SECURITY STUDIES PROGRAM
Massachusetts Institute of Technology

Attachment B
Letter to John Podesta
White House Chief of Staff

Technical Discussion of the Misinterpreted Results of the IFT-1A Experiment Due to Tampering With the Data and Analysis and Errors in the Interpretation of the Data

by

Theodore A. Postol
Professor of Science, Technology and National Security Policy
Massachusetts Institute of Technology

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Introduction

The accompanying *Attachment A* to this letter explains that the sensor in the Exotatmospheric Kill Vehicle (EKV) can only observe each space-object as a point of light. Due to this sensor limitation, the only way the EKV can identify space-objects is to record the signal fluctuations of each space-object with time, and to infer from the time-dependence of the fluctuating signals which objects are warheads and which are decoys. The EKV sensor and logic attempts to accomplish this task by measuring the fluctuating signal from each object at two infrared wavelengths, and in the visible – if the sun illuminates the space-objects that are under observation.

In this section it will be shown that the EKV sensor and logic in the IFT-1A flyby could not discriminate between different space objects because *there were no time-fluctuating features in the signal data that were unique to either the warhead or the decoys.* In particular, it will be shown that:

- The only feature that *intermittently* distinguished the warhead in the IFT-1A flyby from the other eight objects was the intensity of the signal and the ratio of the intensities of the signals from the two infrared band measurements.

  Since the intensity of the signal from each object observed in the IFT-1A experiment depends on the projected area relative to the sensor boresight, the intensity of the signal changes over time with the changing orientation of each space-object. This explains why the warhead could only be distinguished in certain time intervals. During these time intervals it was fortuitously the brightest object due to its orientation and that of the decoys.

  The fact that the signal from warhead was only intermittently assigned to the warhead is simply a consequence of the changing relative orientation of the different objects. As the sensor viewing angles changed due to the relative movements of the warhead, sensor, and other objects, the relative intensities of each target also changed. This obvious fact of geometry explains why different targets were found to be the warhead at different times during the IFT-1A homing process. It also clearly indicates that the National Missile Defense system will not be able to discriminate in combat environments, as well as in test environments that even minimally simulate realistic conditions of combat.

  In addition, it is also worthy of note that the signal, and the ratio, for both warheads and decoys could be readily changed by an adversary by simply changing the coating on the surface of the warhead.

- The Ballistic Missile Defense Organization's discrimination technique for IFT-1A was designed to look for an oscillating component in each signal, under the erroneous assumption that the coning motion of the warhead will result in an oscillating component to the signal that is unique to the warhead.

However, no oscillating component was observed in the signals from any of the nine objects studied by the Ballistic Missile Defense Organization Team in the IFT-1A experiment. As a result, it is no surprise that the BMDO could not find an oscillating component in the signals and could not discriminate by frequency analysis one object from the other.

- The BMDO-POET Team used an erroneous example of simulated data to show that they could detect an oscillating component in a signal. At best, this example shows that it is possible to find oscillating components in a signal, a result that was demonstrated by the famous French mathematician Jean Fourier more than two hundred years ago.

  However, the BMDO-POET team *did not show* that they could find oscillating components in the signals from the IFT-1A experiment. This is because there was no oscillating component in the IFT-1A data. Stated differently, there was no oscillating component in the signal to detect and exploit for discriminating between warheads and decoys.

- When the BMDO-POET Team was unable to find the features in the signals that the EKV sensor and logic could use to discriminate between warheads and decoys they tampered with both the data and analysis to create the false impression that the data made it possible for the EKV sensor and logic to perform discrimination.

  This was done by selectively choosing time intervals in the data where the signal from the warhead was fortuitously of highest intensity, and the ratio of the intensities from two wavelength bands had a certain ratio.

  Even then, the BMDO-POET team could not demonstrate that they could reliably identify the warhead from other objects, so they then changed the expected values of the intensity and the ratio of the two-wavelength-intensities to create the false impression that the signal from the warhead had unique features that made it identifiable.

  These procedures are like rolling a pair of dice and throwing away all outcomes that do not give snake eyes, and then claiming that there is scientific evidence that makes it possible to reliably predict when a roll of the dice will be a snake eyes.

- After the IFT-1A experiment, the BMDO changed the number of objects it planned to fly in follow-on experiments from ten to four. The four objects were to be a medium reentry vehicle (MRV), a 2.2 meter balloon, and two 0.6 meter balloons.

  Some time after this reduction in the number of objects to be flown in IFT-2, 3, and 4 experiments the number of objects was again changed. This time the two 0.6 meter balloons were removed, further reducing the number of objects for follow-on experiments from four to two, leaving only a single large balloon and a medium warhead.

  The removal of the two 0.6 meter balloons appears to have been motivated by the revelation from the IFT-1A experiment that it would not be possible to find the warhead among the decoys in the IFT-2, 3, and 4 follow-on experiments. When the medium warhead is viewed from nose-on, it has a projected area quite close to that of the small balloons, and the balloons could well have signal intensities that would make them indistinguishable from the warhead. This suggests that the configuration of the IFT-2, 3, and 4 was altered to avoid having the EKV sensor fooled by the simplest of objects – two 0.6 meter diameter balloons.

- The fidelity of the IFT-2, 3, and 4 experiments was further undermined by the careful choice of a time of day for the intercept attempt, which placed the sun behind the EKV illuminating the balloon and warhead from the front. This results in very bright targets, and very large differences in the intensity of the two targets, making it easier to home, and easier for the EKV to find the dimmer but bright warhead near the balloon.

- In summary, a review of the data and analysis from the IFT-1A shows that the current National Missile Defense system has no hope of functioning in combat, as it cannot even determine the difference between warheads and light balloons.

  When the results of the IFT-1A experiment were discovered, it appears that an effort was made to cover up the results of the flyby and analysis. The results of the IFT-1A experiment are simply explained. There were no features observed in the signals measured by the EKV sensor that were unique for warheads relative to decoys. This means that the data from the sensor carries no information that can be used to identify objects, and no algorithm, no matter how sophisticated, can obtain information where there is none.

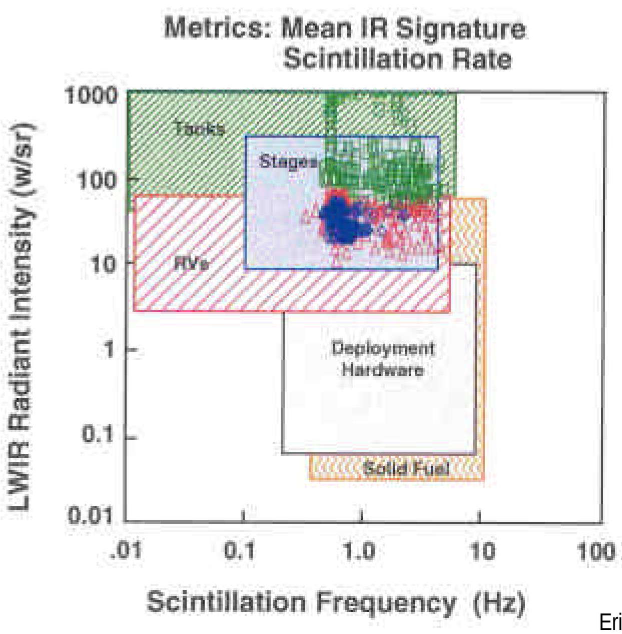
- Finally, the above observations indicate a highly orchestrated scientific hoax, involving tampering with data, distortion of analysis, and the intentional changing of experimental conditions to create a deception that a weapon system that could be vital to the security of the United States works – when in fact it is prone to total failure.

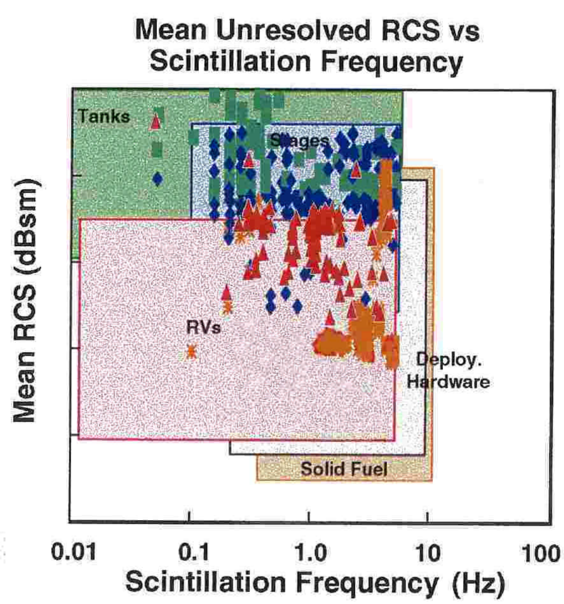
Why the Data from IFT-1A and Elsewhere Shows that there Are No Unique Features in the Signals Measured by the EKV Sensor Can Be Used to Identify Warheads and Decoys

As noted in the introduction and explained in Attachment A, the Exoatmospheric Kill Vehicle must be able to find features in the fluctuating signal from space-objects that appear to the sensor as points of light. The source of the fluctuations in the signals from space-objects is the changing orientation of the object as it falls through space. If the object is cone shaped, as it is seen from different orientations it will radiate and reflect infrared and visible light differently. Even if the object is a spherical balloon, it can be made to scintillate by covering sections of the balloon with different coatings, and by making the balloon imbalanced with small weights.

The two graphs below show data published by the MIT Lincoln Laboratory showing the range of fluctuation frequencies observed in infrared and radar measurements of warheads in flight, and of the upper stages, deployment vehicles, and other hardware that typically travel along with warheads launched by ballistic missiles. The wide variation in the target radar cross sections and radiant intensities indicates that these graphs must have been constructed from “laundered” technical intelligence measurements, probably on Russian missile systems.

The striking feature of these data are that almost all the observed objects scintillate at frequencies roughly between 0.5 and 5 Hertz. This indicates that regardless of whether an object is a small piece of deployment hardware, or a large discarded upper missile stage, the dynamical motions are all similar, and all within a narrow range of frequencies. The EKV can only reliably discriminate between objects if warheads have some unique pattern to their scintillations relative to that of all other objects.





Eric D. Evans, “Missile Defense Technology (Can BMD Systems Work?),” MIT Lincoln Laboratory Briefing, 10 December 1999

The IFT-1A experiment was performed in order to measure the time varying signals, and spectral content of the signals from space objects that might be expected to be launched along with nuclear warheads.

Figures 1A through 1D on page 6 of 19 pages shows the raw signal data from the medium reentry vehicle (the warhead) that was flown as one of ten targets in the IFT-1A experiment. The plot in Figure 1A is extracted directly from the BMDO-POET study *"POET Study 1998-5, Independent Review of TRW Discrimination Techniques, Final Report."* That study is included as *Attachment D* to this letter.

Figure 1A shows the intensity in the J_1 and J_2 wavelength bands from the warhead as a function of time for the period between 1750 and 1768 seconds after launch. Figure 1B shows the same data with the data points connected by lines, so trends in the data can be more readily seen, and Figure 1C shows the data curves without data points, so it is still easier to see the trends in the data.

Inspection of Figure 1C shows that the more slowly time-varying part of the signals from the J_1 and J_2 bands behave in a roughly similar way. This behavior is expected, and it is simply because the amount of infrared energy radiating from the object changes with projected area of the warhead, causing the signal to fluctuate relative to the sensor boresight. One can also see sharp peaks in the data that are sometimes correlated, anti-correlated, and uncorrelated. The correlated and anti-correlated peaks are probably due to the intermittent exposure of radiating or reflecting pieces of warhead surface. Uncorrelated peaks may be due to external sources of noise, or signal components that do not appear in both wavelength bands.

Figures 2A through 2D on page 7 of 19 pages shows what is known as the *"Power Spectral Density"* of the raw signals for the warhead and the eight remaining objects that were analyzed following the IFT-1A experiment. Data from the tenth object, a partially inflated medium balloon, is not shown in the figure, *as this data was inexplicably removed from the IFT-1A telemetry*, apparently because its signal appeared more like that expected for the warhead than the warhead itself.

This data on the nine remaining objects makes it possible to determine whether there is *any* time structure in the collected signals that is unique to the different observed objects.

In the remaining discussion in this section, and the section that follows, we will explain why the IFT-1A data in Figures 2A and 2B on page 7 of 19 pages show that there is essentially no exploitable features in the time structure of the different signals that can be used to tell one object from another.

The full meaning of the Power Spectral Density will be clear after a reading of this section, and the section that follows.

All continuous signals observed in the physical world can be constructed in terms of a sum of sines and cosines (oscillating sinusoids) of different frequencies and magnitudes. The Power Spectral Density simply shows the magnitude and frequency of each sinusoidal component needed to construct a particular time varying signal.

As will be shown in the next section, if the signal is simply an oscillating sinusoid, the Power Spectral Density of that signal would simply have a spike at the frequency of the sinusoid. The magnitude of the spike would simply be the amplitude (or the square of the amplitude) of the sinusoid. If the time-varying signal is made up of the sum of two sinusoids of different frequency, then there would be two spikes in the Power Spectral Density at each of the two frequencies. In addition, if one spike is larger than the other, it simply means that the signal is the result of two sinusoidal signals each of different frequency and intensity.

A simple inspection of Figures 2A and 2B show that there are *no* spikes in the Power Spectral Density, indicating that none of the signals have any dominant oscillating component associated with them. This is striking, as it indicates that all the signals are simply made up of somewhat differing broad ranges of frequencies, all having the same indistinctive features.

Figure 1 A

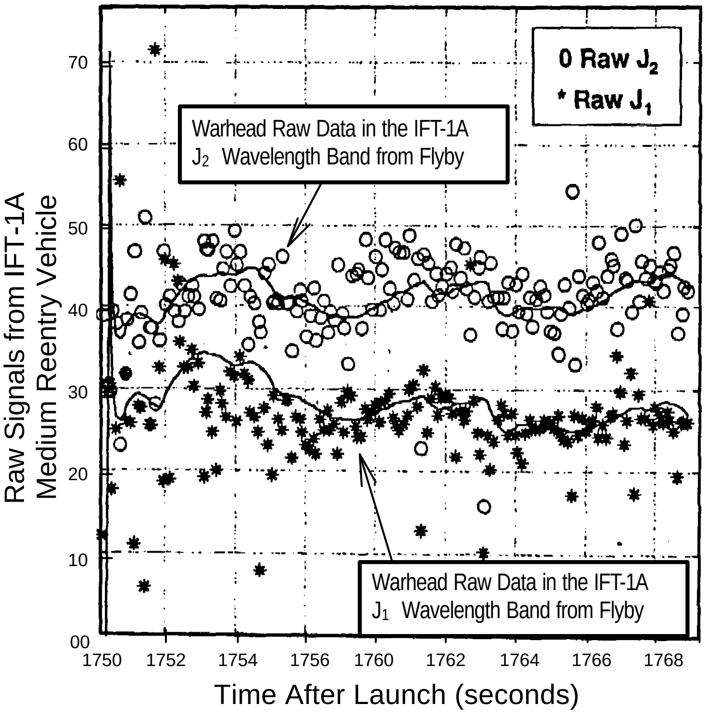
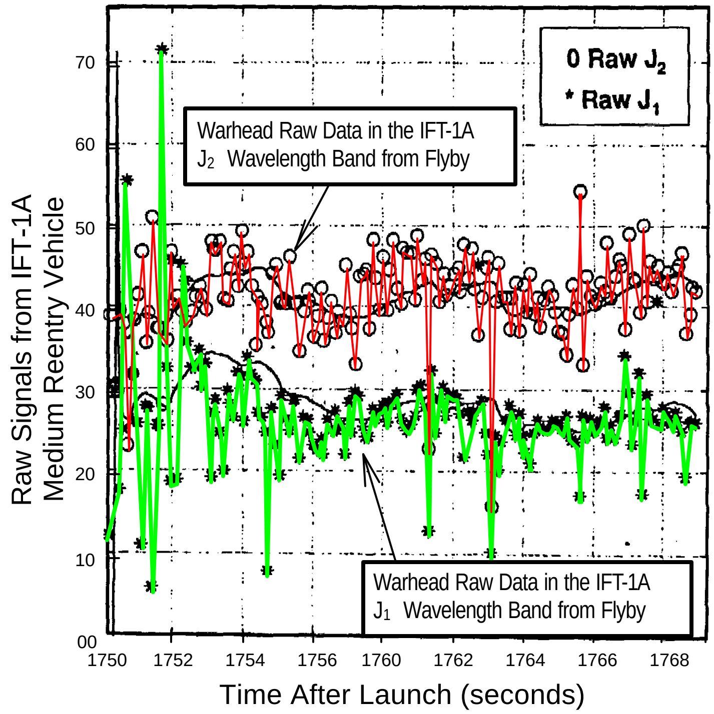


Figure 1 B



Above graph from *"POET Study 1998-5, Independent Review of TRW Discrimination Techniques, Final Report,"* Figure 14, Page 32.

Figure 1 C

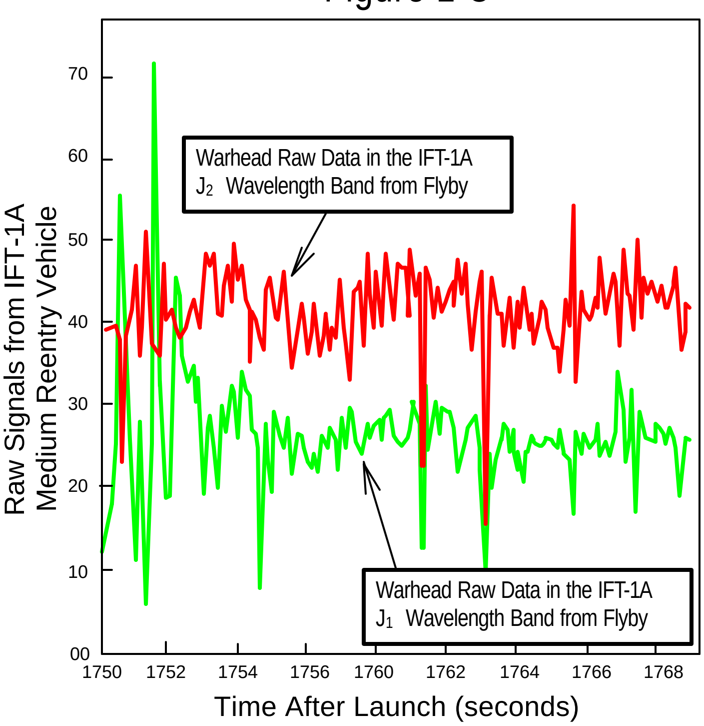
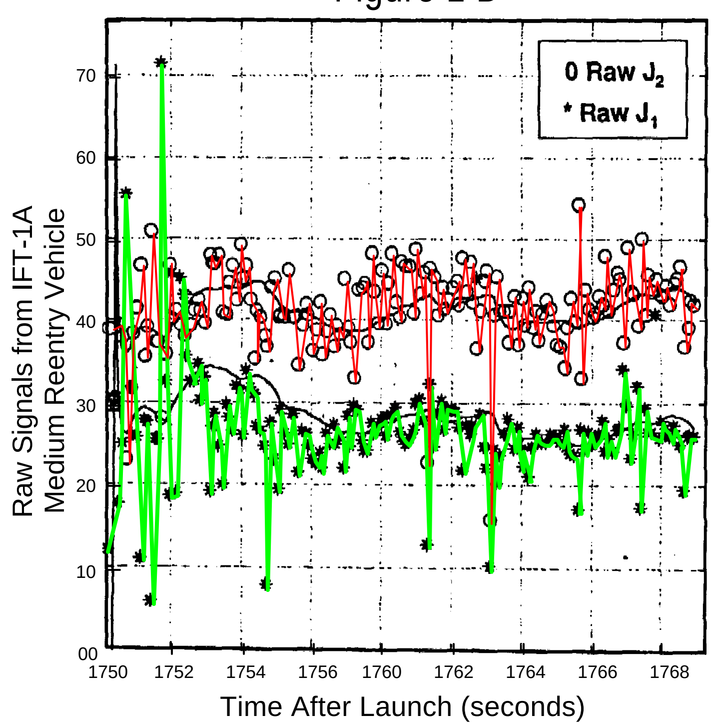


Figure 1 D



Above graph from *"POET Study 1998-5, Independent Review of TRW Discrimination Techniques, Final Report,"* Figure 14, Page 32.

Figure 2 A

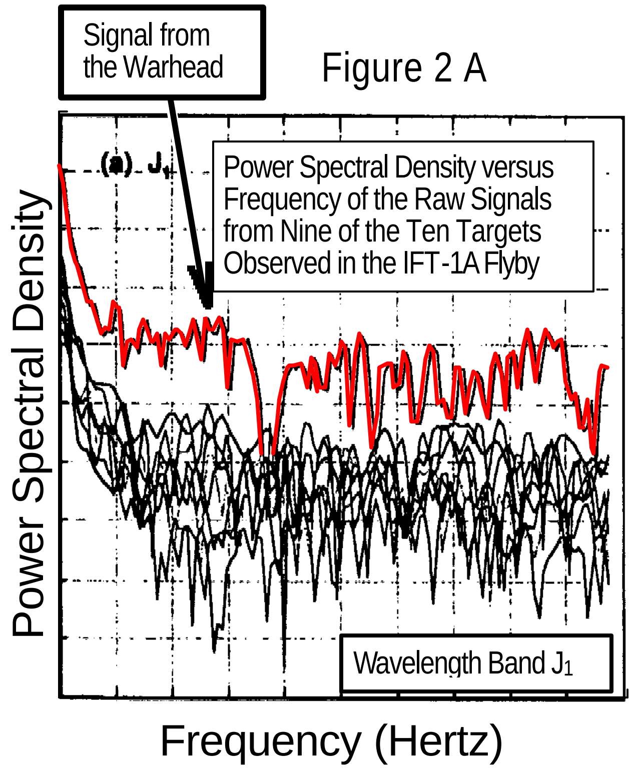
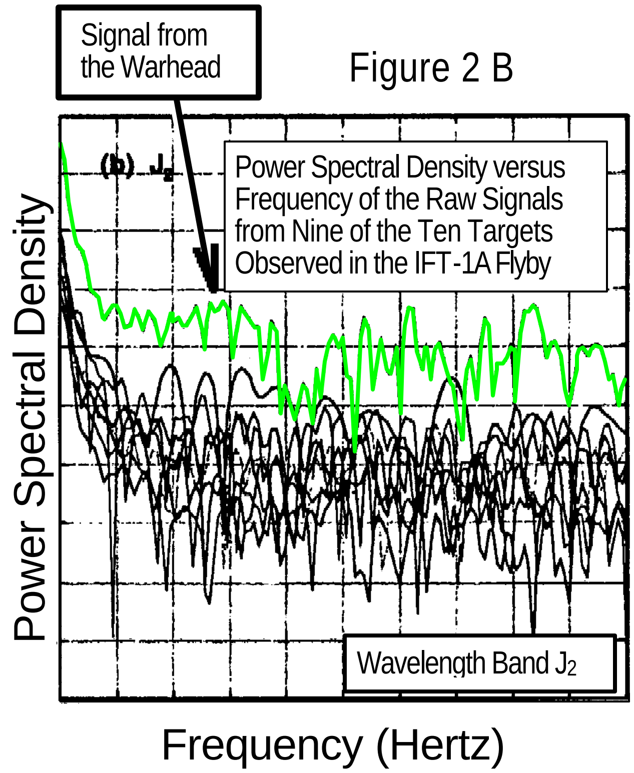


Figure 2 B



All graphs and data derived from *"POET Study 1998-5, Independent Review of TRW Discrimination Techniques, Final Report,"* Figure 2, Page 13.

Figure 2 C

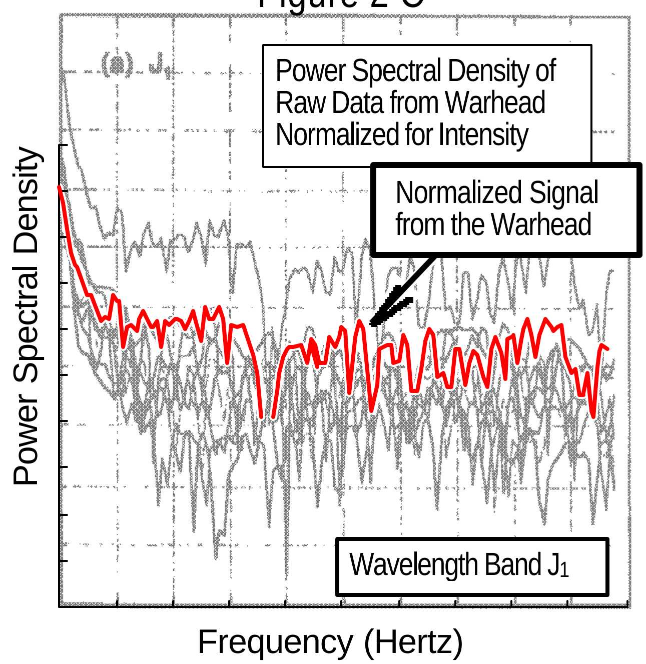
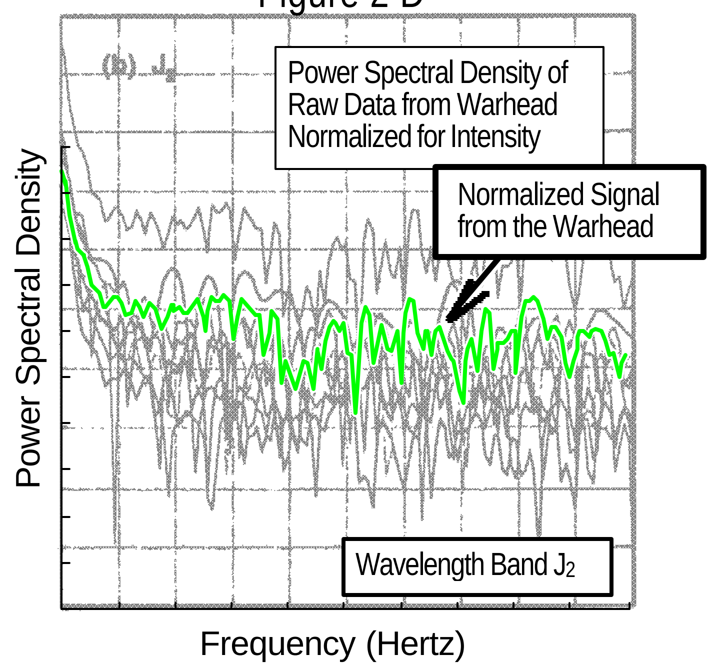


Figure 2 D



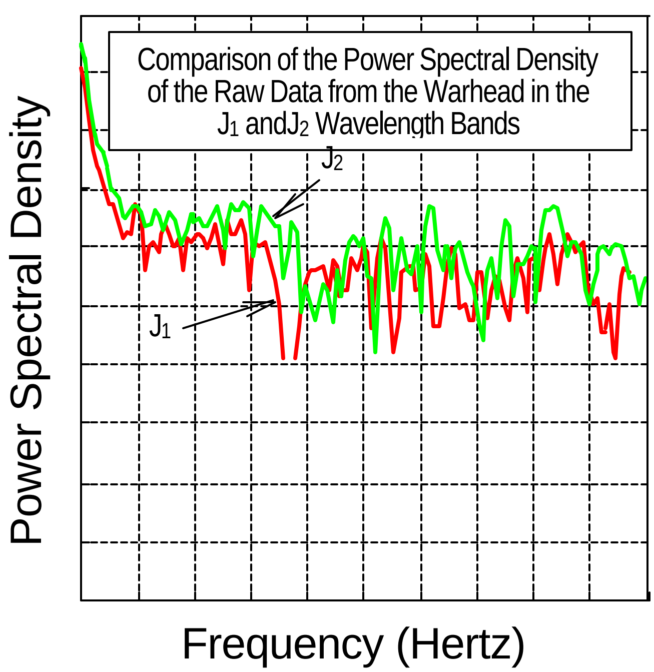
In addition, it will be shown in the next section that the Power Spectral Density of the different targets observed in the IFT-1A are simply different randomized signals, which only differ due to the relative position of the spikes in each signal. This means that the Power Spectral Density of each observed object will change with its spin rate, precession, and orientation relative to the sensor. Stated differently, *the data from the IFT-1A experiment contains no usable information of any kind for identifying one object relative to another.*

Figures 2C and 2D are exactly the same as 2A and 2B, except the trace of the signal from the warhead has been normalized to account for the different intensity of the signal from the warhead relative to the other objects. As noted earlier, this will occur if the warhead is oriented so that it presents a different projected area to the sensor, or if the objects that surround the warhead are made to be a little larger, or if the warhead is coated with a material that causes the infrared signal to be slightly smaller.

Note that when the signal is normalized, it is essentially indistinguishable from the other data. In fact, it will be shown by simulation in the next section of this attachment that each of these signals is basically the sum of spike-like signals of varying intensity and time-duration. It will also be shown that the Power Spectral Density for such signals will vary significantly (the hills and valleys in the Power Spectral Density data curves shown in 2A and 2B) if the spikes that make up the signal are just moved around a bit, just as would happen if the target were observed from a different look angle, or if its dynamics is only slightly different from that observed during the IFT-1A experiment. Thus, the data for nine of the ten objects that were observed, simply shows that the intensity of the signal from the warhead, and the ratio of the intensities associated with the signals from the two infrared wavelength bands was the only feature that distinguished the signal from the warhead relative to the decoys. Since the intensity of the signals from the warhead change with its orientation, and can also be altered by simply changing a surface coating, it is clear that there is no exploitable feature present in the data from the IFT1-A experiment that will make it possible for the EKV to identify warheads and decoy balloons.

Figure 3 below simply shows that the frequency content of the warhead signals for the two observed infrared wavelength bands is very nearly the same. This, of course, is to be expected since the time-fluctuations in the signal are due to the changing orientation of the target relative to the sensor boresight.

Figure 3



Why the Simulated Signals in the Ballistic Missile Defense Organization POET Analysis are Misleading and Incompatible with the Observed Data from IFT-1A

In the previous section we showed the Power Spectral Density data for nine of the ten space-objects that were observed during the IFT-1A flyby. We noted that there was no well-defined frequency or set of frequencies in *any* of the observed space objects.

Figure 4 on page 10 of 18 shows the *simulated* data used by the BMDO-POET team to demonstrate that it is possible to fit a sinusoid function to sinusoidal oscillating data. This is a peculiar point to demonstrate, as the data presented in page 13 of the same report shows that there is no sinusoidal component to the signals in question. In fact, any attempt to match such a a sinusoid to the data from the IFT-1A will simply lead to a meaningless result.

This *fact*, which should be obvious to any competent scientist who has done data analysis, is easily seen in Figures 5A and 5B on page 11 of 19 pages.

Figure 5A shows a sinusoidal sample of data which is essentially the same as the data shown in the POET report. Notice that it's Spectral Density, shown in the adjacent Figure 5B, shows a single well-defined spike in frequency. Since the time-signals shown in Figure 5A and Figure 4 are sinusoidal functions of a single frequency, this is exactly the expected Spectral Density.

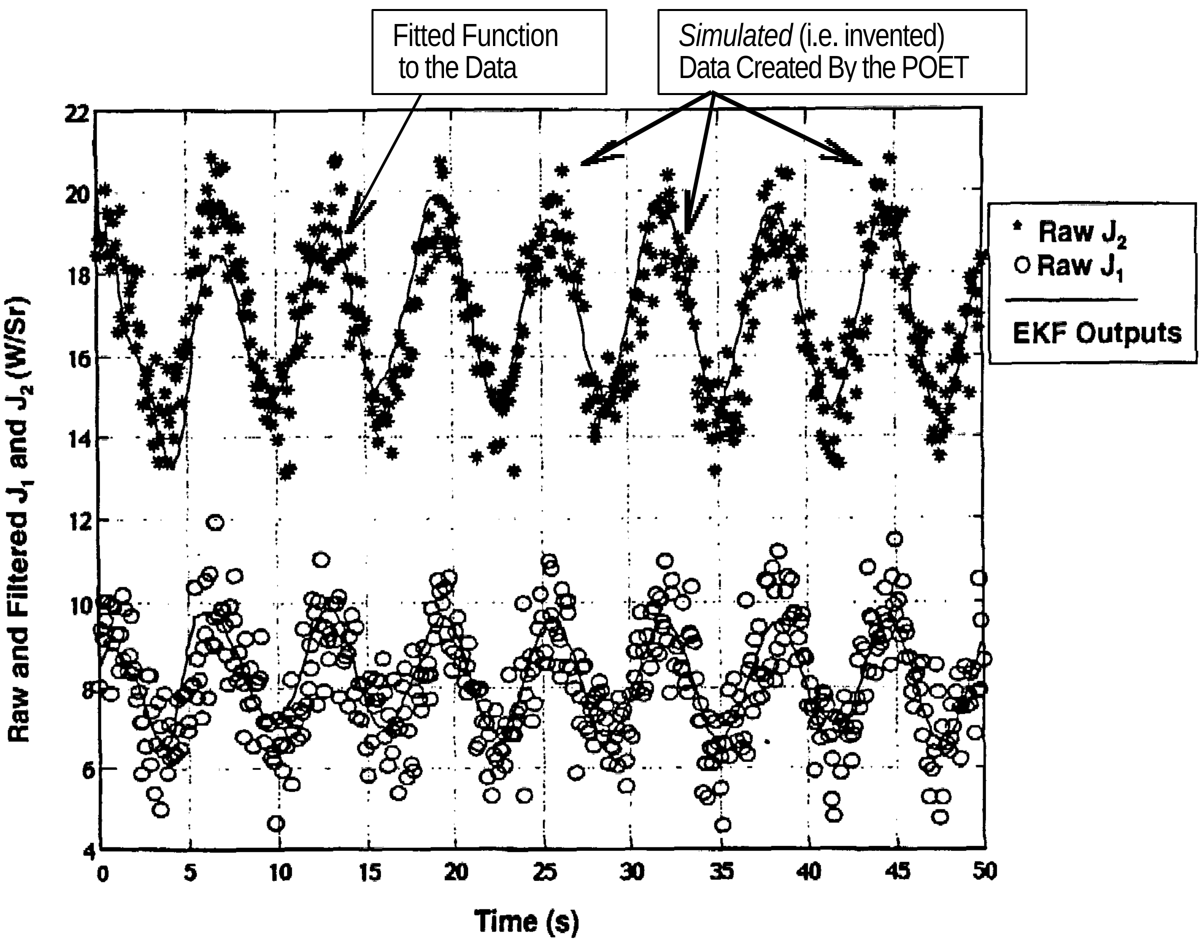
Figure 5C shows how the signal looks when noise is added to it, just as noise was added to the signal shown in Figure 4 on page 10 of 19 pages, which is copied from the BMDO/POET report *(Attachment D)*. Again, an inspection of the Spectral Density (Figure 5D) reveals a well known property of noise. The noise is spread over all frequencies while the sinusoidal component of the signal remains prominent. It is exactly this mathematical property of the sinusoid relative to noise that makes possible long-range detection of submarines in noisy ocean environments.

Instead of being constructed from sinusoids, the simulated time-signal in Figure 5E is constructed from spikes of random size, time-duration, and time-location. An inspection of Figure 5D shows a striking result, the Spectral Density of this signal appears very similar to the Power Spectral Densities of the eight decoys and warhead observed in the IFT-1A experiment. This indicates that the observed signals from these objects are the result of spike-like signals, not the result of sinusoidal signals, like that assumed by the POET in spite of the data in the same report.

Figure 5J on page 12 of 19 pages shows the simulated signal that is constructed from the spike-like signal (Figure 5E) and the noisy sinusoidal signal (Figure 5E). Even a careful inspection of the time-signal shown in Figure 5J is likely to raise doubts about whether there is a sinusoidal component to the time-signal. However, the Spectral Density of the signal clearly and unambiguously reveals the presence of a sinusoidal component.

These simulated data illustrate facts that are well-known and not subject to debate among competent scientists. That is, if a signal contains even a quite weak sinusoidal component, it will be evident in the Spectral Density of the time-signal. This well-known fact, should have been immediately evident to the BMDO-POET team after the first superficial inspection of the data they presented on page 13 of their report. It is therefore very hard to understand how a team of competent experienced scientists could unwittingly make such a stunningly blatant error in their analysis.

Figure 4



Simulated Noisy Two Band Intensity Signals—Used by the POET team to demonstrate the "Convergence" of the Kalman Filter.

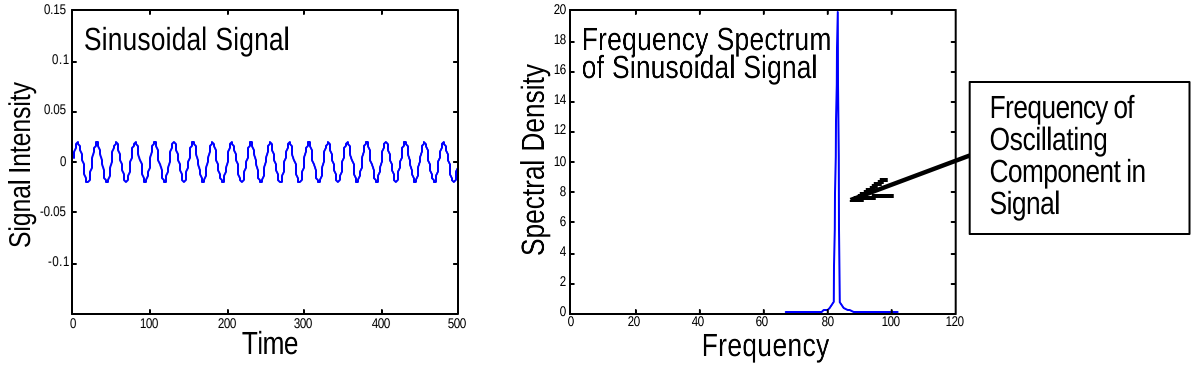
Above graph from *"POET Study 1998-5, Independent Review of TRW Discrimination Techniques, Final Report,"* Figure 15, Page 33.

$$\text{POET Fitting Function for Time Dependent Intensity of the } J_1 \text{ Signal} = A_1 + B_1 \cos\left(w t + j_1\right)$$

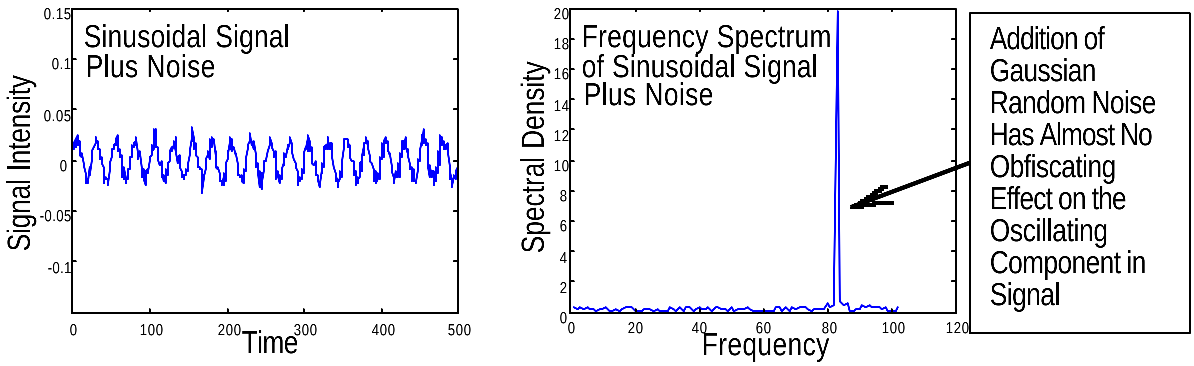
$$\text{POET Fitting Function for Time Dependent Intensity of the } J_2 \text{ Signal} = A_2 + B_2 \cos\left(w t + j_2\right)$$

Simulated Signals to Demonstrate that there are No Distinct Features in the IFT-1A Data

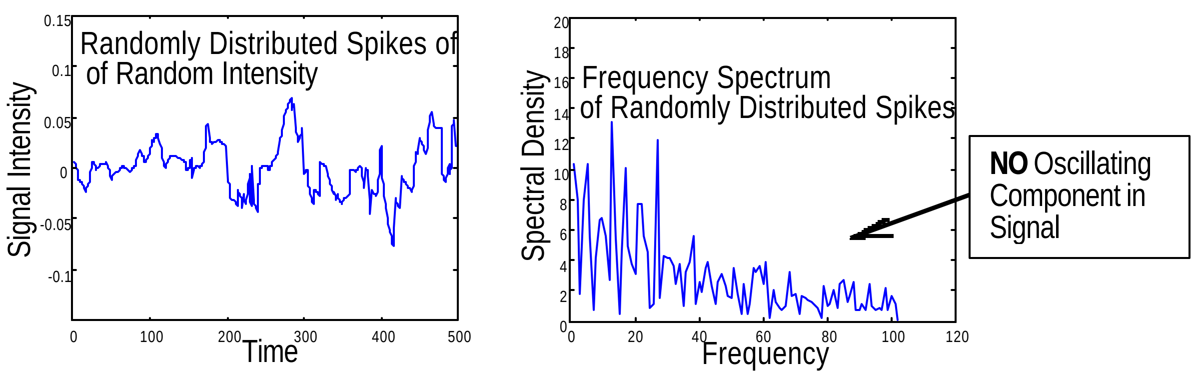
Figures 5A and 5B



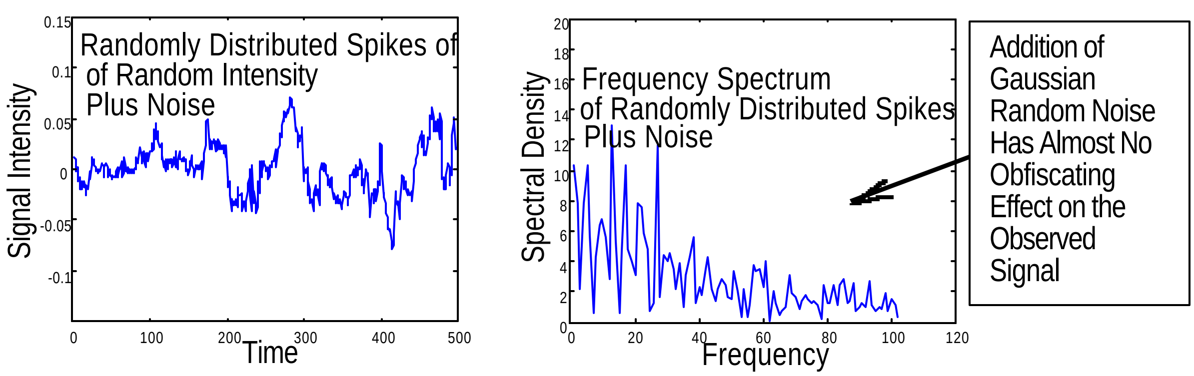
Figures 5C and 5D



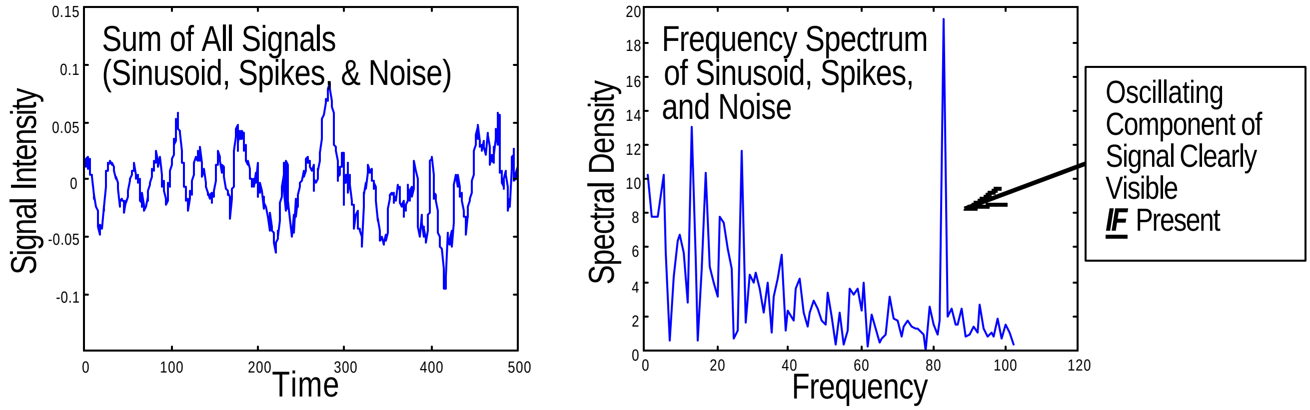
Figures 5E and 5F



Figures 5G and 5H



Figures 5i and 5j



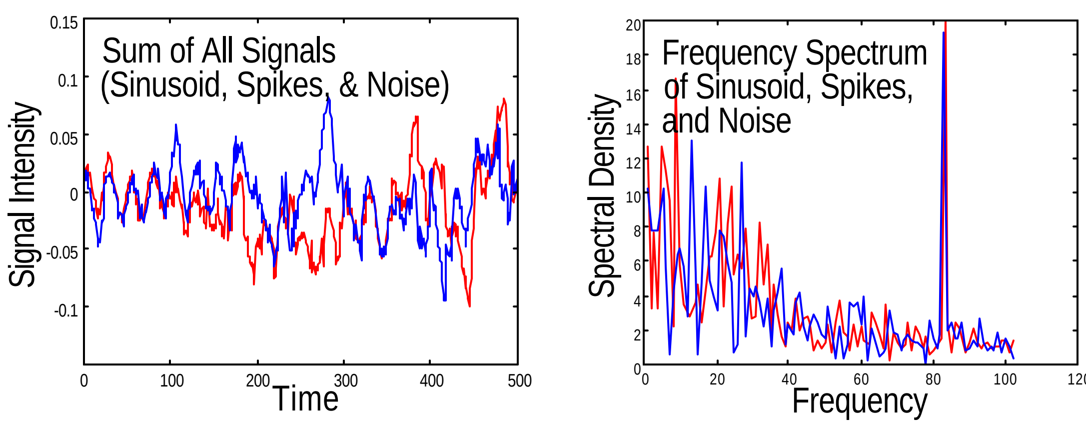
Non Uniqueness of the Signals from the Space-Objects Observed in the IFT-1A Flyby Data

It now only remains to show that the actual observed IFT-1A signals from the nine studied objects differ only in ways that are meaningless. This is demonstrated below in Figures 6A and 6B.

Two simulated signals are shown in 6A and 6B that were constructed in *exactly* the same way. Each signal contains the same number of spikes, with the same intensities, and the same range of time durations. The only piece of the signal that was altered was the location of the spikes in time. As can be seen by inspection, the Spectral Densities of the two simulated signals, while qualitatively similar, differ in essentially the same way as the measured signals from the nine studied objects in the IFT-1A experiment.

Since the sequence of spike-like signals from each of the observed objects will change with their spin rates, precession, and orientation relative to the EKV's sensor, it is very clear that the use of these signals for discriminating warheads from decoys is a mathematical impossibility.

Figures 6A and 6B



Additional Blunders in the BMDO-POET Analysis of the IFT-1A Experimental Data

It now should be clear that the only difference between the signals from the warhead and the decoys was the absolute value of the average intensities of the signals in the different wavelength bands. A simple inspection of the Power Spectral Density Data shows that there is no discriminating sinusoidal component or any other time-dependent feature in any of the nine out of ten signals analyzed in the BMDO report.

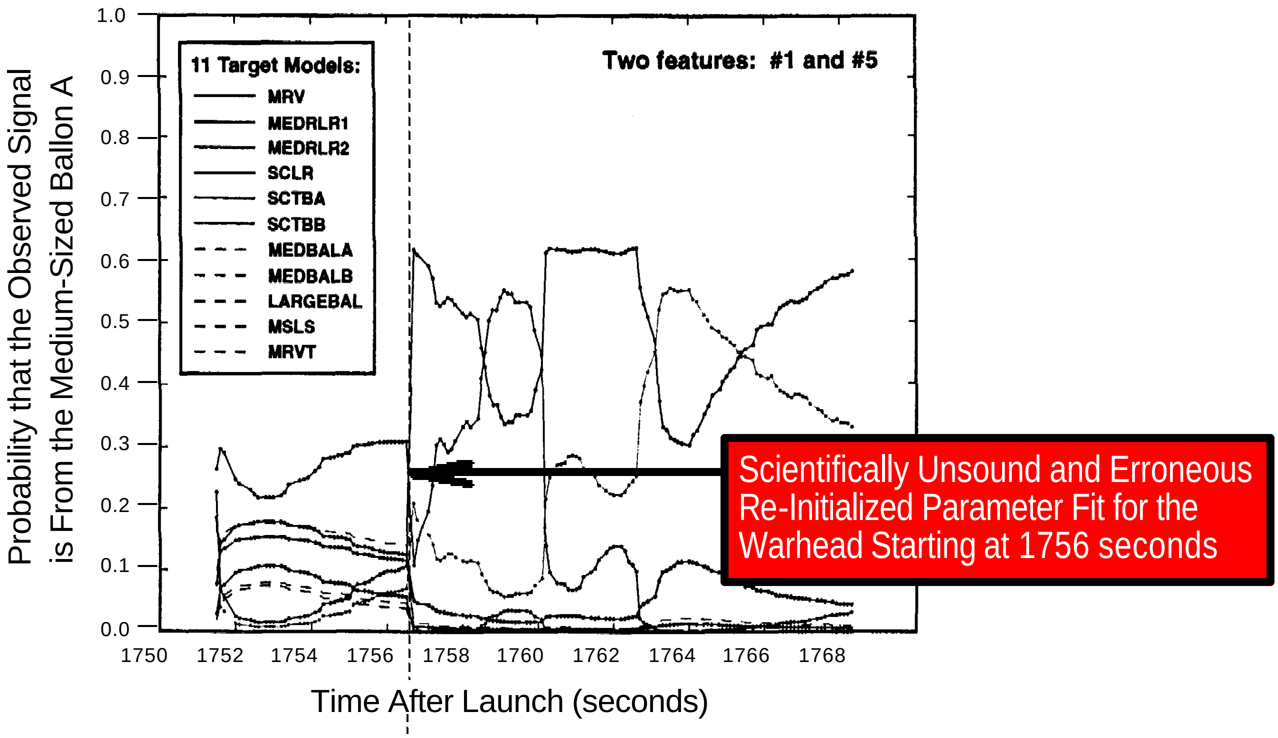
Figure 7A (on page 14 of 19 pages) from the BMDO-POET report shows ill-fated attempts to fit a meaningless functional form to the data obtained in the IFT-1A flyby. The vertical axis in Figure 7A is supposed to be the probability that each of the nine observed signals is from a medium balloon target that was flown as part of the IFT-1A experiment. The signals are analyzed from 1752 to about 1757 seconds, and then inexplicably the analysis is reinitialized at about 1757 seconds and allowed to run until 1768 seconds. During the second period of the attempt to find information in these meaningless signals, the fitting procedure jumps around suddenly picking one target, than another, and another, as most likely the Medium Balloon. This behavior is simply a result of the fact that there is no distinguishing feature in the signals from each target other than the relative intensities – which as explained earlier, change with the orientation of each object relative to the sensor.

Figure 7B is yet more revealing than 7A. Here the BMDO-POET Team again arbitrarily stopped the analysis of the data, and again began a second fit to the data. Not surprisingly, the warhead was quickly selected as the target during this time interval. The reason for this is clear. The parameter the team chose to fit for was the intensity of the signals in the two different bands. This result was simply fortuitous, as they obviously chose the time period where the warhead was bright relative to the other targets, the intensity being the only distinguishing feature in the signal from the warhead relative to the decoys in that time interval.

It is also interesting to note that in the time interval from 1752 to 1757 seconds the fitting procedure was indicating that the signals from a Medium Balloon and a Medium Rigid Light Replica Decoy were more likely to be from the warhead. During this interval, the signal from the warhead is judged less likely to be from the warhead than the signals from either of the two false targets. This again shows that an arbitrary choice of a different time interval leads to yet a different set of meaningless results. It is therefore clear that the entire fitting process shown in figures 7A and 7B has no scientific meaning. The results of the fits at different time intervals are simply due to random statistical fluctuations in the signal intensities from the Medium Balloon, Medium Rigid Light Decoy, and the warhead, due to their changing spatial orientation relative to the sensor.

These meaningless figures, and the associated meaningless conclusions reached by the BMDO and POET, simply illustrate that complex mathematical procedures, of any kind, applied mindlessly to data that contains no information, will inevitably lead to a meaningless result.

Figure 7A



Above graph from *"POET Study 1998-5, Independent Review of TRW Discrimination Techniques, Final Report,"* Figure 12, Page 28.

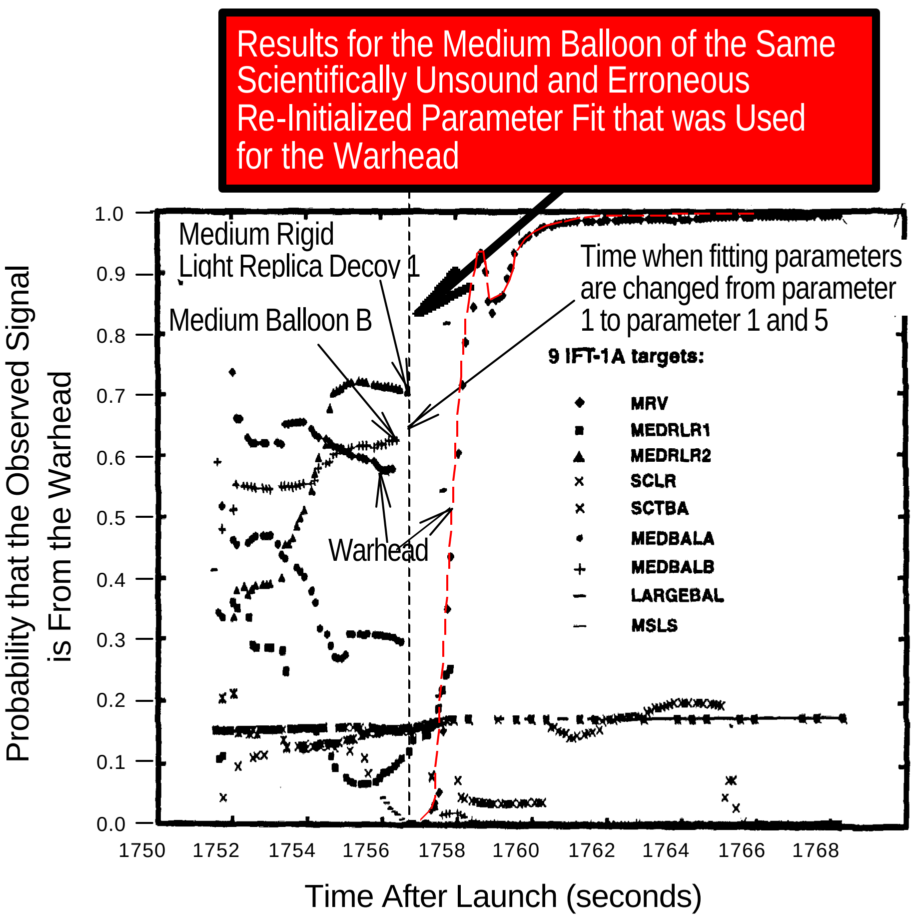


Figure 7B

Above graph from *"POET Study 1998-5, Independent Review of TRW Discrimination Techniques, Final Report,"* Figure 9, Page 24.

Altering of Experimental Conditions to Create the False Impression of a Capability

When the results of the IFT-1A experiment were discovered, and it is clear that they were discovered, it appears that in addition to efforts to cover up the results of the flyby, efforts were also aimed at re-designing the IFT-2, 3, and 4 experiments so that they would not encounter the inevitable discrimination problems indicated by the IFT-1A experience.

After the IFT-1A experiment, the BMDO changed the number of objects it planned to fly in follow-on experiments from ten to four (see Figure 8 on page 16 of 19 pages). The four objects were to be a medium reentry vehicle (MRV), a 2.2 meter balloon, and two 0.6 meter balloons.

Some time after this reduction in the number of objects to be flown in IFT-2, 3, and 4 experiments the number of objects was again changed. This time the two 0.6 meter balloons were removed, further reducing the number of objects for follow-on experiments from four to two, leaving only a single large balloon and a medium warhead (see Figure 9). .

Figure 9 shows why the removal of the two 0.6 meter balloons raises quite serious additional questions about the fidelity of the IFT-2, 3, and 4 experiments. When the medium warhead is viewed from nose-on, it has a projected area quite close to that of the small balloons, and the balloons could well have signal intensities that would make them indistinguishable from the warhead. This suggests that the configuration of the IFT-2, 3, and 4 may have been further altered to avoid having the EKV sensor fooled by the simplest of objects, 0.6 meter diameter balloons. This also indicates that the EKV, and the National Missile Defense System that is designed to support it, is essentially useless if the EKV cannot discriminate against such simple objects.

Once the small balloons were removed, the fidelity of the IFT-2, 3, and 4 experiments was further undermined. As shown in Figure 10 (on page 17 of 19 pages), the choice of a time of day for the IFT-2, 3, and 4 intercept attempts was carefully chosen so that the sun would be behind the EKV illuminating the balloon and warhead from the front. This results in very bright targets, and very large differences in the intensity of the two targets. The fact that both targets are bright make it easier for the EKV to home on the dimmer warhead target, and that fact that the two targets are of very different intensities, essentially eliminates the possibility that if the EKV acquires both targets, that it will pick the wrong one.

Thus, the technical story described herein, is one of tampering with the data and analysis from the IFT-1A experiment, and of altering the experimental conditions for the IFT- 2, 3, and 4 experiments to hide the failure of IFT-1A. These facts unambiguously connect a chain of events and actions that is simply and accurately described as scientific fraud.

Figure 8

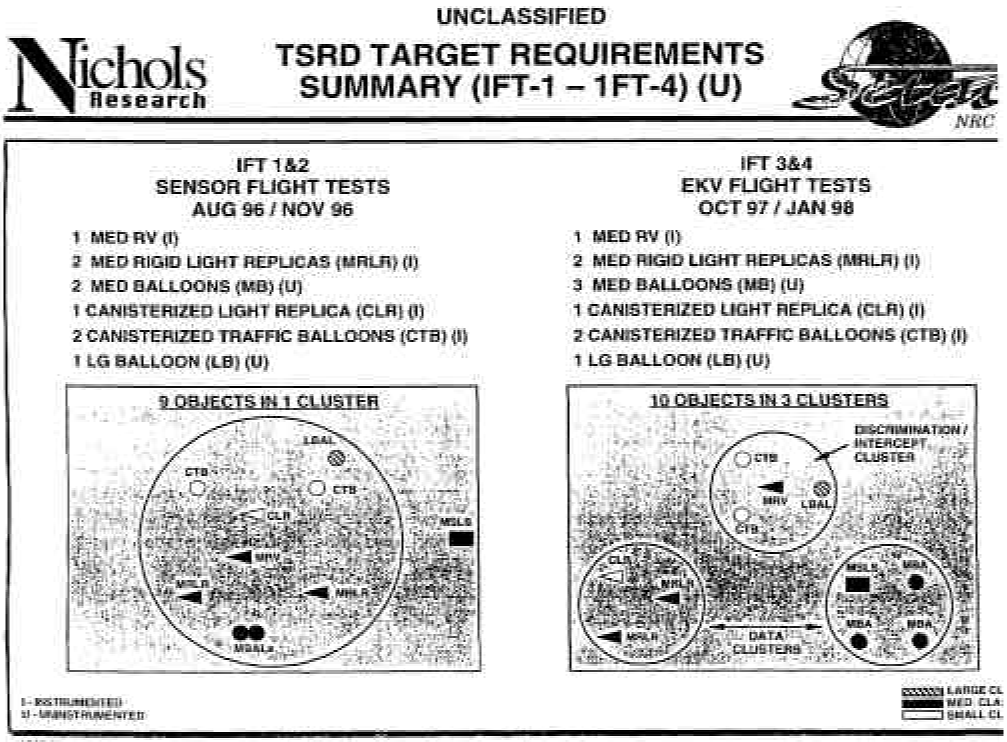


Figure 9

Target Set for First Three NMD Intercept Attempts

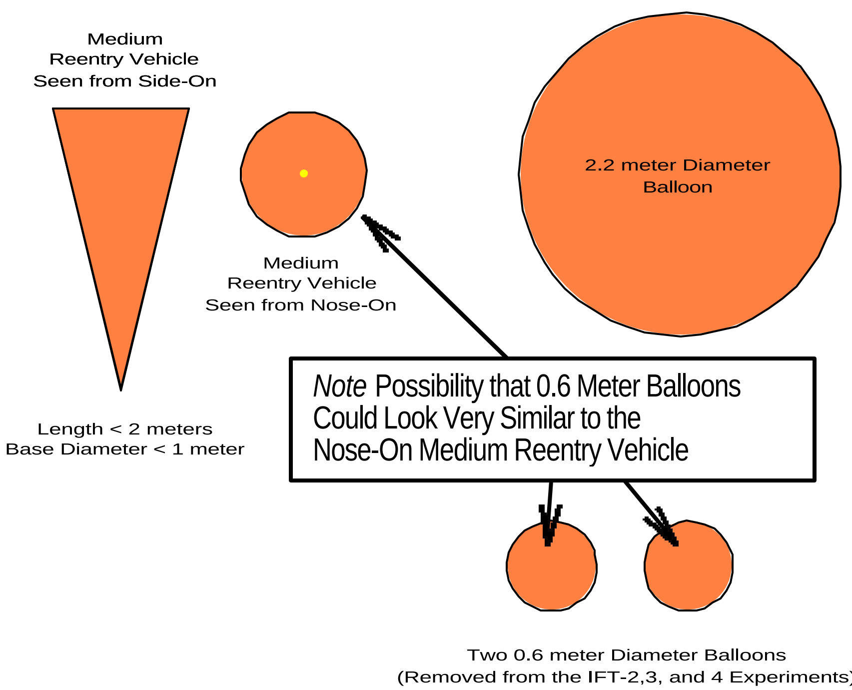
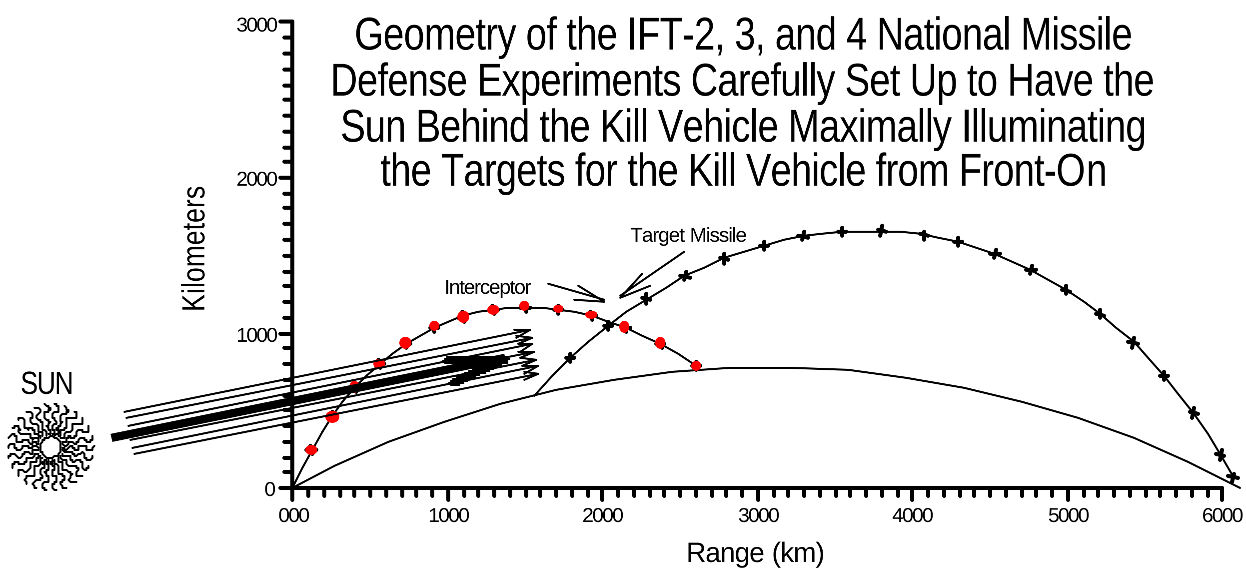


Figure 10



Documents of Primary Concern

1) <u>Independent Review of TRW Discrimination Techniques, Final Report</u>
POET Study 1998-5, M-J. Tsai, MIT Lincoln Laboratory, Larry Ng, Lawrence Livermore National Laboratory, Glenn Light, Aerospace Corporation, Frank Handler, POET/Lawrence Livermore National Laboratory, Charles Meins, MIT Lincoln Laboratory

2) <u>Independent Review of TRW Discrimination Techniques</u>
Ming Tsai, Larry Ng, Glenn Light, Frank Handler, Charles Meins
7-8 December 1998

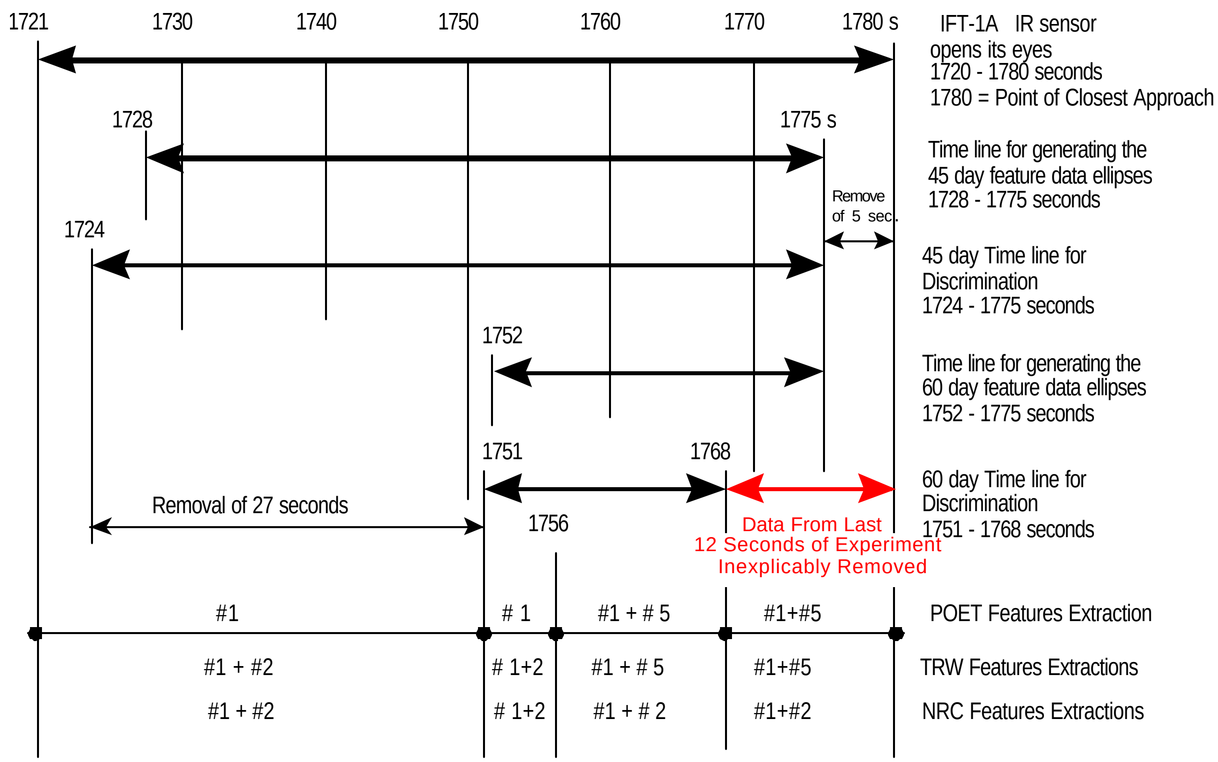
3) <u>Technical Requirement Document (TRD)</u>

4) <u>Sensor Flight Test Final (60-day) Report</u>
- August 22, 1997; Contract:DASG60-90-C-0165 CDRL A029;
- SSD(& D0367; ClMS 9740113; TEST DATE: 24 June 1997

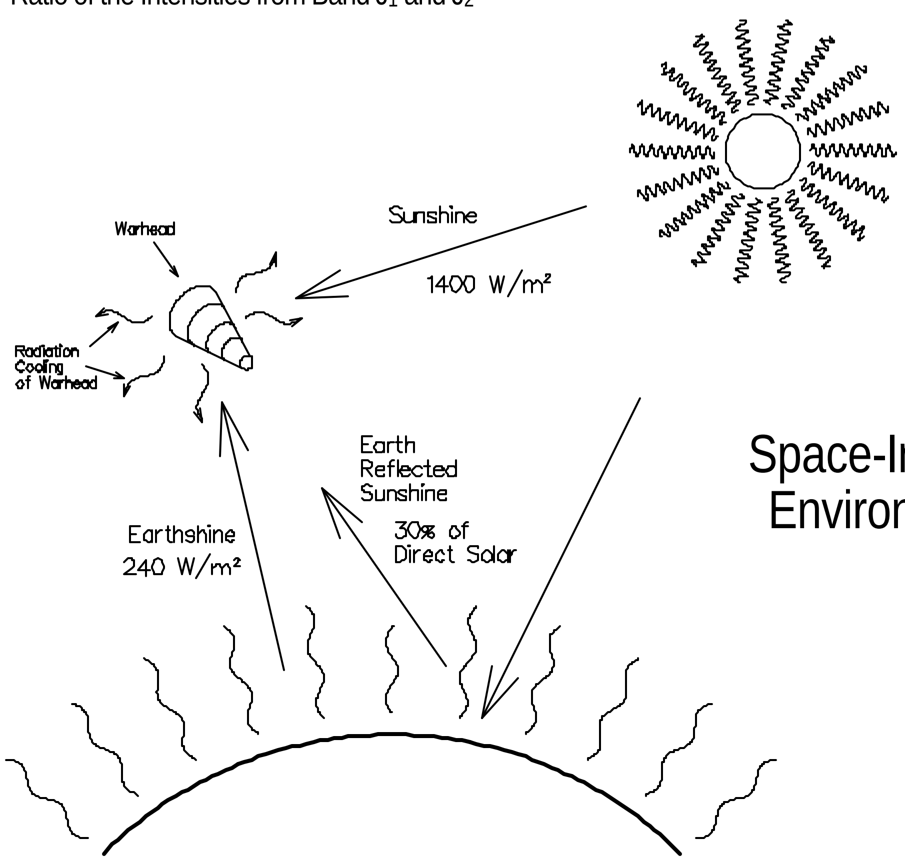
5) <u>45-day Report dated August 13, 1997 Report</u>
Contract No: DASG60-90-C-0165; Derived From: Lightweight Target SCG
dtd 28 August 1996; Target Reentry Vehicles SCG; dtd 28 August 1996; EKV TRP SCG; dtd 11 arch 1995

6) <u>Sensor Flight Test Final (60 Day) Report Addendum 1</u>
Integrated Flight Test-1A Test Report, CIMS Tracking No: 98D0010
Marshall Islands 24 June 1997, Control No: DAS60-90-C-0165
Prepared by Boeing about 22 August 1997

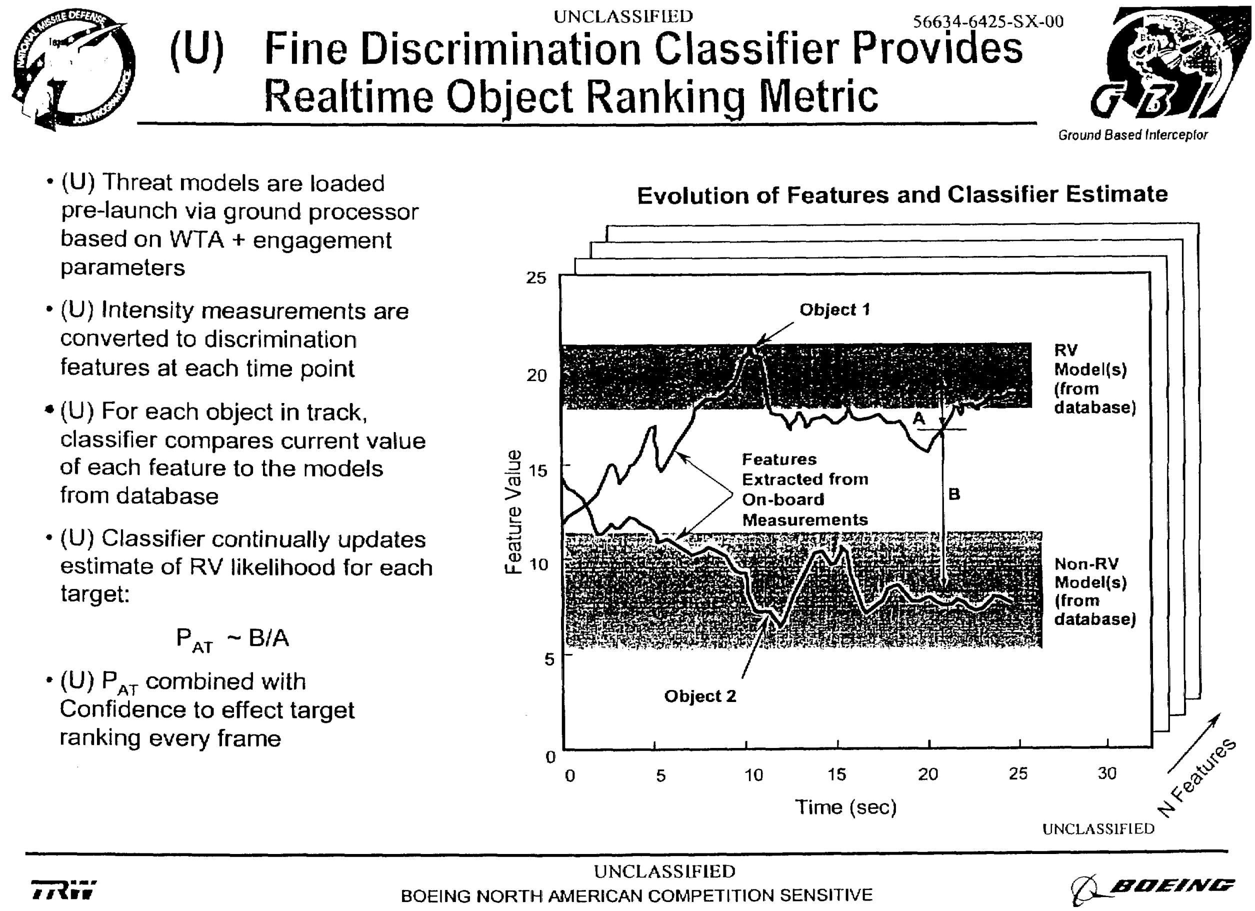
Additional Reference Materials

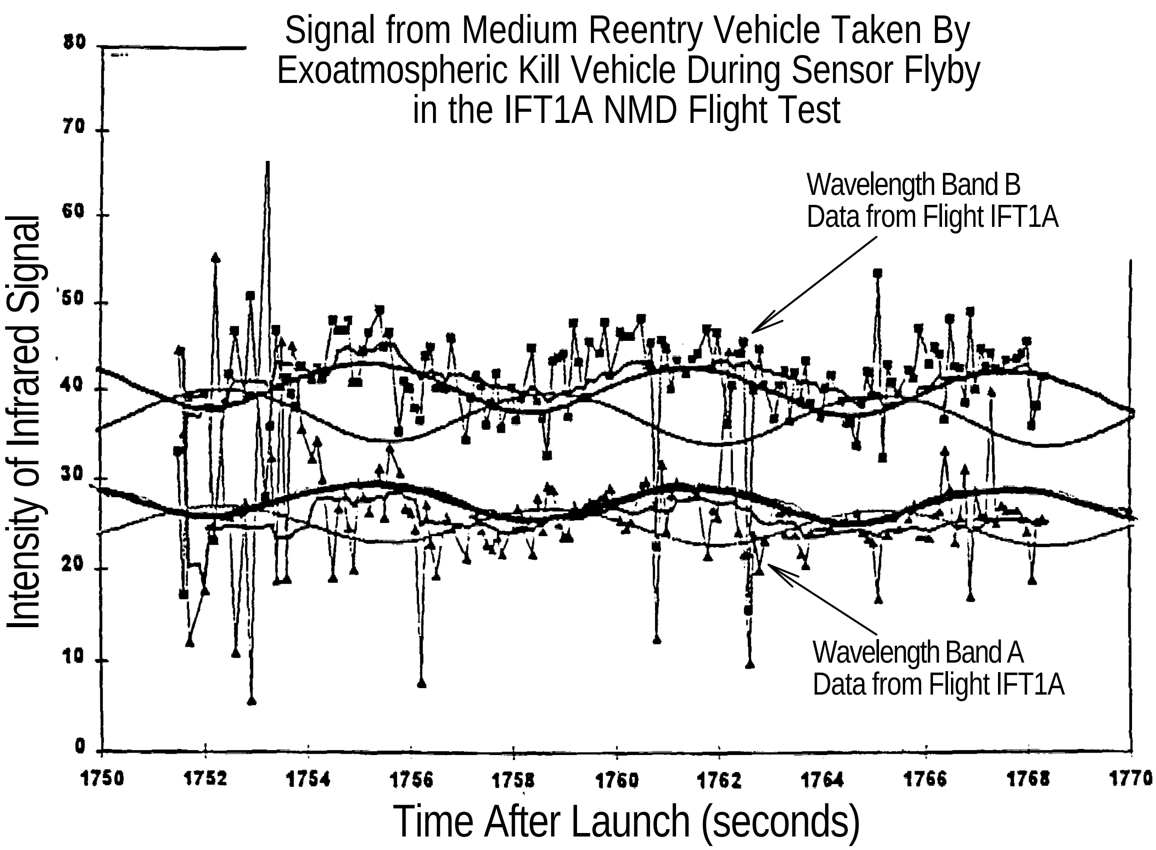


Feature 1 — Intensity of Signal
Feature 5 — Ratio of the Intensities from Band J_1 and J_2



Space-Infrared Environment





Data in the above graph taken from page 81 of *"Addendum 1 to the 60 Day Report"*