

DECEMBER - 1968

The Groundwave

EDITOR: J. DEAN

PUBLISHER: J. BASSIL



OTTAWA DECEMBER 1968

G R O U N D W A V E

December, 1968

OARC DECEMBER MEETING

Place: National Research Council Auditorium, Sussex Drive

Time: 8:00 pm (2000 hours)

Date: 4 December, 1968

Program: Business

A talk on "H.F. PROPAGATION AND THE SOLAR CYCLE" given by E.D. DuCharme of the Radio Physics Laboratory, Defence Research Telecommunications Laboratory. The talk will be illustrated with slides.

Coffee and Ragchew

GROUNDWAVE is the official bulletin of the Ottawa Amateur Radio Club, a noncommercial association of radio amateurs devoted to the promotion of interest in amateur radio communication and experimentation in the Ottawa regional area, and to the advancement of technical competence and achievement of club members

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GROUNDWAVE is published by the Ottawa Amateur Radio Club, P.O. Box 204, Ottawa, Canada. Authorised as Second Class mail by the Post Office Department, Ottawa, and for payment of postage in cash.

FROM THE MINUTES OF THE NOVEMBER MEETING

The President, Bob Knapp, opened the meeting by introducing two visitors:

VE6DY, Stella, From Edmonton, Alberta, and
VELAXK, from St. John, New Brunswick.

The President reported that CJOH had offered the club the use of the TV tower and site at Hazeldean on a long term loan. Bob outlined the problems of policing the shack and preventing the theft of any equipment the club might install. The problem of plowing open a road to the site in winter was also considered an obstacle. Considerable discussion took place on the floor as to whether we had people interested in acting as resident caretakers and whether or not this would be feasible. Distance to the site from Ottawa was also a disadvantage. Further discussion indicated that the members felt they could make little use of this facility, and a show of hands confirmed that the members present were not in favour of accepting the offer.

Charlie Grove, VE3CT was called upon to resolve for the members the question on the constitution raised at the last meeting concerning the expulsion of a member of the executive without cause. He pointed out that this clause was only a device to allow a club to replace someone who may have left the executive without resigning, such as might happen if a member of the executive were suddenly moved from the Ottawa area. He emphasized that a 75 percent majority of the club members had to ratify the expulsion at a meeting called for that purpose only. This fact alone was good democratic protection against abuse of this clause.

The President announced the fall auction again and explained the rules and procedures for the auction. Ray Maskell spoke briefly and asked for volunteers to help in the cataloguing and selling.

Gord Grant presented the following budget for approval:

Publishing	\$360.00
Membership	50.00
Program	10.00
CADC	300.00
Repeater	70.00
Field Day	30.00
Administration	70.00

Total \$890.00

During discussion of the budget it was pointed out that the cost of publishing GROUNDWAVE will be recovered from advertising,

and that the CADC expenditures were recovered as the items were sold. In actual fact therefore, the total expenditures would be about \$230.00. After discussion, the members present voted to accept the budget as presented.

Eric Flott, VE3XE, introduced the speaker for the evening, Mr. Jack Sharron of Olivetti-Underwood who gave an excellent talk on the uses of Desk Top Computers. Mr. Sharron brought a machine for demonstration purposes, and showed how programming was done and how problems were executed. The numerous questions from the floor and the continued interest of the members as they operated the machine after the meeting showed that Mr. Sharron's presentation was indeed well received.

The President spoke on the lack of instructors the the beginners classes, and asked for more volunteers to help out. Several persons volunteered from the floor.

Gord Grant, VE3DY, spoke briefly on his trip to the RSO Convention at Brantford. He sat in on the CARF sessions, and felt that CARF was well "off the ground". Quebec, Saskatchewan, and P.E.I. have not yet joined CARF. Bob Knapp mentioned that CARF was considering moving to Ottawa, and had indicated some officers and secretarial help would be needed.

AREC

By

Gord Beaman, VE3DMU
Ottawa Area Emergency Coordinator

It would seem we have started off rather slowly in the AREC group this season. With perhaps 200 members in the two local clubs, I had hoped to sign up at least 50. We now have 15.

Signing with AREC commits you to very little really; it just gives us an idea of whom we can draw upon in time need. We now have most of the hard core workers, but with each additional member the work load is spread, reducing the pressure on the whole group.

The EMO needs a standby group of electronically oriented volunteers to man and maintain their stations during emergencies, and this is the reason for the EMO registration cards. They do not commit you to EMO authority, but are for record purposes.

You do not need an elaborate station to be valuable to the AREC either; your willingness to help is all that is required. So come on Fellows! Let's see if we can get the AREC rolling.

"C H U CANADA"

By
Syd Sheard, VE3BCL

The radio voice of the Dominion Observatory was first broadcast in 1923. During that year, time signals from the observatory were sent by telephone to a local Ottawa broadcast station and put out over the air at regular intervals.

In 1927 experimental time signals were broadcast directly from the observatory using very low powered transmitters operated from batteries. "Wavelengths" of 20.41, 40.82 and 90 meters were used. These were chosen as close as possible to the amateur bands since the amateurs and experimenters were the majority users of the "short waves."

In 1929 the call sign VE9OB was authorized, and reasonably consistent full time broadcasts began. Canadian time service broadcasting was in business.

Later, the present call CHU was assigned and by 1942 the service consisted of 75-Watt transmitters on 3330 KHZ and 7335 KHZ, and 100 Watts on 14670 KHZ. The Canadian Department of Transport also sent out time signals on 11990 KHZ with a 2KW transmitter and the call VAA. VAA's time transmission were limited to a five minute period (1055; 1100) and were not transmitted on Sundays or on holidays. The Canadian Navy at Dartmouth also relayed time signals via CFH to assist field surveys during the summer in Northern Canada.

During 1946 three "new" transmitters were acquired from the RCAF (AT-3's) and installed at what was then a Department of Transport site approximately 10 air line miles from the observatory. Power was now 300 watts on all frequencies.

In 1951 the first "high powered" transmitter, a Collins 231D20 was installed and operated on 7335 KHZ with an output of 3 KW. This transmitter is still faithfully operating, but now on 3330 KHZ.

In 1961 another new transmitter was put into service on 14670 KHZ with an output of 3 KW. This was a TMC GPT 10K transmitter.

The latest transmitter, a TMC 40K was put into operation during April 1968 on 7335 KHZ, and a new vertical antenna was installed with it. This unit is now running at approximately 5 KW, really loafing.

Prior to 1954, CHU's identity was transmitted by means of code signals which interrupted the "beeps" with "CHU CANADA" in morse code..

That year, the first voice announcements were made through the use of a film strip mounted on a drum and a photo-electric pickup system. This, as was all of the time generating equipment, was located at the observatory, and signals were sent out to the transmitter site over telephone lines.

In 1960, a new self-contained time and frequency control system was installed at the transmitter site, together with a new magnetic drum "talking clock". Extremely stable 100 KHZ crystal oscillators were synthesized to the three carrier frequencies and to 60 Hz for the synchronous control of motor driven clocks. These clocks were equipped with a system of cams and switches which gated in the voice announcements. Accuracy of the system was maintained by continuous monitoring against the masters at the observatory.

In 1963 the crystals were replaced by an atomic frequency standard, the early tube type synthesizers were replaced by solid state units, and the electro-mechanical clocks were replaced by electronic solid-state digital clocks. This system is now in operation.

As a matter of interest, the atomic standard in use is a Rubidium vapor frequency standard that maintains its stability to within 15 parts in 10^{-11} per year. Since this unit's output of 100 KHZ is used for both the time pulses and as a source for the synthesized operating frequencies, both are of the same order of accuracy.

In 1964 bilingual (French-English) magnetic drums replaced the unilingual unit in the "talking clock", and the present familiar voices of CHU were established.

The transmitter site is now unattended. Each "main" transmitter is supported by a standby medium powered transmitter which goes into operation automatically in the event of failure of the main unit. Also the time and frequency generating sources are in duplicate and will transfer on failure of the one in operation.

Critical equipment, including the frequency standards and clocks are all battery/battery-charger operated. This insures continuity of accurate time and frequency until the emergency diesel generator comes on, or mains power is restored.

For those of you who are interested in the details of the time data transmitted, the seconds pulses consist of 200 cycles of 100 cps tone. The beginning of the pulse marks the exact second. The zero pulse of each minute is $\frac{1}{2}$ second long, and the zero pulse of the hour is one second long. The pulses occur at the rate of one each mean time second with the following exceptions:
The 29th pulse of each minute is omitted
The 51st to 59th pulses inclusive of each minute are omitted.
The 1st to 10th pulse inclusive are omitted on the first minute of each hour.

A voice announcement of the time occurs each minute in the 10 Second gap between the 60th and 60th seconds. The announcement is in the 24-hour system, and alternates each minute in French and English.

The unit of time has two definitions. In terms of Ephemeris Time (ET) it is $1/31,556,925.9747$ of the year 1900 January 0 at 12 Hrs ET. In terms of the Caesium Beam frequency standard at zero magnetic field it is defined as 9,192,631,770 cycles.

Ephemeris Time is required in celestial mechanics, while the Caesium Beam resonator makes the unit readily available. National time services distribute coordinated time called Universal Time Coordinated (UTC), which approximates mean solar time (UT2). It is derived from the atomic standard by offsetting the output frequency. This offset is revised each year, and when a change is needed it is applied at the beginning of the year. By International agreement these changes are coordinated through the Bureau International de L'Heure, so that most time services are synchronized to the millisecond.

A point which must be remembered when taking advantage of the extremely high level of accuracy maintained by time and frequency radio transmissions is the distance between the transmitter and the receiver. Although the speed of radio waves is considered to be approximately 186,000 miles per second, this when related to terms of microseconds is a significant factor. There is also the transit time involved in the passage of the signal through the receiving and recording equipment. Although CHU's transmitters are only approximately 10 air line miles from the observatory, daily monitoring of the signals against the observatory's master must take into consideration a known delay of .24 microseconds. Similarly in monitoring signals from WWV, Fort Collins, Colorado, allowance must be made for an 8.7 microsecond delay.

CHU receives hundreds of requests for confirmation (QSL's) every month from all over the world. (Incidentally we QSL 100%.) Unfortunately the transmitter site is not open to the public, but anyone interested in more information is always welcomed at the observatory.

BRITISH MOBILERS ON THE INCREASE

Recent figures show that there are now over 2,500 licenced British mobilers. This figure is 20% of the total licenced amateurs which stands at approximately 13,700. Ironically, the British Mobile Society has a membership of 375 and reports a decided decrease in membership. Perhaps the new look of the OARC should be brought to BRMS's attention!



S E A S O N S
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Electrical bandspread.	
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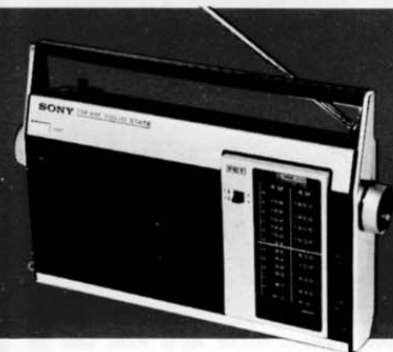
SONY 4F55W — Compact FM/AM Radio. Slim and graceful, with all controls conveniently mounted on one edge for easy finger control. Includes such advanced features as ceramic filter for stable AM reception, automatic gain control and silicon transistors in the FM tuner section. Has large 2½" FM speaker and weighs only 11 oz. In black, blue or red with white comes complete with earphone, carrying strap and batteries.
SUGGESTED LIST PRICE
\$39.95



SONY 6F21W — Smart, compact FM/AM portable radio. Precision engineered 9 transistor circuits with automatic frequency control assure the best FM reception. Has large tuning knob for precise tuning and red dot on top of dial scale indicates wave band on reception. Other features include unique carrying handle and a complete range of jacks for earphone, recording, multiplex FM stereo adaptor and AC power adaptor. Complete with batteries and earphone.
SUGGESTED LIST PRICE
\$59.95



SONY 6F19W — New Sony high performance 2 band portable for FM/AM reception. Improved FM tuner with all transistorized circuitry picks up the weakest signal with the aid of its telescopic antenna. Has big 3½" dynamic speaker, easy to use tuning knob—light only 1 lb. 10 oz.—AFC switch to prevent FM station drift. Convenient grip handle lets you carry it anywhere. Complete with earphone and batteries.
SUGGESTED LIST PRICE
\$49.95



SONY 7F81W — Sony's Deluxe 2 band FM/AM portable. Features the most advanced circuitry available today. 12 transistors including 1 F.E.T. (Field Effect Transistor) and a unique ceramic filter gives you the utmost sensitivity and selectivity. Equipped with big 4" speaker, AFC switch to prevent FM station drift, tone control for music and speech, tuning meter, full scale slide rule dial for accurate pinpoint tuning plus a convenient dial light for night use.
SUGGESTED LIST PRICE
\$79.95



8F56W—Component-styled AM/FM radio in solid walnut finish. Sony design, together with 9 transistors and a full 4" speaker for brilliant sound, enhances any decor. Operates on AC current. Automatic Frequency Control switch "locks in" FM stations. Conveniently grouped control knobs on front, easy-to-read wide slide rule dial and tone control knob for variable tone control.
SUGGESTED LIST PRICE
\$79.95

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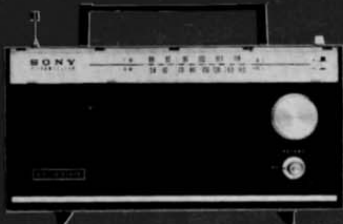
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am/fm mantels



SONY 8F46W — Attractive FM/AM 2 band home radio, with high impact resistant Styrol cabinet in simulated wood finish, the extra long ferrite antenna gives distortion-free reception, while the telescopic antenna assures full quality FM. Simple push button band setting and large distinct dial makes station tuning easy. Complete with batteries.
SUGGESTED LIST PRICE \$59.95

Magnificent FM/AM Radio Sculptured in Rich Resonant Hardwood

Deluxe 8F-48W matches rich contemporary styling with superb high fidelity performance. Operates on battery or AC. Lots of sound power — 1.3 Watts — to drive a wide range 5" front mounted speaker. For the professional touch.

Built in special flywheel tuning that makes station selection a pleasure with our easy-to-read slide rule dial. And there's more features like continuous tone control for adjusting the sound and a built-in AFC for more accurate, drift-free FM. Touch 'N Play switches for easy-on FM and AM, too. The unit on the right is our optional twin-styled **STA-48 Adaptor** that turns the merely magnificent into stunning FM stereo. The adaptor has its own tone, volume controls and a stereo indicator light. Plug it into the 8F-48W and you're ready to enjoy perfectly balanced stereo anywhere you desire.
SUGGESTED LIST PRICE, RADIO \$89.95 SUGGESTED LIST PRICE, ADAPTOR \$69.95
***NOTE** — Available in October 1968.



SONY TFM-1000W — A full size radio that gives a full size performance, this 14 transistor portable pulls in static-free FM/AM, Marine and Shortwave broadcasts. High sensitivity and selectivity on all bands due to RF amplification. There's a lot of power from a big 4" x 6" oval speaker. More deluxe features: gear driven tuning for accurate and drift free tuning. Fine tuning for shortwave and variable tone control for adjusting the sound to suit your taste. Complete with batteries and ear-phone.
SUGGESTED LIST PRICE \$169.95



SONY 8F47W — FM/AM Home Radio with sound as rich as its decorator designed appearance. With built-in telescopic antenna for FM and ferrite bar for AM reception, the set is powered by 4 flashlight batteries. Beautiful walnut cabinet matches any room decor and easy-to-grip handle makes for easy portability. Simple band setting push button and large distinct dial makes for easy station tuning.
SUGGESTED LIST PRICE \$69.95



TRANSCEIVER CB-147W — Deluxe model with separate speaker and microphone. Has advanced 10 transistor circuitry and is push button controlled, truly portable it weighs a mere 1 lb. 10 oz. and has a handy carrying case. With battery indicator, new squelch control dial and batteries.
SUGGESTED LIST PRICE \$169.95 pair

transceiver

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gift radios



TR-1829—Unique Desk Radio—the latest in radio fashion is this handsome tubular SONY set that will strike a pleasing note on any desk or night table. In an exquisite simulated walnut finish with accents of brushed chrome, the set stands a shade under 5" high and 3" in diameter, and weighs only 12 ozs. Easy to operate, the tuning wheel is a large dial at the top of the radio that flips at the touch of a finger, with a large window for easy station selection. With six transistors and ceramic filter for extra selectivity, the TR-1829 covers the standard broadcast band with power from three inexpensive batteries. Keep it in mind as the perfect gift for any occasion.

SUGGESTED LIST PRICE \$29.95

SONY TR-1839—Deluxe Touch 'n Play Desk Radio. Sony's unique contemporary styling conceals a robust AM radio in a slim, simulated walnut cabinet about the size of a small desk diary. Just a light touch of the brushed chrome face instantly reveals the set's recessed tuning controls and turns on perfectly brilliant AM. The set also turns itself off automatically when the cover is closed. Inside, the handsome control panel features a slide rule dial for easy, pin-point tuning and a volume control dial for adjusting the sound. What's more, Sony's cleverly designed cover not only amuses but also helps project the clean rich tone. Operates on 4 penlight cells. For styling and sound, it's an amazing little desk radio for the coffee table, office or as a gift.

SUGGESTED LIST PRICE

\$34.95



SONY TFM-1849W—Another SONY deluxe Touch 'n Play radio with AM/FM. Same as the TR-1839 (as illustrated) set, will play by just touching the front chrome face. The set has a built-in FM antenna for drift-free FM reception as well as ferrite bar antenna for AM. Inside control panel features a large slide rule for easy tuning, AM/FM selection switch and a volume control dial for adjusting the sound. A deluxe simulated walnut finish cabinet with chrome accents makes this a superb radio.

SUGGESTED LIST PRICE

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SONY 2R29—Popular 6 transistor shirt-pocket radio. A slim, 6.6 oz. AM set that operates on inexpensive penlight batteries and projects powerful sound from a 2¼" speaker. Magnified tuning window for easy station selection. Styled in a high-impact case with full-size silver face. Complete with batteries, earphone, and carrying case. **SUGGESTED LIST PRICE \$17.95**



6R22—Sensitive AM portable with 6 transistors. All controls grouped on side for easy finger tip tuning. Set has a dynamic speaker with large easy to read dial. In black, green or burgundy, complete with batteries and earphone. External power input jack, for easy A/C adaption. **SUGGESTED LIST PRICE \$29.95**



SONY 6R11—A 9 transistor AM portable with an RF stage of the highest sensitivity and selectivity. Using a large 3½" P.M. dynamic speaker and a high/low tone control the set produces sound to rival much larger sets. In brown, grey, and maroon, complete with batteries, earphone, carrying case and strap. **SUGGESTED LIST PRICE \$39.95**



SONY 2R30—New pocketable trend setter. With 7 transistors for sharp stable AM reception. This set features controls designed for easy fingertip tuning; magnified tuning window for easy station selection. Comes in high impact case with colorful speaker grill. Styled in 3 exciting colors—ivory, metallic blue and burgundy red. Complete with color co-ordinated carrying case, batteries and earphone. **SUGGESTED LIST PRICE \$19.95**

am/mantel radios



SONY 8R42—Truly handsome table radio. This all transistor model gives constant trouble-free operation at a moderate price. The large dynamic speaker reproduces music, news, sports, and weather information with rich quality sound. The beautiful color cabinet comes in a choice of light blue, dark green, and ivory white. Four "D" flashlight batteries are included. **SUGGESTED LIST PRICE \$29.95**



SONY 8R43—Favorite entertainers, composers, news commentators—all sound better on the SONY 8R43, thanks to the rich tone and powerful volume from the beautifully finished piano wood cabinet. The dynamic four-inch speaker delivers SONY sound quality you've come to trust. Complete with four "D" cell batteries. **SUGGESTED LIST PRICE \$39.95**

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clock radios

SONY 8RC52 — Exciting new component styling in a solid state AM clock radio. Very smart — inside and out! Inside several remarkable Sony ideas. Like instant play all transistor circuitry. Superb clear sound from big 3" dynamic speaker. Outside — contemporary styling! Modern clean design to grace the bedroom or any room. Reliable electric clock with unique timer switch turns set on or off automatically, also has an alarm and 'slumber' switch. Power supply AC current.
SUGGESTED LIST PRICE \$49.95



SONY 8RC-54 — AM clock radio styled in rich walnut finish with black and silver accents to highlight any room decor. And for listening pleasure instant AM comes on clean and clear with a variable tone control, with solid state circuitry, and a full 3 1/2" speaker. Station selection is more precise with our slide rule dial tuning, too. For time at a glance, there's a softly illuminated clock with a front clock switch that even makes time setting easier. Of course, the set features a timer switch that shuts the radio off — or turns it on automatically. There's an alarm buzzer for heavy sleepers and for midnight listening, a slumber switch that shuts the radio off after an hour of play. The set operates on AC current.
SUGGESTED LIST PRICE \$59.95



SONY 6RC-23 — Space-saver clock radio. Handsome cube-shaped set is so compact it fits anywhere — ideal for people who want to enjoy the convenience of a big clock radio in a limited space. And the rich simulated walnut finish blends with any decor. Wakes you to delightful music at the time you preselect and the full-size clock face is easier to read than ever. A front clock switch makes for easy time setting. With advanced solid state circuitry, there's 450 milliwatts of output power and a 2 1/2" speaker that projects clean AM from the sound-chamber cabinet. The set is powered by AC house current.
SUGGESTED LIST PRICE \$39.95



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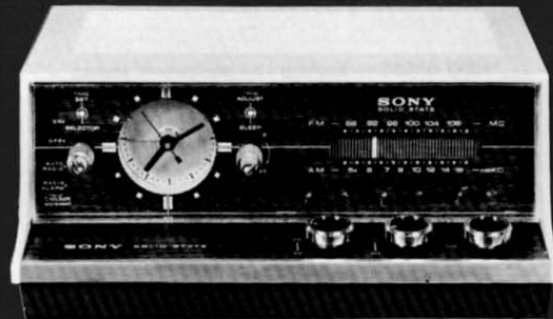
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clock radios

SONY 8FC53W—Sony's latest decorator designed all transistor FM/AM clock radio for heavy sleepers. Styled to fit any decor. Features a timer switch that turns radio off and on automatically. Alarm and slumber switch too. Has easy-to-read illuminated clock. For sound quality: 9 transistors and 3" dynamic speaker. Automatic frequency control switch 'locks in' FM stations. Easy-to-use tone control and slide rule dial tuning. Power supply AC power current.
SUGGESTED LIST PRICE \$69.95

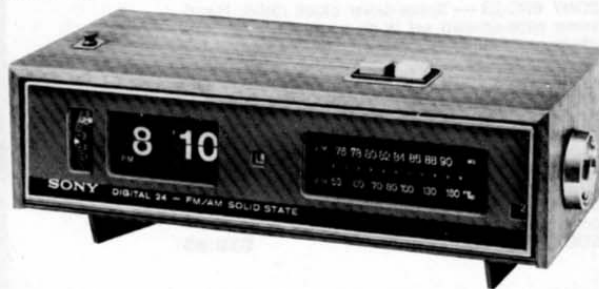


SONY 8FC-55W—Compact clock radio exquisitely designed in a rich walnut with ebony and silver accents to add the magnificent touch to any room. Of course, instant FM/AM comes on fabulous, too, with the special 9 transistor circuitry and a full 3 1/2" speaker that's set in a hardwood cabinet for the finest tone. There's an AFC switch for drift-free FM, a variable tone control and slide rule dial tuning for precise station selection. This softly illuminated clock is easier to read than ever and features a front time control for easy time setting. A timer switch shuts the radio off—or turns it on automatically. Has built in alarm buzzer for heavy sleepers and for midnight listening, a slumber switch shuts the radio off after an hour of play. Operates on AC current.
SUGGESTED LIST PRICE \$79.95



SONY 8FC-69W — FM/AM Deluxe Digital Clock Radio

SONY 8FC-69W — FM/AM Deluxe Digital Clock Radio. Wake up or drift off to the latest in bedside luxury and convenience. Unlike ordinary clock radios, this Deluxe Hardwood Digital Clock Radio runs on a 24 hour synchronized system so you don't have to wake up late because you forgot to set the clock. Just preset the time once for waking and the 8FC-69W turns on automatically every day at the time you've preselected. Turns off automatically too, after an hour of play and for ordinary use, there's a manual on/off button. And with Sony's "Digimatic" you don't have to set the clock within a 12 hour period like conventional clocks. Which means that now you can preselect your waking time whenever you want. Large, easy-to-read numerals tell the time minute by minute and the clock face is softly illuminated in orange for convenient night use. Styled in a rich hardwood to grace any decor. Of course, a sleep timer shuts the set off at night and there's an alarm buzzer for heavy-sleepers. Built in special circuitry makes sure should you drift off to soft music, the set will automatically adjust to a pleasant slightly higher tone for easy waking.



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*NOTE — Available in October 1968.

317 BANK ST.

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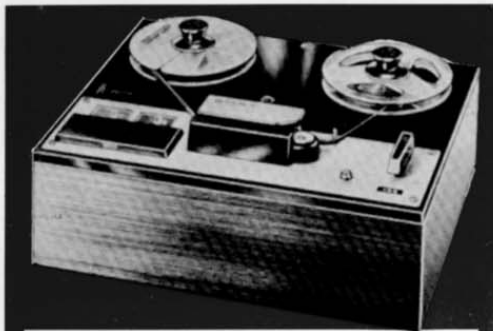
STEREO!

tapedecks



TC-125 — New Sony all silicon transistor AC/DC 4-track 2 channel stereo cassette tapedeck designed to give you the best quality stereo when connected to your other components. Beautifully finished in low profile walnut grain base. Features include: piano key push button operation, tape counter, noise suppressor switch, tape sentinel lamp, cassette ejector plus instant stop button.

SUGGESTED LIST PRICE **\$149.95**
*Available in December 1968.



TC-250A — Custom engineered stereo tapedeck recorder for the most exacting high fidelity sound system requirements. This 4-track tapedeck with recording amplifiers and playback pre-amplifiers has 2 speeds (7½ and 3¾ ips). There's an automatic shut-off switch, pause control, index counter, dual VU meters, non-magnetizing heads, FM stereo inputs (multiplex ready for recording FM stereo 'off the air'), automatic tape lifter, operates in vertical or horizontal positions. Complete in walnut finish base.

SUGGESTED LIST PRICE **\$189.95**

TC-255 — Add the quality of Sony stereo or monophonic tape recording and playback to your stereo music system with this new Sony tapedeck recorder. In this model you will find new and exciting features normally found in much higher priced equipment. Such things as: three speeds, split channel record buttons, professional ultra-high frequency bias, vibration-free motor, scrape flutter filter — retractable pinch roller, stereo headphone jack. Vertical or horizontal operation. Complete with walnut finish base.

SUGGESTED LIST PRICE
\$229.95



TC-355 — Stereo Tapedeck Recorder. Here is a 3 head professional quality tape deck recorder to satisfy the recording and listening requirements of the most discriminating hi-fi enthusiast. Versatile performance techniques include: sound-on-sound, tape-and-source monitoring, (for comparison between sound source and tape being recorded), scrape flutter filter, eliminates tape modulation distortion, noise suppressor switch, ultra high frequency bias, (to achieve true high fidelity response at 3¾ ips); vibration free motor — 4 track stereo and monophonic recording and playback, non magnetizing heads, instant tape threading, 2 VU meters. Pause control and four digit tape counter, automatic sentinel shut-off automatic tape lifter, stereo headphone jack. Complete with walnut finish base.

SUGGESTED LIST PRICE
\$289.95

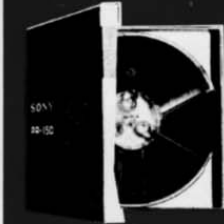


TC-560D — Auto-reverse stereo tapedeck recorder. Sony is proud to present the all new 560D. A solid state stereo record/playback tapedeck recorder unmatched in quality and performance. Featuring Sony E.S.P. automatic tape reverse and mounted in a handsome low profile walnut cabinet. Of course it contains other famous Sony features such as: Servo-control motor system, 3 speeds, 4 track stereophonic and monophonic recording and playback, 2 VU meters, stereo headphone jack, non magnetizing heads, noise suppressor switch, scrape flutter filter, instant tape threading, 4 digit tape counter and operates in vertical or horizontal position.

SUGGESTED LIST PRICE
\$449.95



SONY accessories



SONY PROFESSIONAL RECORDING TAPE

PR-150 — 1 mil thin, extra strong polyester base high fidelity tapes with Sony special impregnated lubricant which ensures intimate head contact for maximum fidelity and minimal recording headwear. Offers 50% more playing time and is virtually impervious to heat, cold or humidity. Available in 3 reel sizes, each in attractive cardboard carton pack.

Type	Reel size (diameter)	Tape Length	Playing time per track			SUG. LIST
			(7½ ips)	(3¾ ips)	(1½ ips)	
PR-150-3	3 in.	300 ft.	8 min.	16 min.	32 min.	\$1.50
PR-150-5	5 in.	900 ft.	24 min.	48 min.	96 min.	\$3.50
PR-150-7	7 in.	1800 ft.	48 min.	96 min.	192 min.	\$5.00

SONY TAPE REELS

With large reel surface designed to write on.

- R-3A — 3 in. reel **69¢ ea.**
- R-5A — 5 in. reel **75¢ ea.**
- R-7A — 7 in. reel **\$1.25 ea.**
- R-5S — 5 in. Sony-automatic reel. **\$1.50**



SONY MICROPHONE MIXERS

- MX6S** — 600 ohm impedance stereo or monophonic and line input mixer with independent level controls for each channel. Used for all Sony Stereo Tape recorders. **\$41.95**
- MX10K** — 3 channel monophonic and line input mixer. 10K ohm impedance with individual level controls for each channel. **\$26.95**
- MX600** — As MX10K with 600 ohm impedance. **\$26.95**

MISCELLANEOUS ACCESSORIES

- RM-6** — Speed control for TC-800. **\$13.95**
- FS-5** — Foot switch. A convenient device to stop and restart motion with your foot while recording or playing back, specially designed for Sony TC-800 and TC-900. **\$10.95**
- TP-4S** — Telephone pick-up (with mini plug): adaptors to pick up and record both ends of telephone conversations. **\$2.95**

ADAPTORS

- AC-6** — AC Power Adaptors for TC-907. **\$19.95**



MICROPHONES

F-96 — Lor H dynamic microphone with thin tapered design and unique removable stand. Complete with cord and mini plug. Low 600 ohms or high 10K ohms impedance. For following Sony Tape recorders: 102M (only F96H) 104, 105, 260, 250A, 350 and 530. **\$19.95**

F98-L — Cardioid dynamic microphone — thin tapered design with unique removable stand. Complete with cord & connecting plug. For the following Sony tape recorders: 560D, 560, 255 and 355. **\$27.95**

TAPE CLIPS

- TF-3** — Clip for holding tape on 3-inch reel. **.25 ea.**
 - TF-5** — Clip for holding tape on 5-inch reel. **.30 ea.**
 - TF-7** — Clip for holding tape on 7-inch reel. **.35 ea.**
- MICROPHONE EXTENSION CORDS**
- EC5M** — 16 ft. cord with mini plug and jack. **\$4.95**
 - EC5A** — 16 ft. cord with phono plug and jack. **\$4.95**
 - EC-10M** — 32 ft. cord with mini plug and jack. **\$6.95**
 - EC10A** — 32 ft. cord with phono plug and jack. **\$6.95**
 - EC25M** — 80 ft. cord with mini plug and jack. **\$11.95**
 - EC25A** — 80 ft. cord with phono plug and jack. **\$11.95**



SONY STEREO HEADSETS Earphones

- DR-3A** — Low impedance (8 ohms) dynamic headset with a binaural phone plug. **\$19.95**
- DR-3C** — High impedance (10K ohms) dynamic headset with a phone plug. **\$19.95**
- SE-1** — Low impedance magnetic stereo earphone with a binaural phone plug for binaural monitor. **\$7.95**
- CE-3** — General purpose high impedance crystal earphones (with mini plug). **\$1.49 ea.**
- ME-10** — Magnetic earphone with mini plug. **\$1.49 ea.**
- MR-10** — Magnetic earphone with mini plug. **.65 ea.**

PLUG ADAPTORS

- PC-1** — Phone plug to mini-plug. **\$1.35**
- PC-2** — Mini-plug to large phone plug. **\$1.35**
- PC-3** — Impedance matched 8 ohm mini-plug connector for recording from extension speaker jack. **\$1.30**
- PC-5** — Mini-plug to phono plug. **\$1.35**
- PC-6** — Impedance matched — high level output to low level input. (Speaker to mic input jack). **\$1.30**

SONY CONNECTION CORDS

- RC-2** — Connection cord with 5-pin connectors on each end for connection of a tape recorder to radio receiver or an integrated amplifier for recording from or for reproducing through the connected radio or amplifier. **\$7.95**
- RK-34** — 10 ft. cord with mini plug on each end. **\$2.50**
- RK-35A** — Special trick recording connection cord. **\$2.50**
- RK-36** — 3 ft. cord with mini plug on one end and alligator clips on the other. **\$2.50**
- RK-46** — 3 ft. cord with phono plug on one end and alligator clips on the other. **\$2.50**
- RK-50** — 3 ft. cord with mini plug on one end and phono plug on the other. **\$2.95**
- RK-55** — 7 ft. cord with phono plug on one end and alligator clips on the other. **\$2.95**
- RK-56** — 3 ft. cord with two phono plugs on each end. **\$2.95**
- RK-58** — 3 ft. cord with mini plug on each end. **\$2.95**
- RK-64** — 3 ft. cord with mini plug on each end, for recording from another tape recorder, radio, etc. **\$2.50**
- RK-66** — 3 ft. magnetic phono connecting cord with a mini plug for low impedance microphone jack of a recorder and a phono plug for the output jack of a magnetic cartridge. **\$6.95**

All Sony Tape recorders Fully Guaranteed and CSA Approved

GENERAL DISTRIBUTORS LIMITED

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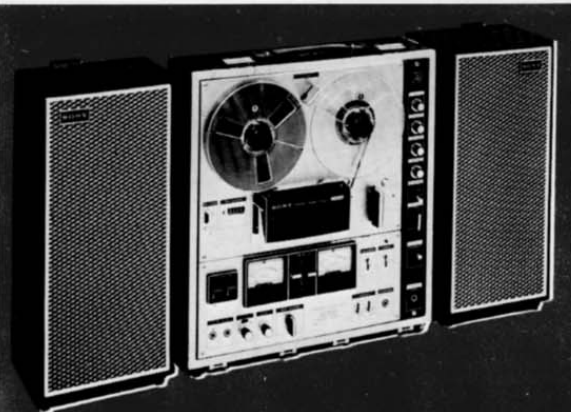
SONY®

STEREO!

tape recorders

TC-560 — New 4-track stereophonic and monophonic tape recorder designed for easy carrying. With exclusive ESP (Electronic Sensory Perceptor) an automatic tape reversing system. Six full hours of uninterrupted stereo reproduction is yours with this newly developed feature from Sony. Other TC-560 features that assure you of reliable performance and simple operation are: 3 tape speeds, dual VU meter, treble and bass tone controls, mode selector, noise suppressor, record and playback. Volume controls for each channel, automatic shut-off switch, self-release instant stop, single-lever control, retractable pinch roller for simple tape threading, 4 digit index counter. All this in a beautiful leatherette covered wooden cabinet complete with 2 dynamic microphones equipped with stands, connecting cord, reel caps and head cleaning ribbon.

SUGGESTED LIST PRICE \$549.95

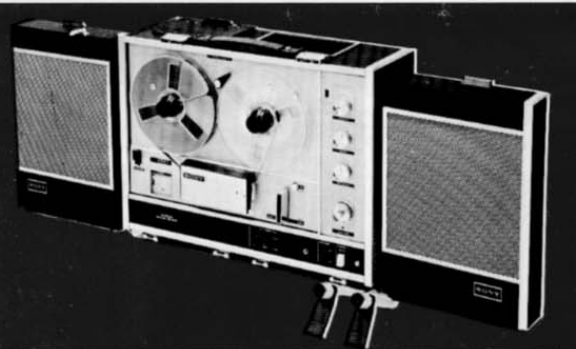


TC-630 — New Sony portable stereo centre with sensational sound. Solid state circuitry provides 20 watts of pure stereo music power, utilizing 2 speakers. Other features include 2 professional VU meters, retractomatic pinch roller for easy threading, 3 head, 3 speed (7½, 3¾ and 1⅞ ips). Sound-on-sound, separate switches for power amplifier and pre-amplifier, speaker switch for external speaker, echo effect, slide recording volume controls. 4 digit tape counter. Complete with 2 Sony dynamic microphones.

SUGGESTED LIST PRICE

\$529.95

*Available in December 1968.



TC-540 — Complete home entertainment tape system. Delivers the full stereo range of sound reproduction utilizing 4 speakers. Low frequency speakers are built right into each side of recorder, while detachable lid houses high frequency speakers. 3-speeds (7½, 3¾, and 1⅞ ips). Retromatic pinch roller provides clear unobstructed tape path for easy threading. VU meter accurately indicates record and playback levels. Separate bass and treble tone controls. Other new features: playback mode selector of L R, L+R, and stereo plus sound-on-sound recording. Complete with 2 Sony F96 dynamic microphones.

SUGGESTED LIST PRICE

\$449.95

*Available in December 1968.

All Sony Tape Recorders Fully Guaranteed and CSA Approved

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SONY®

The World's Best!

tape recorders

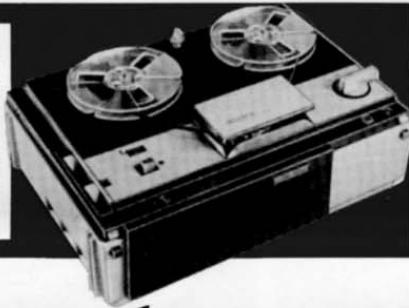
SONY TC-102M — Lightweight and compact model TC-102M is an economical and rugged performer that will satisfy the most exacting recording requirements. This 2-speed (7½ and 3¾ ips) dual track monophonic unit features: 7" reel capacity, VU meter, tone control, automatic tape lifters, dictating pause control, tape counter and mic/line mixing controls. Built-in speaker and amplifier also serve as P.A. system. Frequency response: 50 - 12,000 cps at 7½ ips. Complete with Sony F96 dynamic microphone.

SUGGESTED LIST PRICE \$169.95



SONY TC-104A — Here is a top quality functional monophonic tape recorder that will operate perfectly and practically automatic. You will find more convenient features such as: 3 speeds (7½, 3¾ and 1½ ips) automatic recording volume control system, easy tape loading, tape index counter, automatic shut-off switch, jack for external speaker, speaker on/off switch, pause control plus 2 track monophonic recording and playback. Complete with Sony dynamic microphone.

SUGGESTED LIST PRICE \$165.00



TC-105 — This is the finest 4-track monophonic AC recorder available. This compact portable recorder offers such a wide range of features such as: 16 hours of continuous recording or playback, automatic recording control, instant tape threading, 3-speeds, automatic tape lifter, pause control, 4 digit tape counter and tone control. Complete with Sony dynamic microphone.

SUGGESTED LIST PRICE \$209.95

stereo tape recorders

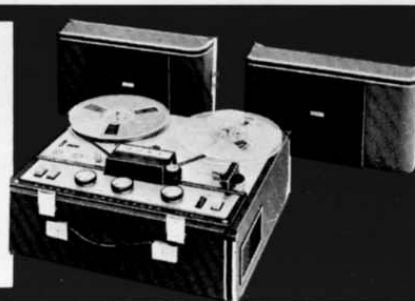


TC-230W — Stereo Tape Recorder, with the luxurious look of fine furniture, the Sony 230W provides the nucleus of a complete component stereo system. The built-in stereo pre-amplifier and 20-watt music power amplifier has input and switching facilities for connecting of a stereo phonograph or stereo FM tuner. Special features include: non-magnetizing heads, 4-track stereo with mono recording and playback, 3-speeds, instant tape threading. Automatic shut-off, pause control, 4 digit tape counter, noise suppressor switch and tone control. Complete with **SONY SS-23 Speaker System**

SUGGESTED LIST PRICE \$369.95

TC-200T — Compact design and superb craftsmanship have been combined by Sony to produce this 4-track stereo and monophonic tape recorder. With such features as: sound on sound recording, public address facility, built-in amplifiers and lid integrated speakers, 2 speeds (3¾ and 7½ ips), 7" reel capacity, two VU meters, variable tone control, instant stop and individual track selection. Complete with 2 Sony dynamic microphones.

SUGGESTED LIST PRICE \$279.95



SONY TC-230 — The Sony 230 with its built-in Stereo Control Center serves as the basis for a complete component system. Simply connect a stereo FM tuner, stereo turntable or record changer; flip the selector switch on the 230's control center panel—immediately you have the desired sound source for listening or recording. And what sound with the 2 beautiful lid-integrated Sony fly-away speakers. Features 4-track stereo and mono playback and recording, 3 speeds, instant tape threading, automatic shut-off, automatic tape lifters, pause control, 4 digit tape counter, noise suppressor switch and tone control. Complete with 2 Sony microphones.

SUGGESTED LIST PRICE \$325.00



TRADING POST

Send articles for inclusion in this column directly to Jack Whittingham, VE3YC, 512 Sherbourne Road, Telephone 722-7076.

FOR SALE

Apache Transmitter with SSB 10 Sideband Adapter	232-0088	Ron	VE3DBM
D-104 Ceramic Mic and Stand	232-6084	John	VE3EYY
Dow Coax 110 volt Relay Footswitch 8-ohm Mibile speaker Muffin Fan, 110 Volts Waters 6 position Antanna Switch Waters Compreamp	722-7076	Jack	VE3YC
Triplet Output Meter 650-SC RCA VTVM WV77A Heathkit VTM Probe 309C Heathkit Visual-Aural Signal Tracer IT-12 Heathkit Resistance Substitution Box IN-12 Heathkit Capacity Substitution Box IN-22 Heathkit Tube Checker- IT-21 (Manuals for all)	749-3669	A.P. McKillip	106 Mafeking Ave.
Viking Ranger Tx Viking II Tx National NC200 Receiver, with speaker Home-brew 100 watt 2 meter Tx. power supplies, etc rack mounted RME 2-6-10 Meter Converter	733-6921	Syd	VE3BCL
Stark 20,000 ohm-per-volt V.O.M. 5" Meter.	722-7-76	Jack	VE3YC

ITEMS WANTED

Match Box or similar, 250 watts Multi-Meter or VTVM	992-2462 822-2821	Frank Bob	VE3DHQ VE3GOL
Tri- and or better transceiver	233-4746	Larry	VE3CPG
General Coverage Receiver	733-7108	Doug	VE3CDC

ITEMS TO TRADE

Minox 8mm camera with built-in light meter, Camera value \$150.00 (Original Spy Camera). What have you in radio gear?

DX TOPICS

By
R. John Athey, VE3CTX

At the present time a severe solar flare is disrupting most long haul DX paths. However by the time you read this conditions should have returned to normal.

It is interesting to note that 15 meters is occasionally open to Central Asia and India before breakfast, with strong signals coming in over the pole. A considerable number of Japanese stations can be worked on this band about 5 to 7 pm local time with modest equipment.

During the last two weeks the following Asian DX has been caught:

20 meters

4S7PB	Ceylon	Q4	S4	Paddy	QSL to K6CAZ
UD6HB	Azerbaijan	Q5	S8		
UF6CA	Georgia	Q5	S7		
UL7LA	Kazakh	Q4	S7		
UL7SG	"	Q5	S8	Alex	
VU2BX	India	Q5	S6	Dar	
VU2CK	"	Q5	S7	Harry	

15 Meters

UI8CD	Uzbek	Q5	S5		
UO5BM	Moldavia	Q5	S7		
VS6DR	Hong Kong	Q5	S8		
VU2DKZ	India	Q5	S9	Zal	

The CQ World Wide contest as usual produced a flurry of activity and odd prefixes. Propagation did not seem quite as favourable as last year for this event.

The appearance of VKØIA on Macquarie Island was welcomed by a number of local DX'ers, although signals were weak and the QRM fierce. FG7TI/FS7 French St. Martin was operated by VE3's EUU and GMT.

Special prefixes which are not shown in the A.R.R.L. Countries List are explained as follows:

OM	Czechoslovakia	4M	Venezuela
HQ	Honduras	A2	Botswans

Don't forget that with the new postage rates QSL cards require 6¢ in Canada. Check with the Post Office for overseas rates.

MEXICAN HAM LICENSES

By
H. Sheperd, VE3DV

For those of us lucky enough to be arranging a visit to Mexico this winter here are a few tips gleaned from the writings of W4DWD, Jules Bamberg. Jules, in addition to being a very active ham is also an avid travel trailerite who recently completed a 4000 mile trailer jaunt through Mexico. We would caution the reader, however, to first check with Bruce Spanton, or one of the DOT stalwarts on any of the requirements which follow:

1. Obtain three facsimile copies of your ham license.
2. Prepare a letter in English which includes
 - a) complete itinerary with dates and locations
 - b) purpose of operation
 - c) description of equipment and power output contemplated.
3. Have letter translated into Spanish.
4. Send one copy of English and one copy of Spanish letter together with the three copies of your licence to:

El Director General, Ing Jorge Suarez Diaz
Telecommunications, Dept De Frecuenais,
Oficina Administrativa,
Mexico, DF

5. Allow a minimum of thirty days for a reply.

TRAFFIC

By
Bert Coy, VE3GI

Carrying on our series on message handling let's talk a bit more about What, Where and How.

The terms of our licenses permit message handling for other than the two operators concerned - so-called "Third Party Traffic" - under certain restrictions. Remember that phone patches are third party traffic too!

Content: The message must not be important enough to be sent by commercial means. This rules out death notices, most business correspondence, and most requests for money. There are exceptions, of course, but as a general rule dont touch them.

Destination: OK within Canada and to any country that has a third party agreement with Canada. The sheet accompanying your licence lists these countries, but note that no agreement exists with most European and Asiatic countries, nor with most British territories or colonies.

You have probably heard traffic being handled in the form - "phone Joe at 333-444 and tell him..... from Pete". This is sloppy even if the other station is going to deliver. I leave it to your imagination what 2 or 3 relays can do to a message like this! For relaying, messages must be set up in the proper form, which is: Number, Station, Check, Place of Origin, Filed Time, Date, Address, Text and signature.

A few words of explanation about these parts is in order:

Number: Just number your messages consecutively as you send them.
Station: This is the call of the originating station.
Check: The number of words in the text of the message. This is a great help for accuracy as a word or line left out is obvious.
Place of Origin: It helps to identify where the message started from, and is a help in routing a reply.
Filed Time: This is optional but is usually included. Most amateurs use GMY - if you do be sure to get the date right. If you don't use GMT, specify the time zone.
Date: This is the date of the message. Have you ever heard a message that said "I'll be home Tuesday" ? What Tuesday??
Address: Who it is going to. Make the address complete - don't make the delivering station look up all the Joneses in the book. Phone numbers help greatly.
Text: This is what you want to say. Make it concise, unambiguous, and please don't make it "cute" or "risque". If the text is such that you would be embarrassed to deliver it to a stranger the delivering operator probably will be to. Personally I mail such traffic without return address.
Signature: The name of the person sending the message. Make it complete enough to identify you to the recipient, particularly if you are not too well known. I once had a man say, "I don't know any 'pootzy' in Chicago - is this a gag?"

In sending the message a break sign (BT) is used between the address and text and again between the text and signature. No other punctuation is sent unless it is spelled out.

Get those Christmas messages out in plenty of time so they can reach their destination before the holidays; remember the nets are busy at that time. The words "HXF" Dec.23" inserted after the number will tell the delivering station to "hold delivery until Dec. 23". Use numbered texts which are listed in the back of the ARRL log book if they cover what you want to say.

WANTED - ARTICLES FOR GROUNDWAVE

GROUNDWAVE is YOUR paper, and should express news and views on things of interest to the club and to club members. As editor I can always find lots to write about, but with over 250 members there must be lots of interesting things happening. If you feel something is of interest, write it down and send it to me anytime, or give it to me at a club meeting. Just one word of caution: Don't copy articles wholesale from other magazines; to comply with copywrite laws we must give credit to the magazines if we use them.

QRR - INSTRUCTORS NEEDED

Beginner's classes have been rolling along since October 7th with a combined membership of forty-odd ham ticket hopefuls and three hard-pressed instructors. If you had been at the November meeting you would have discovered that these instructors now are:

Club Vice-President, George Roach VE3BNO
GROUNDWAVE Editor, Jim Dean VE3 DRV
Course Planner, Bud Willing VE3ANL

A public plea for volunteer short-term relief in this department provided an encouraging response from seven spirited members, namely Al Kirk, John Morgan, Bill Ross, Clare McKerrow, Bob Swinwood, Ron Archer, and Gord Beaman. VE3 DMU (You were already on the "wanted" list, Gord!).

Here is your chance to join the Honour Roll and be counted. Temporarily, the situation is improved, and so a record of your name and telephone number is about all that is needed right now. To provide this, or for further information, please contact:

Bud Willing, VE3ANL
5 Parthia Avenue.
Ottawa.
Phone: Home 728-3811
Office 992-6162.

NOTICE - BEGINNERS CLASS SCHEDULE

To allow for the Christman/New Year's break, the normal schedule of instruction for beginners classes will be interrupted as follows:

Radio Theory

Last class in December - Monday December 16th, 1968
Instruction resumes - Monday, January 6th, 1969

Morse Code:

Last class in December - Wednesday, December 18th, 1968
Instruction resumes - Wednesday, January 15th, 1969

JANUARY MEETING

Mark your calendars now! Because the first Wednesday in January falls on New Year's Day, the club meeting will be held on the second Wednesday, January 8th.

WLAW CHANGES FREQUENCIES

Just about all of us have at one time or another listened to the WLAW code practice transmissions as we struggled for our tickets, tried for code proficiency stickers, or monitored the ARRL Buletins to see what was doing in Hamdom. Most of us have probably experienced VFO swishers and other deliverate QRM'ing of these transmissions. One sometimes gets the feeling that those who don't agree with ARRL think they are getting back at the League by this sort of petty action. In actual fact they do not hurt the League, but instead they discourage beginners trying to learn the code for their first ticket.

November 22nd will see the new frequency regulations for U.S. amateurs come into effect. In anticipation of this WLAW changed it's frequencies on October 27th to put it's operation in the new restricted areas. This was done to take the WLAW out of what will be the most crowded portion of the band, and will allow WLAW to standardize their frequencies; they have now chosen to operate 20 kHz inside the low end of each band. Hopefully, by locating in the frequencies allocated to the highest class of licence, the "top-calibre" amateurs operating here will be above deliberately QRM'ing the code practice sessions and bulletins.

Here are the new WLAW frequencies:

CW: 1820, 3520, 7020, 14020, 21020; 28020, 50020, 144120

Phone: 1820, 3820, 7220, 14220, 21270, 28520, 50120, 144120

For furthur details see QST for November.

CHANGING YOUR ADDRESS?

Unless the club receives information on changes in call letters, addresses, and telephone numbers, it is impossible to keep an accurate Membership List, neither can the members expect to receive their copy of GROUNDWAVE.

If you change your call, address, or phone number, please contact a member of the Membership Committee:

J. McWatters	VE3MC	233-2929
V. McCourt	VE3PY	722-6326
H. Shepher	VE3DV	733-0665

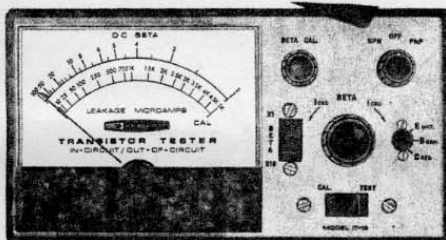


DAYSTROM LIMITED,



• Perfect for the ham-on-the-go • Ideal for local net, or emergency operations • 5-watt input crystal-controlled A.M. transmitter • Optional power supply available for mobile operation.

Kit HW-29A (6 meter), 9 lbs.\$74.95
 Kit HW-30 (2 meter), 9 lbs.\$74.95
 Kit GP-11, Mobile Power Supply, 6 lbs.\$29.95



New Heathkit Portable In-Circuit Transistor Tester . . .
Measures Transistor DC Beta In-Or-Out-Of-Circuit . . .
Measures Leakage Out-Of-Circuit . . .
Tests Diodes In-Or-Out-Of-Circuit . . .

Kit IT-18
\$42.25

Mobile speaker Kit HS-24\$11.30
 RF Power Meter Kit PM-2\$19.75
 PTT Mobile Mike Model GH-12A\$10.60
 93" Webster Bandspanner Model HDP-27\$38.60
 117" Webster Bandspanner Model HDP-37\$38.60

AA-18
\$29.50



ⓐ New Heathkit Solid-State 4 Watt Monophonic Amplifier

• 5 transistor, 2 diode circuit • Delivers 4 watts Music Power • Drives high efficiency speaker of 4 to 16 ohms • Accepts ceramic phono cartridge input, monophonic AM or FM tuners, or tape recorders • Front panel headphone jack and pilot lamp • Can be wired for 120 or 240 VAC • Brown and beige metal cabinet and panel • An ideal amplifier for adding background music to den or rec room • Excellent frequency response
 Kit AA-18, 4 lbs.

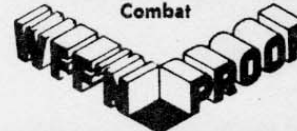
**Heathkit "Cantenna"
 Transmitter Dummy Load**



NOW AN EVEN MORE FUNCTIONAL "CANTENNA"! Now the HN-31 features all specifications and power derating curve (maximum power input vs. time) screened onto the finish of the container . . . keeps the specifications at hand where you need them. HN-31 provides 50 ohm non-inductive load with SWR less than 1.5:1 for frequencies from 1.5 to 300 MHz. Coax fitting to transmitter line. Phono jack for relative power measurements. Oil coolant (capacity 1 gallon—oil not included) permits power up to 1 kw.
 Kit HN-31, 3 lbs.\$16.45

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