Before the
FEDERAL COMMUNICATIONS COMMISSION
WASHINGTON, D.C. 20554

In the Matter of	)	
	)	
Review of Part 15 and other Parts of the Commission's Rules	)	ET Docket 01-278
	)	RM-9375
	)	RM-10051

COMMENTS OF SES AMERICOM, INC.

SES Americom, Inc. ("SES Americom"), by its attorneys, hereby submits its comments on the Notice of Proposed Rulemaking and Order ("NPRM") in the above-captioned proceeding.[1] In the NPRM, the Commission proposes to require that unlicensed consumer radar detectors be subject to emission limits in order to prevent interference to Very Small Aperture Terminal ("VSAT") satellite operations.[2] As discussed below, SES Americom operations have received interference from such radar detectors, and SES Americom fully supports the Commission's proposal.

I. INTRODUCTION

SES Americom is a leader in the delivery of end-to-end communications solutions to, among others, broadcasters, cable programmers, Internet service providers, educational institutions, and enterprise networks. SES Americom's services include data networks designed to meet virtually any business or governmental need. Many of these networks employ VSAT terminals for critical communications. These easily-deployed

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[1] FCC 01-290, rel. October 15, 2001 (the "NPRM").

[2] NPRM, ¶¶ 1, 10-14.

and cost-effective terminals can be used for one-way or interactive communications via satellite. VSAT networks are currently used for a host of consumer, corporate and governmental applications, including corporate networks, government agency and military communications, rural telecoms, distance learning, tele-medicine, disaster recovery, and transportable "fly-away" systems.

In some cases, SES Americom owns and operates the VSAT network. However, in most cases, VSAT networks are owned and operated by SES Americom's customers. In all, SES Americom provides capacity to thousands of VSAT terminals. As discussed below, corruption of this capacity by interference from unlicensed radar detectors threatens the integrity and competitiveness of SES Americom's services.

II. IN VIOLATION OF COMMISSION RULES, UNLICENSED RADAR DETECTORS ARE CAUSING HARMFUL AND COSTLY INTERFERENCE TO PRIMARY VSAT OPERATIONS IN THE 11.7-12.2 GHz BAND.

A. Under Current Commission Rules, Radar Detectors are Prohibited From Interfering with VSAT Communications.

Current VSAT systems operate downlinks to user terminals in the 11.7-12.2 GHz band, which is allocated on a primary basis to satellite communications. However, consumer receivers designed to detect the presence of police radar sweep into this band.[3] The swept frequency oscillator signals generated by the detectors radiate from the devices, producing high levels of interference in the 11.7-12.2 GHz band.

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[3] The police radars themselves do not operate in the 11.7-12.2 GHz band. According to the NPRM, the police radar operate in several bands, including the 10.5-10.55 GHz, 24.05-24.25 GHz and 33.4-36.0 GHz bands. NPRM, ¶ 12; 47 C.F.R. § 90.103. Frequency sweeping into other bands is apparently used by the radar detectors both to enhance detection of police radar, and to make it more difficult for police to detect the presence of the radars in the vehicles. NPRM, ¶ 12.

Therefore, when a vehicle operating a radar detector is near a VSAT terminal, interference to the VSAT operations can result.[4]

Under Part 15 of the Commission's rules, police radar detectors operate on an unlicensed basis. As such, they are prohibited from causing harmful interference to licensed users of the bands in which they operate.[5] However, receivers operating above 960 MHz, such as consumer radar detectors, are exempt from complying with specific emission limits developed for Part 15 operations.[6] Therefore, although interference to VSAT terminals operating in the 11.7-12.2 GHz band is clearly prohibited, no quantitative limitations govern radar detector operations.

B. Interference from Radar Detectors into VSAT Operations is Well-Documented

Notwithstanding this clear prohibition, at least some radar detector models cause harmful interference into VSAT terminals operating in the 11.7-12.2 GHz band.

SES Americom has identified many instances of harmful interference from radar detectors. Attached as Appendix A is an internal SES Americom report

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[4] Although the NPRM focuses on interference to VSAT networks in the 11.7-12.2 GHz band, it is important to understand that other types of satellite systems may be impacted by radar detector interference. For example, SES Americom operates satellite systems in Ku-band frequencies below 11.7 GHz. These systems could also be exposed to interference from radar detector emissions. In addition, there have been proposals to use the 11.7-12.2 GHz band for a host of other Fixed-Satellite Service applications, including consumer direct-to-home services. Any applications involving ubiquitous deployment of small terminals could be harmed by radar detector interference in the band.

[5] 47 C.F.R. § 15.5(b).

[6] 47 C.F.R. § 15.101(b). Even though only "receivers" are exempt from the limits, this band is "restricted" under Part 15 of the Commission's rules, and only spurious emissions from unlicensed devices are permitted. 47 C.F.R. § 15.205(a). Therefore, no unlicensed transmitters operate in the band. Thus, the limits currently apply only to unintentional radiators that cannot be classed as receivers.

describing a particularly well-documented case, which clearly illustrates the problems caused by detector interference. As detailed in that report, at least one vehicle operating a radar detector was causing chronic interference to a VSAT terminal whenever the vehicle was parked in the vicinity of the terminal. The VSAT system in this case was part of a video-conferencing operation for distance learning and other uses. Interference causing loss of synchronization occurred regularly during class time for several quarters before the source of the problem was finally identified.

This was not an isolated incident. Within the same VSAT network described in Appendix A, other instances of interference to antennas at other sites were also traced to radar detectors. Other customers of SES Americom have reported complaints from their VSAT clients of interference that was later determined to be caused by radar detectors. Moreover, it is clear from these reports that the VSAT terminal and the radar detector need not be in very close proximity for problems to occur. Interference can result with separations of several hundred feet, if not more.

Furthermore, it must be assumed that many such cases of interference go unreported due to the intermittent nature of the interference. This factor may be compounded if the VSAT network itself is used intermittently, for example for video-conferencing, distance learning, or tele-medicine. In some cases operators may have accepted degradation because they didn't see any way to avoid it. In the case of SES Americom, which does not own or operate the majority of VSAT terminals employing its satellite capacity, it is likely that many cases involving its satellite customers are not reported to SES Americom. However, as discussed below, even if occasional or tolerated, instances of harmful interference can have high costs to VSAT customers and service providers.

C. Interference to VSAT Operations is Costly to Both the Consumer and the Provider of Such Services.

As illustrated by the report in Appendix A, each instance of interference can have high costs. Due to the intermittent nature of interference from radar detectors, positively identifying the source can take months of investigation, affecting both the customer and supplier of VSAT services. First, it may take some time before the customer identifies the problem as chronic and notifies the supplier. Then, identifying the source can require long-term monitoring. In the case presented in Appendix A, the site had been experiencing occasional loss of sync for over two years, but the intermittent nature frustrated investigation. Intense monitoring over a several-month period was ultimately required to positively identify the source of interference. The investigation required the deployment of specialized test equipment. It also required the engineer in charge to make several trips to the site, and involved hundreds of man-hours in total.

Putting aside the fact that, under Part 15, it is not the satellite operator's burden to remedy such interference, it must be noted that radar detector interference, once identified, is not easy to solve or prevent. As noted in Appendix A, installation of shielding early in the investigation did not prevent future interference in that case.[7] In the general case, building RF shields for VSAT antennas is not a practical solution because installing an effective shield can be more complicated that installing the antenna itself. In addition, effectively shielding a VSAT antenna without significantly reducing the performance of that antenna is often not feasible. This is because the antenna can receive

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[7] In the case described in Appendix A, the VSAT customer resorted to placing signs in the parking lot asking drivers to turn off their radar detectors. This request then had to be enforced on a case-by-case basis when the VSAT terminal received interference.

side-lobe or back-lobe interference a full 360° around the antenna. Furthermore, radar detectors are in most cases moving targets, and RF signals reflect off nearby obstacles. In the general case, therefore, it is not practical to shield VSAT terminals from all possible radar detector emissions.

Finally, as noted above, it must be assumed that many cases of interference go unreported. Even if it is assumed that the impact of the interference in the unreported cases is lower than in the reported cases, or that the interference is simply tolerated, such interference stills has high costs for satellite providers. The inconveniences associated with the interference, and the perception of network unreliability, affect the competitiveness of the VSAT industry *vis-a-vis* terrestrial solutions and satellite solutions operating at higher frequencies. Corruption of satellite capacity by interference from terrestrial sources limits the utility of that capacity, causing customers to seek more robust alternatives. It is vital to the VSAT industry, if it is to remain competitive, that it be able to guarantee clean spectrum to its customers.

III. THE COMMISSION SHOULD ADOPT LIMITS ON THE EMISSIONS OF RADAR DETECTORS IN 11.7-12.2 GHz BAND FOR THE PROTECTION OF VSAT AND OTHER SATELLITE OPERATIONS.

A. The Current Part 15 Limits, Even if Made Applicable to Radar Detectors, Are Insufficient to Adequately Protect VSAT Operations.

Attached as Appendix B is a preliminary technical assessment of the interference threshold for VSAT systems operated by SES Americom and its customers. Several important assumptions were made in this analysis. First, the calculations assume that the radar detector emissions enter the VSAT antenna only via the side lobes. Main lobe interference, which of course is possible in some geometrical configurations, would result in a much smaller threshold. Second, a narrow carrier was assumed for the VSAT

link, because this represents a more sensitive case. However, even smaller carriers are sometimes used in VSAT systems (including those employed by SES Americom). The interference criteria for the VSAT terminal is taken from ETSI Technical Report ETR 077, as confirmed via bench tests performed by SES Americom.

As demonstrated in Appendix B, to protect adequately most of the various types of systems deployed by SES Americom and its customers, it must be ensured that the emissions from radar detectors do not exceed about 30 μV/m into the VSAT terminal. It is important to understand, however, that this number is not a "worst-case" figure. Harmful interference could be caused to some links (using smaller carriers, for example) and for some interference configurations (such as interference into the main lobe of the VSAT terminal) at even lower power levels.

B. The Commission Limit Should Adopt an Emission Limit For Radar Detectors in the 11.7-12.2 GHz Band Sufficient to Protect VSAT And Other Satellite Operations.

SES Americom urges the Commission to adopt a limit on radar detectors in the 11.7-12.2 GHz band sufficient to protect VSAT and other satellite operations in the band. Based on the attached preliminary analysis, it appears that such a limit must be at least as low as 30 μV/m, measured at 3 meters.[8] Although unlicensed radar detectors are already prohibited under Part 15 from causing interference to VSAT operations, radar detectors currently emit much higher power levels than the interference threshold of VSAT links. The proposed limit would provide the quantitative standard needed to ensure radar detector compliance with the existing Part 15 obligation.

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[8] SES Americom considers three meters a reasonable assumption for the minimum distance between a radar detector and a VSAT antenna, although closer proximities are clearly possible.

In addition, consistent with the requirements applicable to certain other receivers under Section 15.101(a) of the Commission's rules, the Commission should require that radar detectors be authorized via certification prior to the initiation of marketing. This would provide the regulatory procedure necessary to ensure compliance with the emissions limit.

IV. THE COMMISSION SHOULD ADDRESS INTERFERENCE FROM OTHER TYPES OF PART 15 DEVICES INTO VSAT AND OTHER SATELLITE SERVICES IN A FUTURE PROCEEDING.

Interference from radar detectors into VSAT antennas is a current and critical problem for satellite operators. SES Americom therefore welcomes the Commission's proposal to address it expeditiously. However, radar detectors do not constitute the only threat of interference from Part 15 devices into satellite services.

Unlicensed low-power devices are proliferating rapidly, and many of the new applications emit radiation at or near bands used by authorized satellite operations. Many current devices are known to interfere occasionally with satellite systems, if brought within sufficient proximity to an antenna. Of greater concern, however, is the unknown impact of the myriad new devices that are introduced into the market every day.[9] The rapid advancement of wireless communications and networking raises the potential of future problems even further.[10]

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[9] For example, it appears possible that anti-collision devices installed on newer model cars could cause interference to satellite systems in certain cases. Further investigation is required.

[10] Illustrating a specific example of this threat, Sirius Satellite Radio Inc. ("Sirius") has recently filed a Petition for Rulemaking urging the Commission to make certain rule revisions to protect DARS systems from out-of-band emissions from Part 15 and Part 18 devices. Petition for Rulemaking on Revision of Part 15 and Part 18 of the Rules Regarding the Out-of-Band Emissions of Radio Frequency Devices, Sirius Satellite Radio Inc. (Jan. 23, 2002). Sirius notes that "[t]he number and the type of devices

For this reason, SES Americom urges the Commission to address more generally the issue of interference from unlicensed devices into authorized satellite services in a future proceeding. By examining both the characteristics of devices slated for introduction in or near satellite bands, as well as the protection requirements of satellite operations, future cases of interference to satellite services may be averted before they harm satellite capacity providers and their customers. SES Americom would participate fully in such a proceeding, in the hope of avoiding another interference scenario like that currently suffered with radar detectors.

CONCLUSION

SES Americom urges the Commission to adopt provisions sufficient to protect VSAT and other satellite operations in the 11.7-12.2 GHz band from emissions from unlicensed radar detectors, and to take appropriate steps to prevent similar problems from arising in the future.

Respectfully submitted,

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qualifying under Part 15 and Part 18 have increased significantly in recent years, raising potential major risks to the spectrum sharing regime foreseen by the Commission when it reformed Part 15 and Part 18 in the 1980s." Id. at ii .

APPENDIX A

Chronic RFI Due to Radar Detectors

A study of the problem at the [redacted]
downlink at [redacted],
[redacted] Oregon, from February to June, 1998[1]

The [redacted] satellite downlink in [redacted] Oregon is part of a video conferencing network using GE Americom's GE 3 KU band satellite. The frequency allocations are in transponder 1. Receive frequencies are from 11719.25 MHz to 11737.95 MHz. Before the transition to GE 3 in September, 1997 the frequencies were from 11757 MHz – 11775 MHz on Spacenet 3.

This site has been experiencing occasional loss of sync on the digital video carrier for over 2 years. The problem was identified as local RFI early on, but the difficulty in having a technical person at the site with the proper test equipment at the right time kept this elusive problem from being identified. I became involved in November, 1997, after the transition to GE 3, when it became clear the problem was still present and our contract maintenance people were not going to find it.

Following a couple of initial visits, installation of some shielding and power isolation equipment, I made plans for more sophisticated troubleshooting. In February, 1998 I set up a spectrum analyzer controlled by a laptop computer, with remote dial-in capability. During a four month period I saved 224 spectrum analyzer max hold traces. 110 of these traces showed evidence of the RFI, and proved that it was present both at 70 MHz I.F. and at L band (950 MHz - 1450 MHz) I.F. Two visits to [redacted] during this period did not result in positive identification of the source.

I prepared for a trip the week of June 1, 1998 by obtaining an L band log periodic antenna and a K band horn with an LNB to use for triangulating. The problem appeared the evening of June 4. I quickly identified it as being received at K band, and began triangulating.

I drove around campus with my laptop and spectrum analyzer running on an inverter in the car, and by 9:30 had triangulated back to the parking lot where I started. The same pickup with a horse trailer was still sitting in the same spot where it had been when I started looking. Two more traces showed positively that the interference was coming from the pickup. A conversation with the driver verified that he had a radar detector that was operating. The interference disappeared when he drove away.

Discussion with the college media services director, [redacted], who is responsible for the [redacted], showed that all previous evidence now fell into place. It's possible that a student in one of the classes may have had a radar detector in his car, explaining why the problem occurred so regularly throughout class time during several quarters. At several other times she went out to the parking lot and noticed that campus police were giving drivers tickets. The actual radar could have been the source in those instances.

All traces I've taken where the problem was present show the typical RF signature is virtually the same except for the total sweep width and intensity. The interference actually appeared as random individual pulses occuring over a wide bandwidth when viewed at L Band first I.F. or 70 Mhz I.F. receive to the modem, because of the narrow video bandwidth setting on the spectrum analyzer.

The following pages contain sample traces showing the typical appearance of the interference signature. Traces I have taken show that on occasion the interference extends from 11.400 GHz all the way to 11.750 GHz. The signatures differ from event to event, showing that the source would have been a different radar detector, or police radar, each time.

The antenna is ground mounted adjacent to a parking lot, on a slope at a point where ground level is about 5 feet above the parking lot. The look angle is to the southeast out over the parking lot. The source that was positively identified on June 4 was 75 feet from the antenna, and directly in front of it.

Bill McDonald
NW Regional Mgr
GE American Communications

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[1] The customer's identity has been redacted to preserve its privacy.

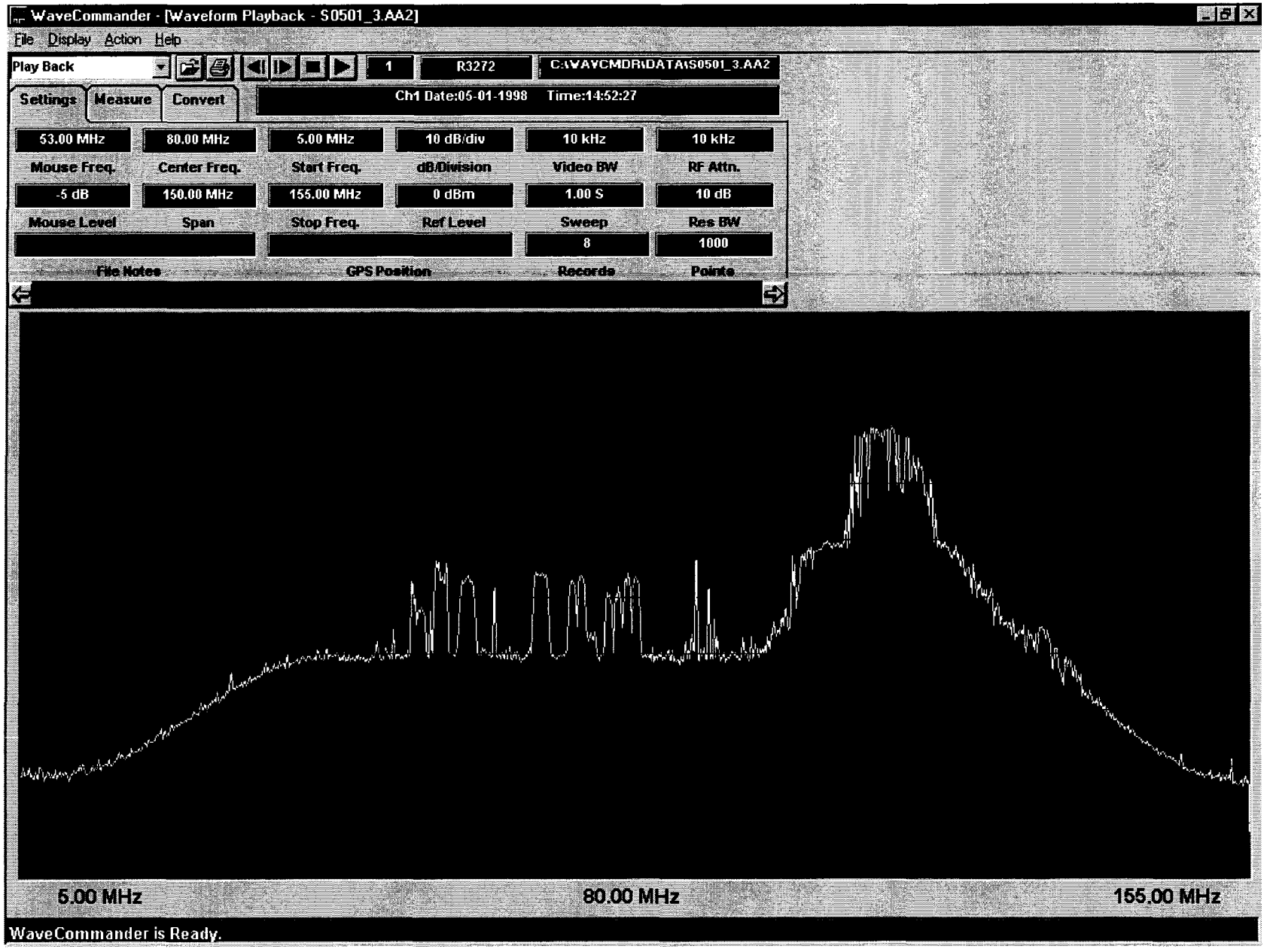

Figure 1

This is a trace of the normal signals at the 70 MHz I.F. splitter. An occasional video carrier in transponder 3 appears at the upper end of the trace.

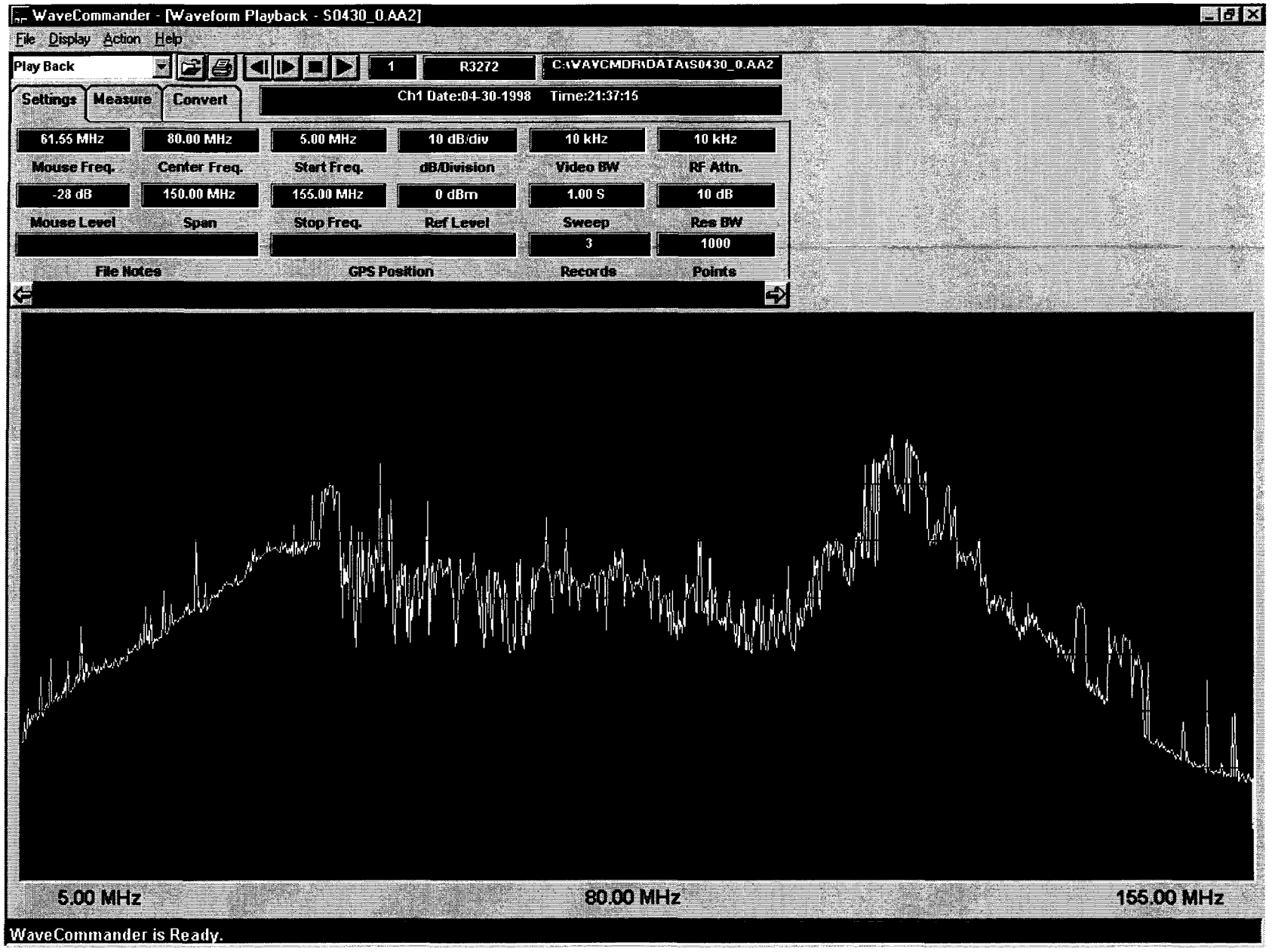

Figure 2

The above trace, taken at the 70 MHz I.F. splitter, shows massive accumulation of interference over a period of 36 hours, since the previous trace shown in Figure 1. Some of the interference was building up in real time, as shown in a trace taken 30 seconds later, in Figure 3. The video carrier at the right is a normal carrier in transponder 3 that was present at some time during the 36 hour period.

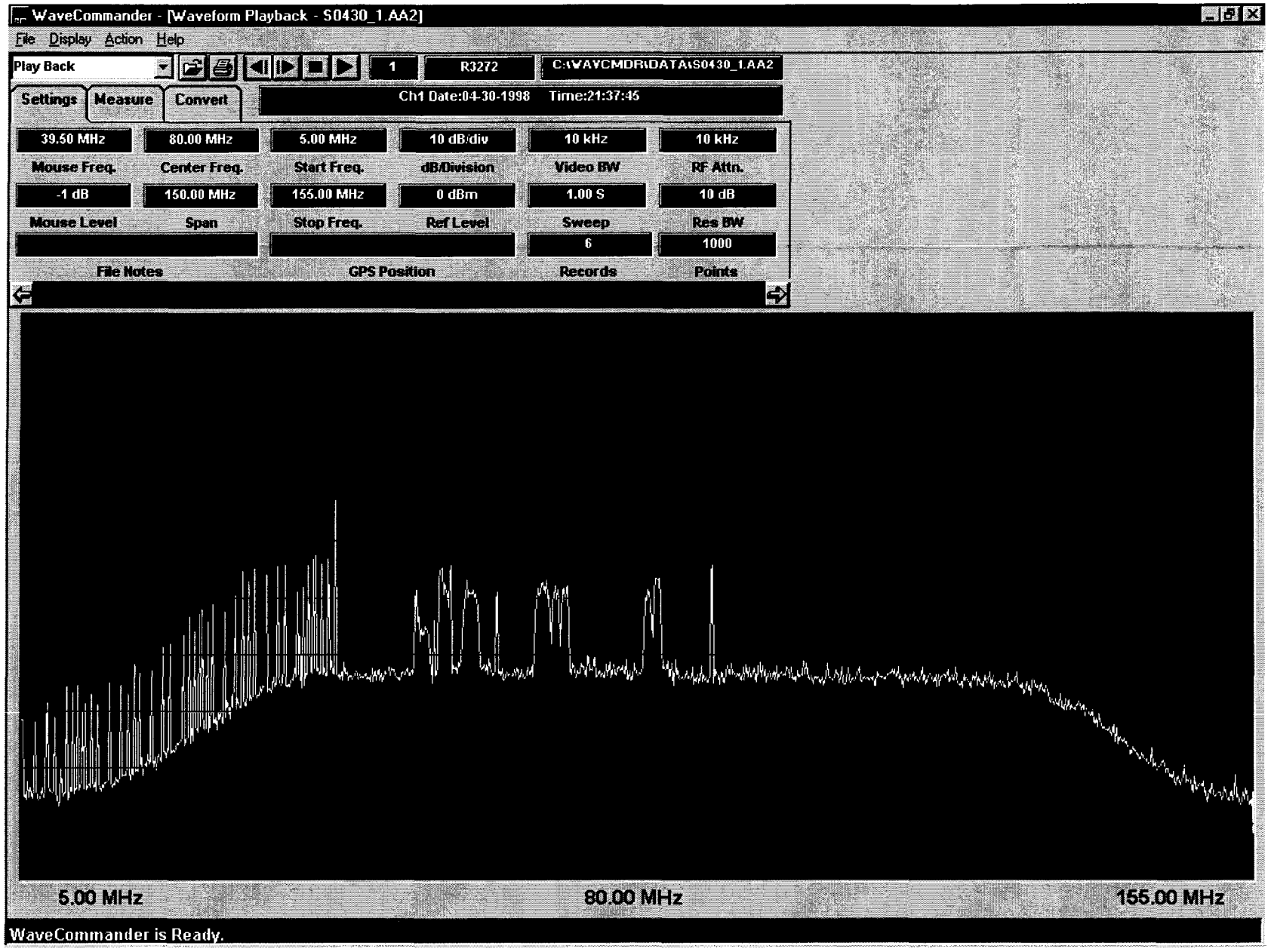

Figure 3

This trace shows a buildup of RFI over only a 30 second period, since the trace in Figure 2 was taken. The RFI was present in real time.

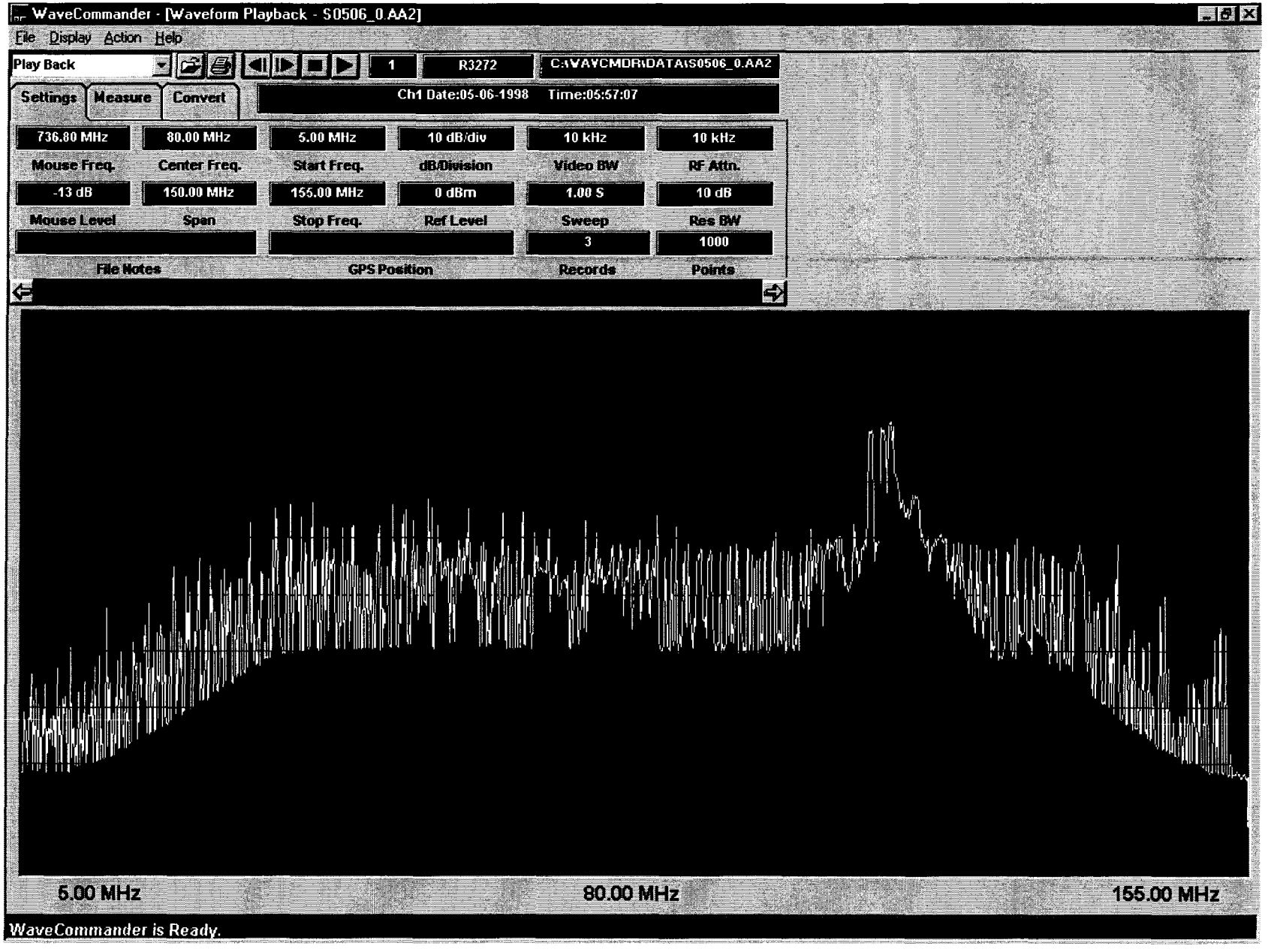

Figure 4

This figure shows an example of massive interference extending all the way to 155 MHz in the 70 MHz I.F., which corresponds to 11.805 GHz at the RF downlink.

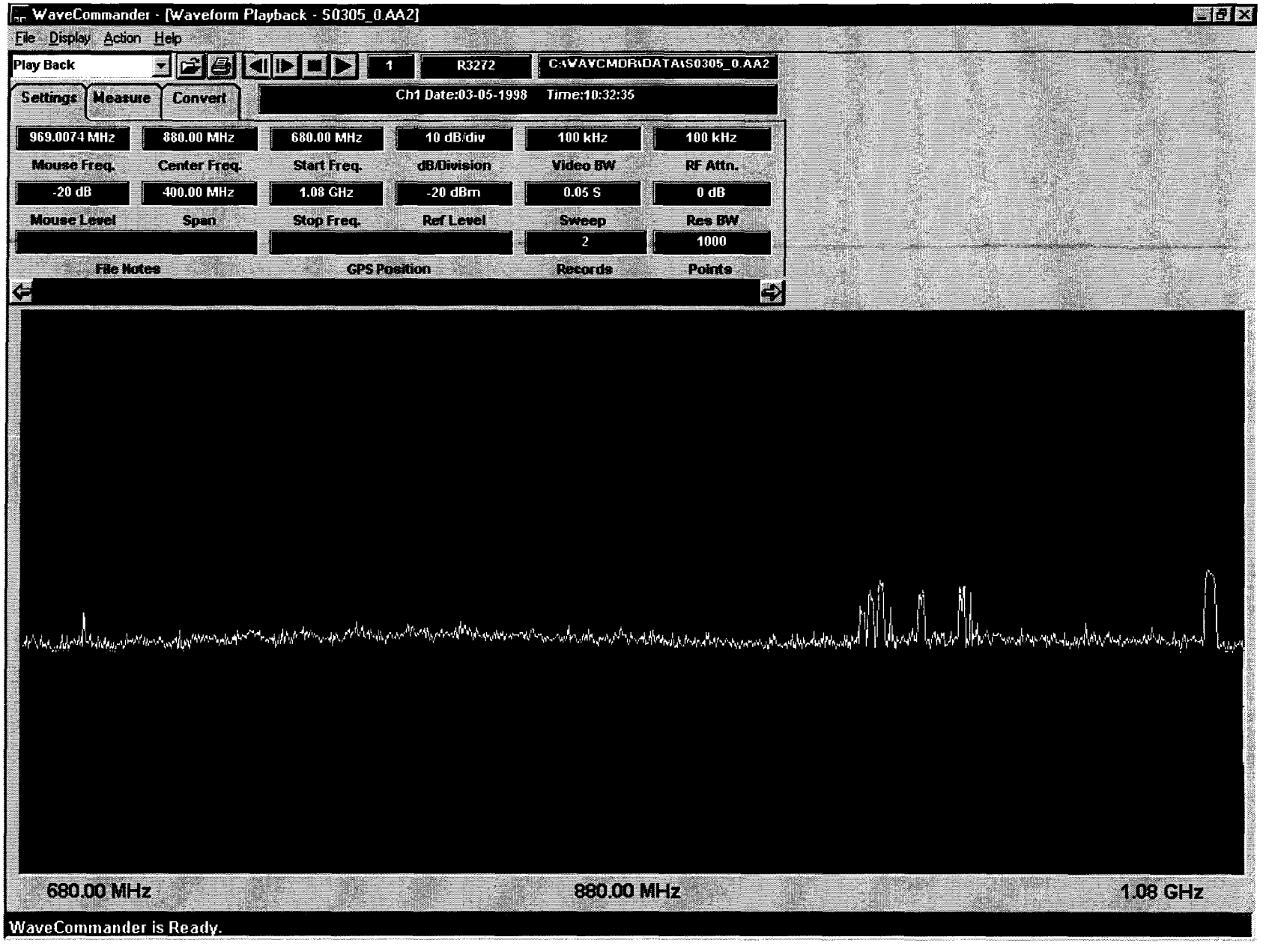

Figure 5

This shows the L. Band first I.F. of the Skydata package, with only the normal satellite signals in transponder 1, 3, and part of 5, GE 3, present at the upper end of the trace.

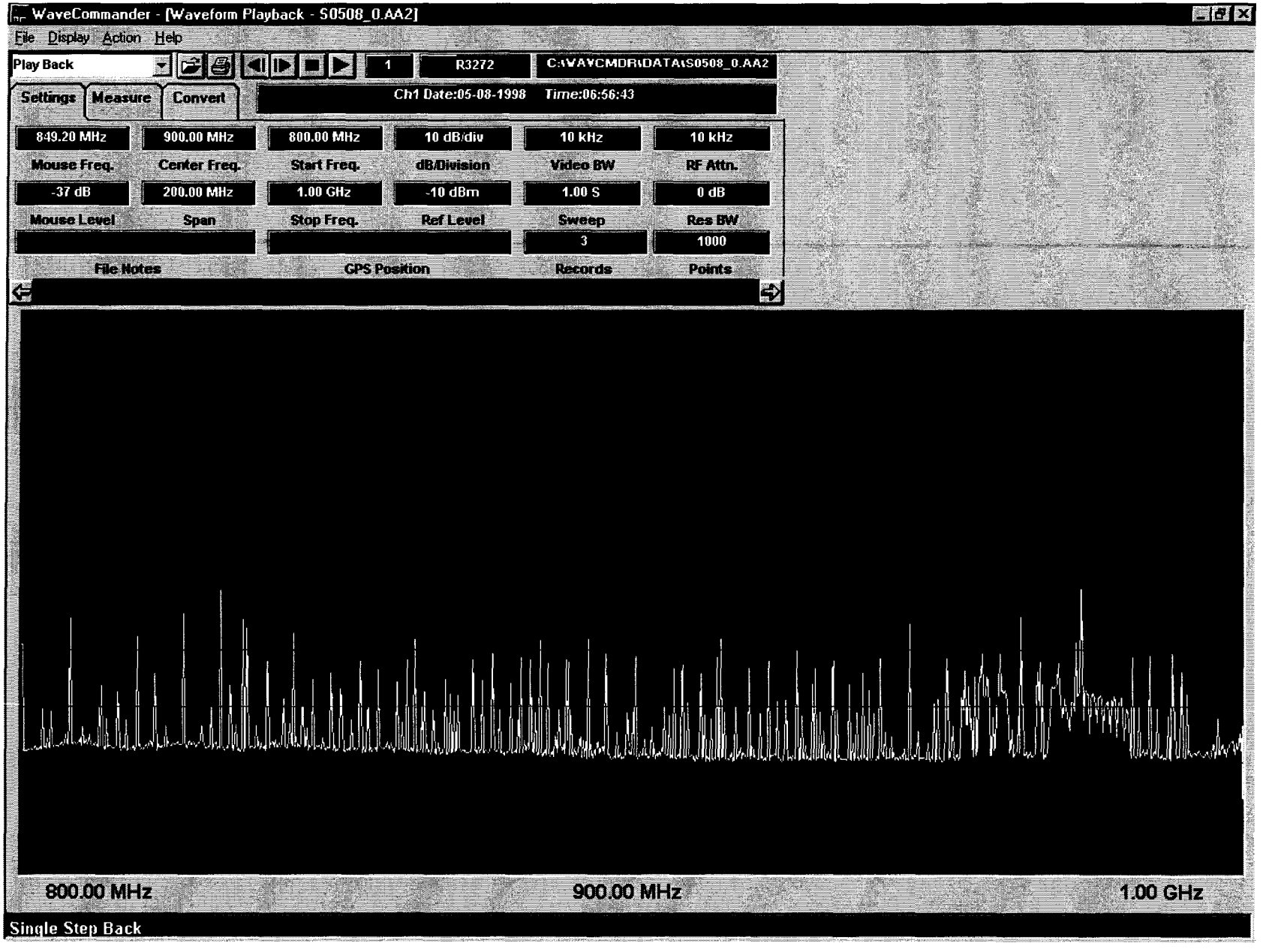

Figure 6

This trace shows a period of severe interference as seen at the L band I.F. on May 8, 1998. 1 GHz corresponds to 11.750 GHz at the RF downlink.

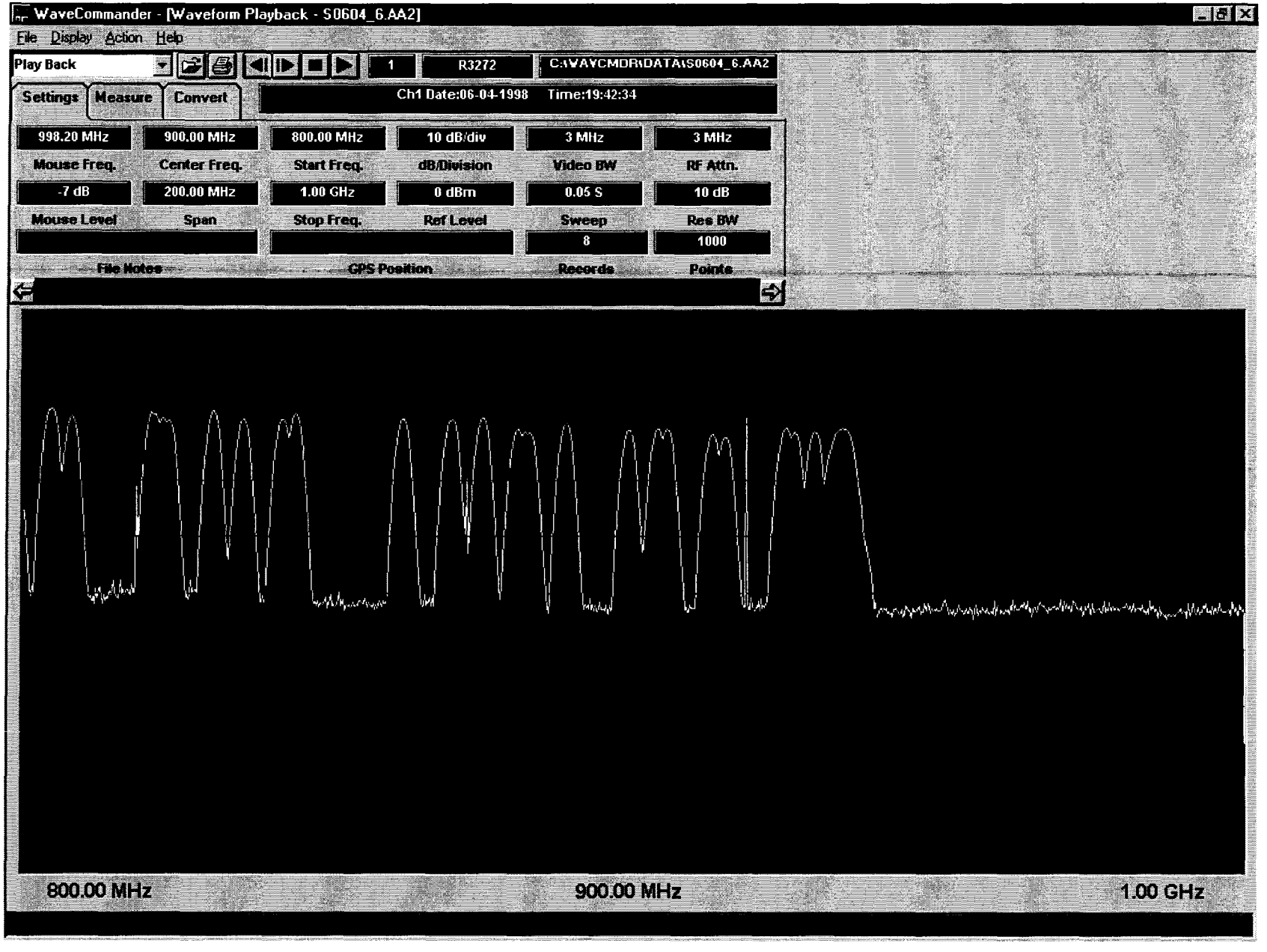

Figure 7

POSITIVE EVIDENCE OF THE RFI AT K BAND. This trace was taken using a K-band horn with an LNB mounted on it. The video bandwidth of the spectrum analyzer was set much wider for triangulating; the width of the sweeping carrier itself appears much wider than the spikes seen in the previous I.F. traces as a result. The actual frequency of the RFI was in the 11 GHz range; using the LNB on the horn translated it to the same frequencies seen in the L band first I.F. of the Skydata I.F. package on the antenna.

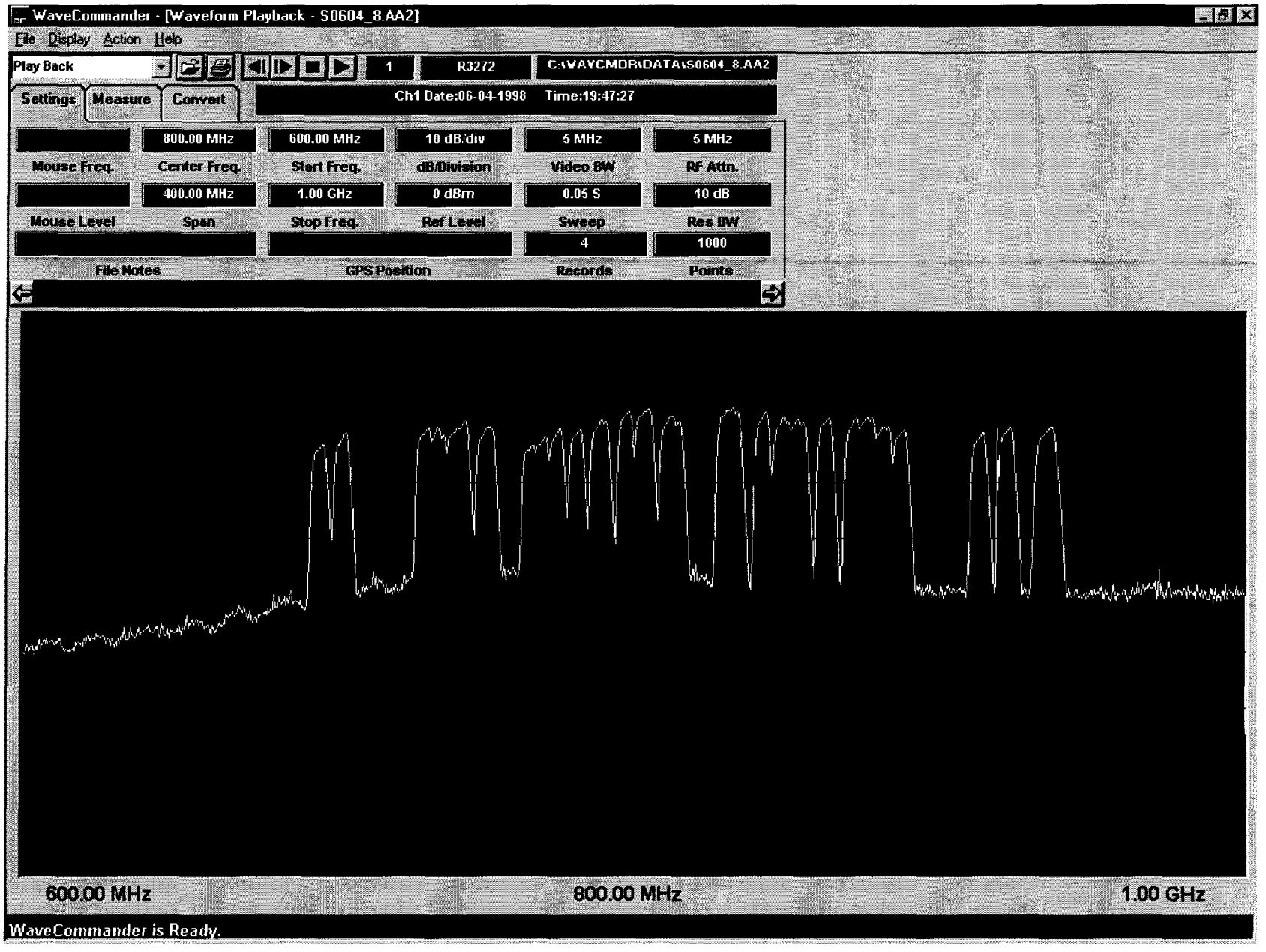

Figure 8

The trace was widened out to show the extent of coverage of the signal. Again, the video bandwidth on this trace is much wider than on the I.F. traces. The actual frequency range covered by this particular radar detector was from 11.420 GHz to 11.700 GHz. Other instances of the RFI extended further into the satellite band, up to about 11.800 GHz (Refer to figures 2, 3, 4, and 6).

APPENDIX B

Methodology:
The following analysis is based upon the reception of a 64 Kbps carrier by a 1.8 meter Ku-band terminal. A link budget was performed to establish the baseline performance of a typical 64 Kbps link without introducing interference from radar detectors. Then interference was added to the clear sky Carrier to Noise of the intended satellite signal at a level that would degrade the signal by a few tenths of a dB (.5 dB approx). This interference level was then calculated, referenced to the input of the antenna, and expressed in microvolts/meter.

Link budget parameters:

Data Rate:	64 Kbps
Occupied bandwidth:	40 KHz
Receive antenna size:	1.8 meter
Receive antenna gain (Gant):	45 dBi
DL EIRP:	11.7 dBW
Clear Sky C/N:	10.6 dB
Margin to threshold:	2.5 dB
Space link availability:	99.5%

Carrier power at LNA input (C):
C = DL EIRP – PL + Gant
= 11.7 - 205.3 + 45
= -148.6 dBW/40 KHz

For a clear sky C/N of 10.6 dB, the noise level (N) is then C – Clear Sky C/N.
N = -148.6 – 10.6
N = –159.2 dBW.

Assuming a level of interference from a radar detector (Ir) that is 10 dB below the total noise power within the carrier's occupied bandwidth, and referenced to the LNA input:
Ir = -159.2 – 10
Ir = -169.2 dBW

Assuming the radar interference source enters the antenna at an angle of 90-180 degrees,
$G_{(90^{o})}$ = - 10 dBi (per antenna specifications)

Reference Ir to antenna input and convert to flux density:
Ir_{FD} = -169 – (-10) + 43
Ir_{FD} = -116 dBW/m^2

Convert to field strength:
E = √SQRT (377 X Inv log (IrFD/10))
E = 31E-6 V/m or **31 microvolts/meter**

It should be noted that for off-axis angles between 0 and 90 degrees, this level may exceed tolerable limits due to the increased off-axis gain of the earth terminal antenna in the direction of the interference source.