-ft long; 5/8" to 7/16" o.d. elements approx. 16½-ft long; less mast and coax; $18.95

RANGE-BOOST/II ANTENNA
End-fed, half-wave antenna; static clover-leaf ball design reduces receiver noise; 3.75 dB true omni gain; v.s.w.r. 1.5:1; S/N improvement 6-20 dB; phasing transformer rubber covered for moisture resistance; vertical consists of 3 seamless aluminum tube sections topped by solid aluminum 108" top section; three 54" radials; direct-ground lighting protection; 50-ohm; 17-ft, 6-in overall length; accepts up to 1½" masts; PL-259 cable connector; less mast and coax; $19.95

DELUXE RANGE-BOOST/II
End-fed, half-wave omnidirectional antenna; 4 dB gain delivers 13 watts e.r.p.; has hi-Q phasing coil for optimum impedance match; v.s.w.r. 1.4:1; loaded ground radials; seamless aircraft tubing and corrosion-proof steel; withstands 100 mph winds; direct-ground lightning protection; overall height 18 ft; stainless-steel mounting hardware will take up to 1½" mounting mast; less mast and coax; $29.95

RANGE-MASTER I ANTENNA
Half-wave; omnidirectional antenna; 5 dB gain; v.s.w.r. 1.5:1; no coils or matching stubs; power handling capability provides 500:1 safety factor; withstands 100 mph winds; weatherproof feed point; die-cast machined parts; mounts on 1¼" mast; SO-239 connector; low angle of radiation; major signal lobe at horizon; 6-ft total span at widest point; overall height 17 ft; without cable; $34.95

SHAKESPEARE

MARINE BIG STICK 176-1
Marine fiberglass antenna consisting of two sections standing 18-ft, 6-in. high; half-wave coaxial antenna; usable with or without external or internal grounding system; dual-joint, free-pivoting base; claimed SWR is 1.5:1 or better; supplied with base and stand-off bracket; may be fed with 52-ohm coaxial cable; $58.95

SEA-BEE 388
Marine fiberglass antenna consisting of a single 7-ft section; center loaded, end-fed, half-wave with matching circuit; no ground plate required; base mounts on flat surface—levelling plate supplied; claimed SWR 1.5:1; $29.95

SUPER 45 430
Taper-pitched helical load antenna; fiberglass construction; 45-in. long; set-screw adjustment to obtain lowest SWR reading; supplied with 15-ft cable and connector; silver mica capacitor matching circuit; also available with cowl or trunk lip mounting; manufacturer has adapter available to fit mounting bases of other manufacturers; price range $14.50 to $23.50

THUNDER STICK 181
Capacitive-loaded whip; 108-in. long; fiberglass construction; electrically approaches 3/8 wavelength whip; may be fed with any 52-ohm coaxial cable; claimed SWR is 1.2:1 or better; thread size 3/8-24; $11.95

WHIP 10-3
Quarter-wave fiberglass constructed whip; dielectrically loaded to reduce length to 96 in.; claimed SWR (when mounted) is 1.5:1 or better; may be fed with 52-ohm coaxial cable; $9.95

VIP 173
Top-loaded antenna for cowl mounting; height 48 in.; fiberglass construction; claimed SWR 1.5:1 or better (when mounted) may be fed with 52-ohm coaxial cable; manufacturer also offers 4 blister-packaged variations of this design including models with ball mounting and spring; trunk lid mounting with 20-ft cable cowl mounting with 15-ft cable and combination CB-AM antenna with cable and connectors; price range $14.95 to $21.95

SUPER STICK 474
Capacitive loaded whip; 108-in. long; close to 3/8 wavelength; matched for 50 ohms; fittings allow easy slip-apart action with 3 lengths of approximately 54 in. each; special matching provides performance of 130-in. whip and outperforms standard 108-in. whip. $12.50

CO-PHASED DUAL ARRAY 464
Two antennas mounted on opposite sides of the trunk; co-phased for increased capture area and gain; more symmetrical radiation pattern; $38.95

In addition to the above, manufacturer offers a variety of stainless-steel springs, bumper mounts, gutter clips, stand-off brackets, adapters, etc. for convenience in mounting mobile antennas. Check manufacturer's catalog.

Mobile Station Antennas

ANTENNA SPECIALISTS

MIGHTY MITE M-130 ANTENNA

Center-of-roof or center-of-trunklid mounted mobile antenna; only 18-in. high; all parts chrome-plated brass or stainless steel; complete with 17-ft cable and connector; $17.69

ASM-39 ANTENNA

Marine fiberglass antenna consisting of single 8-ft section; double-loaded, half-wave; no ground plate required; Cyclolac base with loading coil and SO-239 antenna connector; may be used with Model ASM-57 mounting kit; $49.39

MOBILE SCANNER

Designed for installation on roof of full-size station wagon; 9-ft spacing between base-loaded antennas is critical to efficient operation; system consists of two 50-ohm antennas (not supplied) interconnected through dashboard-mounted scanner control box; electronic switching produces directional gain in relation to position of vehicle (front, rear, or sides); available with various types of loaded antennas (see Model M-228, in company's catalog); manufacturer claims forward gain of 2.0 dB and maximum front-to-side ratio of 17 dB; price $20.49

QUICK-GRIP

For installation in center or side of trunk lip—no hole drilling necessary; mounts by means of two setscrews on underside of lid; base-loaded whip 46-in. high; special swivel adapter available as optional extra; available with or without stainless-steel shock spring; line includes Models M-175, M-176, M-304, M-177, MR-196 and MR-209, see company's catalog for details; price range $19.95-$24.89

MAGGIE MOBILES

Complete line of center-of-rooftop or center-of-trunklid mounting antennas; base-loaded; radiator 46-in. long; available with fiberglass whip or stainless-steel whip and with or without shock spring; includes 17-ft cable and connector; line includes Models M-67, M-125, M-73, M-127, M-303, M-74, M-123, M-128, M-304, M-124, M-175, and M-176, see company's catalog for details; price range $15.95-$24.89

M-189 ANTENNA

System designed for campers, trucks, trailers, and buses; universal mounting bracket has large base plate surface; base-loaded coil and tapered whip; can be mounted on side or top of camper/trailer; mount adjusts full 90 degrees to allow installation anywhere; 20-ft cable and solderless connector; $21.49

ASM-40 ANTENNA

Marine fiberglass antenna; half-wave design consisting of two sections with total height of 18 ft; no ground plate required; supplied with 20-ft of white-jacket coax cable; requires special clamp and swivel mount; $67.99

M-178 ANTENNA

Powerful magnet permits easy relocation of antenna; for permanent mount, double-faced adhesive bonds unit to auto roof or trunk; concealed coil in low-profile chrome-plated base; fine-tuning adjustment; 17-7PH stainless steel whip; 38-in. long; comes with 17-ft RG-58/U cable and PL-259 connector; $18.59

M-180 ANTENNA

Features fold-down gutter clip; clamps on in seconds and adjusts to five positions from inside car; heavy-duty chrome-plated clamp mount with five-position spring-loaded position adjustment; mounts either side of vehicle; fiberglass whip; center-loaded; comes with RG-58/U cable and PL-259 connector; $19.69

M-411 BIG MOMMA II ANTENNA

Rooftop version of the Big Momma CB antenna. Has flat base mount with ¾" hole and oversized loading coil. $30.59

M-410 BIG MOMMA I ANTENNA

Designed around an industrial-type loading coil with stainless-steel whip. Has Quick-Grip mount for a no-holes trunk installation. With 17-ft cable. $30.59

M-412 BIG MOMMA III ANTENNA

Mobile roof, trunk, and van-top antenna; ¾" hole mount; completely waterproof; $30.59

M-210 LUGGAGE-RACK ANTENNA

M-125 antenna on handy clamp; fits any round pipe to ¾" dia. ¾" square material; 17" coax attached with connector; $21.49

M-325 ROOFTOP ANTENNA

Tunable whip; v.s.w.r. adjustable; stainless-steel shock spring; center-loading; wound in fiber glass; ⅜" hole mount; "O" ring seal for weather or waterproof installations; 43" high; 17" coax and connector; low-profile base; $20.49

CUSH CRAFT

SQUALO

Horizontally polarized antenna supplied with

rubber suction cups for car-top mounting; measures 50 inches square; also supplied with short aluminum boom for mast or tower mounting; all parts pre-formed and partially pre-assembled; accepts standard 52-ohm coaxial cable; claimed less than 1.5:1 standing-wave ratio; $21.50

HUSTLER

DOUBLE-TALK
Two separate antennas with 18-ft matching harness; manufacturer supplies variety of center-loaded antennas for rooftop, trunk lid, cowl, or trunk lip mounting; System RTG-27 usable on station wagons and panel trucks and has 12-ft phasing harness; includes coax connector; price range $24.95-$29.95

RTB-27-L
Center-of-roof, cowl, or trunk lid mounting; base-loaded; radiator 45-in. long; tapered stainless steel rod; adjustable tip rod for fine tuning; better than 1.1:1 SWR; includes company's "base matching tuning" adjustment; 18-ft cable and connector supplied; $28.95

RTG-27-L
Gutter clamp antenna; center-loaded; radiator 25-in. long; adjustable stainless steel tip rod; includes 12-ft cable and connector; $16.95

RTS-27-L
Center-of-roof or center-of-trunk lid mounting; center-loaded; radiator 30-in. long; chrome plated brass tubing with adjustable stainless steel tip rod; includes 18-ft cable and connector; $16.95

TCS-27-M
Combination CB-AM-FM cowl mounting antenna; center-loaded; extended height 48 in.; retracted height 35 in.; adjustable stainless steel tip rod; includes special matching harness and connecting cables; also available as CB antenna only with 60-in. cable and connector; price range $15.95-$19.25

TLA-27L
Trunk-lip mounting antenna; center-loaded; radiator 48-in. long; fiberglass with adjustable stainless steel tip rod for resonating to lowest SWR; includes 17-ft cable and connector; $19.95

TMR-27
Portable antenna designed for direct mounting at transceiver antenna terminal; has right-angle PL-259 connector and stainless steel spring with center r.f. bonding braid; weather-protected resonator and adjustable tip rod; over-all length 21 in.; $8.95

DFG MOBILE CB ANTENNA
Designed specifically for rain-gutter mounting, especially on station wagons, truck cabs, VW's, and other unusual body styles. Fiberglass 42" design. To be used in pairs with phasing harness for exact match & minimum standing-wave ratio; $29.95

HY-GAIN

COMBO TOPPER
Combination CB-AM-FM mobile antenna for cowl mounting; telescopes down to 28" and extends to 50"; top loading with adjustable tuning rod; supplied with isolating coupler, AM radio plug, 22-ft cable, and connector; $19.95

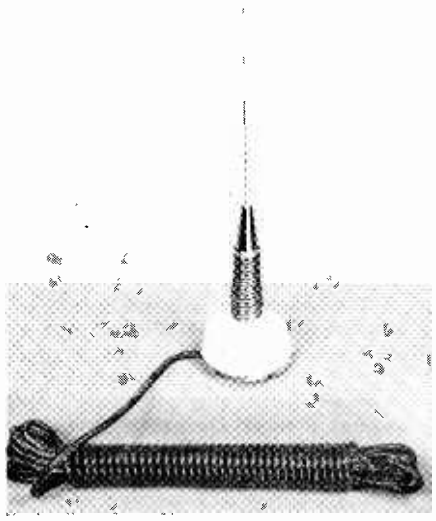
DX CAT
Cowl or bumper mounted antenna; 88" over-all height; center-loaded design; epoxy-fiberglass protected; foldover mast for easy garaging; base has ⅜-24 stud; $32.50

GLASSCAT-2
Bumper-mounting, quarter-wave antenna of epoxy-fiberglass construction. 102 inches over-all and of one-piece construction. Has chrome base with ⅜-24 stud to fit all standard mounts. $10.95

GLASSCAT 3
Fiberglass rod antenna with tunable tip rod that permits instant adjustment; 48" over-all length; $13.95

SON-OF-GUN
52" whip with heavy-duty coil. Comes with coax and connector. 1000 W p.e.p. sideband. Roof-top claw mount with spring; trunk-lip mount without spring.
MODEL 509. Roof-top with spring $32.50
MODEL 510. Trunk-lip with spring $32.50

HELLCAT-1
Center-of-roof or center-of-trunk-lid mounted mobile antenna; 54" high; stainless steel whip



section and spring; supplied with 18-ft cable and connector; $18.50

HELLCAT-2
Center-of-roof or center-of-trunk-lid mounted

mobile antenna; 24" high; stainless steel whip (no spring); supplied with 18-ft cable and connector; $17.95

HELLCAT-3
Center-of-roof or center-of-trunk-lid mounted mobile antenna 25" high; Alnico magnet base mount; stainless steel whip section; supplied with 16-ft cable and connector; $21.95

HELLCAT-4
Trunk-lip mounted mobile antenna; 54" high; stainless steel whip section (no spring); supplied with 20-ft cable and connector; $22.95

HELLCAT-5
Center-of-roof or center-of-trunk-lid mounted antenna similar to Hellcat-1, but less stainless steel spring; 47" high; $16.95

HELLCAT-6
Designed for trunk cab, house trailer, or camper mounting; 54" high; flexible foldover feature permits antenna to tilt at 60-degree angle; supplied with 18-ft cable and connector; $24.95

HELLCAT-7
Center-of-roof or center-of-trunk-lid mounted mobile antenna; tension loaded to fold flat against roof of car (automatic foldover); 54" high; supplied with 18-ft cable and connector; $22.95

HELLCAT-8
Center-of-roof or center-of-trunk-lid mounted mobile antenna similar to Hellcat-5 but encased in fiberglass for protection against rain, sleet, smog, etc.; 54" high; supplied with 18-ft cable and connector; $22.95

HELLCAT-9
Marine antenna 59" high; fiberglass whip section with plastic and chrome fittings; tunable matching unit; supplied with 22-ft cable and connector; $32.95

HELLCAT-10
Center-of-roof or center-of-trunk-lid mounted mobile antenna; 54" high; stainless steel whip section and spring; rated to handle 150 watts; supplied with 18-ft cable and connector; $23.95

ROBYN

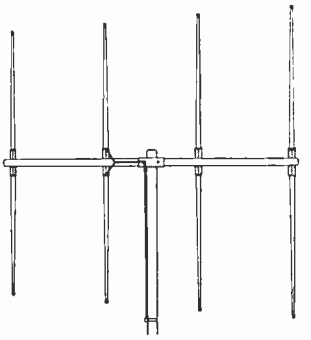
7000-BL MOBILE ANTENNA
Base-loaded with company's special adjustable three-way bracket; may be used to mount on car gutter, trunk lip, or disassembled and fitted to rooftop or center of trunk lid; has neon lamp at tip as transmit indicator; includes waterproof protective cap to cover PL-259 connector when antenna is removed; chrome plated; $24.95

SHAKESPEARE

BIG STICK 176
Half-wave coaxial antenna; fiberglass construction; no radials; stands 18 ft, 6 in. high; may be fed with 52-ohm coaxial cable; supplied with U-bolts for mounting; $36.95

GRAYHOUND 460
⅝ wavelength vertical; capacitive top hat reduces static and lowers angle of radiation; aluminum alloy construction; extends to 18 ft; $28.50

BIG BLAZER 453
Vertical four-element, half-wave beam antenna;



16-ft boom with wide-spaced elements; can be used with standard TV rotator; U-bolts supplied for mounting to 1¼"-1½" pipe; $79.95

NOTICE TO OUR READERS

We consider it a valuable service to our readers to continue, as we have in previous editions of the COMMUNICATIONS HANDBOOK, to print the prices submitted by the manufacturers for items described as available at press time. With few exceptions, prices submitted by manufacturers should be considered "net."

We are aware that prices vary across the country in different trading areas. It is obvious that we are not in a position to quote local prices for the various trading areas in the United States on each of the items listed. Accordingly, we are quoting the price furnished to us by the manufacturer or distributor, for each of the products, although it may be possible to purchase some items in your trading area (depending on where you are) at a price lower than that listed in this Handbook.

We would also like to point out that almost all manufacturers' and distributors' prices are subject to change without notice.

CB & HAM Accessories

ANTENNA SPECIALISTS

M-252 WATTMETER
In-line design with printed circuits; measurement accuracy ±5%; includes 10 W and 100

W scales; easy-to-read meter indicates forward power; designed for wall, desk or console mounting; also available with 250 W/500 W scales; $27.95

M-250 ANTENNA SWITCH
No insertion loss; four positions, necessary for dual-polarity antennas; allows two antennas and dummy load to be available at all times; $11.95

M-253 ANTENNA MATCHER
Wide-range matching capability; protects transmitter by matching it to load; develops maximum output; $22.95

M-255 REMOTE SPEAKER
Provides remote monitoring of CB station; connector plug included; $9.95

BIRD

4353 CB-MATE WATTMETER
Frequency range 25-30 MHz; power range 0-2.5/10 W; accuracy ±8% full-scale; impedance 50 ohms. $79.00

COURIER

PORT-A-LAB 500 TEST SET
Self-contained test set; measures true r.f. power output up to 500 watts; may be used to check SWR; measures modulation percentage; built-in

field-strength meter with collapsible antenna; built-in dummy load; $69.95

CRYSTEK CRYSTALS

CRYSTALS
Company offers complete line of crystals including CB, ham, monitor, marine, industrial, and MIL Spec types; dealers stock popular crystals or can supply less popular types via Zip Crystal Certificates; customer purchases appropriate certificate which is mailed to factory for redemption with shipment direct to customer; price range $3.25-$5.50

CUSH CRAFT

BLITZ BUG
Patented lightning protection device; inserted between CB transceiver and coaxial feedline; no insertion loss; two models; both ends female connectors, or one end male connector, other end female; price range $3.95-$4.45

COAX SWITCH
Three positions for horizontal, vertical, or auxiliary antenna; desk or wall mount; CFS-1; $12.95

DATA ENGINEERING

CRICKET 1 CODE KEYER
Solid-state keyer suitable for both beginners and advanced ops; speed 3.5-50 wpm; jam-proof spacing; self-completing dots and dashes; keyed time base, instant start; sidetone oscillator and speaker; built-in key; 117-volt, 50/60 Hz or 12-volt d.c.; turned on side, can be used as

straight key for manual keying. 2½" x 3½" x 8½". $49.95

FTK ELECTRONIC KEY
Solid-state electronic key using COS/MOS IC; requires no paddle movement; has no keying contacts; designed for single or twin-lever keyer; 117-volt, 50/60 Hz or 12-volt d.c.; 2½" x 4" x 4", paddle extends 1½" from cabinet. (d.c. version $19.95); complete kit $15.95 (add $2.95 for built-in a.c. supply)

ELECTRO-VOICE

MODEL 719 CERAMIC MIKE
Press-to-talk base-station mike; integral stand and head; die-cast, non-reflecting gray and chrome; switch may be used for press-to-talk in base or moved to upper part of stand for grip-

to-talk use; switch shorts in "off" position allowing relay operation or electronic switching; hi-Z: output —58 dB; response 70-7000 Hz; 4-ft cable; $19.20

MODEL 619TR COMPRESSOR MIKE
Base-station mike with built-in transistor amplifier and speech compressor; for two-way communications where high value of average modulation (p.e.p.) is important; separate controls

for level and degree of compression; grip-to-talk switch in stand riser, compression meter in base; switch completes battery circuit in "on" position and provides for relay operation; response 150-10,000 Hz; output: hi-Z —42 dB; 3000 ohms —44 dB; 150 ohms —58 dB; coiled cord extends to 5 ft; $51.00

MODEL 717 MIKE
Hand-held, high-output ceramic mike with close-talking cardioid pickup pattern for rejection of unwanted background noise and feedback; output —55 dB; response 100-7000 Hz; $14.10

MODEL 619 MIKE
Mobile mike; housed in high-impact Cycolac case for protection against shock damage; lo-Z model has "open circuit" switch wiring for multiple paging installation; hi-Z provides "straight-through" circuit for VOX; switch also closes relay circuit when depressed; output level —55 dB; response 10-7000 Hz; hang-up bracket; specify hi-Z or balanced lo-Z impedance; $30.30

MODEL 619 MIKE
Similar to Model 619TR but less amplifier and compressor; press-to-talk switch in base may be moved to upper part of stand for grip-to-talk use; switch shorts mike in "off" position and provides for relay operation; response 70-10,000

Hz; output —57 dB; specify hi-Z or balanced lo-Z; 15-ft cable; $35.70

MODEL 729 CERAMIC
Cardioid design; discrimination against sound from rear makes it suitable for VOX operation; tailored for single sideband; output —60 dB; response 60-8000 Hz; hi-Z only; desk stand and floor stand adapter included; (Model 729SR supplied with relay control switch $18.90); $17.40

MODEL 634 ASR DYNAMIC MIKE
Dynamic omnidirectional types with integral cable and dpdt push-to-talk "on/off" switch; response 70-10,000 Hz; imp 150 ohms or high-Z; high-Z output level —57 dB; features mechanical noise isolation to reduce mechanical noise transmission $30.75

GOLD LINE

GLC-1056 IN-LINE WATTMETER
Rated 5 watts continuous; reads true output

power in watts; 8-30 MHz; can be left in line for constant monitoring; negligible insertion loss; $13.25

HEATH

HM-2102 VHF WATTMETER
Tests transmitter output in power ranges 1-25 watts and 10-250 watts ±10% of full scale;

50-ohm nominal impedance to reduce line loss; built-in SWR bridge with less than 10 watt sensitivity for tuning 2- or 6-meter antennas. $29.95 mail order

HUSTLER

DISCONE-DCX MONITOR ANTENNA
Base station broadband design covering 40 to 700 MHz. Will cover Police, Fire, Weather, Marine, FM, TV, and Industrial channels. Vertically polarized with 55-in cone element and 20-in disc elements. $14.95
MODEL DCL. Discone antenna with 50-ft cable; $21.95

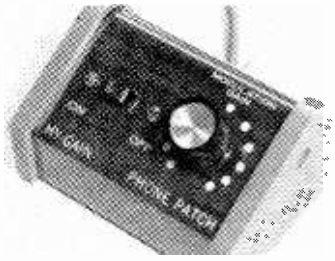
MONITOR-MATCH 5M5
Use with car antenna, unit functions as five antennas through electronic isolation and impedance matching; optimized performance is provided in separate outputs for AM or AM/FM radio and low-band, high-band, and UHF monitor receivers; designed to function with single-band monitor radios or 2- and 3-band monitors with single antenna input for combined high/low band operation; comes with cables for AM/FM radio and one monitor receiver; $14.95

HY-GAIN

DUMMY LOAD
Non-inductive 50-ohm load capable of accepting up to 5 watts for a period of 15 minutes; insertion SWR is 1.1:1; fits SO-239 receptacle; $1.95

IMP
Base-loaded replacement antenna for walkie-talkies; no tuning required; offset clamp permits antenna to be folded for self-storage when not in use; $4.95

PHONE PATCH
Isolation device for coupling CB transceiver to household landline telephone system; has front-



panel modulation gain control; on/off switch; $22.00

SURE SAFE PROTECTOR
Lightning arrester; sturdy construction; manufacturer claims it will bypass to ground at least 10 direct lightning strokes; for chassis wall or panel mounting; fitted with SO-239 input and output connector; $29.95

ANTENNA SWITCHES
Permits polarity switching or selection of omnidirectional or directional antennas.
NO. 475. Six-position switch $15.95
NO. 502. Three-position switch $10.50
NO. 503. Two-position switch $8.50

HY-LEVEL MODULATOR
Legally increases gain. Processing consists of compression and clipping, raising average modulation 10 dB. Has two mike inputs with individual controls. Operates from 117 V a.c. or 12 V d.c. for base or mobile use. Mounting bracket available. $59.95

RECEIVER PREAMP
Tunable receiver preamp provides up to 20 dB gain on all 23 channels. Automatically switched. Operates on 12 V d.c. or 117 V a.c. Includes a.c. receptacle for external power distribution. $59.95

CB POWER METER
All functions necessary to analyze transmitter signal and antenna performance. Wattmeter has three scales: 10 W, 100 W, 100 W. SWR scale

and modulation. Interconnecting cables included. $43.95

CO-PHASER
Unit directs power to two phased colinears. Cuts out co-channel interference. Requires no external power. May be mounted for dashboard operation. $22.95

E.F. JOHNSON

ANTENNA METER
Direct-reading SWR meter; inserted in coax line between transceiver and antenna; self-powered; $14.95

TRANSCEIVER TESTER
Reads power output in actual watts; reads modulation directly in percentage; permits earphone monitoring of transmitted signal; built-in dummy load; built-in r.f. and audio generator; crystal activity checker; SWR metering; field-strength meter; battery operated; $49.95

ANTENNA MATE
Combination CB antenna matcher and SWR indicator; insert in transmission line between transceiver and antenna; direct-reading of SWR; pi-network matching section; SO-239 connectors; $29.95

MATCHBOX
Pi-network antenna matching device; inserted between transceiver and antenna feedline; SO-239 antenna and cable connections; $15.95

TONE-ALERT V
A solid-state (reedless) selective signaling device. Plugs into company's Messenger Two, III, 100, 300, 323, 323-M. Compatible with Messenger 120 selective-signaling transceiver. $69.00

KIZER

PW 42-500 DUPLEX SWITCH
Permits operation of two sets from a single antenna: two CB sets tuned to different channels, CB transceiver and police monitor, regular CB set and a CB SSB unit, a CB set and emergency channel monitor; $29.95

PACE

CB9 MONITOR RECEIVER
Monitors channel 9 continuously; alternate channel monitor; works from same CB antenna; sensitivity 0.4 μV for 10 dB S+N/N; selectivity 100 dB minimum rejection on all except channel 9; channel 9 crystals supplied; 3 watts class-B audio output; squelch range 0.3-15 μV; series-type noise limiting with automatic threshold adjustment of i.f. clipping; $49.95

P5403A METER
Power wattmeter with direct-reading SWR and field-strength. Has 100 & 10 W scales. $19.95

P5407 BASE COMMAND
On-the-air monitor with 500 W power monitor meter lamp; intensity control; meter adjustment control. Provision for measuring modulation, standing-wave ratio. Includes TVI filter. $69.95

P5425 TWO WAY TESTER
Covers wattmeter (25 & 250 W scales), standing-wave ratio, modulation, field strength, crystal activity check. Has a 27-MHz oscillator with 1000 Hz modulation. $59.95

PAL

PRO CB FILTERS
Alternator and generator filters. Will reduce noise from these sources on CB and ham frequencies (2 to 40 meters). $9.95

KW-1 SWR METER
Combination 1000-watt and SWR meter. Accuracy ±2%. $59.95

KW TVI FILTER
Low-pass TVI filter with emphasis on 27-MHz (11 meters); 1 kW AM output. $16.95

PALOMAR

500 INLINE WATTMETER
Features three scales: 0-10, 0-100, and 0-1000 watts, calibrated for 26-28 MHz operation. Can be used as SWR bridge or AM monitor with earphones. $49.95

DYNA-MIKE WITH PREAMP
Frequency response 300-3000 Hz; 10 dB compression; 12 dB clipping; 10 dB amplification; audio shaper circuit uses FET; high-Z output. $49.95

ROBYN

MT-I MICROPHONE
Transistorized power mike; 0-38 dB max. amplifier voltage gain; 5000 ohms impedance; touch-bar push-to-talk switch; choice of relay/ electronic switching; volume control; response 300-6000 Hz; uses 9-V transistor-type battery. $34.95

MT-II COMPRESSION MIKE
Designed for use with SSB/AM transceivers; has 3-transistor, 1-FET transistorized amplifier; operates from 9-V transistor-type battery; choice of relay/electronic switching; AM/SSB slide switch; response 300-6000 Hz. $44.95

SHURE

CB/AMATEUR/MOBILE MIKES
MODEL 401A. Controlled magnetic. Frequency range 200-4000 Hz. High imp. 2.81 mV/μ bar. With 5-ft three-conductor (one shielded) cable. $15.75
MODEL 401B. Same except low imp. 0.31 mV/μ bar with 5-ft four-conductor (two shielded) cable. $15.75
MODEL 201. Ceramic omnidirectional. Frequency range 200-4000 Hz. High imp. 1.68 mV/μ bar. With 5-ft three-conductor (one shielded) cable. $13.20

MODEL 202. Ceramic, noise-reducing. Frequency range 200-4000 Hz. High imp. 3.5 mV/μ bar. With 5-ft three-conductor (one shielded) cable. $14.40

444 HAM MICROPHONE

Controlled magnetic omnidirectional with adjustable stand, push-to-talk switch bar with optional locking feature to operate external relay control & mike muting circuits. Frequency range 300-3000 Hz. High imp 2.25 mV/μ bar. With 7-ft two-conductor shielded cable. $30.60

444T CB MICROPHONE

Controlled magnetic omnidirectional design with built-in two-transistor preamp with volume control. Has push-to-talk switch bar with optional locking feature to key CB transmitter & activate transistor amp in the mike. With self-contained batteries. Frequency range 200-6000 Hz. 1000 ohms impedance. Output adjustable from 2 to 45 mV/μ bar. With 5-ft four-conductor (two shielded) coiled cord $35.10

SILTRONIX

PM-15 IN-LINE WATTMETER

Frequency range 2-30 MHz (to 50 MHz with slightly reduced accuracy); power ranges 0-5, 0-50, 0-500, 0-1500 watts; meter reads forward or reverse power in watts; accuracy ±10% full-scale; directivity 30 dB; insertion v.s.w.r. 1.05:1; 6½" H x 4¾" W x 6¾" D; comes with two SO-239 connectors on rear panel. $69.95

SWAN

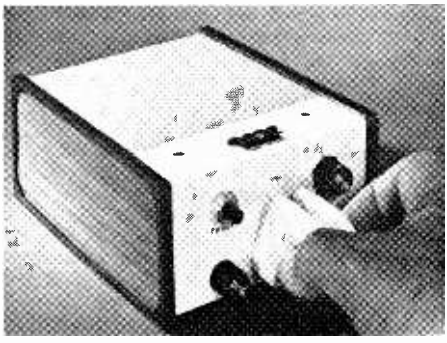
WM-1500 INLINE WATTMETER

Forward/reverse reading wattmeter; 5, 50, 500 and 1500 watt readings from 2-30 MHz; 50 MHz coverage at slightly reduced accuracy; four calibrated scales; has two SO-239 connectors on rear panel; accuracy ±10% of full scale; insertion v.s.w.r. 1.05:1; 6½" H x 4¾" W x 6¾" D; $49.95

TEN TEC

KR40 KEYER

Squeeze keyer for CW operators. Paddles are mounted on torque bars for multiplied force



for light action; individually adjustable. Offers variable weighting control; dit and dah memories; built-in monitor with variable level and tone. 105/125 V, 50/60 Hz. 2½" x 4¾" x 8". $89.95

MODEL KR20. Similar to KR40 but without the squeeze feature. $59.95

MODEL KR1. Keyer paddle assembly for use with Models KR40 and KR20. $18.95

KR5 KEYER

Incorporates new paddle principle. Tension factory-adjusted for optimum return force. Speed from 6-60 wpm; weighting ratio is ideal for speeds under 35 wpm. Monitor not provided. Power source is 12 or 6 volts d.c. for battery or pack operation. 2" x 4" x 6". $34.95

MODEL KR2. Keyer paddle assembly for use with KR5. $12.95

200 VFO

Solid-state, permeability tuned v.f.o.; fundamental frequencies 3.5-3.75 and 7.0-7.5 MHz; r.f. output 35 volts on 40, 20 volts on 80 meters; comes with r.f. inter-connection cable with plug to replace FT 243 crystal; readout ±5 kHz on fundamental; grid-block or v.f.o. keying (selectable); 4⅝" H x 7¼" W x 7½" D. $69.00

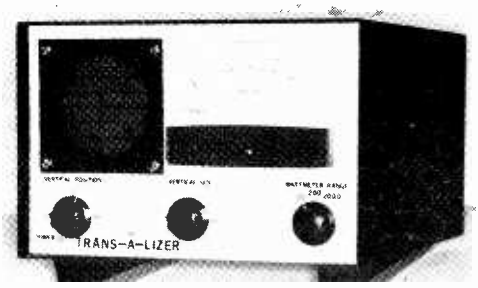
206 CRYSTAL CALIBRATOR

100-kHz crystal calibrator; Pierce crystal oscillator followed by Schmitt trigger; output gated from unijunction oscillator; adjustable to WWV with internal variable capacitor; operates from 9-12 volt d.c. at 8 mA. 2⅛" H x 4⅜" W x 4⅛" D. $23.95

TRANSEL

TRANS-A-LIZER

Designed for CB or ham use; combines 3" CRT calibrated in modulation percentage with r.f.



power meter calibrated in watts; CRT allows direct viewing of r.f. carrier and determination of modulation percentage; includes peak-reading wattmeter calibrated in 0-20, 0-200, and 0-2000 watt ranges, with full 80-10/11 meter coverage; optional two-tone oscillator for adjusting SSB transmitters and linear amps. $149.50

Optional two-tone oscillator $19.95

HETERODYNE VFO

Output over any 500-kHz segment between 3.5-30 MHz, providing 80-10 meter coverage or multiplication to 2 and 6 meters; usable with any ham transceiver or transmitter; dial calibration 0-500 kHz with 1 kHz read-out; built-in regulated power supply for 117-volt a.c. or 12-volt d.c. mobile operation, positive- or negative ground; temperature-compensated oscillators; electrical fine tune. $99.95

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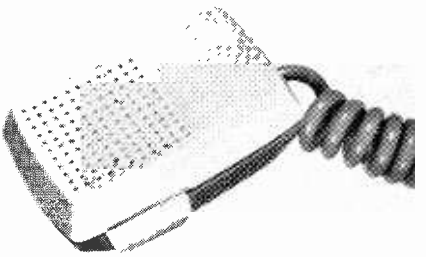
TURNER

MODEL M + 3 MOBILE MIKE

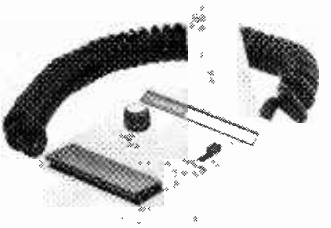
Transistorized mobile version of Model +3; provides up to 15 dB gain; slide-action volume control; compression amplifier circuit to prevent overmodulation; ceramic design; 300-3500 Hz



tailored for voice transmission; push-to-talk switch; 7-volt built-in power pack; designed for relay switching; (Model JM + 3 for electronic switching); $55.00

MODEL +3 BASE-STATION MIKE

Base-station microphone with solid-state preamplifier; built-in compression circuit to guard



against overmodulation; adjustable volume output control; ceramic microphone cartridge with high speech intelligibility limited to 300-3000 Hz; touch-to-talk front bar with slide-lock; self-contained battery; similar model available without compression circuit; $75.00

SUPER SIDEKICK MIKE

Features integrated circuit amplifier for perfect impedance match with all transistorized and AM/SSB transceivers; has amplifier gain control for adjustable maximum output level of −25 dB and will fully modulate any transceiver; unaffected by temperature or humidity; housed in die-cast case with black base and neck and bright chrome head; 3-conductor cable (one shielded coiled cord with black PCV jacket); mike is activated by pressing down on touch bar and can be locked on by moving slide lock forward. $80.00

Printed in U.S.A.

When it comes to a complete line of CB transceivers, the others just don't stack up...Hy-Gain gives you the choice!

Utopia Base Transceiver–46 channels SSB/USB/LSB 23 channels AM/All plug-in glass boards/RF and audio gain controls/Tube output dissipates all 15 watts/ALC/Illuminated S/RF/SWR meter/True high level plate modulation on AM/Mic preamp/Noise blanker/Base or mobile operation/Power cables. Model 623 $495.00 **Hy-Range I Mobile Transceiver**–23 channels/Mic preamp/ANL/Automatic modulation control/+ or – ground/Mic and mobile bracket. Model 670 $114.95 **Hy-Range II Mobile Transceiver**–Continuous Delta Tune/Speaker jack/PA/Mic preamp/+ or – ground/S/RF meter/ANL/Automatic modulation control/Mic and mobile bracket Model 671 $149.95 **Hy-Range III Mobile Transceiver**–Noise blanker/ANL/S/RF meter/PA/Speaker jack/+ or – ground/Mic preamp/Continuous Delta Tune/Adjustable antenna matcher/Automatic modulation control/Mic. Model 672 $199.95 **Hy-Range IV Base Transceiver**–Continuous Delta Tune/Mic preamp/TVI filter/ANL/Automatic modulation control/S/RF meter/Variable antenna tune/Mic. Model 673 $199.95 **Hy-Range V Mobile Transceiver**–AM plus SSB for 69 channels/Noise blanker/ANL/PA/Speaker jack/Bridge detector/+ or – ground/Clarifier/Automatic modulation control/S/RF meter/RF gain control/Mic. Model 674. $329.95 **The Slider Remote VFO**–Plugs into rear panel of any Hy-Range transceiver. AM/SSB Model 675 $79.95

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