BOOTH, FRERET, IMLAY & TEPPER, P.C.

14356 CAPE MAY ROAD
SILVER SPRING, MD 20904
TELEPHONE 301.384.5525
FACSIMILE 301.384.6384
BFITPC@AOL.COM

September 16, 2004

Via Courier and E-mail
James.Burtle@fcc.gov
David.Solomon@fcc.gov
Bruce.Franca@fcc.gov

James R. Burtle, Chief
Experimental Licensing Division
Office of Engineering and Technology
Federal Communications Commission

David Solomon, Chief
Enforcement Bureau
Federal Communications Commission
445 Twelfth Street, S.W.
Washington, D.C. 20554

Bruce Franca, Deputy Chief
Office of Engineering and Technology
Federal Communications Commission
445 Twelfth Street, S.W.
Washington, D.C. 20554

Re: Experimental Station WB9XVP (File No. 0136-EX-ST-2004) At Cottonwood (Yavapai County) Arizona; Broadband Over Power Line System; Request for Immediate Cessation of Operation and Revocation of Special Temporary Authorization

Gentlemen:

This letter is in reply to that of Electric Broadband (EB) dated September 3, 2004, in response to a letter from Mr. Burtle, apparently dated September 1, 2004 to EB (a copy of which was not provided to undersigned counsel) regarding the above-referenced EB broadband over power line (BPL) system operated pursuant to Special Temporary Authority. ARRL, the National Association for Amateur Radio (ARRL) had complained on August 17, 2004 by letter, with exhibits, of both actual harmful interference to Amateur Radio operation from this test system, and, based on measurements of the system *in situ*, of radiated emissions far above the levels permitted by Part 15 regulations. No action has apparently been taken on that complaint, but the Burtle letter apparently

addressed some of the ARRL's concerns. The September 3, 2004 EB response letter, which was served on counsel for ARRL, attempts to rebut the interference issues raised in the letter. In reply to the arguments raised therein, ARRL states as follows:

EB first argues that it conducted equipment tests in April of 2004 before starting operation. The system was allegedly in compliance at that time. There is no indication that it conducted any compliance monitoring between April, 2004 and August, 2004. There is no proof of compliance or test results provided, but only the bare allegation that the system was in April, 2004 compliant with the Part 15 radiated emission limits applicable to carrier current systems. ARRL's own measurements establish that, whether or not the limits were met by the system in April, 2004, it most certainly was not in July of 2004.

There were allegedly, after EB's receipt of the complaint of interference documented by the Verde Valley Amateur Radio Association dated July 31, 2004, tests conducted on August 18 and 19, 2004 to measure RF emissions from the BPL system by Mitsubishi. EB's September 3, 2004 letter response to the Cottonwood interference complaints do not provide sufficient technical detail to allow a determination of how Electric Broadband, Mountain Telecommunications, APS and Mitsubishi engineers performed their testing. The test result report and test method do not meet reasonable minimum scientific standards for such testing and reporting. The test results are an exercise in obfuscation, and are insufficient to demonstrate that the equipment is operating under the maximum emissions limits. More significantly, it did not address evaluation of harmful interference to the Amateur Service in any way, other than to claim that there existed at the Sawmill Cove test area an impossibly high ambient noise level, which quite frankly did not exist (1) when the Verde Valley Amateur Radio Club evaluated the site on June 6, 2004; (2) at the time of the July 1, 2004 measurements conducted by ARRL Laboratory Supervisor Ed Hare; or (3) when re-evaluated on September 4, 2004 when the Verde Valley Amateur Radio Club again evaluated the site.

EB's technicians were either mistaken or have otherwise misstated the situation. The noise floor was not 40 dBuV or anything like it at the Sawmill Cove Site. Nor has any of its alleged modifications to its system alleviated the interference from the BPL system at that location in the Amateur allocations.

The following items were omitted from the description of the test fixture and instrumentation claimed to have been used by EB during its August 18 and 19 tests:

- EB stated that it had hired a local consultant to make measurements, but the name of the consultant or company, and the qualifications and credentials of that consultant were not included in the report.

- EB did not include a model number or description of a 57-dB gain preamplifier that was used with their active antenna. Without knowing a model number, it is not possible to find noise-figure specifications on this preamplifier or to calculate

its effect on the inappropriately high ambient noise level claimed to have existed in their testing.

- The test-result report does not indicate what detector mode was used on the spectrum analyzer.

- The report does not indicate how the test equipment was powered, nor does it include any reference to the model of AC-inverter used, if any.

- The report indicates that changes were made to the system, but no testing was reported on the field strength present on each band before those changes were made.

In addition to the foregoing, the following major testing errors appear in the report:

- EB claims to have measured the ambient noise levels at the test site, but did so using a spectrum analyzer with a bandwidth setting that is different than what is outlined in ANSI C63.4.

- The testing used a calibrated loop antenna without applying the calibrated antenna factor to the measurements.

- A high-gain external preamplifier was added to an already-amplified antenna, thereby raising the noise floor of the measurement fixture.

- In lieu of using the calibrated antenna factor of the loop antenna, the report indicates that +57 dBuV was added to the results. If a preamplifier is used with an un-amplified antenna, the preamplifier gain must be subtracted from the reading, not added.

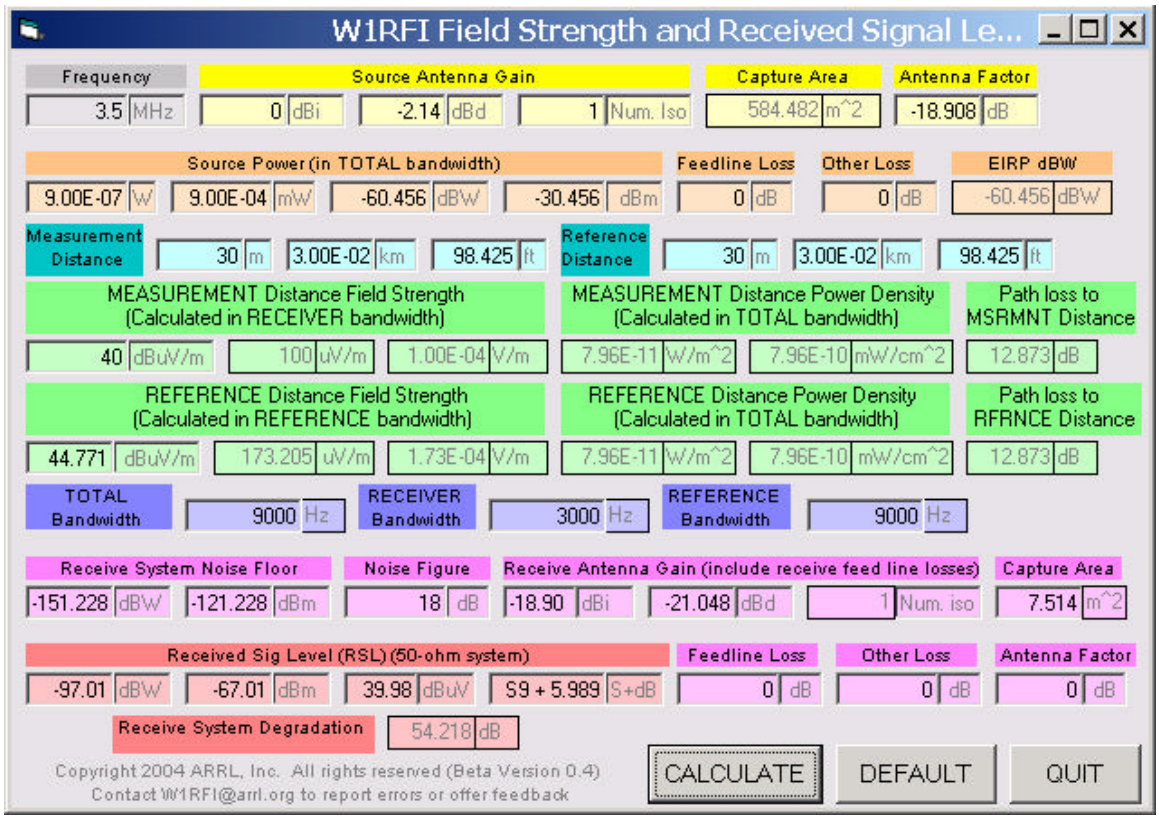
- The test result report does not show any correction for distance between the "approximately" 10-meter measurement distance and the 30 meters stipulated in the rules.

- The ARRL and Verde Valley ARC complaints each alleged interference on several amateur bands. Yet all of the testing was done in only the 3-5 MHz portion of the spectrum.

The ambient noise levels reported by EB cannot be correct. They do not correspond with any observations made at any of the sites in question by either ARRL staff or the Verde Valley ARC. On July 1, 2004, ARRL Lab Supervisor Ed Hare made observations and measurements at two locations in the Cottonwood BPL area. In neither of the areas he observed did he note noise levels anywhere near the level reported by EB. As a follow-up, Bob Shipton, a local licensee in the Amateur Service, noted that at the American Heritage site, the ambient noise levels on 3.5 MHz were not sufficient to move the signal-strength meter on the receiver he was using. (A separate report on this testing

has recently been filed by the Verde Valley Amateur Radio Association.) This does not correspond at all to the +40 dBuV/m level reported erroneously by EB.

The following calculation estimates the signal strength reading that would be expected to a 3.5 MHz mobile whip antenna. Note that the received signal level is greater than S9 on the meter, not the S1 or lower "baseline" levels reported by amateurs in nearby areas in the vicinity[1].



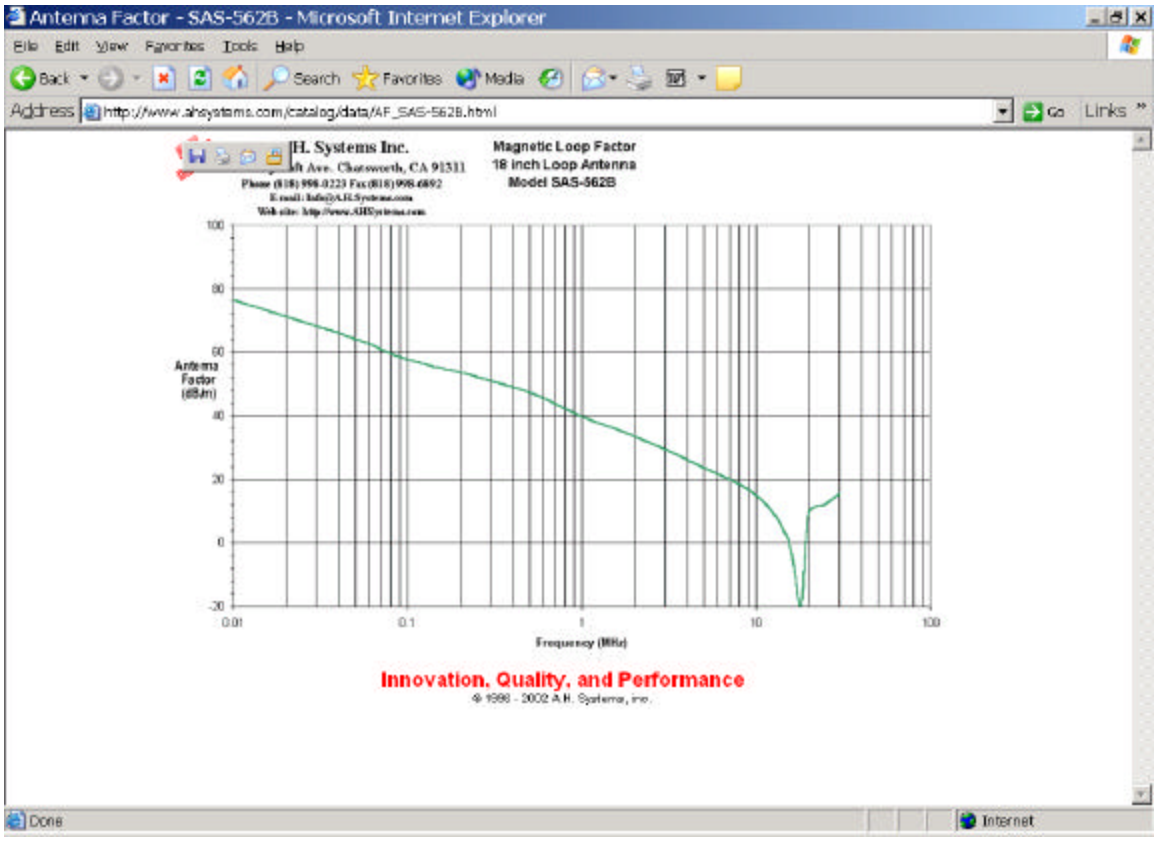
The most likely explanation for EB's error is the use of an external preamplifier described in their test result report. The gain of this preamplifier is stated to be 57 dB. From AH System's web page, on 3.5 MHz, an antenna factor of 30 dB would be typical. If that +57 dB preamp factor were not applied and a +30 dB antenna factor were applied instead, the ambient noise level would be slightly more credible, but still higher than what was actually observed by both ARRL and the Verde Valley ARC. Although it is clear that the reported ambient noise level is too high, it is not possible to ascertain, from the four corners of EB's incomplete test results, what additional errors are present.

EB next claims that its unnamed consultant determined that "extremely powerful signals" from a local licensed AM broadcast station were measured. The fact is, KYBC (AM) is a 1 kW daytimer, which is not what one would refer to, regardless where located, as a

[1] A copy of these baseline results were included in the report filed by the VVARA on 6/6/2004. The interference complaint was also filed in paper form as a late-filed comment in ET04-37, although it mysteriously never appeared in the public record.

likely candidate for reradiation. In any event, the reported levels for the harmonics of the AM broadcast station also appear to be too high. For the levels to be as shown in the graph, if the broadcast station complies with the Commission's rules for spurious emissions, the level of the fundamental broadcast station signal at the test site would have to be approximately +135 dBuV/m. This is additional clear evidence that the levels that EB reported for ambient noise are unrealistically high.

It does not appear, however, that the noise at approximately +42 dBuV/m is actually external noise. As can be seen in the graph below, the typical antenna factor for the SAS-562B varies with frequency. ARRL's own SAS-563B, with a similar curve, varies from 30.9 dB on 3 MHz to 24.8 dB on 5 MHz. Any external noise, if uniform vs frequency, would show almost a 6 dB variation between 3 and 5 MHz. The noise shown on the graphs in EB's report does not vary by 6 dB over this frequency range. This almost certainly establishes that what EB was showing is the noise floor of the measurement set-up, not external noise.



The erroneous test results submitted by EB force the conclusion that its BPL system is operating below the ambient noise level in the area. This is not theoretically possible. For BPL to function, it must operate a higher level than the existing noise on the line. The ambient noise level will be predominantly from the radiated emissions from the medium-voltage primary lines and the low-voltage secondary lines. More importantly,

this is not borne out by actual observation using a communications receiver at the subject sites. In all cases, at levels significantly below that reported by EB, BPL signals were clearly audible on one or more bands allocated to the Amateur Service. ***The multiple carriers used in this OFDM BPL system have an unmistakable sound, with modulated carriers audible every 1.1 kHz, across several MHz of spectrum. This is not like any known on-the-air signal or any known local noise source. Neither ARRL nor the Verde Valley ARC mistook any other signals for BPL signals in the Cottonwood area.*** What they heard was not an AM broadcast station signal being re-radiated on power lines.

The most significant error in EB's test procedure is that it did not investigate the entire affected spectrum. The initial complaints reported interference on several different amateur bands in different parts of the system, yet only 3 to 5 MHz was measured in EB's reported tests. According to follow-up testing performed by Mr Shipton of the Verde Valley ARC on September 4, 2004 (See Exhibit A, attached), BPL signals are present on the 3.5, 14, 21 and 28 MHz amateur bands in the several areas he observed (see attachment A). The levels range from moderate interference – ***more than strong enough to preclude reception of most licensed signals on that band*** – to very strong levels that would cover up all but the strongest amateur signals. Either must be classified as harmful interference levels, according to the internationally accepted definition of "harmful interference" involving non-safety of life radio services, which is repeated at 47 C.F.R. §97.3(a)(23).

A comparison of the spectrum on which BPL signals were present on June 6, 2004 and September 4, 2004 show that most of the "correction" for the interference reports involved little more than reducing the most serious of the radiated emissions[2], and shuffling spectrum, to move some of the interference observed on 3.5 MHz to other bands. On some of these bands, as can be seen from Exhibit A, the interference level is higher now than it was on June 6, 2004. In other cases, EB seems to have attempted to avoid use of amateur spectrum, but missed the mark on at least part of the amateur band. This is similar to what has been observed by ARRL technical staff and consultants in other BPL test areas.

The EB letter claims that the BPL system was not operating on a band for which interference was reported "near" the amateur station. BPL signals have been observed at fixed, residential amateur stations located over a mile from the BPL noise source. EB was unable to measure the system's signal when located 10 meters distant from it, so it is not surprising that it was unable to properly assess the impact of BPL to communications receivers over that distance.

[2] ARRL measured BPL signals more than 30 dB greater than that permitted by Part 15 limits at one point. The levels that are present now, based on the less-accurate receiver signal-strength meters, are below this level, but still high enough to cause preclusive, harmful interference. It should be noted, however, that the BPL equipment deployed by EB is *capable* of operating at more than 30 dB over the FCC limits. This would be the equivalent of an amateur station having a 1.5 megawatt transmitter, but stating that it would always be adjusted to a legal 1500 watts. The capability of the devices is discouraging in view of the demonstrated inability of EB to operate this system in compliance with the Commission's Rules.

ARRL is unable to draw other than general conclusions from the EB reply to ARRL's complaint due to the inadequacy of the test methods employed by EB and the incomplete reporting of its test conditions. However, from actual observations using communications receivers, it is readily apparent that BPL interference continues in Cottonwood and that the test equipment EB used is not capable of assessing interference to typical, more sensitive communications receivers using typical antennas with more gain that small test-equipment loops. The local licensees have repeatedly offered to demonstrate the level of interference to mobile and home stations. Had that demonstration been part of the series of testing EB conducted in response to the interference complaints, EB would obviously have reached a different conclusion and the Commission would now have more than the incomplete and erroneous test data to use in evaluating the interference problem. A simple communications receiver and inexpensive mobile whip antenna could have been used by EB as part of its test, but that was either not done, or if it was, the results were scuttled. This would have conclusively demonstrated the presence of harmful interference, and would have provided an important check and balance to determine if some test-fixture noise were confounding the results, which ARRL clearly believes was the case in EB's failed evaluation.[3]

At this point, the Commission can do one of three things: (1) It can sweep this ongoing interference matter under the rug, as it has attempted to do in other prior cases, so as to justify its predetermined outcome in the pending docket proceeding, ET Docket 04-37; (2) it can conduct its own investigation of the matter, and publish its results so that a fair and objective evaluation of the interference potential of BPL can be made; or (3) it can immediately shut this test system down, as ARRL has requested, which is the only remedy consistent with the current Section 15.5 of the Commission's rules, and with the published commitment of FCC Chairman Powell to prevent interference to licensed radio services from BPL systems.

Yours very truly,

Christopher D. Imlay

Christopher D. Imlay

Cc: James Burtle, FCC
Anh Wride, FCC
Riley Hollingsworth, FCC
Alan Stilwell, FCC
Lance Rosen, Electric Broadband, LLC

[3] In ARRL's experience, most of the AC inverters used to power test equipment *in situ* can generate a very high level of local noise.

EXHIBIT A

BPL Signal Strength Readings Using Different Modes.
Recorded September 4, 2004 from 9:00 am Through 11:00 am Local Time
Cottonwood, AZ

Radio and antenna information:

Icom 706Mk II G
Preamp off
Selectivity: 3.00 khz SSB, CW
8.00 khz AM
8.00 khz FMN
12.00 khz FM

Hustler Antenna - 54 inch mast bumper mounted located right rear corner 2003 Chevrolet pickup. Using 400 watt resonators for each band

Coax is 18 feet RG 58. Rated loss 4.5DB at 100 feet. Velocity Factor- 66%.

Signal readings were taken by the following and were at the BPL sites

Mike Kinney KU7W
1652 E. Sierra Drive
Cottonwood, AZ 86326

BPL Site #1- Sawmill Cove Area Repeater

Freq. in Mhz	SSB	CW	AM	FM
28.045	S-6	S-6	S-8	S-9+10
28.250	S-7	S-7	S-9	S-9+20
28.450	S-7	S-7	S-9	S-9+30
28.650	S-6	S-7	S-9	S-9+30
28.850	S-7	S-7	S-9	S-9+30
29.000	S-7	S-7	S-9	S-9+30
29.050	S-6	S-8	S-9	S-9+30
29.200	S-1	S-0	S-6	S-3
29.300	S-0	S-0	S-0	S-0
29.350	S-0	S-0	S-0	S-0
24.900	S-0	S-0	S-0	S-0
24.960	S-0	S-0	S-0	S-0
24.990	S-0	S-0	S-0	S-0

21.045	S-7	S-9	S-9+20	S-9+60
21.200	S-9	S-9	S-9+20	S-9+60

Freq. in mhz	**SSB**	**CW**	**AM**	**FM**
21.300	S-8	S-9	S-9+10	S-9+60
21.400	S-8	S-8	S-9+10	S-9+60
21.450	S-8	S-9	S-9+20	S-9+60
18.059	S-0	S-0	S-0	S-0
18.121	S-0	S-0	S-0	S-0
18.180	S-0	S-0	S-0	S-0
14.010	S-6	S-4	S-8	S9+20
14.150	S-6	S-7	S-8	S9+20
14.250	S-7	S-5	S-8	S9+10
14.300	S-7	S-6	S-8	S9+20
14.350	S-6	S-6	S-8	S9+10
10.000	S-0	S-0	S-0	S-0
10.057	S-0	S-0	S-0	S-0
10.130	S-0	S-0	S-0	S-0
7.060	S-5	S-5	S-7	S-7
7.102	S-5	S-5	S-7	S-8
7.200	S-5	S-5	S-6	S-6
7.250	S-4	S-4	S-6	S-6
7.300	S-0	S-0	S-0	S-0
3.600	S-2	S-5	S-7	S-8
3.510	S-5	S-5	S-6	S-7
3.772	S-6	S-6	S-7	S-9
3.803	S-6	S-6	S-8	S9+10
3.850	S-6	S-7	S-6	S9+30
3.890	S-8	S-9	S9+20	S9+60
3.900	S-9	S-9	S9+10	S9+60
3.930	S-7	S-7	S-9	S9+20
3.950	S-5	S-5	S-8	S9+20
4.000	S-5	S-5	S-7	S-9

BPL Site #2 American Heritage Academy Repeater

Freq. in mhz	**SSB**	**CW**	**AM**	**FM**
28.045	S-5	S-5	S-7	S-7
28.250	S-5	--	--	--

28.450	S-5	S-5	S-7	S-7
28.650	S-2	S-5	S-6	S-6
28.850	S-0	S-4	S-6	S-5
Freq. in mhz	**SSB**	**CW**	**AM**	**FM**
29.000	S-5	S-2	S-6	S-6
29.200	S-1	S-4	S-6	S-5
29.350	S-0	S-0	S-0	S-0
24.900	S-5	--	S-6	S-8
24.960	S-4	S-0	S-7	S-7
24.990	S-0	S-0	S-6	S-2
21.045	S-7	S-9	S9+20	S9+60
21.200	S-9	S-9	S9+20	S9+60
21.300	S-8	S-9	S9+20	S9+60
21.400	S-8	S-8	S9+10	S9+60
21.450	S-7	S-8	S9+10	S9+40
18.059	S-0	S-0	S-0	S-0
18.121	S-0	S-0	S-0	S-0
18.180	S-0	S-0	S-0	S-0
14.010	S-9	S-7	S9+20	S9+60
14.150	S-8	S-9	S9+20	S9+60
14.250	S-9+10	S-9	S9+20	S9+60
14.300	S-9+10	S-9	S9+20	S9+60
14.350	S-8	S-9	S9+20	S9+60
10.000	S-0	S-0	S-0	S-0
10.057	S-0	S-0	S-0	S-0
10.130	S-0	S-0	S-0	S-0
7.060	S-0	S-0	S-0	S-0
7.102	S-7	S-8	S-9	S-9+30
7.200	S-6	S-6	S-7	S-8
7.250	S-0	S-0	S-0	S-0
7.300	S-0	S-0	S-0	S-0
3.772	S-0	S-0	S-0	S-1
3.803	S-0	S-0	S-0	S-0
3.850	S-0	S-0	S-5	S-6
3.890	S-5	S-5	S-7	S-8
3.900	S-6	S-6	S-8	S-8
3.930	S-0	S-0	S-0	S-0

3.950	S-0	S-0	S-0	S-0

BPL Site #2 Birch Street Apartments Repeater

Freq. in mhz	SSB	CW	AM	FM
28.045	S-0	S-0	S-0	S-0
28.250	S-0	S-0	S-0	S-0
28.450	S-0	S-0	S-0	S-0
28.650	S-0	S-0	S-0	S-0
28.850	S-0	S-0	S-0	S-0
29.000	S-0	S-0	S-0	S-0
29.050	S-0	S-0	S-0	S-0
29.200	S-0	S-0	S-0	S-0
29.300	S-0	S-0	S-0	S-0
29.350	S-0	S-0	S-0	S-0
24.900	S-0	S-0	S-0	S-0
24.960	S-0	S-0	S-0	S-0
24.990	S-0	S-0	S-0	S-0
21.045	S-6	S-7	S-9	S-9+30
21.200	S-7	S-7	S-9	S9+20
21.300	S-7	S-7	S-8	S9+20
21.400	S-6	S-6	S-8	S9+20
21.450	S-6	S-7	S-9	S9+20
18.059	S-0	S-0	S-0	S-0
18.121	S-0	S-0	S-0	S-0
18.180	S-0	S-0	S-0	S-0
14.010	S-8	S-9	S-9	S9+60
14.150	S-8	S-8	S9+10	S9+60
14.250	S-9	S-8	S9+60	S9+40
14.300	S9+20	S9+20	S9+40	S9+60
14.350	S9+20	S9+30	S9+40	S9+60
10.000	S-0	S-0	S-0	S-0
10.057	S-0	S-0	S-0	S-0
10.130	S-0	S-0	S-0	S-0
7.060	S-8	S-8	S9+10	S9+60
7.102	S-0	S-0	S-0	S-0
7.200	S-0	S-0	S-0	S-0
7.250	S-0	S-0	S-0	S-0
7.300	S-0	S-0	S-0	S-0

3.772	S-0	S-0	S-0	S-0
3.803	S-0	S-0	S-0	S-0
3.850	S-0	S-0	S-0	S-0

Freq. in mhz	**SSB**	**CW**	**AM**	**FM**
3.890	S-0	S-0	S-0	S-0
3.900	S-0	S-0	S-0	S-0
3.930	S-0	S-0	S-0	S-0
3.950	S-0	S-0	S-0	S-0