2nd copy

19 October 1944.

From: The Commanding Officer, U.S.S. RAZORBACK
To: The Commander in Chief, United States Fleet.
Via: (1) Commander Submarine Division, TWO HUNDRED ONE.
(2) Commander Submarine Squadron, TWENTY.
(3) Commander Submarine Force, Pacific Fleet, Subordinate Command.
(4) Commander Submarine Force, Pacific Fleet.
(5) Commander in Chief, Pacific Fleet.

Subject: U.S.S. RAZORBACK (SS394), Report of War Patrol Number One.

Enclosure: (A) Subject Report.
(B) Track chart; to ComSubPac.

1. Enclosure (A), covering the first war patrol of this vessel conducted in the Philippine Sea - Luzon Strait Area, during the period August 25, 1944 to October 19, 1944, is forwarded herewith.

2. The commanding officer was also in command of a group of three submarines, the RAZORBACK, PIRANHA and CAVALLA, constituting the "DOGS". This RAZORBACK war patrol report, therefore, contains also his report as pack commander. Due to different destinations for all three members of the pack, upon completion of the patrol, it was not possible for the pack commander to include much information on the actions of the other two. Reference therefore is invited also to USS PIRANHA'S and USS CAVALLA'S second war patrol reports.

R. S. BENSON

[redacted]

U.S.S. RAZORBACK

First War Patrol

25 August to 19 October, 1944

[redacted]

(A) PROLOGUE

Keel laid at Navy Yard, Portsmouth, N.H., on September 9, 1943. Launched January 27, 1944. Commissioned April 3, 1944. Commenced usual tests and training exercises. On June 5, 1944, Lt. Comdr. A. M. BONTIER was relieved as Commanding Officer by Commander Roy S. BENSON, and Lt. Comdr. J. L. HAINES was relieved as Executive Officer by Lt. Comdr. C. D. BROWN. On June 23, 1944, having completed normal training exercises, departed New London, Conn., enroute the Pacific. Services rendered to Fleet Sound School, Key West, Florida June 30, 1944 to July 11, 1944. Transitted the Panama Canal on July 15, 1944. On July 19, 1944, departed for Pearl; reported to Cincpac for duty in Submarine Force. This vessel is in Squadron 24 (Captain G. C. CRAWFORD) and Division 242 (Captain C. W. WILKINS). On August 4, 1944, arrived at Pearl Harbor; five days voyage repairs. In addition to normal items the following were accomplished: installed 40mm gun in place of 20mm on after end of bridge, installed VHF and APR, installed RBH-1 radio receiver in place of one RAL; painted with standard grey camouflage 32/3 SS-B.

Had the normal 15 days training exercises (Commander D. C. WHITE, Training Officer). Ready for sea August 24, 1944.

[redacted]L

(B) NARRATIVE

August 25

Underway from Pearl Harbor, proceeding independently to rendezvous with other members of "DOG PACK", USS PIRANHA (Lt. Comdr. H. E. RUBLE) and USS CAVALLA (Lt. Comdr. H. J. KOSSLER), Commanding Officer USS RAZORBACK in command of "DOG PACK", unit of "ZOO" (Captain C. W. WILKINS in SEA HORSE).

September 1

Made contact with USS PIRANHA and CAVALLA; proceeding now in company to Saipan.

September 7

Arrived Saipan. Unit moored to HOLLAND to top off fuel and effect minor repairs.

September 8

Unit underway in company from Saipan.

September 12

Spent the day on submerged patrol in "Waiting Area".

September 13

Commenced surface patrol as a unit of the "ZOO" (Captain C. W. WILKINS, O.T.C.). Each vessel is assigned an individual station.

September 17

0945(I) Sighted an unidentified plane. Apparently we were not sighted. Remained on the surface.

1100(I) Sighted another unidentified plane. Remained on the surface.

September 19

1002(I) Sighted a plane similar to EMILY at a distance of about 6 miles. Submerged.

1056(I) Surfaced.

1126(I) Sighted a plane similar to NELL at a distance of about 4 miles. Submerged.

1157(I) Surfaced.

2012(I) Underway at 4 engine speed to locate and attack ship reported at Lat. 20, Longitude 132. Other vessels of the "ZOO" continue offensive reconnaisance.

[redacted]

September 20

Patrolling independently the assigned area.

September 21

Stormy weather. At dusk departed assigned patrol area to send negative report of search. Then returned to vicinity and resumed search.

September 22

Storm subsided. Departed special search area to return to assigned position in the "ZOO".

0700(I) Sighted unidentified single-engine plane distance about 8 miles.

September 23

Resumed patrol in assigned position in the "ZOO".

0801(I) Sighted a plane similar to KATE heading for us. Submerged.

0908(I) Surfaced.

1354(I) Sighted a plane similar to BETTY heading for us rather close aboard firing its machine guns at us. Submerged.

1534(I) Surfaced and resumed patrol, expecting another plane any moment.

September 25

0900(I) On orders from "ZOO KEEPER", Bear and Dog Packs are now proceeding to area eleven detect, this pack, "DOGS", to patrol the part of that area to the eastward of the meridian of GARAM Bi, FORMOSA. The traffic will be coming up from the South China Sea and proceeding up both the east and west coasts of Formosa, thence via the East China Sea to the homeland. Some of this traffic will undoubtedly hug the China and Luzon coasts and the latter traffic follow the island chain of LUZON STRAIT to the southern tip of Formosa, then hug the coasts of that island. Other fast traffic will cut across and trust their speed as anti-submarine defense.

This pack is assigned that part of area eleven detect east of GARAM Bi. If the ships of the enemy hug the coast of Formosa we will not be able to get to them there, but can still get them as they approach Formosa. From information, air search and air coverage here is excellent and planes equipped with radar cover the area thoroughly. Until we find out how thorough this air search is, will assign portions of the total "DOG" area to the individual submarines to patrol at will. If the situation warrants it later will attempt more co-ordinated search. Therefore, assigned PIRANHA up to latitude 21-40, CAVALLA down to latitude 22-20, RAZORBACK in between. Directed them to attack any enemy encountered without delay and without waiting for the arrival of other members of the pack. Doctrine calls for exchange of information.

Proceeding to area.

1804(I) Sighted an unidentified aircraft at a great distance. Did not dive.

[redacted]

September 26

0829(I) Sighted a plane similar to BETTY at a distance of about five miles coming out of the clouds right for us. Submerged. He dropped two bombs.

1112(I) Surfaced and resumed towards the southern point of Formosa.

1155(I) Sighted twin engine bomber similar to BETTY at about three miles distance coming at us out of the clouds. Submerged.

We are wasting our time trying to patrol on the surface. Not only are we exposing ourselves to the certainty of repeated air attacks but disclosing our location. Therefore, we are going to stay down.

It is our intention to pass between KOTO SHO and GADD ROCK tonight and patrol the remainder of the night between these islands and Formosa and conduct submerged patrol in that passage tomorrow. Unfortunately we have a bright moon, smooth phosphorescent sea and only 20 miles between KOTO SHO and GADD ROCK. We have never on this patrol used the SD radar and are now keying the SJ for two rotations of the antenna every 5 minutes.

September 27

0230(I) While about to pass between KOTO SHO and GADD ROCK the position of the ship became sufficiently in doubt that, at this time, we gave up the idea and reversed course.

0258(I) For the past few minutes we have had a 150 mcs signal on the APR. It was intermittently steady on us increasing in volume. There was nothing periodic about its being on us or off. Therefore, assuming that possibly a plane had us on its radar, we submerged. This is all entirely new to everyone on board. The 150 mcs checks with information on Jap airborne radar. We had been keying our SJ radar for a double rotation every 5 minutes.

Decided to send this verification of data to Comsubpac so headed out on surfacing.

Have also now had an opportunity to observe that air search in this vicinity is excellent and that, therefore, day and night surface scouting line of this unit would be out of the question. Therefore, decided to leave the ships as they are now assigned and make similar individual assignments for our time to come in area eleven delete. After we get down in that area it may be possible to organize a coordinated search.

September 28

Succeeded in sending orders to the other "DOGS" on the area frequency but unable to send radar information to Comsubpac. Now proceeding back to KOTO SHO and FORMOSA.

1000(I) Sighted a plane similar to NELL at a distance of about 8 miles. We were submerged and apparently not detected.

September 29-30

Patrolling in the KOTO SHO area. At sunset 30th departed for new area in eleven delete.

The total area assigned this "Pack" commencing October 1st is Area Eleven Delete north of latitude 19-30. From analysis of contacts made by previous submarines in this area and other data, assume that there are two traffic lanes in this locality. Slow speed convoys hug the coast of LUZON, then follow the BABUYAN and BATAN Islands up to GARAM Bi, FORMOSA. High speed convoys and singles cut straight across from the Straits of Formosa to the South China Sea. Have divided our area into three parts as follows: one ship take everything to the east of the meridian of CALAYAN Island up to latitude 19-55, one take everything to the west of the meridian of CALAYAN Island up to latitude 20-00, the third take the remainder. The result will be one boat will always cover the BABUYAN-BATAN route while the other two can cover that route and also the cut-across route to the westward. In case of receiving information from submarines either to the northward or southward it will be possible quickly to establish a line; that is, within the limitations of being able to communicate. Will try later to organize a co-ordinated search.

October 1

0210(I) Rain had commenced a little over one-half hour ago. At that time decided to try again keying the SJ radar for two complete rotations of the antenna every five minutes in order to assist in our target hunt. Again, contact on the APR, this time 230 mcs, steady on us intermittently with increasing intensity. Submerged. It is possible that our SJ merely triggers off a piece of equipment causing this radar signal and no plane is around. If that is true their equipment is ingeniously designed. The only way to know is for someone to stay on the surface and see what happens. (Note: See October fifth for further data on this idea).

1930(I) The weather is stormy, rather heavy seas from the eastward; the full moon through an almost total overcast made it nearly as bright as day. Visibility poor in several directions and excellent in others. Decided to try again keying the SJ for a double rotation every 5 minutes.

2000(I) Interference on the SJ radar on two different bearings almost simultaneously. This was followed by a strong signal on the APR at 155 mcs, steady on. Submerged. Our position at this time was about 80 miles to land. The only assumption that can be made is that we can not get away with the use of the SJ in this area.

2200(I) Radar interference on ten centimeters which did not seem to be our type.

October 2

0000(I) Ten centimeter radar signals like our own, being keyed every five minutes. The true bearing was 180. Message intercepted indicating that USS WHALE was driven down by planes.

[redacted]

October 3

The storm continues with no indication that it will ever cease. Will send a message tonight for a two night and one day scouting line of the western part of our area to catch ships cutting across.

After dark sent the message. During the transmission we got an APR contact on 150 mcs. When the transmission had been completed the APR signal was strong and steady. Submerged. Did not get receipts for the message but will act as if they have it and that the scouting line will be formed as ordered.

October 4

0015(I) Message intercepted indicating that the USS WHALE was driven down by planes.

0401(I) Strong signal on the APR at 150 mcs, steady on us. Submerged. This was the first instance of an unprovoked steady-on APR signal at this frequency. On all previous occasions we had either used our SJ or our radio.

2000(I) The "Dog Pack" is now presumably in a Scouting Line on course 270 at speed of 12 knots in order, PIRANHA, RAZORBACK, CAVALLA at a distance of 30 miles.

October 5 (Still in Scouting Line)

0015(I) Momentary APR signal at 155 mcs. This was followed immediately by the receipt of a message that the PIRANHA had been driven down by planes. We had had SJ radar signals from the PIRANHA'S direction earlier in the evening; we never transmit on our SJ anymore.

0025(I) Intercepted a message indicating that the CAVALLA was driven down by planes. This settled that matter of how to continue the Scouting Line with one ship driven down. It has disintegrated.

0032(I) Steady APR signal at 155 mcs. Submerged. This makes it complete. Since just before the PIRANHA dove we had had intermittent radar signals on the APR at 155 mcs but not steady on. If the other two dove because of a signal steady on them the Japs' equipment is directional and not on land, and it was directed on each of us in turn. The distance to land was over 100 miles. On surfacing headed back to the eastward. Will not risk further attack tonight by trying to tell the other two "DOGS" to discontinue the scouting line. Our attempt at co-ordinated search has demonstrated its impracticability in this area at this time. On request, later today, granted CAVALLA permission to remain in the western portion of our area.

October 6

The storm continues. Have decided to fight the storm through BASHI CHANNEL instead of BALINTANG CHANNEL though it does take us out of our area.

[redacted]

October 6 (cont.)

Spent this date in submerged patrol on the TAKAO-BASCO line. Found on surfacing that we had been set way up to the northwest. Headed for BASHI CHANNEL.

October 7

0325(I) Strong, steady APR contact on 150 mcs. Submerged. All night we had had an APR contact which appeared to be a rotating antenna and, from what little directional characteristics our APR antenna has, appeared to be located on the southern tip of FORMOSA. The APR contact which caused us to dive was entirely different. It was the third unprovoked APR contact, strong and steady on.

Sunset (I) War patrol of the "DOGS" completed. Directed ships to proceed independently; CAVALLA to Freemantle, PIRANHA to Pearl Harbor, RAZORBACK to Midway.

October 8

1400(I) Driven down by 2-engine bomber. He dropped one or two depth charges.

October 9

1300(I) Headed up to search for a patrol craft attacked by planes and by the USS PIRANHA; not located.

October 19

Arrived Midway for refit.

[redacted]

(C) WEATHER

While in the LUZON STRAIT area, a storm was encountered which persisted from 1 October to 8 October. The wind was force 6 to 8, sea 6 to 7, both from the east working to the northeast. Most of the above period was spent riding out the storm.

(D) TIDAL INFORMATION

Same as indicated by current publications except close to and east of Koto Sho, where the current was unpredictable. From 25 to 29 September the set alternated from 045°T to 265°T, the drift in most cases being less than one knot. On 29 September, between Koto Sho and Formosa, indicated set and drift were 009°T and 4 knots.

(E) NAVIGATIONAL AIDS

High peaks on KOTO SHO did not give accurate cuts. Tangents of KOTO SHO and SHO KOTO SHO proved more accurate. High peaks on FORMOSA could not be identified.

(F) SHIP CONTACTS

None

[redacted]

(G) AIRCRAFT CONTACTS (REVISED)

	CONTACT NUMBER	1	2	3	4	5	6
SUBMARINE	Date	9/17/44	9/17/44	9/19/44	9/19/44	9/22/44	9/23/44
	Time (Zone)	0945(-9)	1100(-9)	1002(-9)	1126(-9)	0700(-9)	0801(-9)
	Position: Lat. N	13-57	14-05	17-27	17-30	19-43	22-33
	Long. E	129-51	130-03	129-13	129-14	132-13	129-08
	Speed	15	15	15	15	15	15
	Course	055	055	354	114	100	289
	Trim	Surf	Surf	Surf	Surf	Surf	Surf
	Minutes Since Last SD Radar Search	---	---	---	---	---	---
AIRCRAFT	Number	1	1	1	1	1	1
	Type	Unk	Unk	EMILY	Unk	Single Engine	KATE
	Probable Mission	Pat	Pat	Pat	Pat	Pat	Pat
	How Contacted	Lookout	Lookout	Lookout	Lookout	Lookout	Lookout
	Initial Range(Miles)	15	12	6	4	8	10
	Elevation Angle °	½	2	5	10	3	3
	Range & Relative Bearing of Plane when it Detected S/M	ND	ND	ND	4 mi. 260	ND	ND
CONDITIONS	Sea: (State Beaufort	2	2	3	3	3	3
	(Direction(Rel)	150	120	040	040	030	180
	Visibility(Miles)	15	15	30	30	30	30
	Clouds: (Height in ft.	2000	2000	2000	2000	2000	2000
	(Percent (Overcast	100	70	20	20	10	30
	Moon: (Bearing(Rel)	---	---	---	---	---	---
	(Angle	---	---	---	---	---	---
	(Percent (Illum.	---	---	---	---	---	---

[redacted]

(G) AIRCRAFT CONTACTS (REVISED)

CONTACT NUMBER:		7	8	9	10	11	12
SUBMARINE	Date	9/23/44	9/25/44	9/26/44	9/26/44	9/28/44	10/8/44
	Time (Zone)	1354(-9)	1804(-9)	0829(-9)	1155(-9)	1000(-9)	1400(-9)
	Position: Lat. N	22-58	22-19	21-51	21-45	22-11	20-50
	Long. E	128-58	125-38	123-30	123-18	123-11	125-44
	Speed	15	5	15	15	1.5	15
	Course	325	239	220	315	270	130
	Trim	Surf	Surf	Surf	Surf	Sub	Surf
	Minutes Since Last SD Radar Search	---	---	---	---	---	---
AIRCRAFT	Number	1	1	1	1	1	1
	Type	BETTY	Unk	BETTY	BETTY	NELL	Unk
	Probable Mission	Pat	Pat	H	H	H	H
	How Contacted	QM	Lookout	QM	QM	OOD	Lookout
	Initial Range (Miles)	6	16	5	3	8	20
	Elevation Angle °	20	3	20	15	14	8
	Range & Relative Bearing of Plane When it Detected S/M	8 mi. 240	ND	ND	Unk	ND	15 mi. 160
CONDITIONS	Sea: (State Beaufort	5	1	1	1	1	2
	(Direction (Rel)	240	340	180	270	000	270
	Visibility (Miles)	30	25	30	30	30	30
	Clouds: (Height in ft.	2000	1500	1500	1600	---	3000
	(Percent Overcast	10	80	50	5	0	20
	Moon: (Bearing (Rel)	---	---	---	---	---	---
	(Angle	---	---	---	---	---	---
	(Percent Illum.	---	---	---	---	---	---

Type of S/M Camouflage on this patrol: Standard Grey 32/3 SS-B.

[redacted]

(H) ATTACK DATA

None.

(I) MINES

None.

(J) ANTI-SUBMARINE MEASURES AND EVASION TACTICS

This vessel's only contacts with the enemy were with planes sighted in the daytime and APR contacts at night, the latter in some cases undoubtedly radar equipped planes. We submerged to escape air attack by planes in sight in the daytime seven times, and as result of APR contacts at night, six times. In general, the enemy planes apparently considered their task completed when we had been driven under, for they did not make determined efforts to attack. No gambit tactics were encountered though we surfaced again while the enemy plane could still very well be in the vicinity. We were straffed by machine gun fire once, two bombs were dropped on another occasion, and one or two depth charges released on a third.

The outstanding anti-submarine measure encountered, and one entirely new in the experience of the Commanding Officer, was radar equipped planes, or other means for causing APR contacts which were determined to be from radar equipped planes. It was either most fortunate or most unfortunate that we had this new APR equipment. We assumed that a strong, steady-on APR signal in a frequency reported to be in use by Japanese radar equipped planes meant that we were in imminent danger of an air attack. We also assumed that a reasonably competent aviator could at night, make such an attack with bombs, depth charges, and guns with a reasonable chance of success. If these assumptions were correct, we were undoubtedly saved by the APR equipment, for without it we would have been attacked on the surface six times, or until one of the attacks were successful. If either of these assumptions was not correct, the APR ruined us. It caused us:

(a) To stop using our SJ radar and thereby reduced the effectiveness of our night search to a small fraction of what it would otherwise have been.
(b) To hesitate in the use of our radio equipment. On the one occasion we used it in Luzon Strait, the Japs were on us before the short transmission was completed and we couldn't wait for receipts.
(c) To be driven from the surface nearly every night during the short period in the patrol when we were in an area where there was a reasonable chance of locating targets.

[redacted]

(d) To discontinue the scouting line on the one occasion when we attempted co-ordinated search. It reduced a unit of three submarines to nothing more than three individual submarines in adjacent areas with communications haphazard and dangerous.

Possibly aviation and radar experts can assist us in evaluation, to determine a proper course of action. If our course of action when we had a strong, steady APR contact, entirely defensive, was correct, then the only value of submarines at night in Luzon Strait is to harass the enemy and cause them continued difficulties in getting their ships through and continued strenuous anti-submarine effort, both of which are certainly worthwhile, though the hunted feeling is far from the glorious feeling of watching enemy ships go to the bottom.

(K) MAJOR DEFECTS AND DAMAGE

(a) Torpedoes.

August 23 - loaded 24 Mark 18-1 torpedoes. None were fired.

September 6 - torpedo 55890, after being charged for two hours, belched smoke from its battery compartment. The charge was stopped and the torpedo hauled out of the tube. No grounds or shorts were discovered. Could not discover what had burned. Cause for smoke undetermined. The charge was resumed and the torpedo since has demonstrated no abnormalities.

October 6 - Found small hole in top of cell 60 of torpedo 56157. Electrolyte sloshes through, but not seriously. No cell top sealing material is carried. No action taken.

(b) Low Pressure Blower

This is undoubtedly no news to anyone, but the low pressure blower of this vessel makes at least ten times as much noise as the one on board older submarines; for example, USS TRIGGER. This blower is ROOT-CONNERSVILLE.

(L) RADIO

The performance of all radio equipment was very satisfactory with the exception of the VHF unit and the RBO receiver. The VHF did not work properly from the time of its installation through the whole patrol. It was installed hurriedly during the last few days at Pearl Harbor and undoubtedly was insufficiently tested prior to our departure. The major item found was the antenna flooded out due to a cracked insulator.

Maintenance of the VHF equipment was seriously handicapped by lack of spare parts and instruction book, including schematic drawings. Neither were available at Pearl Harbor. If instruction books are still unobtainable, it is recommended that photostatic copies of schematic drawings on this equipment be furnished submarines to augment part of this obvious deficiency.

The performance of the RBO receiver was extremely unsatisfactory. Short wave reception was generally poor accompanied by a high noise level which usually rendered the radio useless. Tuning was poor and very critical, and much trouble was experienced with drifting. It is not believed that this particular receiver is defective but rather that the design is at fault. Location of the RBO in crews' quarters is not recommended. A better location would be in the radio room or wardroom, where supervision of its use is possible.

(M) RADAR

All radar trouble was confined to the SJ-1 radar. We list below the casualties suffered in this equipment by component parts.

Transmitter failures (entailing the loss of 8 operating hours):

1. Local oscillator (726B) ceased to have an output.
2. The voltmeter in the "A" regulated rectifier failed, causing a 300 volt short to ground.
3. C-508A in the range unit shorted to ground.
4. The high voltage rectifier developed a short on its terminal board.
5. The 5D21 in the modulation circuit developed a grid to cathode short.
6. An 836 tube in the high voltage rectifier became gassy.
7. C-7 in the transmitter, coupling V-4 to V-5, shorted out.
8. Three 5U4G tubes in the "A" regulated rectifier developed plate to cathode shorts on three separate occasions.
9. Tube V-4 in the transmitter developed a grid to cathode short.

PPI failures (no operational time lost):

1. The CRT's grid started emitting electrons giving extraneous indications on the screen.
2. The 6SN7 in V-1 became gassy shorting its 300 volt plate voltage to ground.
3. A wire connecting the cathode of the 6000 volt rectifier tube to a one megohm resistor separated.
4. A ground developed in the coaxial cable from PG5A in the range indicator.

Range Indicator failure (no operational time lost):

1. C-36 shorted.

Recommendations:

Move SJ-1 transmitter from present location to the after part of conning tower. This may forestall trouble from salt spray coming down the upper conning tower hatch and will certainly provide a better location from the point of view of combining maintenance with diving the ship.

Since the SJ-1 causes indications on the APR-1, it is desirable for the APR-1 operator to know exactly when the SJ-1 is transmitting. This could be arranged by changing the present keying switch to a double throw, double pole switch, taking the 115 volt primary of the high voltage rectifier through one side, and 115 volt ship's power through the other side to light an indicator light at the APR-1. Extra conductors in cables from the conning tower to the pump room could be utilized in making the connections.

The value of our APR-1 would be materially increased by the addition of the TN-4 tuning unit to cover the frequency band of 1000 to 3000 mcs. Inclusion of power driven tuning for all frequency bands would make watch standing less arduous and therefore more efficient. Comments under part (L) on VHF maintenance apply to the pulse analyser of the APR in that no instruction book or schematic drawings were available in Pearl Harbor.

(N) SOUND GEAR AND SOUND CONDITIONS

No sound contacts were made on this patrol. Shortly after leaving Saipan, the cable leading from the hydrophone to the amplifier on the JP-1 sound gear became open circuited, rendering this equipment useless for the remainder of the patrol. However, this would not have been much of a loss if we had found any targets because the location of JP in the forward torpedo room introduces a communication problem which has been recognized in submarines for years. This resulted in putting sound gear in the conning tower. If the JP is as superior to QB,QC or JK as reported, it should be in the conning tower. We should have JP and QC-JK in the conning tower, and QB elsewhere if necessary.

(O) DENSITY LAYERS

No trouble was experienced in finding density layers at any time during this patrol. A dive to deep submergence was made every morning and a bathythermograph card taken at this time. In the PHILIPPINE SEA area a negative gradient was invariably found at 240 feet with isothermal conditions down to that depth. In the area about Lat. 22-North, Long.132-East, conditions were isothermal to depths of 140 feet where a negative gradient was found and balancing became possible. In the LUZON STRAIT area, about Lat. 20-North and Long. 123-East, layers were usually found below 180 feet with isothermal conditions down to that point.

[redacted]

(P) HEALTH, FOOD, AND HABITABILITY

The general health of the officers and crew was excellent. Sick days:

Officers	-	none.
Enlisted men	-	One chanchroid - no sick days.
		One fungus infection, skin, foot - 4 sick days.
		One prostatitis, chronic, non-venereal - 6 sick days.
		Two gastritis, acute - no sick days.

The food was good.
The habitability was good but, in the opinion of the Commanding Officer, the new submarine is by no means as comfortable, neither with respect to temperature nor internal arrangement, as the submarine he commanded previously, the USS TRIGGER. The air conditioning equipment is entirely inadequate. It seems we have gone backwards in habitability on board these ships.

[redacted]

(Q) PERSONNEL

A. OFFICERS

(a) Number on board	9
(b) Average Age	28
(c) Number making first patrol	5
(d) Average number of war patrols	1.8
(e) Qualified:	
(1) Command	2
(2) Submarines	3

B. CHIEF PETTY OFFICERS

(a) Number on board	7
(b) Average age	31½
(c) Number making first patrol	2
(d) Average number of war patrols	4
(e) Qualified:	
(1) At start of patrol	7
(2) At end of patrol	7

C. ENLISTED MEN (Other than Chief Petty Officers)

(a) Number on board	71
(b) Average age	23
(c) Average number of war patrols	1.8
(d) Number of men qualified at start of patrol	38
(e) Number of men qualified at end of patrol	47
(f) Number of unqualified men making their first patrol	33
(g) Number of men advanced in rating during patrol	6
(h) Number of men qualified for advancement for which there are no vacancies	15

D. SUMMARY OF TOTAL COMPLEMENT

(a) Number on board	87
(b) Average age	24
(c) Average number of war patrols	2

[redacted]

(R) MILES STEAMED — FUEL USED

Pearl Harbor to Saipan - - -	3370 miles -	45,000 gallons
Saipan to Area- - - - - - -	1025 miles -	16,000 gallons
In Area - - - - - - - - - - -	5135 miles -	54,000 gallons
Area to Midway - - - - - - -	3430 miles -	46,000 gallons

(S) DURATION

Days enroute to area - - - - - - - - - - -	19
Days in Area - - - - - - - - - - - - - -	25
Days enroute to base - - - - - - - - - -	13
Days submerged - - - - - - - - - - - - -	14

(T) FACTORS OF ENDURANCE REMAINING

Torpedoes	Fuel	Provisions	Personnel Factor
24	2000 gallons	20 days	Unknown

Limiting factor this patrol - - - Compliance with orders.

(U) RADIO AND RADAR COUNTERMEASURES

Radio:

Jamming of radio communications by the enemy was frequently encountered. This caused some trouble in reception but on the whole was relatively ineffective. Ten messages were sent in the area, five on the 2000 KC band and five on the ship to shore frequency of the 4235 KC series. Of these, only one was jammed. This was in the area about Latitude 22-North, Longitude 126-East, on the night of 25 September, area frequency 2160 KCS. Jamming commenced immediately after beginning to transmit, with a signal strength ratio of one to four. The jamming consisted of fast keying of code on the same frequency. The band width was 6 kcs and it was fairly effective. However, the message was cleared. No indication of the location of the jamming station was obtained.

Jamming of NPM schedules was consistent, especially on 9090 KCS and 6380 KCS. The higher frequencies were usually clear and 14390 KCS could

[redacted]

usually be relied upon for a clear signal. The principal types of jamming encountered were CW, fast random keying, saw (variable tone) and bagpipe. By careful tuning we were able to copy through this jamming and as a result only a few NPM Fox numbers were missed.

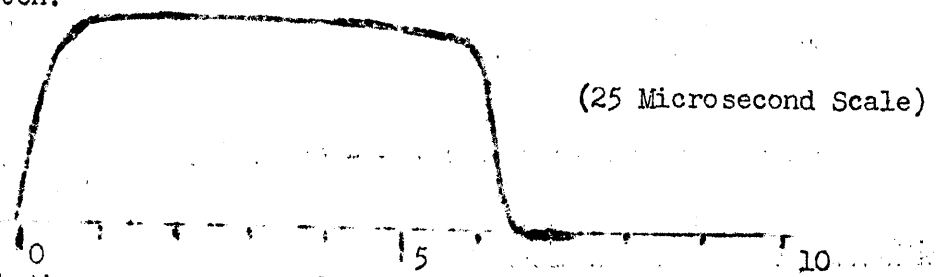
Radar:

1. Two contacts on 150 MCS signal made at following positions:
   (A) Lat. 21-49-N Long. 121-47-E
   (B) Lat. 20-00-N Long. 120-00-E

Characteristics follow:

Signal frequency from dial reading	150 MCS
Signal frequency corrected	146 MCS
PRF	1000 PPS
Pulse width from 10-division scale	16 microseconds
Pulse width from calibration sine wave	14 microseconds
Signal strength	very strong

Sketch:



Comments:

In both cases our own electronic devices in operation were secured to check the origin of signals.

The signal strength, after the signal was picked up, increased rapidly indicating the radar may have been airborne.

Contact (A) was made following a 25 minute period in which our own SJ-1 radar was being operated approximately 10 seconds out of every five minutes. Contact (B) was made shortly after a TBL radio transmission. In either case, these were the only electronic devices emitting signals from our ship.

The antenna did not appear to be rotating but appeared to be fixed on aircraft. Once the signal steadied on it did not again swing off, although the radar beam seemed to sweep through our bearing a number of times in a non-cyclic fashion before steadying on.

2. Two contacts on 155 MCS (152 MCS corrected), which resembled the signal under (1) in every detail except for the slight variation in frequency. These were picked up in the following positions:

(A) Lat. 20-13-N Long. 120-37-E
(B) Lat. 19-55-N Long. 119-59-E

Comments:

The circumstance, under which contact (A) was made, indicates strongly that the radar was airborne. The PIRANHA, CAVALLA, and RAZORBACK were in a scouting line. The signal was picked up on our APR-1, but the beam did not steady on. Shortly thereafter, the PIRANHA sent by radio, "Am diving from aircraft". The CAVALLA followed suit in about 10 minutes. Then after approximately 7 minutes, the signal steadied on, and we dove.

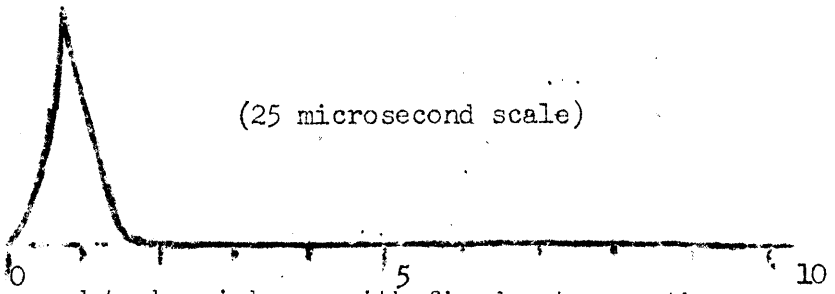
None of our electronic gear was sending out signals. Our SJ-1 was being manned as a listening device. Do not believe local oscillator has sufficient strength to be D/F'd.

The other time this signal was picked up, we were keying our SJ-1 radar (the only electronic device emitting signals) 10 seconds out of every five minutes. This procedure had been in effect about 25 minutes when the contact was made on APR.

3. One contact was made on 230 MCS at Lat. 20-43-N Long. 121-12-E, with the following characteristics:

Signal frequency from dial reading	230 MCS
Signal frequency corrected	227 MCS
PRF	750-1000 PPS
Pulse width from 10-division scale	4 microseconds
Pulse width from calibration sine wave	3½ microseconds
Signal strength	strong

Sketch:



Comments:

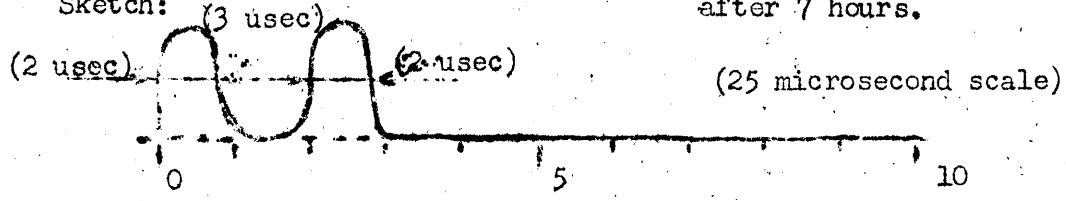
Radar appeared to be airborne with fixed antenna, the same as the 150 and 155 MCS signals under (1) and (2).

Our SJ-1 radar was being keyed 10 seconds out of every 5 minutes prior to the contact.

4. One contact (duration 7 hours) was picked up originally at Lat. 20-57-N Long. 121-10-E, with frequency of 160 MCS and other characteristics as follows:

Signal frequency corrected - - - - -	158 MCS
PRF - - - - - - - - - - - - - - - - -	500 PPS.
Pulse width - - - - - - - - - - - - -	See sketch
Signal strength - - - - - - - - - - -	Never strong, faded after 7 hours.

Sketch:



Comments:

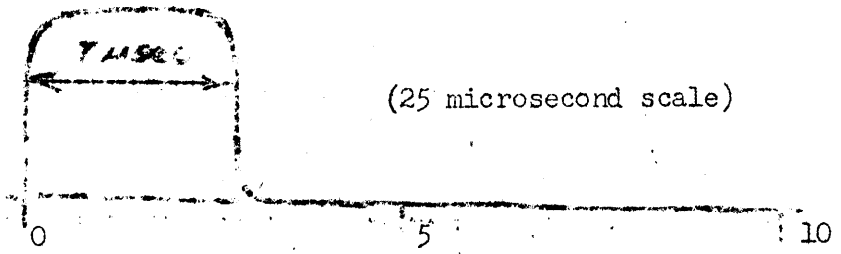
The antenna never steadied on us; it appeared to be hand rotated since the rotational speed varied from one revolution in 1½ minutes to 1 revolution in 7 minutes.

The nearest land was about 50 miles distant. Fading of the signal gave indication of land bassd radar.

Slight directivity of our antenna gave a very approximate bearing of 300°T. (Formosa).

Side lobes were quite apparent although part of this effect may have been due to our zigzagging.

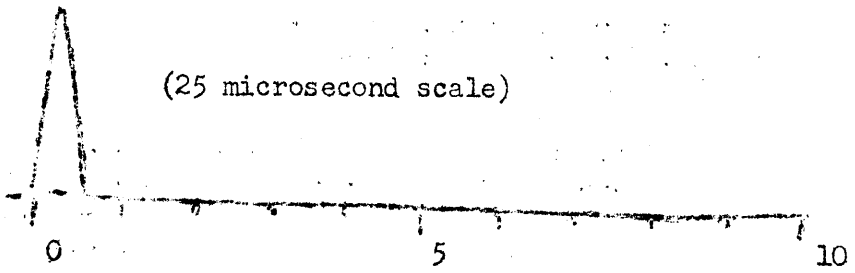
The strange appearance of pulse may have been due to excessive double moding of detected radar transmitter. Actual envelope of HF output may look like this:



The actual frequency in this case might be vastly different from 160 MCS. We were, however, unable to pick up any other signals at other frequencies.

During this entire contact we made no electronic transmissions.

[redacted]



Comments:

Signal resembled those caused by our own SJ throughout the patrol; however, the signals persisted after securing our SJ. Shortly before, interference on the SJ indicated a friendly SJ in the vicinity. Attention is called to the latter as a possible source of the signals.

7. One contact at Lat. 14-13-N, Long. 130-15-E, was picked up over the frequency span from 80 MCS (lowest our APR could be tuned) to 220 MCS. Signals appeared as noise on pulse analyzer and on various radio receivers. Assume this was caused by St. Elmo's Fire which was in evidence on all antennas and the bow of the ship. The signals ceased with the disappearance of St. Elmo's Fire.

(V) REMARKS

None

SUBMARINE SQUADRON TWENTY

FC5-20/A16-3

Serial: 0179

[redacted] DECLASSIFIED

Care of Fleet Post Office,
San Francisco, California.
October 21, 1944.

FIRST ENDORSEMENT to
CO RAZORBACK 1st War Patrol
Report dated 19 Oct. 1944.

From: The Commander Submarine Squadron TWENTY.
To : The Commander-in-Chief, United States Fleet.
Via : (1) The Commander Submarine Force, Pacific Fleet, Subordinate Command, Navy No. 1504.
(2) The Commander Submarine Force, Pacific Fleet.
(3) The Commander-in-Chief, United States Pacific Fleet.

Subject: U.S.S. RAZORBACK (SS394) - Report of First War Patrol.

1. The first war patrol of the U.S.S. RAZORBACK covered a period of 55 days of which 25 days were spent on station or in the areas assigned. The Commanding Officer, Commander Roy S. Benson, U.S.N., was also in command of a group containing two additional submarines, PIRANHA and CAVALLA.

2. During the first part of the patrol the group operated as a unit of the ZOO under the tactical command of Captain C.W. Wilkins, U.S.N., engaged in offensive reconnaissance in support of the fleet action against Palau and the Philippines. The second part of the patrol was spent patrolling the areas east of Formosa and between Formosa and Luzon.

3. There were no contacts except with enemy planes, the absence of Japanese shipping being attributed to the large scale activities of our surface forces and their accompanying air arm. It is unfortunate that this skillful and experienced submarine captain did not have the opportunity of repeating his former successes.

4. Attention is invited to the remarks under sections (J) and (U) concerning the enemy's use of radar. Considerable thought and effort was expended by this submarine in making a systematic collection of information regarding the characteristics of enemy radar encountered.

5. The RAZORBACK was one of the cleanest submarines to ever arrive for a refit by this squadron and her material upkeep indicated unusual care and attention by the officers and crew.

SUBMARINE SQUADRON TWENTY

FC5-20/A16-3

Serial: 0179

Care of Fleet Post Office,
San Francisco, California.
October 21, 1944.

[redacted] DECLASSIFIED

Subject: U.S.S. RAZORBACK (SS394) - Report of First War Patrol.

- -

6. The Commanding Officer, officers and crew are congratulated on their participation in a successful fleet operation which resulted in the assault and capture of Palau. It is recommended that personnel of this submarine attack group be authorized to wear a bronze star in their appropriate campaign ribbon if such a star is authorized for the surface units which took part.

L. S. PARKS.

SUBMARINE FORCE, PACIFIC FLEET hch

FF12-10/A16-3(15)

Serial 02397

Care of Fleet Post Office,
San Francisco, California,
1 November, 1944.

[redacted] DECLASSIFIED 2 NOV

THIRD ENDORSEMENT to
RAZORBACK Report of First
War Patrol and Report of
Sixteenth Coordinated Attack Group.

NOTE: THIS REPORT WILL BE DESTROYED PRIOR TO ENTERING PATROL AREA.

COMSUBSPAC PATROL REPORT NO. 559.
U.S.S. RAZORBACK - FIRST WAR PATROL
and REPORT OF SIXTEENTH COORDINATED
ATTACK GROUP.

From: The Commander Submarine Force, Pacific Fleet.
To : The Commander-in-Chief, United States Fleet.
Via : The Commander-in-Chief, U. S. Pacific Fleet.

Subject: U.S.S. RAZORBACK (SS394) - Report of First War Patrol, (25 August to 19 October 1944), and Report of Sixteenth Coordinated Attack Group.

1. The first war patrol of the RAZORBACK was conducted in areas east of Luzon and off Formosa. The RAZORBACK, along with the U.S.S. CAVALLA (SS244) and the U.S.S. PIRANHA (SS389), formed an attack group with the Commanding Officer of the RAZORBACK, Commander R. S. Benson, U.S. Navy, acting as group commander. Further details will be found in the PIRANHA's and CAVALLA's second war patrol reports.

2. Area assignments and movements of this group were largely dependent upon coordination with surface and air forces engaged in offensive operations at this time. As may often be the case under these conditions, few contacts resulted. In the case of the RAZORBACK, no contacts other than numerous enemy aircraft were made. However, the potential submarine striking power and supply of information to other forces, including negative information, are most valuable contributions to the success of offensive operations as a whole.

3. The pertinent comment with regard to radar will receive thorough study.

4. Award of the submarine Combat Insignia for this patrol is not authorized.

5. The Commander Submarine Force, Pacific Fleet, congratulates the group commander and commanding officer, officers, and crew for completion of this arduous and important patrol. It is regretted that opportunity to attack the enemy was not afforded this veteran commanding officer and thoroughly trained new submarine. The second war patrol of the CAVALLA, who proceeded to the Southwest Pacific on completion of patrol, has not yet been received by this Command. A

SUBMARINE FORCE, PACIFIC FLEET hch

FF12-10/A16-3(15)

Serial 02397

[redacted] DECLASSIFIED

Care of Fleet Post Office,
San Francisco, California,
1 November, 1944.

THIRD ENDORSEMENT to
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NOTE: THIS REPORT WILL BE DESTROYED PRIOR TO ENTERING PATROL AREA.

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ATTACK GROUP.

Subject: U.S.S. RAZORBACK (SS394) - Report of First War Patrol, (25 August to 19 October 1944), and Report of Sixteenth Coordinated Attack Group.

- -

despatch summary, however, shows that no opportunity for attack was presented in her case either, and no direct damage was inflicted upon the enemy by this group.

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