work well with power levels up to 1000 watts. Some, however, are capable of operation up to only about 200 watts and should not be acquired if you entertain notions of getting high-power gear after upgrading your license. The Dentron Model W-2 is a very handy unit as it doubles as a direct-reading wattmeter as well as an SWR bridge

Also highly recommended is a crystal calibrator to provide known reference marker signals for receiver dial calibration and as insurance that one is operating within the band—the FCC frowns on out-of-band operation! In selecting a calibrator, if one is not already an integral part of the receiver or transceiver, be sure that it is capable of putting out markers a maximum of every 100 kHz. A calibrator requires a simple initial adjustment—zero beating the calibrator output with the carrier of the National Bureau of Standards' time and frequency station. WWV. If your receiver doesn't cover the frequencies on which WWV transmits (2.5, 5, 10, and 15 MHz), you can use a general-coverage receiver to trim the calibrator. A very interesting calibrator is that produced by Rainbow Industries, Indianapolis, Ind. It is capable of generating markers as low as 25 Hz, making it



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useful as an audio generator and oscilloscope calibrator in addition to its primary function. It is available in an attractive cabinet or as a wired circuit board for custom installation in the receiver.

A receiving preamp is generally not necessary if you are using contemporary solid-state equipment with good sensitivity [1 microvolt or less for 10 dB (S + N)/N]. A preamp can even cause receiver overloading and cross-modulation if used improperly. However, the gain of even some of the best receiving gear tends to decrease on 10 meters and, to a lesser extent, on 15 meters. A preamp may be of some value in compensating for this roll-off in gain. Whether a homebrew or commercial unit is selected, make sure that, if you are using it with a transceiver, there is a positive means of switching the preamp out of the circuit (by either a relay or electronic switching) to prevent its ruin by application of the rig's r-f output on transmit. Ameco's PC-series of preamps and MFJ's Model 1030BX are popular and highly effective commercial units. Building an equivalent preamp is not too difficult even for the beginner. There are many designs to choose from in the ARRL Handbook and other amateur radio publications.

If your Novice transmitter is crystalcontrolled, a vfo (variable frequency oscillator) would most certainly be a valuable addition, providing considerable operating flexibility and convenience. Anyone contemplating vfo construction should have some mechanical ability and good tools to make a mechanically rugged unit, plus enough circuit knowledge to troubleshoot any key clicks or chirps (common maladies in poorly designed vfo's) which may develop. A number of good vfo's are on the market and they can be made to work with a wide variety of transmitters. The old Heath Model HG-10 or Johnson Viking vfo's are good companions for the crystal-controlled Heath DX series transmitters or such old-timers as the Johnson Adventurer and Challenger.

Most operators can send better code if they can actually hear what they are sending. Many beginners using equipment which doesn't contain a built-in sidetone oscillator simply use the station receiver or an auxiliary receiver as an on-the-air monitor. Employing the main receiver for code monitoring is inconvenient because you must constantly retune the receiver and "ride the gain" to prevent blasting and overloading. There are many different ways to monitor your

keying, such as using a small r-f-actuated audio oscillator or simultaneously keying both the transmitter and a separate code practice oscillator. If your transmitter or transceiver doesn't have a built-in monitor, your best bet is to buy a keyer which contains its own sidetone (most do). This will allow you to practice your sending off the air without connecting the keyer to a practice oscillator.

Necessities. Two accessories which belong in every ham shack are a lowpass filter and a dummy load. Although the use of a good antenna coupler can add 10 to 20 dB of harmonic suppression, this still might not be enough in "fringe" TV reception areas. Also, the use of a multi-band antenna, such as a trap dipole, actually increases the possibility of harmonic radiation. A good TVI filter, such as a Drake, Nye Viking or Barker and Williamson model can provide 70 to 90 dB of harmonic suppression. That should make the rig "clean" as far as TVI harmonics are concerned, assuming the rig itself is well shielded and grounded.

A dummy load absorbs the power output of the transmitter and allows you to make practically any transmitter adjustment without actually radiating a signal and interfering with other hams. Most dummy loads are nothing more than 50ohm air- or oil-cooled resistors. In a pinch, an ordinary light bulb can be used to absorb the transmitter's power output. One disadvantage of using the light bulb is that its resistance changes with filament temperature, causing transmitter loading to change as the bulb gets warm. Various commercial products are available, some of which include a direct-reading wattmeter to indicate actual transmitter output power so you can keep a continuous check on transmitter performance. However, the simpler units should be adequate for most purposes, such as the Heathkit Cantenna. This load, if filled with oil coolant, can handle a full kilowatt at frequencies up to 30 MHz and sells for under \$15. It can be used in conjunction with your SWR bridge or directional wattmeter to tune the rig for maximum power without conducting excessive on-the-air tuningsomething the FCC frowns upon.

A grid-dip meter and field-strength meter are also useful additions to the ham shack and, if bought in kit form, offer good construction practice. They are especially helpful when you are tuning a directional antenna such as a Yagi or cubical guad.

Computer Bits

By Leslie Solomon

graphic displays open up new applica-

Hard Copy Stuff. If you have, or are

going to get, a Selectric Model 731 or

735 I/O Writer, then take a look at the

"Typeaway." This is an S-100-to-Selec-

tric interface from Micromation, Inc., 524

Union St., San Francisco, CA 94133

(Tel: 415-398-0289). This \$350 assem-

bled (\$275 in kit) board includes a single

S-100 plug-in that has solenoid drivers.

I/O ports, complete software in PROM,

all necessary cabling and connectors,

Software is supplied in two 1702A

PROM's: all code conversions and con-

SWTP Board. National Multiplex

Corp., 3474 Rand Ave., Box 288, South

Plainfield, NJ 07080 (Tel: 201-561-

3600) is now selling a Z80 board that

plugs into the SWTP bus. Costing \$190

assembled and tested (plus \$3 shipping

and handling), the new board uses a 2-

MHz clock, and on-board baud-rate gen-

erator up to 9600 baud. A 1K ROM mon-

itor, and tape recorder read/write rou-

tines for both KC and National NRZ re-

corders are included. This new board re-

This same company also has a 2SIO

plug-in for the SWTP machine. It fea-

tures 3K of ROM space and two I/O

ports. One or two recorders can be con-

trolled via a 4-bit parallel port along with

Apple Stuff. Electronic Systems, Box

9641, San Jose, CA 95157 (Tel:

408-374-5984) announced its serial I/O

board for the Apple II. The board comes

with software to input or output BASIC

programs, monitor a serial 20-mA de-

vice, or for using the Apple II as a video

terminal. Both input and output are

RS-232 compatible. The board also fea-

tures selectable parity, number of stop

bits, and has a jumper-selectable ad-

The board is available as an assem-

bled and tested unit for \$62, or as a kit

for \$42. Full documentation and soft-

ware is included with each board. The

Other available kits include a tape in-

terface, modem, r-f modulator, power

supply. 8K static RAM for the S-100 bus.

UART and baud-rate generator, tape in-

terface DMA board for the S-100 bus, a

Microproducts, 1024 17th St., Her-

mosa Beach, CA 90254

dress. Data rate is to 30,000 baud.

two serial ports.

places the 6800 board currently used.

and a power supply.

trol functions are included.

tion areas for the computer enthusiast.

ANOTHER GRAPHICS SYSTEM

THERE IS no doubt that the next advancement in personal computing will be in graphics. Alphanumerics are great if the program you are running has to be read or printed out. However, the old adage about one picture being worth 10K words still applies.

Currently, most computers use either their associated CRT terminal or a "plug-in" video module to display a coarse form of graphics that uses character-generator types of symbols. Resolution, in such cases, is fine for games. In many other instances, however, higher resolution is desirable.

A couple of manufacturers have indeed made high-resolution plug-ins, especially for the ubiquitous S-100 bus that can create up to 256 x 256 pixels (picture elements) for an excellent image on a monitor CRT screen.

Now, another company has entered the lists: Vector Graphics Inc., 790 Hampshire Rd., Westlake Village, CA 91361 (Tel: 805-497-6853). They introduced a "High Resolution Graphics" board at \$235 assembled, and \$195 in kit form. This S-100 bus plug-in is raster scan and can operate in either of two modes-digital with 256 horizontal by 240 vertical screen elements or a 16level gray scale having 128 horizontal by 120 vertical elements. In either case, the video output conforms to RS-170 to allow interface with any raster-scan video monitor

Special circuitry on the new board allows the video screen to be updated without "alitches.

The board, specifically designed for the Vector Graphic 8K static RAM mem-

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fresh memory and as conventional memory. The two boards are interconnected by five small cables.

ry required to multiplex the address and data signals to the associated 8K memory board. This logic allows the memory to be addressed by the MPU and the video counters, thus delivering both conventional data transfer and video to the monitor.

source listing for a callable alphanumeric U/L case character generator set that could also be used to create special symbols and graphics. A North Star diskette is also provided, and includes a robot control language by Dr. LiChen Wang, and some demo graphics.

We installed the graphics/memory pair in our computer and ran the demo program. Some of the images generated were of excellent quality. We understand that these photographic demos were created by digitizing a slow-scan TV camera.

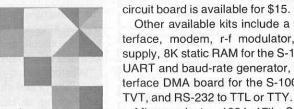
The robot language was interesting. The cursor forms a "bodyless" robot that can be programmed to move around the screen in almost any pattern desired. Routines within the language can be called to make the "robot" move around. We assume that once a robot is built, the bits that position the cursor can then be transmitted to the robot mechanics to make the machine physically move in the same programmed manner.

ory board, is used for both screen re-

The graphics board has all the circuit-

Software provided includes the

This is the second high-resolution graphics board that we have had the opportunity to work with. We feel that such



This is the kind of resolution obtained from Vector Graphics video board



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213-374-1673) has announced its EPROM programmer for the Apple II at \$89.95, with a \$9.95 2716 socket adapter. Two empty ROM sockets can be filled with 4K of user-selected programs. This assembled and tested plug-in fits into any available slot in the Apple and contains a zero-insertion-force socket. The board is self-contained and has its own "on board" 25-volt power supply for programming the Intel 2716 EPROM.

Handling MOS Devices. In our August 1978 issue, we discussed the handling of static-sensitive MOS devices without destroying them. Unfortunately, the company that was to supply a lowcost anti-static kit went out of business shortly after the article was published.

Recently, we heard from Westcorp, 1155 Terra Bella Ave., Mountain View, CA 94040 (Tel: 415-969-7717), a pioneer in the development of anti-static work stations. This company advises it is ready to offer the hobbyist an antistatic work station consisting of a conductive cotton twill wriststrap, an 18" x 24" conductive felt workbench cover. and a conductive grounding strap. Three alligator clips are provided; two for the grounding cable, and one for the free end of the wriststrap. The latter feature allows use by a left-handed person. The twill wriststrap should be more comfortable than the older plastic straps. With its Velcro fastener, it will allow the user to fasten the strap to optimum tightness. The resistance built into the grounding strap is said to prevent electrical shock if the strap should contact an exposed lead. Price is \$13.95 (\$12.95 kit).

The conductive felt workbench cover can be folded for storage without breaking or forming permanent creases. It also has greater bulk than conductive plastic covers, thus providing greater mechanical protection to the circuit board being worked on.

According to Westcorp, the type of anti-static material used is superior to the earlier conductive plastics. Though the plastics meet federal recovery standards of two seconds, some of the newer MOS devices can be burned out in less than one millisecond, Westcorp claims. Since the new material is a carbon-filled plastic, it "looks" like a fixed resistor built into the circuit, and thus recovers faster than the MOS device.

Westcorp also manufactures a complete line of anti-static devices, including an ionizing air blower (\$265) that prevents static electricity from building up in the area.

Pet Peripherals. If you have a Pet and wish to increase its memory capacity to 16-, 24-, or 32K-bytes, then take a look at the Pet Store from Computer Mart Systems, 13 E. 30th St., New York, NY 10016 (Tel: 212-686-7923).

Priced at \$550 for the 16K, \$650 for the 24K, and \$750 for the 32K version, the board can be mounted within the Pet. It uses the existing power supply without degradation. No disassembly of the Pet is required and all mounting hardware and cables are provided. Each board comes assembled and tested with a six-month warranty.

The accompanying manual details installation and operation, and includes a memory test program that uses the Pet graphics capability. That is, the program illustrates the chip layout of the memory board and identifies the bad chip.

Commodore, creaters of the Pet, have also developed a couple of peripherals. First is an external cassette drive for expanded file keeping. This new item connects to the Pet special I/O port, and is available at under \$100 from Commodore or Pet dealers. The cassette drive is capable of read/write up to 170K bytes and is accessed directly through a BASIC command.

The second peripheral is a printer that features up to 80 characters per line on an 81/2-wide roll or fanfolded paper. Printing is at 120 characters per second. All upper and lower case and graphic characters can be reproduced on the printer with a 7 x 8 dot matrix. In addition, the system can be programmed to generate a special graphic character (company symbol) when desired.

Composite Video. Matrox Electronics Systems, Box 56, Ahuntsic Stn., Montreal, Quebec, H3L 3N5, Canada (Tel: 514-481-6838) has just announced its MSBC-24/320 Controller. This new board integrates an alphanumeric display of 24 lines of 80 characters per line with a graphic display of 320 \times 240 dots. This format matches the 4:3 TV screen aspect ratio while maintaining equal horizontal and vertical dot spacing.

On the input side, the new board "looks" like a 4K × 8 RAM with an access time of 500 ns. The card uses the Intel SBC bus. Character fonts are 5×7 or 7×9, and video reversal is possible. External sync is also allowed. The price

Floppy Disk. A floppy-disk system for S-100 bus machines is available from Quay Corp., Box 386, Freehold, NJ



Apple's Disk II has controller card, cable, and drive.

07728 (Tel: 201-681-8700). The Quay 80 F1 (\$795) includes a controller board (supporting up to four disks), a DOS, a Q/FD1 125K 51/4" drive, with power regulator and interface cables and a cabinet. Add-on drives are priced at \$395 each.

In addition to the disk support, the controller board also features a programmable 8-bit, TTL-compatible parallel I/O port.

Sorcerer. Developed by Exidy, 2599 Garcia Ave., Mountain View, CA 94043, the "Sorcerer" computer (\$895) features a Z80 CPU, 8K of RAM (expandable to 32K), RS232 I/O port, 8-bit parallel port, 4K of ROM, S-100 bus connector for exterior expansion, capability to handle two cassette recorders, and a 64-character by 30-line video display. There are 64 defined graphic characters and 64 user-defined characters.

Cabinet dimensions are 191/4" × 13" \times 4" (49 \times 33 \times 10.2 cm) and weight is 13 pounds (5.9 kg). An external video monitor is required. The keyboard consists of 79 keys (upper and lower case and graphics) and a separate 16-key numeric cluster that also carries some graphic symbols.

The BASIC (Microsoft) comes in a Rom Pac plug-in that looks like a cartridge for a video game. A cartridge containing an assembler and editor is also available, as is a user-programmable EPROM Rom Pac. In development is a DOS that allows operation under FOR-TRAN and COBOL. The BASIC and Development Pacs are \$95 each, and the EPROM Pac is \$45.

Apple Remembers. Using one of the smallest controller cards around, the new Apple Disk-II (\$495) and its DOS can drive one or two minifloppys for almost instant access to 1.6-million bits of data. The system provides full disk capability with 16K of RAM, ability to load and store files by name, random and sequential access, automatic generation of



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file-name directories, storage capacity of 116K per diskette, and use of the present Apple power supply.

Each track contains 13 sectors of 256 bytes, and data transfer is 156K bits/ second. Track access time is 200 ms average and disk latency is 100 ms.

Apple Listens, Too. Until now, only S-100 bus systems could have speech input. Now, Heuristics, Inc., 900 N. San Antonio Rd., Los Altos, CA 94022 (Tel: 415-948-2542), introduces the Speechlab 20A (\$189 assembled and tested) for the Apple II computer. With a 20-word "vocabulary," the new Speechlab plugs directly into an Apple connector, where it is addressed as a keyboard. Several games, like Shooting Star, Blackjack, and Mastermind, are available for this new vocal interface.

Take AIM. Rockwell International has

now come on the one-board computer scene with its AIM 65 general-purpose microcomputer. Priced at \$375 for the 1K version and available at any Hamilton Avnet supplier, this new machine features an on-board 20-character printer and display, and a 54-key terminal-style keyboard. Its R6502 processor can address up to 64K with 13 addressing modes and both decimal and binary functions. An 8K ROM resident monitor provides all peripheral control and user programming functions. Spare sockets are provided for expansion.

A separate application connector on the computer interfaces a TTY and two conventional cassette recorders. It also includes a user-dedicated adapter that has three 8-bit bidirectional ports (two parallel and one serial) and two 16-bit interval timer/event counters.

The 4K version is \$450, the assembler is \$100, and BASIC is also \$100. ♦

Software Sources

CP/M Disk Sort/Merge. QSORT is a CP/M-compatible sort/merge program which can sort and merge files with fixed record lengths under 256 bytes, up to a full diskette of data. Output is written to a temporary file which is renamed after the sort has been completed. Therefore, the previous output file will remain intact in case of power failure or malfunction. Files may reside on any drive, independent of each other. Sort parameters can be filed separately for later reference, so they need only be entered once. Up to five sorting keys can be specified, and upper- and lower-case letters are treated equivalently for sorting. Single-density diskette of object code with 20-page user's manual, \$95. Structured Systems Group, 5615 Kales Ave., Oakland,

TDL Software for Digital Group Z80. Z80 software written by Technical Design Labs is available in a version for Z80based Digital Group systems. The programs are provided in self-loading cassette, and do not require disabling the EPROM. Programs are available with hard-copy routines for 110baud TTY, Baudot TTY, and Digital Group Printer. Programs, prices and requirements are: MICRO Monitor (requires 2K memory starting at page 340), \$40; Relocating Macro Assembler (requires 9K, controlled reader and Micro-Monitor), \$40; Zapple Text Editor (requires 7K plus text space), \$30; Zapple Text Output Processor (requires 3K, controlled reader, Zapple Text Editor and Micro-Monitor), \$40; Zapple 8K BASIC (requires 12K plus program space), \$40; Zapple 12K Super BASIC (requires 16K plus program space), \$79. Micro-Com, 1261 Southwest

11th Ave., Deerfield Beach, FL 33441. 8080 Floating-Point Math Package. For 8080- or Z80-based systems with any peripheral configuration, this new floating-point package requires less than 2k bytes. It includes floating-point routines for addition, subtraction, multiplication and division, plus routines to place the floating-point accumulator anywhere in memory, and for conversion from BCD to binary and vice versa. Also included are square root, natural logs and anti-logs, sine and cosine, hyperbolic sine and cosine, arctangent, and base-10 logs. The package is available as object or source code. The machine-language, objectcode version, on Intel hex-format paper tape, loads from address 1k. It is \$10, complete with annotated source listing. Two sourcecode (mnemonic) versions are available, both on paper tapes in Intel assembly format, for \$25 each. Version I, the commented version, requires about 40k bytes if the whole program is resident in memory. Version II, with comments stripped, requires about 15-20k bytes. Write: Burt Hashizume, Box 447, Maynard, MA 01754.

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BROADCASTS IN ENGLISH TO NORTH AMERICA

Sept.-Oct. 1978

by Glenn Hauser

| TIME! CDT/EST | TIME UTC/GMT | STATION | QUAL. | ² FREQUENCIES, kHz ³ |
|---|------------------------|---|--------|--|
| 4:00-4:15 a.m, | 0900-0915 | BBC. | A | 9510, 6195 |
| 4:00-4:15 a.m. | 0900-0915 | | -В | 9505 |
| 4:00-5:00 a,m, | 0900-1000 | | Α | 11805, 9755 |
| 4:00-6:00 a,m, | 0900-1100 | | D | 11890 |
| 5:00-5:05 a.m. | 1000-1005 | | Α | 9565, 5955 (Tue-Sat) |
| 5:00-5:30 a.m. | 1000-1030 | | В | 9505 |
| 5:00-5:30 a.m. | 1000-1030 | | C | 12035, 10040 |
| 5:00-6:00 a.m. | 1000-1100 | KGEI, San Francisco | A | 9575 |
| 5:00-7:00 a.m. 5:00-sunrise | 1000-1200 | AFRTS-Washington | A | 11805, 9755, 9700 |
| 5:30-6:30 a.m. | 1000- | R. Australia | В | 5995 |
| 5:30-7:00 a.m. | 1030-1130 | Sri Lanka Br. Corp. CBC Northern Service | C | 17850, 15120, 11835 (Not all Eng.) |
| 5:55-6:55 a.m. | 1055-1155 | R. Thailand | B C | 9625, 6065 (Mon-Fri 1155) |
| 6:00-6:15 a.m. | 1100-1115 | R. Japan | В | 11905, 9655 9505 |
| 6:00-6:25 a.m. | 1100-1125 | R. Tirana | C | 11985, 9500 |
| 6:00-6:30 a.m. | 1100-1130 | V. of Chile | В | 15175, 15150, 15145, 15125, 15115 |
| | | | | 15110, 11765, 11755 |
| 6:00-6:56 a.m. | 1100-1156 | R. RSA | В | 21535, 17780 |
| 6:00-7:35 a.m. | 1100-1235 | TWR-Bonaire | A | 11815 (Sat, Sun-1220) |
| 6:00-7:50 a.m. | 1100-1250 | R. Pyongyang | C | 11535, 9977 |
| 6:00-8:00 a.m. | 1100-1300 | R. Australia | Α | 9580 |
| 6:00-8:30 a.m. | 1100-1330 | BBC | A-B | 15215, 11775, 6195, 9510 |
| 6:00-9:00 a.m. | 1100-1400 | VOA | Α | 9730, 9565 (to 1430), 5955 |
| 7:00-7:13 a.m. | 1200-1213 | CBC Northern Service | В | 9625, 6065 (Sun 1205-1300) |
| (Mon-Fri) | | | | |
| 7:00-7:15 a.m. | 1200-1215 | R. Japan | В | 9505 |
| 7:00-7:30 a.m. | 1200-1230 | Israel Radio | C | 21495, 17685, 15530, 15405 |
| 7:00-7:30 a.m. | 1200-1230 | R. Tashkent | C | 15460, 15115, 11925, 17730 |
| 7:00-7:30 a.m. | 1200-1230 | HCJB, Ecuador | A | 11800, 9715 (Mon & Thu only) |
| 7:00-7:45 a.m. | 1200-1245 | V. of Germany | В | 17765, 15410 |
| 7:00-7:45 a.m. 7:00-7:55 a.m. | 1200-1245 1200-1255 | R. Berlin International R. Peking | C | 21540, 15320, 15125 11685 |
| 7:00-9:00 a.m. | 1200-1255 | AFRTS-Washington | A | 15430, 15330, 11805, 9700 |
| 7:00-11:30 a.m. | 1200-1400 | HCJB, Ecuador | A | 15115, 11745 |
| 7:15-7:30 a.m. | 1215-1230 | V. of Greece | В | 17830, 15345, 11730 |
| 7:20-7:50 a.m. | 1220-1250 | R. Ulan Bator, Mongolia | D | 12070, 6383 (not Sun) |
| 7:30-7:55 a.m. | 1230-1255 | Austrian R. | C | 15110 (frequent changes) |
| 7:30-8:00 a.m. | 1230-1300 | R. Bangladesh | D | 21683, 15520 (both vary) |
| 7:30-8:00 a.m. | 1230-1300 | V. of Chile | В | 15125, 15110, 11765, 11755 |
| 7:30-8:00 a.m. | 1230-1300 | R. Sweden | С | 21690 |
| 7:30-8:20 a.m. | 1230-1320 | TWR-Bonaire | A | 15255 |
| (Sat) | | | | |
| 7:30-9:20 a.m. | 1230-1420 | | | |
| (Sun) | | | | |
| 8:00-8:15 a.m. | 1300-1315 | R. Japan | В | 9505 |
| 8:00-8:30 a.m. | 1300-1330 | R. Finland | С | 15105 |
| 8:00-9:50 a.m. | 1300-1450 | R. RSA | В | 21535, 17780, 15220, 11900 |
| 8:13-11:13 a.m. | 1313-1613 | CBC Northern Service | В | 11720, 9625 |
| (Mon-Fri) | | | 1111 | " And the second second |
| 8:00-11:00 a.m. | 1300-1600 | | | |
| (Sun) | 1010 1705 | | | |
| 8:10-12:05 p.m. | 1310-1705 | | | |
| (Sat) | 1015 1045 | Builton D. Hannaustrand | C | 21520 17020 17740 000 15250 |
| 8:15-8:45 a.m. | 1315-1345 | Swiss R. International | C | 21520, 17830, 17740-SSB, 15350, 15305, 15140 |
| 8:30-9:30 a.m. | 1330-1430 | R. Finland | С | 15200, 15105 |
| 8:30-10:00 a.m. | 1330-1500 | All India R. | C | 11810 |
| 8:30-11:00 a.m. | 1330-1500 | BBC | B-C | 21710, 17705, 15400, 15070 |
| 9:00-9:30 a.m. | 1400-1430 | R. Japan | В | 9505 |
| 9:00-9:30 a.m. | 1400-1430 | R. Sweden | В | 17790 |
| 9:00-9:30 a.m. | 1400-1430 | R. Norway | В | 17840 (Sun only) |
| 9:00-9:30 a.m. | 1400-1430 | V. Rev. Party, N. Korea | D | 4557, 4120 |
| 9:00-9:30 a.m. | 1400-1430 | R. Afghanistan | C | 4775 |
| 9:00-9:30 a.m. | 1400-1430 | R. Tashkent | C | 15460, 15115, 11925, 11730 |
| 9:00-9:30 a.m. | 1400-1430 | R. Ghana | C · | 17870 (has been inactive) |
| 9:00-9:45 a.m. | 1400-1445 | R. Berlin International | В | 21540, 15125 |
| 9:00-10:00 a.m. | 1400-1500 | V. of Indonesia | C | 11789 |
| 9:30-10:00 a.m. | 1430-1500 | R. Finland | В | 15200 |
| 9:30-10:00 a.m. | 1430-1500 | V. of Chile | C | 17755, 11755 |
| 9:30 a.m5:00 p.m. | 1430-2200 | UN Radio | Α | 21670, 15410 (also French; when |
| 0.45 10.00 | 1445 4500 | p. 61 | | in session |
| 9:45-10:30 a.m. | 1445-1530 | R. Ghana | С | 21540, 17870 (has been inactive) |
| 10:00-10:15 a.m. | | R, Japan | C | 9505 |
| 10:00-10:50 a.m. | | R. RSA | В | 21535, 11800 (Sat, Sun only) |
| 10:00-11:00 a.m. | | V. of Rev. Ethiopia | D | 9615 (frequent changes) |
| 10:00-11:00 a.m. 10:00 a.m12:30 p.m. | | BBC R. Australia | B C | 17840, 11775 (Sat, Sun) |
| 10.00 a,III. 12.30 p.M. | 1000-1100 | | | 11775 |
| 10:15-10:30 a.m. | 1515-1530 | V. of Greece | В | 17830, 15345, 11730 |

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