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Declassified under NND 913043
Volume III
ENGINEERING DIVISION
Part 16
VTB DESIGN BRANCH

Classification [redacted] (changed to unclassified) by authority of
Number 2545

on 6/29/55
(Date) (Signature) (Rank)
Bureau of Aeronautics
Department of the Navy

97

Declassified under NND 913043
Class Desk History

1. 3 March 1932

On this date a memo from Material Division, Subj: "Temporary Organization of Airplane Design Section," with Enclosure "Organization Chart" set forth a temporary organization of the Airplane Design Section and specified the duties of the Head of Airplane Design Section and the two chief assistants. This office was originally a section of the Material Division.

2. 15 July 1932

The 'Class Desk' organization was incorporated in the Airplane Design Section of BuAer by Material Division Order No. 7. of this date.

Organization under this order is as follows:

Head of Airplane Design
General Assistant
Class Desk "A" - VF(1) and High Speed
Class Desk "B" - VF(2), VB (Dive) and VS (Carrier)
Class Desk "C" - VO, VS (Cruiser), and VN
Class Desk "D" - VJ, VT, VP, VJ, VR

Duties of the Class Desks were set forth as follows:

New Design - drafting, competitions, and detail negotiations.
New Design Contract Changes
Mock-up boards and changes
Flight tests and trial board changes
Airplane Specifications and requisitions
Check - General and Process Specs.
Check - Technical Orders and notes.
Check - Strength and Safety matters (including flight restrictions.)
Trouble Report Action
Service Changes
Et. cetera

3. 16 July 1932

A Design Section Memo of this date made the following assignment of duties in accordance with Material Division Order No. 7:

Class Desk A - VF(1) and High Speed
   Lt. Comdr. J.R. Allen (CC) USN
Class Desk B - VF(2), VB (Dive) and VS (Carrier)
   Lt. Comdr. L.B. Richardson (CC) USN

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Class Desk C - VO, VS (Cruiser) and VN
Lt. L.J. Maxson (CC) USN

Class Desk D - VB-VT, VP, VJ and VR
Lt. Comdr. D. Royce (CC) USN

General Assistant - Lt. Comdr. J.R. Allen (CC) USN

4. 17 October 1933

Design Section Memo made the following rearrangement of airplane cognizance and of heads of Class Desks:

Class Desk A - VF (1) and High Speed, VR, Airship Unit Planes.
Lt. Comdr. J.R. Allen (CC) USN

Class Desk B - VF (2), VB (Dive) and VS (Carrier)
Lt. Comdr. A.C. Miles (CC) USN

Class Desk C - VO, VS (Cruiser), VN, VJ.
Lt. L.J. Maxson (CC) USN

Class Desk D - VB-VT, VP
Lt. Comdr. D. Royce (CC) USN

General Assistant - Lt. Comdr. A.C. Miles (CC) USN

5. 5 June 1935

Airplane Design Section Memo made the following assignment of duties and rearrangement of airplane cognizance for the Class Desks:

Class Desk A - VF (1) and High Speed, VF (2), Airship Unit Planes (Special Assignment - SF-1 and FF-1)
Lt. Comdr. J.E. Ostrander, USN

Class Desk B - VSB, VB (Dive), and VS (Carriers)
Lt. Comdr. A.C. Miles (CC), USN

Class Desk C - VO, VS (Cruisers), VN
Lt. C.L. Helber (CC) USN

Class Desk D - VB-VT, VP, VR, VJ
Lt. P.E. Pihl (CC) USN

General Assistant - Lt. Comdr. A.C. Miles (CC) USN.

Class Desks were at this date carried under the heading of the Airplane Design Section of the Engineering Branch of BuAer.

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6. 1 July 1936

There were established on this date Class Desk E and Class Desk F by Airplane Design Section Memo further dividing airplane cognizance shown as follows:

Class Desk A - VF(1) and High Speed, VF (2), VB, Airship Unit Planes

Class Desk B - VS, VB (Dive) and VS, (Carrier)
   Lt. Comdr. A. Gavin, USN

Class Desk C - VO, VS (Cruiser)
   Lt. C.L. Helber, USN

Class Desk D - VB-VT, VP -
   Lt. A.R. Sanborn, USN.

Class Desk E - VR, VJ, VN, Coast Guard Contracts
   Lt. J.B. Pearson, USN

Class Desk F - Radio Controlled Aircraft. Farnhey

Assistant - Lt. Comdr. A.M. Pride, USN

This memo was signed by A.C. Miles, Lt. Comdr., USN,
Head of Engineering Branch.

7. 29 July 1927

Engineering Branch Memo of this date made the following assignments:

Head of Engineering Branch. - Comdr. F.W. Pennoyer, Jr., USN
Ass't to Head of Eng. Br. - Comdr. H.R. Oster, USN
Airplane New Des. - Lt. Comdr. L.C. Stevens, USN

Class Desk A - VF(1) and High Speed, VF (2), VB, Airship Unit Planes
   Lt. Comdr. R.B. Farnsworth, USN

Class Desk B - VS, VB (Dive), and VS (Carrier)
   Lt. E.W. Clextion, USN.

Class Desk C - VO, VS (Cruiser)
   Lt. Comdr. C.L. Helber, USN

Class Desk D - VE-VT, VP
   Lt. Comdr. A.R. Sanborn, USN

Class Desk E - VR, VJ, VN, C.G. Contracts
   Lt. R.S. Hatcher, USN

Class Desk F - Radio Controlled Aircraft
   Lt. Comdr. D.B. Farnheyt, USN

This memo also established the office "Airplane New Design" under the direction of Lt. Comdr. L.C. Stevens, USN.
The duties, responsibilities, and authority of this office were

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8. 24 February 1938

On this date a memo was sent by Lt. Comdr. Farnsworth, the Head of Class Desk "A", to the Head of the Engineering Branch proposing a readjustment of the Class Desk Airplane cognizance. This move was prompted by the assignment of the Head of Class Desk "D" to temporary additional duty as INA at Baltimore. The readjustment is as outlined:

1. The following airplanes to be transferred from Class Desk D to Class Desk B:

   X TBD-1
   XT 3D-2
   TBD-1
   TG-1
   TG-2

2. The following Airplane to be transferred from Class Desk B to Class Desk C.

   XOP

The above adjustments in airplane cognizance resulted in the following distribution of airplanes:

<table>
<thead>
<tr>
<th>Class Desk A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
</tr>
</thead>
<tbody>
<tr>
<td>New Competition</td>
<td>XSBC-3</td>
<td>XOSN-1</td>
<td>New Long</td>
<td>XJO-3</td>
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<tr>
<td></td>
<td>XSBA-1</td>
<td>XOS2U-1</td>
<td>Range</td>
<td>PM-1</td>
</tr>
<tr>
<td></td>
<td>XBT-1</td>
<td>XOSS-1</td>
<td>XPBM-5</td>
<td>J-1</td>
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<tr>
<td></td>
<td>XGB3U-1</td>
<td>XSO2U-1</td>
<td>XPBS-1</td>
<td>JRS-1</td>
</tr>
<tr>
<td>Seversky</td>
<td>XTBD-1</td>
<td>XSO3C-1</td>
<td>XPTBH-1</td>
<td>JF-2</td>
</tr>
<tr>
<td>XFD</td>
<td>XT 3D-2</td>
<td>XOZ-1</td>
<td>XPB2Y-1</td>
<td>N3-1</td>
</tr>
<tr>
<td>BFC-2</td>
<td>SB2U-1</td>
<td>XOP</td>
<td>XPY-1</td>
<td>JE-1</td>
</tr>
<tr>
<td>F3F-1-2</td>
<td>BT-1</td>
<td>O3U-1-3-6</td>
<td>XP2Y-1</td>
<td>JF-1</td>
</tr>
<tr>
<td>F2F-1</td>
<td>SBC-3</td>
<td>O2U-2-3-4</td>
<td>XP2M-1</td>
<td>JB-1</td>
</tr>
<tr>
<td>FF-2</td>
<td>SBU-1-2</td>
<td>OJ-2</td>
<td>PM-1</td>
<td>JH-1</td>
</tr>
<tr>
<td>GP-1</td>
<td>SU-1-2-3-4</td>
<td>SOC-1-2-3</td>
<td>PBY-1-2-3-4</td>
<td>JF-2-3</td>
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<tr>
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<td>SON-1</td>
<td>P2Y-2-3</td>
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<td>BG-1</td>
<td>O2C-1</td>
<td>PH-1</td>
<td>NS-1</td>
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<td>TSD-1</td>
<td>DL-9</td>
<td>PK-1</td>
<td>JO-1-2</td>
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<tr>
<td></td>
<td>TG-1-2</td>
<td></td>
<td></td>
<td>Misc. Transports</td>
</tr>
</tbody>
</table>

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9. 27 April 1939

On this date a memo from Lt. Comdr. Farnsworth, Head of Class Desk "A", proposed a further reassignment of Class Desk airplane cognizance and duties of Heads of Branches to aid in the indoctrination of recently assigned class desk officers to their new duties. The new arrangement is as follows:

Engine - Trenner
Class Desk A - VF and High Speed Development
  Lt. Comdr. Hatcher
Class Desk B - VS6, VB (Fives), VS (Carrier)
  Lt. Comdr. Clexton
Class Desk C - VTB, VSO, VOS, VO, VS
  Lt. Fleming
Class Desk D - VP, VFB
  Lt. Comdr. Farnsworth
Class Desk E - VN and Radio Controlled Aircraft
  Lt. Scrymgeour
Class Desk F - VR, VJ, Coast Guard Contracts
  Lt. Murphy

Note: It is this memo that recalled VTB from Class Desk "B" and placed VTB under the cognizance of Class Desk "C". This had been only a temporary expedient as outlined above.

10. 5 February 1941

A memo from the Engineering Branch to Administration proposed that the new route sheet, being drafted at that time, list the class desks as follows:

VF Design
VS6 Design
VOS-VSO, Rotating Wing Design
VPB Design
VJ-VR Design
VN Special Design
VTB Design

These designations were adopted as proposed except that the designation 'Rotating Wing Design' was not put on Route Sheet though VOS-VSO still retained cognizance.

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In April 1941, VTB Aircraft were removed from the cognizance of Class Desk C and set up as Class Desk G.

In January 1942 when the Engineering Branch and other Branches of BuAer were moved to Building "W", the Class Desks were made separate sections.

In February 1942 the class "Radio Controlled Aircraft" had its designation changed to 'Special Design' still remaining, however, with Class 'VN' as Class Desk E.

This class also made an appearance in February 1942, and was assigned to Class Desk C which already consisted of VSO, VOS, VO, VS. The use of the designations of VO and VS were dropped sometime prior to January 1941.

A Memo from Head of Engineering Branch, Capt. J.E. Ostrander, Jr., established the "Office of LTA Design" in the Engineering Branch.

On the BuAer Organization Chart the block labeled "VN special Design" was modified to read "VN and Special Design" this date. Notice of this separation of VN and Special Design into two separate sections was officially requested by memo from Engineering to Administration on 17 July 1942 to appear in the BuAer Log.

BuAer Office Order No. 25-43 established the Engineering Branch as the Engineering Division in the Bureau of Aeronautics and the Class Desks were consequently elevated to the level of branches.

Declassified under NND 913043
1 June 1944

MEMORANDUM

From: VTB Design Branch
To: Technical Data Branch
Subj: BuAer War History.
Ref: (a) Engineering Division Memo 8-44 of February 17, 1944.

1. The VTB Design Branch has not report for the BuAer War History for the month of June 1944.

/\ W.W. Hollister
Commander, USN
MEMORANDUM

From: VTB Design Branch
To: Technical Data Branch
Subj: BuAer War History
Ref: (a) Engineering Division Memo 8-44 of February 17, 1944.

1. The VTB Design Branch has no report for the BuAer War History for the Month of April 1944.

W.W. Hollister
2 May 1944

MEMORANDUM

From: VTB Design Branch
To: Technical Data Branch

Subj: BuAer War History

Ref: (a) Engineering Division Memo 8-44 of February 17, 1944.

1. The VTB Design Branch has no report for the BuAer War History for the Month of April 1944.

W.W. Hollister
MEMORANDUM

From: VTB Design Branch
To: Technical Data Branch
Subj: BuAer War History
Ref: (a) Engineering Division Memo 8-44 of February 17, 1944.

1. The VTB Design Branch has no report for the BuAer War History for the month of March 1944.

W.W. Hollister
MEMORANDUM

March 1, 1944

From: VTB Design Branch
To: Technical Data Branch

Subject: BuAer War History

Ref: (a) Engineering Division Memorandum 8-44 of February 17, 1944.

1. The VTB Design Branch has no report for the BuAer War History for the month of February, 1944.

W. W. Hollister.
The surrender of Japan on 14 August 1945 brought to an end the combat utilization of the torpedo bomber which undoubtedly contributed the most in length of service and dependability of any operational carrier based torpedo naval aircraft during World War II. This torpedo bomber was the Avenger.

During the opening days of World War II, the torpedo-attack missions were being carried out by the use of a Douglas TBD torpedo bomber. This model had been in operational use since 1934 so that by 1940 a new torpedo bomber was being designed and built for use by the U.S. Navy. This new torpedo bomber was constructed by the Grumman Aircraft Engineering Corp. and was known as the TBF-1. The first production TBF-1 flew in January 1942 and by April 1942 the fleet was receiving the first models for use as torpedo bombers. The TBF-1 first saw action in the Battle of Midway on June 4, 1942. Even though the TBF was later manufactured by another contractor, the basic configuration of this airplane persisted as the only torpedo bomber used operationally by the U.S. Naval Air Forces up to and including 14 August 1945 when Japan accepted surrender terms of the Allied Forces. This represents three years and three months in terms of actual combat service use for the TBF/TBM type.

A brief summary of the major improvements offered by the TBF as compared to the TBD are as follows:

- An inhabited power operated dorsal turret; increased forward fire power; increased armor protection for all crew members; bomb bay capable of housing an aircraft torpedo and many combination of bombs; 60 mph Vmax increase; 170 nautical miles combat radius increase.

Early in 1942 just following the start of production of the TBF by Grumman, it was determined that it would be necessary for this contractor to exert all his efforts in the design and construction of fighter aircraft. Accordingly, an attempt was made to locate a new production source for the TBF type torpedo bomber. In March 1942 a contract was signed with Eastern Aircraft Division, General Motors Corp. for the production of this airplane. The torpedo bomber that was produced by Eastern Aircraft was designated the TBM even though there was no change in the basic configuration of the aircraft. Consequently, the aircrews have been universally designated TBF/TBM torpedo bombers.
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A brief summary of the major improvements offered by the TBF as compared to the TBD are as follows:

- An inhabited power operated dorsal turret; increased forward fire power; increased armor protection for all crew members; bomb bay capable of housing an aircraft torpedo and any combination of bombs; 60 mph Vmax increase; 170 nautical miles combat radius increase.

Early in 1942 just following the start of production of the TBF by Grumman, it was determined that it would be necessary for this contractor to exert all his efforts in the design and construction of fighter aircraft. Accordingly, an attempt was made to locate a new production source for the TBF type torpedo bomber. In March 1942 a contract was signed with Eastern Aircraft Division, General Motors Corp. for the production of this airplane. The torpedo bomber that was produced by Eastern Aircraft was designated the TBM even though there was no change in the basic configuration of the aircraft. Consequently, the airframes have been universally designated TBF/TEM torpedo bombers.
Approximately 80% of the total torpedo aircraft production has been by Eastern Aircraft of the Avenger type aircraft for the present World War II.

Original credit should be given to Grumman Aircraft Corp. for their part in furnishing the design of the basic TBF/TBM torpedo bomber. No little amount of credit goes to Eastern Aircraft Division of General Motors Corp. for their excellent cooperation and production record of the Avenger Torpedo Bomber. In a former automobile hardware plant, which was converted to the production of originally 150 torpedo bombers a month, 400 TBM Avengers were built and accepted at Trenton, New Jersey in March 1945. Throughout the production of the TBM Avengers, Eastern Aircraft was most cooperative in doing everything within their means to incorporate changes in the Avenger production line as dictated by battle needs.

The long and brilliant record of the Avenger throughout the complete span of World War II as a carrier based naval torpedo bomber was undoubtedly a major contributing factor in the successful prosecution of aerial and naval phases of World War II.
Monthly reports give the status of design projects during the period. Contain no information on administration or organizations. The Basic Review gives a brief summary of the development of specific plane types. Includes some information on organization and administration which is scattered throughout the report.

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- History, 15 July 1932 - 1 Oct. 1944
  (See Index - p. iii of report).
- Review of TBY Program, 6 July 1945.
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(See Index - p. iii of report).


Review of TBY Program, 6 July 1945.
From: Head, VTB Design Branch  
To: Head, Technical Data Branch  
Subj: Naval Aviation, Administrative History of.  
Refs: (a) DCNO(Air) and BuAer Administrative Circular No. 58-44.  
      (b) Engineering Division Memo. 49-44.  
      (c) DCNO(Air) and BuAer Office Order No. 29-44.  
Encl: (A) History - VTB Design Branch  
      Engineering Division  
      Bureau of Aeronautics  

1. Enclosure (A) has been prepared in accordance with the instructions of reference (a) and reference (b) and is submitted in accordance with reference (c).  

2. Enclosure (A) covers the history of VTB Design Branch up to and including September 30, 1944.

W. W. HOLLISTER  
Commander, USN  

Classification (seeneed) {changed to unclassified} by authority of ManAir 2145  
on 4/29/45  
(Date) (Signature) (Rank)  
Bureau of Aeronautics  
Department of the Navy  

Declassified under NND 913043
HISTORY

VTB DESIGN BRANCH
ENGINEERING DIVISION
BUREAU OF AERONAUTICS
NAVY DEPARTMENT

15 JULY 1932 TO 1 OCTOBER 1944

Classification (eeneeed) (changed to unclassified) by authority of
NavAdm 2545

on 6/29/55 Bf8
(Date) (Signature) (Rank)
Bureau of Aeronautics
Department of the Navy

Declassified under NND 913043
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II. EARLY TORPEDO AIRPLANES

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DECLASSIFIED
Authority NND913043

Declassified under NND 913043
INTRODUCTION

Before recording the history of the Class Desk known as VTE Design Branch, in order to provide a background for the following history, it is wise to discuss briefly the early sequence of events occurring in the years prior to 1932 which determined that a system, similar to the present Class Desk System, was necessary and should be established in the Bureau of Aeronautics.

Prior to 1932 the responsibility of Design Study, Procurement and Production was vested in the Material Division of the Bureau of Aeronautics. All types of aircraft, both lighter-than-air and heavier-than-air, were placed under the cognizance of one officer, and such assistants as he needed to help him execute the duties of his office, who acted as Engineering Director and Coordinator for all needs concerning Naval Aircraft. It is this billet that eventually became known as the Director of the Engineering Division in the Bureau of Aeronautics.

Early in 1932 the number of different types of Naval Aircraft had become so numerous that the need for further subdividing the Engineering work load resulting from Aircraft Design Study, Experimental Flight Research and, later, Operation of Service Aircraft was readily apparent. Consequently, the Material Division on the 3rd of March, 1932, established a temporary organization designated as the Airplane Design Section. The memorandum establishing this Airplane Design Section outlined the duties of the Head of the Section and those of his two chief assistants. The establishment of this Airplane Design Section in the Material Division was the first step towards the formation of the Class Desk System within the Bureau of Aeronautics.

The establishment of the Class Desk System of airplane cognizance was promulgated by the basic idea that the Class Desk would exemplify and fulfill the interpretation given to the Class Desk System as representing the project method of procurement. By this it was meant that each Class Desk was responsible for the origination, coordination and completion of only those projects that were desired for the eventual procurement of Naval Aircraft of the type or types assigned to that particular Class Desk. It was the opinion of the U. S. Army Air Forces in 1932 that the Class Desk System, as herein explained, represented the most efficient method of Aircraft Procurement and was being used as such at that time by the Army Air Forces.
I. ORIGIN OF CLASS VT

1. On the 15th of July, 1932, a Material Division Order No. 7 established the Class Desk Organization in the Bureau of Aeronautics to be incorporated under the direction of the Head of the Airplane Design Section. Material Division Order No. 7 set up four Class Desks, respectively, Class Desk A, B, C and D, dividing airplane cognizance by Class among them.

2. The duties of the Class Desk, as specified in Material Division Order No. 7, are set forth as follows:

- New Design - drafting, competitions, and detail negotiations.
- New Design Contract Changes.
- Mock-up boards and changes.
- Flight tests and trial board changes.
- Airplane Specifications and Requisitions.
- Check - General and Process Specifications.
- Check - Technical Orders and Notes.
- Check - Strength and Safety matters (including flight restrictions).
- Trouble Report Action.
- Et cetera.

The Class VT, as it was known in 1932, made its first appearance when the Class Desk System was incorporated in the Bureau of Aeronautics and applied to torpedo carrying aircraft. At this time, however, there were not sufficient torpedo carrying aircraft to warrant including them as one individual class, so that VT airplanes and bomber type airplanes of the Class VB were consolidated and designated as constituting the VB-VT Class. By Material Division Memorandum No. 7 the VB-VT Class was further placed under the cognizance of Class Desk D.

II. EARLY TORPEDO AIRPLANES

1. When the Class Desks were incorporated in the Material Division of the Bureau of Aeronautics in 1932, the torpedo carrying airplanes that were placed under the general cognizance of Class Desk D, and specifically under the cognizance of Class VB-VT, were a combination of airplanes built from both Bureau of Aeronautics designs and contractor designs.
TAM-1

A torpedo airplane designated as the TAM-1 was, in 1932, one of the two most widely used service airplanes of the Class VT. The TAM-1 was the production version of the XTAM-1, the "X" model being built by the Glenn L. Martin Co. from their Design #74 as a three-purpose, shipboard torpedo plane. The TAM-1 was a two-place tractor biplane mounted on twin floats. It was powered by a Pratt & Whitney R-1690 engine of 525 HP. The gross weight of the airplane was 7289 pounds and had a maximum speed of 113.5 mph. The wing span was 53 feet and the range, as listed in available performance data, was 346 miles. The airplane carried a torpedo suspended from the bottom of the fuselage on a suitable rack in between the twin float alighting gear. The TAM-1 was operational until the end of 1934, concluding at that date seven years of service.

The TAM-1 provided the basic design from which were built the TG-1, TG-2, XTN-1 and XT6M-1.

TG-1

The other torpedo airplane that was in the wide operational use in 1932 was the TG-1. Before going further, it is in order to point out that TG-1 enjoyed eight years of operational use and has exceeded the operational record of any torpedo plane in use either before or after the TG-1 up to 1 Oct. 1944. The TG-1 was first constructed as a production airplane in January, 1930, and was in service until December, 1938. This airplane was built in 1930 by the Great Lakes Aircraft Company of Cleveland, Ohio and was similar to the TAM-1. The TG-1 differed from the TAM-1 in that it was a three-place airplane, and the empennage configuration was altered slightly to improve flight control. The TG-1 had a slightly higher gross weight than its predecessor and consequently suffered slightly in Vmax, service ceiling and range.

TG-2

The TG-2 was first built in June, 1931, and had a Wright R-1820-86 engine installation in lieu of the smaller Pratt & Whitney R-1690 installation of the
TG-1, so accordingly was designated Model (-2). The gross weight of the TG-2 was 8271 pounds and had a maximum speed of 128 mph. The service ceiling was 13,500 feet and carried sufficient fuel for a 300 mile range. The TG-2 was in all other respects similar to the TG-1.

**XT6M-1 & XTN-1**

The XT6M-1 and the XTN-1 were operational only until the end of 1932 after three years' service. The XT6M-1 was a two-place airplane, as was characteristic of Martin's early torpedo planes, and was powered by an R-1860 engine. The XTN-1 was a twin-engine airplane powered by two R-1750 engines, but the twin-engine installation imparted to the airplane a negligible performance gain. These two airplanes were similar to the T4M-1 with the exceptions just noted. The XTN-1, in 1932, was the first twin-engine torpedo airplane that was ever built, though a twin-engine design for a torpedo airplane was proposed as early as 1925.

Another torpedo model in flying status in 1932 at the incorporation of the Class VB-VT was the XT3D-1. This airplane was developed from the Bureau of Aeronautics Design #97 as a carrier based torpedo airplane. The XT3D-1 was flown for only two years, being replaced in mid-1932 by the XT3D-2. The XT3D-2 had as power plant a Pratt & Whitney R-1830-54 engine of 800 hp which gave the airplane considerable improved performance as compared to that of the XT3D-1. The maximum speed of the XT3D-2 was 153 mph with a service ceiling of 15,000 feet. Gross weight was 8759 lbs. and the range was listed at 483 miles. The XT3D-2 flew until the end of 1936, after 4½ years in flying status.

2. The listing of airplanes by type, as in the above paragraphs represents those aircraft under the cognizance of Class VB-VT at the time Class Desks were incorporated into the Material Division of the Bureau of Aeronautics.

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Bureau of Aeronautics
Department of the Navy

Declassified under NND 913043
III. ORGANIZATION - CLASS VT - 1932 TO 1935

1. The first Head of Class Desk D, which had cognizance of the Class VB-VT, was Lt. Cdr. D. Royce (CC) USN, as established by Material Division Memorandum No. 7, and remained as such until the 5th of June, 1935, when an Airplane Design Section Memorandum designated Lt. P. E. Pihl (CC) USN as Head of Class Desk D effective that date.

IV. TBD (XTBD-1 AND XTBG-1)

1. In January, 1934, the Class VB-VT became guardian and guide to the destiny of a design that was later to take a very active part in the opening phases of World War II. This was the XTBD-1. This design was originally conceived due to fleet demands for an improved performance, carrier based torpedo plane, as the TG-2 was rapidly reaching the point of obsolescence.

2. In mid-1934, the Great Lakes Aircraft Company proposed the XTBG-1 as a replacement of the TG-2 and running mate of the XTBD-1. The first XTBG-1 crashed during its acceptance trials and because of inferior performance, as compared to the XTBD-1, production of this model was never undertaken.

3. The XTBD-1 was the first deviation from a biplane torpedo plane in that it was a low wing monoplane. This airplane was also the first airplane that represented the Class VTB, as it is known today, because it was designed for dropping torpedoes as a primary mission with horizontal bombing as a secondary mission. The physical configuration of the XTBD-1, as a low wing monoplane, has persisted in the Class VTB, as up until the end of 1944 no different configurations of torpedo planes have been built though in May, 1944, a mock-up board convened to discuss the mock-up of a twin-engine, high wing monoplane, Class VTB airplane. This latter Class VTB airplane will not be built, the reasons for the cancellation to be discussed later in this history.

4. At this point, a brief listing of the performance characteristics of the XTBD-1 is desirable to show the improvement offered by this design.
5. Because of increasingly urgent demands from the fleet for a replacement for the TG-2, a memorandum setting forth the intended VTB Procurement program was drafted by Lt. P. E. Pihl, Head of Class Desk D. This memorandum was signed by Rear Admiral E. J. King, then Chief of the Bureau of Aeronautics, on September 13, 1935. At this date the trials of the XTBDB-1 were approaching completion and indicated that this airplane was a distinct improvement over the TG-2 in all respects. For this reason this VTB Procurement memorandum directed all Bureau of Aeronautics divisions concerned to initiate at once the request for bids on production of the XTBDB-1 in quantities of 27, 54, 60, 81, 108, 114 and 120 and to begin the preparation of specifications for this airplane. The XTBG-1 undergoing flight tests at that date was to have been procured under the same procedure as soon as flight tests proved that the plane had the desired performance. The first XTBG-1 crashed during first flight tests, so the steps toward procurement were necessarily delayed until the second XTBG-1 model was flying. As mentioned before, no production models of the XTBG-1 were built.

6. As a result of the efforts to obtain production models of the XTBDB-1 in June, 1936, the first production TBD-1 was flown and was, up until June 4, 1942, the only model of torpedo airplane in service with the fleet. The idea of having a sea-plane as a torpedo plane still persisted up to 1939 so NAF in 1939 mounted twin-floats on a TBD-1 and designated the airplane as the TBD-1A. This version was not put into service as the TBD-1 was operated as a carrier-based plane during its service life.

V. ORGANIZATION - CLASS VT - 1935 TO 1938

1. On the 1st of July, 1936, a memorandum from Lt. Cdr. A. C. Miles, the Head of the Airplane Design Section, removed VR, VJ, VN classes from the cognizance of Class Desk D leaving two classes, VB-VT and VP. The Head of Class Desk D was then Lt. A. R. Sanborn.
VI. VT DESIGN NO. 145

1. The possibility of building a twin engine torpedo airplane was proposed on Feb. 9, 1937 in a memorandum from Engineering to Planning via Material wherein Lt. Cdr. A. M. Pride forwarded plans and characteristics of Bureau of Aeronautics Design No. 145 proposing it as a possible VTB design. This airplane was to have as power plants two XR-1535-92 engines.

2. In answer to a Planning Memorandum written on 20 April 1937, Ship's Installation sent a memorandum to Planning dated 27 April 1937 outlining the results of a comparative spotting survey of Bureau of Aeronautics Design No. 145 and the TBD-1. This memorandum stated that Design No. 145 could satisfactorily be spotted on the flight and hangar decks of the WASP, RANGER, YORKTOWN, ENTERPRISE, LEXINGTON and SARATOGA with only a few handling restrictions in the vicinity of the elevators on the hangar deck and while passing the forward elevator, if down, on the flight deck of the YORKTOWN and ENTERPRISE. The design appeared more advantageous for flight deck spotting due to the fact that the horizontal tail surfaces would pass under wing tips of airplanes of the same design while spread; a more forward position of the tail wheel allowed a greater tail overhang at the deck edge; sweeping the trailing edge of the wing forward allowed a closer spot when the design is parked nose to tail.

3. Regardless of the above flight deck spotting advantages, Design No. 145 was never carried beyond the design study stage. The TBD was satisfactorily meeting fleet requirements for a VTB type airplane at that date, so production of Design No. 145 was not undertaken.

VII. CLASS VTB - 1938 TO 1939

1. Before proceeding further there are a few points to be mentioned to establish the chronological changes of VTB Class Desk history. At the inception of the Class Desk system on July 15, 1932, torpedo carrying airplanes were placed in the Class VB-VT under Class Desk D and remained as such until Feb. 24, 1938. On this date it was proposed by the Head of Class Desk A that the Class VTB, consisting of these aircraft:  

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be transferred from Class Desk D to Class Desk B as a temporary expedient. This rearrangement was to remain in effect only so long as to cover the assignment of the Head of Class D to temporary additional duty as INA, Baltimore.

2. This move was particularly significant to the Class VTB in that torpedo airplanes were removed from Class VB-VT and set up on this date as the Class VTB, which indicated the tactical concept of the TBD as a torpedo bomber in lieu of just a torpedo airplane. From Feb. 24, 1938 up to the 11th of July, 1944, all airplanes under the cognizance of Class VTB were principally torpedo bombers as the class designation signified. The first change in the designation VTB of torpedo airplanes was when a design was proposed on the 11th of July, 1944, for a torpedo scout airplane. It was requested by memorandum that this design be designated the XTSF-1, thereby designating the scout mission in place of the bombing mission for this torpedo aircraft. This torpedo scout airplane will be covered later in this history.

3. On April 27, 1939 a memorandum from the Head of Class Desk A recalled VTB from Class Desk B and placed VTB under the cognizance of Class Desk C.

VIII. TWIN ENGINE VTB - 1938

1. On June 6, 1938 a memorandum from Lt. Cmdr. Stevens, discussing a proposed twin engine VTB type airplane, explained why the design was not interesting to the Bureau of Aeronautics. The design proposed was a twin engine, tricycle landing gear airplane of 15,000 pounds gross weight. It offered a top speed of 282 mph at 1000' and a landing speed of 65 mph. The design was rejected as too heavy principally and also because the company proposing the airplane had not established the soundness of their organization with the Procurement Division. The design was brought into the Bureau on June 6, 1938 by a Mr. A. Garr of Roxbury, Mass.

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IX. VTB PROCUREMENT - 1939

1. With the incorporation of the Class Desk System into the Bureau of Aeronautics organization there was also put in use a new method of aircraft procurement. Prior to 1930 the Bureau of Aeronautics Drawing Room prepared drawings of the desired type of aircraft which were submitted to the manufacturers as representing the desired configuration of aircraft. After 1930, drawings of the outline configuration and suggested inboard profile of the desired type of airplane were prepared in the Bureau of Aeronautics Drawing Room for the use of Bureau personnel only, and there was submitted to the bidding contractors a general type specification for use in the preparation of the designs that were to be submitted.

2. The first type specification for Class VTB airplanes was drafted by VTB Design and was proposed by a memorandum from Engineering to Procurement for use in requesting bids for this class airplane. On March 10, 1939 a confidential memorandum from Engineering to Procurement forwarded Type Specification SD-114-6 for the Class VTB airplanes, as stated above. This memorandum was drafted by Commander Stevens and signed by him for Commander F. W. Pennoyer, Jr., the Head of the Engineering Branch. This memorandum also forwarded Airplane Characteristics and Performance Sheet; Preliminary Weight Table Form; List of Engines with Characteristics and Performance Data; and Strength Requirements, Appendix XXXI to SD-114-6. These data were to be used by the Procurement Division as guides in the procurement of future VTB type airplanes. The memorandum requested that the following points be included in the letter to prospective bidders setting forth the details of the subject informal design competition.

   a.) The missions of the aircraft represented by this design are to attack heavy surface craft with bombs or torpedoes, to serve as heavy smoke layers, and without bombs or torpedoes, to conduct scouting operations and attack light surface craft with gunfire. The principal features desired in the design are briefly summarized in the following sub-paragraphs:

      1.) Maximum Stalling Speed with power off, 70 mph (statute) with one MK XIII torpedo (normal torpedo condition) less 1/2 fuel.

.....It is essential that the airplane have good stability and control about all three axes at low speed in the landing condition
and that stalling shall be followed by nosing over without tendency to dive or fall off on one wing.

2.) **Range at Economical Speed** - Range at economical speed carrying one Mk XIII torpedo or as bomber (3 - 500# bombs) shall be not less than 1000 miles (statute).

3.) **High Speed** - Highest practicable, and at least 300 mph with normal fuel load.

4.) Take-Off shall be as short as possible and not more than 325 feet in a 25 knot wind with normal torpedo load (Mk XIII torpedo) and fuel for 1000 miles range at economical speed.

5.) **Service Ceiling** - Shall not be less than 30,000 feet, beginning with normal torpedo load.

6.) **Armament** - All guns shall be located as near the center line as possible in order to effect high concentration of fire. The torpedo and bombs shall be carried internally.

7.) **Radio** - Scouting radio equipment and rotation direction finder shall be carried in loading conditions.

8.) **Power Plant** - Single engine, mechanically supercharged. May be either air-cooled or liquid-cooled, the air-cooled preferred.

9.) **Strength** - In accordance with appendix XXXI of Type Specification SD-114-6.

10.) **Minimum Weight** and size are desired but weights up to 12,500 pounds will be considered in normal torpedo.

11.) **Dimensions** - Overall height with wings folded shall not exceed 17 feet under static conditions on its own landing gear. The limiting overall dimensions with wings folded are 41 feet by 48 feet with a
clearance not less than 12" all around. The overall length shall not exceed 39 feet and the span shall not exceed 60 feet.

12.) Miscellaneous Designs Features -
The gunner is designated also as radio operator, since he is the only one available for this assignment when the assistant pilot-bomber is at the bomb sight. It would, however, be desirable to have the radio accessible to both the gunner and the assistant pilot-bomber. The intention is not to have the radio inside the gun enclosure, but the radioman should have easy access to it from the enclosure. Depending on the space within the fuselage and the relative locations of assistant pilot's seat, rear gun enclosure and radio, the possibility of providing an auxiliary seat for use of the gunner-radioman when not in the gun enclosure is suggested, though not required.

3. Procurement, using the above information that had been furnished by Engineering, in Bureau of Aeronautics confidential letter, Aer-PR-BA, VTB, of March 25, 1939, requested that designs be submitted for competition on a proposed VTB type airplane. The request of this letter resulted in the submission on August 24, 1939 the following designs: Grumman "A" & "B"; Brewster "A", "B" & "C"; Vought "A", "B", "C", & "D"; Douglas "A"; Hall "A"; Vultee "A" & "B".

4. These designs were commented upon by Lt. Fleming in a memorandum dated September 20, 1939 as follows:

Paragraph 1 of this memorandum considered the power plant installation from the viewpoint of including a power plant that gives the best performance for both torpedo dropping at low levels and high level bombing. It was recommended that the R-2600-B526B two-stage engine be installed in the design selected as giving the best overall performance.

The bombing installation was discussed in paragraph 2 and it was pointed out that speed of interchangeability between the two attack
missions of VTB types is of great importance. It was further recommended that the SBAE installation be permanent.

The incorporation of an automatic pilot was discussed in paragraph 3 and it was not recommended for installation.

5. The recommendations of Lt. Fleming above were set forth for the two acceptable proposed designs in this order; first, Grumman "B"; second, Brewster "A" or Vought "C".

6. The Grumman "A" design was submitted along with the "B" design but incorporated a two-speed engine in lieu of the two-stage engine installation as proposed for the "B" design. The uncertainty regarding the availability of the two-stage engine, even though this engine gave a better performance at bombing attitudes, was the determining factor in deciding to proceed with efforts to obtain the two-speed installation if a production contract was executed.

7. Using the comments of the Head of Class Desk C, Comdr. Pennoyer, then Head of Engineering, wrote to the Chief of the Bureau of Aeronautics a confidential memorandum on Oct. 21, 1939. This memorandum went into detailed comment upon all the designs submitted and offered a recommendation as to the awards to be made. A few highlights of the comments upon the Grumman "A" and "B" and Vought "C" designs are recorded as significant to the history of VTB Design.

"Grumman A, with the R-2600, 2 speed engine, is eliminated from consideration by the low performance at high altitudes."

"Grumman B, with the R-2600-B-658, two-stage engine, supercharged to 22,000 feet, is the best all-round design."

"Vought C, with the R-2800, 2 speed engine, has higher speeds than Grumman B or Brewster A at all altitudes up to 19,400 feet, and is faster at 16,000 feet by approximately 14 mph and 17 mph respectively than the above designs. From a performance standpoint, this airplane is outstanding for torpedo and normal bombing operations...... It has approximately the same weight as the Grumman and is over three hundred pounds heavier
than the Brewster. For carrier adaptability, it rates below the Grumman ........... This design is preferred over the other Vought proposals." (This design later became the XTB-1.)

The memorandum in paragraph #10 stated "In conclusion, it is recommended that the first award be made to Grumman for his design B, and that at least two airplanes of that design be purchased in order to provide valuable insurance for rapid completion of the trials. ........and it is recommended that the second award be made to either Brewster for Design A or to Vought for design C, ........ An important factor favoring the Vought C is the use of the R-2800, 2 speed engine, which does not tie this competition down to one engine, although it is to be remembered that it suffers a speed penalty above 19,400 feet."

8. In a confidential memorandum to Capt. Ramsey, Lt. Cdr. A. B. Vosseller on Oct. 25, 1939 commented in further amplification of Cdr. Pennoyer's memorandum concerning the designs submitted for the VTB competition. The memorandum concurred with Engineering in recommending the Grumman "B" design but suggested that Vought be asked to submit a less complicated arrangement for his slot-flap-spoiler system before making an award to Vought for his Design "C". He further recommended that the same engine be specified for both designs when awards were made.

9. Capt. Ramsey then, on October 27, 1939, wrote a memorandum to the Admiral and Ass't Chief, wherein he offered his recommendations as to awards to be made. He indicated that both the 2600 and 2800 engine designs be obtained and two Grumman prototypes be procured instead of one. He further explained that Grumman stated that the X model could be adapted to the 2800 engine but not at the cost submitted. This memorandum requested that a conference be called to decide upon the awards to be made and to be attended by the following:

Admiral
Ass't Chief
Capt. Kraus
Capt. Ramsey
Comdr. Pennoyer
Comdr. Stevens
Comdr. Richardson
Lt. Cdr. Vosseller
Mr. Frishie

Classification (secrets) (changed to unclassified) by authority of WavAnn 25/45

NavAnn 25/45 on 6/29/35

Department of the Navy

Bureau of Aeronautics

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10. This conference was held on Nov. 3, 1939 and the
decision resulting therefrom was to procure two Grumman "B"
designs with the R-2600 installation and one Vought "C" de-
sign with the R-2800 engine installation.

X. TBF/TEB PRODUCTION (1940-)

1. As fleet demands for a production torpedo airplane
were increasing daily, steps were immediately undertaken to
procure two Grumman "B" designs to be used as prototype TBF
airplanes. Accordingly Contract 72974 was executed to cover
the procurement of these two airplanes from the Grumman Air-
craft Engineering Corp.

2. On July 8, 1940 a mock-up board met at Bethpage, Long
Island, to hold the mock-up inspection. The members of the
mock-up board are as listed in an Engineering Division Memo-
randum of June 24, 1940.

3. The first flight of the XTB-1, Bureau Number 2539,
took place on August 7, 1941. The airplane was used for flight
experiments until the 28th of November, 1941, where, during
a full power climb stability check, the airplane caught fire in
the air and crashed. Flight tests were continued with the
second XTB-1, Bureau Number 2540.

4. Due to urgent demands from the fleet, it was decided
to place the TBF-1 in production so on the 30th of December,
1940, a contract was executed with Grumman to procure 325 TBF-1's
and 1 XTB-2. The XTB-2 had as a power plant the R-2600-10, two
stage engine. The 325 TBF-1's had the R-2600-8 two speed engine
as production of the (-10) engines was not sufficient to provide
the required number in time to meet the contract delivery dates.
The first TBF-1 flew in January, 1942, and was in action with
the Pacific fleet in time to participate in the battle of Mid-
way on June 4, 1942.

5. The original Contract 76928 for 325 TBF-1 airplanes
was supplemented by Contract 91367 for 1965 TBF-1 airplanes.
1200 airplanes of this contract were built as TBF-1 and the
balance were built as TBF-1C airplanes. The (-1C) model had
two .50 caliber wing guns in lieu of one fixed, .30 cal.,
synchronized, forward-firing cowl gun. The date of Contract
91367 was Jan. 2, 1942.

6. Then in 1942, when it became necessary to have Grumman
exert all effort on the F4F and F6F production program, steps

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were taken to locate a new production source for the TBF-1C. The Eastern Aircraft Division of General Motors Corp., located at Trenton, New Jersey, was given Contract 98837 on the 23rd. of March, 1942, for 1200 TBM-1 and TBM-1C later increased by 300 TBM-1 and TBM-1C airplanes to make a total of 1500 airplanes. Of this quantity 550 airplanes were to be TBM-1's with the balance TBM-1C's.

7. On Jan. 1, 1943, a letter of intent for Contract NOa(s)-228 signified an intent to purchase 1000 additional TBM-1C airplanes. Amendment #1 to the letter of intent for Contract NOa(s)-268 provided for 800 TBM-3 airplanes. This change to Model (-3) was the installation of the (-20) engine in lieu of the (-6) installation in the TBM-1C. Amendment #4 to the letter of intent dated July 23, 1943 further increased the quantity of TBM-3's by 1377 airplanes. Amendment #7 on the 20th of December 1943 increased the quantity of TBM-1C's by 382. Complete engineering responsibility for the Avenger -1 and -1C airplanes was transferred to Eastern Aircraft by a VTB Design letter dated 10 December 1943.

8. On the 31st of December 1943, Contract NOa(s)-228 was executed to amend and supersede Contract 98837 to provide for all previous changes and amendments applicable to Eastern Aircraft production. Further increases in March, 1944, and July, 1944, provided for 1738 additional TBM-3 airplanes.

XI. XTEU-1 & TBY-2 PRODUCTION (1940-____)

1. XTEU-1 Number 2542 was originally ordered under Requisition AERO-750-EU-40 and then covered by Contract Number 73253 on 22 April 1940. At that time production of the TBU was not undertaken by Vought-Sikorsky because Grumman was considered more suitable than Vought-Sikorsky as a source for production airplanes and, furthermore, early performance indications were that the two airplanes would perform alike in most respects. As production of the TBF proceeded, it became apparent that the Grumman airplane was going badly overweight and all production TBF airplanes were well below the expected performance, so it was decided to execute a production contract for the XTEU design.

2. On 12 June 1942 a Planning Directive was issued calling for 1100 TBU airplanes to be built by Vought-Sikorsky Aircraft Corporation. But, due to the high priority of the F4U and resultant slow progress of the TBU production engineering, a letter of intent dated Oct. 31, 1942, authorized the production of 1100 TBY airplanes and spares by the Consolidated Vultee Aircraft Corp.
in their plant located at Allentown, Pa. The first production model was to be the TBY-1 with the R-2800-20 (B) series engine.

3. The engineering, test, and design responsibility was to rest with Chance-Vought even though production of the TBY-1 was to be at Consolidated Vultee Aircraft. So, accordingly, Contract NOa(s)-622 was executed with Chance-Vought for them to have engineering, test, and design responsibility until the delivery of the 301st airplane, or final acceptance by the Navy of the first airplane, or until Jan. 1, 1945, whichever of the three conditions was fulfilled first. Contract NOa(s)-159 was executed with Consolidated Vultee Aircraft to cover the production of 1100 TBY-1 airplanes and to assume engineering, test, and design responsibility of the TBY under the conditions stated above for Contract NOa(s)-622.

4. The Bureau, realizing that the R-2800-22 (C) series engine would improve the performance of the TBY-1, in October, 1942, gave consideration to the use of this engine in the TBY-1. A meeting with the Director of Planning on March 30, 1943 resulted in the decision to install the (C) engine in all production TBY airplanes with Chance-Vought engineering the changeover. This conference is covered by VTB Memorandum No. 55707 of March 30, 1943.

5. VTB Design then scheduled a conference to be held at Chance-Vought on March 31, 1943 to inform Chance-Vought of the Bureau's desires regarding the (C) engine installation. This conference was attended by the Head of VTB Design; INA, Stratford; officials of Chance-Vought and officials of Consolidated Vultee Aircraft Corp. Because of an unacceptable delay of ten months necessary for Vought to engineer the changeover from the (B) series to the (C) series engine, it was decided to continue with the (B) series installation in the TBY-1.

6. Following these conferences and discussions it was decided to have the (C) engine installed in the 301st TBY, at which point engineering was to be transferred to Consolidated Vultee Aircraft Corp.

7. On Nov. 1, 1943, the Consolidated Vultee Aircraft Corp. contacted VTB Design and stated they were ready to install the (C) engine in the first TBY-1 if a satisfactory arrangement for responsibility or contract guarantees with Chance-Vought could be made. No agreement with Chance-Vought could be reached following efforts by VTB; therefore, the original plan was to be followed.
8. VTB, still wanting this new engine and in an effort to expedite the installation of the (C) series engine in the TBV, scheduled a conference to be held on Dec. 7, 1943 with the Assistant Chief of the Bureau of Aeronautics, attended by representatives of Production, Material, Engineering and Plans. As a result, after being informed of the Bureau's desires, Consolidated Vultee Aircraft Corp. agreed to install the (C) engine in the first TBV-1 and to assume all responsibility for only the engineering work done by Consolidated Vultee Aircraft Corp. on this installation. The installation of the (C) series engine changed the designation of the TBV-1 to the TBV-2.

9. Beginning with December, 1943, all engineering responsibility of Chance-Vought under Contract NO(s)-622 was being cleaned up so that as soon as possible all engineering and design responsibility would rest with Consolidated Vultee Aircraft Corp. This changeover, on Sept. 1, 1944, was very nearly complete and a termination request on Contract NO(s)-622 was soon to be executed.

10. Engineering progress at Allentown following Jan. 1, 1944 was very slow and little progress was being realized toward the first flight of the TBV-2. This situation was discussed in detail and recommendations for improvement were offered in a conference on July 10, 1944 held in the Bureau of Aeronautics. Memorandum No. 126504 dated 19 July 1944 covers the proceedings of this conference.

11. There was a reorganization of key personnel at Consolidated Vultee Aircraft as a result of the above conference which placed new personnel in certain key positions. The immediate result of this change was the speed-up of the production of the first TBV-2 airplane with a subsequent first flight taking place at Allentown, Pa. on Aug. 20, 1944.

12. The XTBV-1 completed service acceptance trials as reported upon by Naval Auxiliary Air Station, Philadelphia, dated July 26, 1944. Contract NO(s)-3260, covering the XTBV-1 airplane, will be terminated before December 31, 1944.

XII. VTB EXPERIMENTAL PROGRAM - 1942.

1. The production torpedo airplanes in January, 1942, were the TBF and TBV. The TBF was in production and the TBV design was being set up as a production model so that attention was directed toward the study of new and improved designs of future torpedo bombers.
2. Since the tactical importance of the bombing mission of VT aircraft was being questioned at this time, the transfer of the scout mission from VSB type aircraft to VTB type aircraft, and thereby designating them as VTSB, was the suggestion as expressed in a joint memorandum by the Director of Planning and the Head of Engineering on January 29, 1942. This memorandum stated a new VTB program was in order to be filled by a twin engine torpedo scout bomber. A tricycle gear was suggested. This memorandum recommended that the new project be placed in the hands of a contractor immediately with the Douglas Aircraft Company particularly recommended. This resulted in a proposal in February, 1942, from Douglas as will be covered in the following paragraph. The Vega proposal and the Grumman XTB2F proposal, all submitted as a result of the above decisions, will be discussed in succeeding paragraphs.

XIII. XTB2D-1

1. As early as January, 1942, the Bureau of Aeronautics had indicated that the scout mission of dive bombing airplanes should be transferred to torpedo-carrying aircraft to allow for greater specialization of the dive bombing mission. So on February 9, 1942 Bureau of Aeronautics confidential letter C-1660 was sent to Douglas Aircraft Company asking for a proposal on the design and fabrication of two experimental torpedo scout bombers of an advanced design. The missions of this VTB type were to be torpedo dropping, high altitude bombing and long range scouting. The design suggested was a twin engine, three-place airplane utilizing air-cooled, radial engines.

2. The result of this request was the submittal by Douglas of four proposed designs. A preliminary performance comparison of the twin engine turbo, twin engine two-speed, single X-4360 two-speed and single V-3420 turbo designs submitted indicated that the X-4360 single engine airplane design represented a definite step forward in VTB type aircraft performance. High level horizontal bombing by VTB type aircraft was at this time losing its tactical importance so that, even though the turbo installations showed superior performance at altitudes, the two-speed, X-4360 single engine installation was selected as the design offering the desired VTB type performance.

3. The design submitted by Douglas Aircraft Corporation incorporated several departures from the conventional design of carrier-based torpedo bombers. The airplane was to have a
tricycle type landing gear, but not designed originally for barrier crash, only for arrested landings. There was no bomb-bay as all torpedo and bomb loads were to be carried on four external racks, two racks mounted under each inboard wing panel. The power plant was to be the R-4360-8 Pratt & Whitney Wasp Major with a dual rotation, 8-bladed Hamilton Standard Super Hydromatic propeller. The design was drafted, keeping in mind that intended operations would be from CV-9 and CVB class carriers.

4. A memorandum from the Head of Engineering dated Nov. 6, 1942, Serial No. C-16682, recommended that a letter of intent be issued at once in order to prevent any unnecessary delay of the procurement of these airplanes. The letter of intent, NX8(a)-18156, was issued to the Douglas Aircraft Company, Inc. The mock-up board met at El Segundo on March 15, 1943 and the members were as listed in a VTB Design Memorandum dated March 10, 1943. The letter of intent was replaced by Contract N6a(s)-268 dated 31 October 1943 which provided for two experimental models, one static test article, design data, drawings and wind tunnel models.

5. In December, 1943, TWX No. 17TWX1222 was sent to Douglas asking for a proposal to furnish 23 additional XTB2D airplanes. This resulted in the submission of a detailed cost proposal by Douglas in letter B311-94 dated Jan. 10, 1944. This proposal was for 25 airplanes but was later revised downward to 23 total which quantity with the two X models would make a total of 25 airplanes.

6. The procurement of these 23 XTB2D-1 airplanes was directed by a DCNO Procurement Directive, Serial No. 47931 of 25 March 1944 plus the design and fabrication of production tooling necessary to produce 100 airplanes and spare parts per month. Delivery was to be from June, 1945, to December, 1945.

7. The size of the XTB2D-1 had been of necessity kept within certain limits so that elevators of CV-9 and CVB class carriers, on which this airplane was intended to be used, could accommodate the XTB2D. The span of the airplane, while large, was not a critical dimension because the wings could be folded but the overall length of the airplane must remain fixed, so was shorter than it should have been to produce positive directional stability in the carrier wave-off condition. This conclusion was reached as a result of flight tests of the XSB2D and wind tunnel model tests of the XTB2D-1. In an attempt to produce satisfactory flight characteristics and at the same time incorporate improvements in the airplane, Douglas proposed.
in their confidential letter B2-5621 of 2 November 1943 a major configuration change for the XTB2D-1 airplane. The most important configuration change was the proposed use of full-span, all-purpose flaps. This proposal also included two alternate span increases to fin and rudder in an attempt to improve the stability deficiency as mentioned above. The revisions were noted as acceptable to the Bureau of Aeronautics as outlined in Bureau of Aeronautics confidential letter Aer-E-17-WW, Serial No. C-01068, dated 13 January 1944.

8. The procurement directive for the procurement of 23 XTB2D-1 airplanes as directed in March, 1944, was cancelled by Deputy Chief of Naval Operations letter No. 132236 of 28 July 1944. The three primary reasons for the cancellation of these additional airplanes are as stated in a VTB Design Memorandum to the Director of Engineering on 6 June 1944. The reasons are briefly that cancellation of the two XTB2F-1 airplanes due to size and weight led to reconsideration of the XTB2D-1 as it was of the same size and weight class of carrier airplanes; stability was in question due to tail length restrictions; and it was generally concurred that proceeding with production tooling and production facilities for 23 airplanes before the first test flights of an airplane incorporating so many revolutionary features of design was not a wise procedure. The BT2D program was then becoming of major importance so that, following the issue of the cancellation directive, the XTB2D-1 was awarded a low priority for completion of the X models. Further justification was offered in that it was the opinion of certain individuals in the Navy that the mission of torpedo dropping by aircraft was becoming of secondary importance as a tactical operation. Recent battle reports and observations have indicated, though, that they are tactically important and that torpedo bombers should still be regarded as one of the primary offensive weapons to be used against enemy surface vessels.

9. The final objective of the XTB2D project, as outlined in the above-mentioned VTB Design Memorandum of June 6, 1944, was for the project to be continued at a low priority on the fabrication of the two "X" models, for the cancellation of these airplanes would eliminate any future possibility of using an airplane of this size as a carrier based torpedo bomber without a considerable delay in the procurement of a new model for carrier evaluation. The consideration of their future use as a torpedo bomber will depend on combat requirements.

10. The first "X" model is expected, on September 1, 1944, to fly in January, 1945, with the second "X" model following in approximately 30 days.
XIV. VEGA PROPOSAL

1. On June 10, 1942 Lt. A. B. Metsger, Head of VTB Design, visited the Lockheed and Vega organizations to discuss in preliminary form a proposed design for a twin-engine VTB type airplane to be built by Lockheed, as reported in a VTB memorandum to the Director of Planning dated June 15, 1942. The Vega organization undertook the preparation of preliminary design studies which were to be submitted to the Bureau of Aeronautics for the possible basis of an eventual contract with Vega for this new advanced VTB type airplane.

2. A Vega Aircraft letter of July 23, 1942 written by Mac Short submitted the results of the investigations and stated that a program for the development of an airplane of this type could not be done at that time as effectively as work along other types such as patrol planes. Since July, 1942, the efforts of the Vega organization have been directed toward the design and fabrication of military aircraft other than VTB types.

XV. XTB2F

1. VTB Design, still wishing to obtain a twin-engine VTB type airplane as a running mate for the XTB2D, requested a proposal from Grumman on the desired twin-engine design. On Dec. 21, 1942, by confidential letter No. 1242-3165, Grumman submitted a preliminary design study of the desired VTB type. A more detailed Grumman proposal was submitted in Grumman's confidential letter No. 343-3939 dated March 19, 1943 which represented the XTB2F configuration up till the time of the mock-up.

2. The design submitted was a twin-engine, tricycle gear, high wing, single tail airplane. An internal bomb bay was incorporated that would accommodate two torpedoes and numerous different bomb combinations. The power plants were to be two R-2800 P. & W. (C) series engines. The folded span of the airplane was 36', the length 52' and the height was 16'-9" with a normal torpedo gross weight of 34,515 lbs. Comments comparing the XTB2F to the XTB2D were given in a VTB memorandum of a conference held at Bethpage on May 3, 1943.

3. Letter of Intent for Contract N0a(s)-1564, dated Aug. 6, 1943, was issued to Grumman for the procurement of the two XTB2F-1 Airplanes, tests, miscellaneous data and drawings. Engineering development of the XTB2F proceeded until the time of the mock-up.
board meeting, which took place at Bethpage, Long Island, N.Y. from May 1 to May 5, 1944. The members of the mock-up board were as listed in Bureau of Aeronautics letter Aer-E-17-WTE, No. 75204 dated April 25, 1944.

4. Beginning with the discussions of the mock-up board, a series of succeeding conferences resulted in a confidential Military Requirements memorandum C13327 to the Chief of the Bureau of Aeronautics dated May 20, 1944 recommending that the XTB2F project be cancelled. The main objections were to the high gross weight and large size of the airplane with attendant handling difficulties aboard CVB class carriers, for which class of carrier this aircraft was being designed and built.

5. This Military Requirements memorandum went into detail discussing the various points that were raised as being objectionable to the XTB2F and the following points were set forth as a justification for the cancellation of any further development work on this airplane.

The advantages of this design are (1) increased load and armament, (2) increased rate of climb, and (3) increased range.

The advantage under (1) above is counteracted by the fact that, due to the size of the XTB2F, less than half the number of this type of airplane could be spotted on the carrier deck as compared with current VTB type airplanes, giving an actual reduction in total bomb load and armament possibilities.

The advantage as listed under (2) above of the increased rate of climb offered by the XTB2F is refuted by the knowledge that surprise can no longer be utilized in an attack against an enemy which has the use of radar.

The advantage of increased range is not desirable in that the range of VTB and VB aircraft should equal the range of VF aircraft.

It is interesting to note at this point that this latter argument is in direct contrast to the original motive which prompted the Bureau of Aeronautics to ask for proposed designs on a new type of long range torpedo scout airplane. The XTB2F and the XTB2D were two designs which were to fill the requirements of a long range scout in addition to torpedo missions.
6. Paragraph 4 of this Military Requirements memorandum listed the following points as their specific recommendations why the project should be cancelled:

(a) Marginal handling characteristics aboard ship.
   (1) Overloads deck.
   (2) Overloads elevators.
   (3) Overloads catapults.
   (4) Increases maintenance difficulties.
   (5) Reduces utility and operational mobility.
   (6) Makes hangar clearance marginal.

(b) Fewer planes per ship resulting in smaller bomb load per air groups.

(c) Too much has been sacrificed for long range.

7. In answer to the possible suggestion that this design be used as a Navy land based airplane for the Marine Air Corps, it was stated that the speed and range did not justify it for land based use and that shore based attack airplanes are not properly a function of the Navy.

8. The above Military Requirements memorandum, which recommended the cancellation of the XTB2F, was commented upon in VTB Design by Comdr. Hollister, outlining various possible reasons why the XTB2F should be retained as a possible VTB type airplane. A brief condensation of these comments are as follows:

"Cancellation of this airplane would tend to establish a limit on the size of carrier aircraft to a maximum of 26,000 pounds gross weight. It was further the opinion of VTB that an airplane of the type as represented by the XTB2F should be built and at least flight tested for carrier operation if the flight decks of the CVB class carriers could be stressed to accommodate an airplane of this weight class. It must be remembered that this airplane was originally designed with the thought in mind that it would be used only from CVB class carriers. Cancellation of the TB2F project would bring up the possible cancellation of the TB2D, which was in the approximate same weight and size class of this airplane."

A brief discussion comparing the use of the XTB2D and the XTB2F was given therein. Probably the major objection to the
cancellation of the XTB2F, as expressed by VTB in these com-
ments, was that by so doing the Navy would be committing them-
selves to relatively small, short range, carrier type aircraft. 
The question was raised as to which was paramount--torpedo 
plane performance or the problem of handling large type tor-
pedo airplanes aboard carriers. The general recommendation 
as given in this memorandum was that the design be continued.

9. Further discussions revealed that it might be possible 
to obtain a smaller twin-engine VTB type airplane for use aboard 
CVB carriers so that a "stop work" order was given to Grumman 
by Bureau of Aeronautics letter No. 106288 of 14 June 1944 to 
Grumman Engineering, which requested that all work on the 
letter of intent for the proposed contract NOa(s)-1564, Model 
XTB2F Airplane, be halted pending further decisions in regard 
to this contract.

XVI. XTF

1. The above-mentioned Bureau of Aeronautics letter, 
which requested that work be stopped on the XTB2F project, 
further requested that Grumman prepare and submit a design 
study of a torpedo bomber which had the following character-
istics:

- Twin engine, tricycle landing gear, monoplane 
  with catapult and arrested landing provisions.
- Bomb bay capable of containing one MK-13 Mod. 3 
  torpedo.
- Fuel capacity in self sealing internal tanks 
  for 400 mile combat radius.
- Four fixed .50 cal. machine guns. APS-4 radar 
  in the nose. Armor protection for pilot and 
  crewman.
- Maximum gross weight with all above equipment 
  - 28,000 lbs.
- Maximum span - 60 feet spread, 34 feet folded.
- Maximum over-all length - 46 feet.
- Maximum tail height - 16 feet.
- Maximum wing loading - 48 lbs/sq. ft.
Vmax Sea Level - 380 mph.
Vstall power off - 85 mph.
Take-off in 25 knots - 450 feet.

It was further suggested that the above-listed characteristics might be obtained in the adaptation of a modified F7F-2 airplane as a possible VTB type.

2. In answer to this request for design study the Grumman Aircraft Corp. submitted their Design No. 66. On the 24th of June a conference was held in the Engineering Division for the purpose of reviewing Grumman's Design No. 66. The branch representatives who attended this conference are as listed in VTB Design Memorandum of July 3, 1944.

3. Design No. 66 was substantially the F7F-1 modified to incorporate a bomb bay in the fuselage that would accommodate a torpedo. There being no other major physical configuration changes, this resulted in a high wing loading on the F7F airplane so that it was felt that the design should not be undertaken as represented. This high wing loading gave an exceptionally long take-off run of 466 ft when the aircraft was loaded with one torpedo and 700 gallons of fuel. This take-off would mean an operational spot of 610 ft from the bow of the carrier. The bomb bay design, as proposed in this modification, would not accommodate the 1000# R/P installation. It was the conclusion of VTB that the present F7F-1, which would carry a torpedo externally, offered superior possibilities as a VTB type aircraft so that further development of Design No. 66 was not recommended.

4. The Grumman Aircraft Corp. then submitted on July 21st a revised design which was a modification of the F7F-2. This VTB type aircraft was offered as a substitution for the XTSF on Contract Noa(s)-1564 and to be designated the XTSF-1. This new design differed from the F7F-1 proposed design in that it was a two place airplane incorporating a bomb bay in the fuselage and with slightly greater wing span in order to reduce the wing loading over that of the F7F.

5. The performance characteristics as proposed for the new XTSF airplane in Grumman's proposal of July 21st represented a decided improvement for VTB type aircraft. The take-off distance with the greater span was reduced to 351 ft; maximum speed at sea level W.E.P. was to be not less than 389 miles per hour; maximum speed at airplane critical altitude W.E.P. was to be
6. The designation of this design as the XTSF-1 was authorized by confidential Aviation Planning Directive 65-A-44 dated 22 July 1944. This model of VT type aircraft is the first airplane of this class to be designated as a torpedo scout specifically, as requested in a joint memorandum from the Director of Planning and the Head of Engineering on January 29, 1942. The XTB2D, which has already been covered in this document, was procured as a torpedo-scout-bomber airplane and answers the purpose extremely well in that the scout condition gives the longest scout radius to date of any VTB type aircraft. The XTB2D was intended to answer this need for a torpedo scout though the designation of VTS type was never given to the airplane.

7. A VTB Design Branch memorandum of 17 August 1944 requested that an amendment to Contract NOa(s)-1564 be executed to substitute the XTSF-1 airplane, as proposed by Grumman Aircraft Corp., letter #744-1587 of July 21st, for the XTB2F airplane. This procedure eliminated the termination of one contract and the preparation and award of an entirely new contract. It was possible to proceed in this manner inasmuch as relatively few items of Contract NOa(s)-1564 were altered so as to apply to the XTSF-1 airplane.

8. The Grumman Aircraft Corp., when they submitted their proposal on July 21st, stated that two XTSF airplanes could be built within six months following authorization from the Bureau of Aeronautics to proceed with their fabrication. Accordingly, in an effort to expedite the fabrication of these two models, it was decided to hold a partial mock-up on October 2, 1944 at Bethpage, L.I., N.Y. The mock-up was to depict only that portion of the fuselage which included the first and second cockpits and the space allocated for the radio and radar equipment. This mock-up was to be supplemented with a mock-up of only a portion of one side of the bomb bay to show primarily the armament installations.

9. This covers the development of the XTSF-1 VT type aircraft to October 1, 1944.

XVII. XTB3F

1. Due to the fact that the TBM was being operated in the fleet at a considerably greater gross weight than was originally
intended, a resulting undesirable change in performance characteristics was being realized. The maximum speed of the airplane was dropping off and the take-off distance was increasing to such a point as to definitely restrict the number of TBM airplanes that could be operated from carriers when spotting for take-off was being considered. Accordingly, Military Requirements, in a memorandum dated 17 May 1944, requested that VTB Design investigate the possibility of increasing the performance of the TBF/TBM type airplane by the possible installation of the R-2800 C series engine.

2. The high gross weights at which the TBM airplanes were being operated in the fleet in the summer of 1944 was further restricting their use aboard CVE class carriers. It was felt that the R-2800 installation plus a weight empty reduction and a general clean-up on the airplane would give a more satisfactory CVE class carrier-based VTB type airplane.

3. In paragraph 3 of the letter that gave a "stop work" order on the XTB2F to Grumman it was requested that the installation of the R-2800 C series engine be investigated. This was Bureau of Aeronautics letter #106238 of 14 June 1944. In response to this letter, Grumman Aircraft Engineering Corp. submitted a proposal incorporating this engine but did not show the weight reduction in the TBF/TBM type that was desired so that further discussion on the possible development of this airplane was delayed until such time as Grumman could submit another proposal.

4. The design desired by the Bureau was the change from a three place airplane to a two place airplane eliminating the bombardier and tunnel gunner. The tunnel gun and bombsight installation was to be deleted and the present inhabited turret was to be replaced by single .50 cal. flexible M/20. Further, the airplane was to be cleaned up aerodynamically as much as possible.

5. On the 19th of September 1944 representatives of the Grumman Aircraft Engineering Corp. proposed their second design modification, the XTB3F, which was the subject of a conference held on this date in the Bureau of Aeronautics.

XVIII. XA41

1. Early in 1944 there was built for the U. S. Army Air Forces an attack airplane designated the XA41. This airplane
was built by the Consolidated-Vultee Aircraft Corp. and was one design study by the Army Air Forces in their experimental attack airplane program.

2. The XA41 is a single-place, single-engine, mid-wing, land-based, attack airplane. It has as its power plant installation a Pratt & Whitney Wasp "Major" engine driving a 13'2" diameter, 4-blade Hamilton Standard super hydrometric propeller. The airplane has a conventional landing gear and incorporates an internal bomb bay which will accommodate a Mk 13-2 torpedo and numerous standard bomb arrangements. The forward firing armament is four wing-mounted .50 cal. guns or four 37mm cannons. There are provisions for carrying an external gas tank and also smoke laying apparatus beneath the wings on external racks just outboard of the wheel wells.

3. Due to a curtailment of the single-engine attack airplane program by the U. S. Army Air Forces, further development of the XA41 was subsequently halted and the possible utilization of this design by the Navy was brought to the attention of the Military Requirements Division of the Bureau of Aeronautics. Desiring to have the model investigated for a possible VTB prototype, Military Requirements in their memorandum dated May 15, 1944 requested a preliminary study of the XA41 by VTB as a basis for discussion of its possible use as a carrier-based torpedo bomber.

4. Commander W. W. Hollister, Head of VTB Design Branch, in a memorandum to Military Requirements on the 21st of July, 1944, outlined the results of a preliminary study by VTB of the XA41 as requested above. The objections to the use of the XA41 were as follows:

It is noted that several major design changes should be undertaken in order to convert this airplane to a satisfactory carrier-based torpedo bomber.

- (1) In order to provide satisfactory take-off performance a larger diameter propeller would have to be installed thereby raising the thrust line 9½" which would very nearly eliminate the present excellent pilot visibility provided.

- (2) it would be necessary to incorporate wing folding provisions involving a considerable weight empty increase.

- (3) the installation of an arresting hook would be required.

- (4) considerable weight empty increase would

-28-
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It is noted that several major design changes should be undertaken in order to convert this airplane to a satisfactory carrier-based torpedo bomber.

(1) In order to provide satisfactory take-off performance a larger diameter propeller would have to be installed thereby raising the thrust line 92" which would very nearly eliminate the present excellent pilot visibility provided.

(2) It would be necessary to incorporate wing folding provisions involving a considerable weight empty increase.

(3) The installation of an arresting hook would be required.

(4) Considerable weight empty increase would
result from the incorporation of barrier crash, catapult and arrested landing strength requirements.

5. The memorandum stated that this design would provide an excellent land-based, long range torpedo bomber but that any modifications as mentioned in the preceding paragraph to modify the airplane for carrier use by the fleet would involve too great a weight empty increase and thereby materially reduce the excellent performance characteristics offered by the design in its present form. It was thought that the only possible use the Navy would have for the airplane in its present form would be as a shore-based Marine attack airplane. In conclusion the memorandum recommended that no further consideration be given to the design at that time.

6. In order to have an accelerated flight test report on the XA41 for future reference, this airplane was obtained on a loan basis from the Army and arrived at Patuxent River, Md. on Sept. 8, 1944 for a period of two weeks' flight testing. Following the completion of these tests no further investigation of the XA41 is contemplated by the Navy.

XIX. CLASS VTB (1939-1944)

1. From April 27, 1939 up until April, 1941, VTB type airplanes were under the cognizance of Class Desk C. In April, 1941, all torpedo airplanes under the class VTB were removed from the cognizance of Class Desk C and assigned to Class Desk G. Then in July, 1941, following the request of a memorandum from the Director of Engineering to Administration, the designation of Class Desk G was changed to VTB Design. This memorandum changed the designations of all class desks from the alphabetical designation to the present Navy class designation under which they are listed today.

2. The first skipper of Class Desk G in April, 1941, was Lt. Cdr. F. C. Sutton, USN. He acted as head of Class Desk G for approximately one month, when he was replaced by Lt. A. B. Metzger, USN, who then became head of the VTB Design Section. On the 15th of July, 1943, Bureau of Aeronautics Office Order No. 25-43 established the Engineering Branch as the Engineering Division in the Bureau of Aeronautics and also elevated VTB Design to the branch level. Lt. A. B. Metzger was the head of VTB Design Branch until Nov. 15, 1943. On this date Commander A. B. Metzger was relieved by Commander W. W. Hollister.
3. Commander W. W. Hollister, the present head of VTB Design Branch, reported for duty to the Bureau of Aeronautics on Sept. 16, 1943 and has acted as head of the branch since Nov. 15, 1943, as stated above.

4. This document outlines the history of the VTB Design Branch up to and including Sept. 30, 1944.
MEMORANDUM

From: VTB Design Branch.
To: Technical Data Branch.
Subj: BuAer War History.
Encl: (A) VTB Design Branch History for Oct. 1944.

1. Enclosure (A) is submitted in accordance with ref. (a).

W. W. Hollister
Comdr., USN

Classification (see next page) (changed to unclassified) by authority of

W. W. Hollister

on 6/29/55

(Date) (Signature) (Rank)

Bureau of Aeronautics
Department of the Navy

Declassified under NND 913043
TBM-3 Avenger Airplanes

On 21 October 1944, confidential memorandum from Comdr. W.W. Hollister, Head of VTB Design Branch, to the Head of Military Requirements strongly urged immediate action be taken to reduce the weight of the TBM-3 Avenger airplanes.

The specific recommendations of the memorandum are as follows:

(a) Remove the turret and tunnel gun.
(b) Remove all radio communication equipment except on VHF transmitter and receiver.
(c) Install only the following electronic equipment:
   1. AN/APS-4 Radar
   2. AN/APN-1
   3. AN/ARC-1
   4. IFF
   5. Interphone
   6. AN/APG-17
(d) Relocate radio-radar operator in second seat.
(e) Fair canopy demanded by removal of the turret.

The memorandum stated that these changes combined with the increase in wing strength, will give a 5g airplane with improved performance.

It was requested in the memorandum that a directive to proceed on these changes be issued.

XTB2D-1

A proposal was received from Douglas Aircraft Company in their letter B2-3170 of 2 October 1944, outlining the installation of jet propulsion in the second XTB2D-1 flight article. This external installation would require removal of the bomber's tub, tunnel gun and related equipment; the Emerson turret including armor,
electrical and oxygen provisions; and the radio operator's aft armor protection. Removal of the turret and tunnel gun would result in a considerable weight reduction, and the crew could be decreased to pilot and radioman. The proposal stated in the event that additional airplanes of this configuration are required on a production basis, deletion of wing and empennage de-icing system fixed provisions was proposed, with retention of radio operator's aft armor. The proposed design was attractive in that Vmax at sea level was increased by an estimated 73 mph in the normal torpedo condition.

Comments on this proposal were made by Comdr. W. W. Hollister, Head of VTB Design Branch, to the effect that this proposal offers definite possibilities, especially by having such an installation in a prototype plane it could be used for further advancement in the study of jet propulsion. Comdr. Hollister further pointed out that the main difficulty to be encountered with the jet installation as proposed is that it gives deck interference in the three-point attitude with tires flat and struts bottomed. It was felt that the contractor could correct this condition by additional study.

The proposal is at this writing under consideration by the Bureau.

**XTSF-1**

The mock-up for the XTSF-1 was the subject for discussion when the Mock-up Board met at Grumman on 2 Oct. 1944. The opinion of the Mock-up Board after the inspection was that the airplane appeared to have every indication of being of considerable value to the fleet due to its versatility.

The bomb bay installation is similar to the TBM bomb bay, offering many alternate bomb loadings, plus internal self-sealing bomb bay tank for scout and ferry operations. The specified AN/APS-3 radar installation will provide the fleet with the best available search and scouting airplane. The design strength of the airplane is 5g at 24,000 lbs. gross weight providing sufficient strength for all torpedo and scout missions.

A VTB Design Branch confid. memo of 12 October 1944 to Director of Military Requirements via Director of Engineering recommended procurement of additional TSF-1
airplanes under a production contract or the preparation of a procurement directive calling for 23 additional experimental flight articles.

Following a conference in Experiments and Developments on 12 October 1944, the decision was made to procure the two experimental XTSF models with a fuselage nose large enough to accommodate the SCR-720. This installation when available will provide a night intruder version of the XTSF.

**XTB3F**

In answer to the request given in BuAer letter #106288 of 14 June 1944, that the installation of the R-2800 engine be investigated for an improved VTB type, Grumman submitted five preliminary designs. They were:

- **Design #70** with R-2800, 2-place with turret
- **Design #70A** with R-3350, 2-place
- **Design #70B** with R-4360, 2-place with remote control G.E. turret
- **Design #70D** with R-3350 plus an I-20 jet unit, 2-place
- **Design #70F** with R-3350 plus #24-C jet unit, 2-place

The Grumman Design #70F was selected as most suitable for an advanced torpedo bomber design. The design was based on an airplane gross weight of 19,200 lbs. for normal torpedo condition. An internal bomb bay for 1 Mk 13-2 torpedo and alternate bomb loadings was proposed. The Vmax at sea level with War Emergency Power, plus the jet, is 394 mph. Rate/climb is 4880 feet per minute. Take-off distance in a 25 knot wind without jet is 318 ft. and 204 ft. with jet in operation. V stall at design gross weight without power is 79.2 mph. Combat radius with all internal protected fuel, one torpedo, is 80 nautical miles. Scout radius is 413 nautical miles.

A memorandum from Experiments and Developments to Chief of BuAer recommended the immediate procurement of three flight articles and one static test article. The date of this memorandum is 25 Oct. 1944. Following approval by the Chief of BuAer, a procurement directive was prepared by VTB Design for the procurement of three flight articles and one static test article. This procurement directive is, as of this date, under process in the Bureau.
In response to the request of a Military Requirements directive for an engineering study of the XF8B, VTB Design Branch submitted a letter for the signature of the Chief of BuAer that requested such a study by the Boeing Aircraft Company.

The letter requested a study of the following modifications:

(a) Remove the two-stage engine and substitute an R-4360-4 single stage, variable speed, single rotation, .425, #60 shaft.

(b) Remove the dual rotation and substitute a suitable single rotation propeller for the engine of (a) above.

(c) Modify control surfaces and empennage to provide for single rotation propeller.

(d) Move pilot's cockpit forward and provide 15° down vision over the engine cowl.

(e) Incorporate second seat behind the pilot for radar-radio operation, with sufficient armor protection against .50 cal fire, from a 45° cone from the rear, oxygen equipment, radar controls and scope, seat and safety belt.

(f) Provide installation provisions for external mounting of a Mk 13-3 aircraft torpedo with lug suspension either under a wing or on the centerline of the fuselage, whichever location involves the lesser modification to the present design design.

(g) Provisions for carrying APN/APS-4 detachable radar package under the right hand wing as far outboard as is possible to obtain maximum radar vision ahead and above.

(h) Provide installations for carrying the 11.75" rocket projectile "Tiny Tim," under each wing and additional alternate provisions for four 5" HVAR rockets under each wing.
(i) Provide installations for carrying one twin .50 cal Douglas machine gun package, or one Mk 1 single .50 cal container, or one Mk 3 single .20 mm cannon, under each wing.

(j) Provide installations for carrying one 150 gal. drop tank on each wing.

(k) Items (f), (h), (i) and (j) may be interchangeable at one wing station if propeller clearance, lateral stability and flap or aileron clearance permit.

(l) Provide the following radio-radar equipment:

<table>
<thead>
<tr>
<th>Item</th>
<th>Description</th>
<th>Est. Install. Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>ARB receiver</td>
<td>35.0 lbs.</td>
</tr>
<tr>
<td>2.</td>
<td>AN/ARC-5 Yardeny receiver</td>
<td>22.0</td>
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<tr>
<td>3.</td>
<td>AN/ART-13 (ATC) transmitter (HF only)</td>
<td>117.0</td>
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<td>4.</td>
<td>AN/ARC-1 VHF</td>
<td>65.0</td>
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<td>5.</td>
<td>AN/ARR-2A homing receiver</td>
<td>22.0</td>
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<td>6.</td>
<td>RL-7 interphone</td>
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<td>7.</td>
<td>AN/APN-1 radar altimeter</td>
<td>40.0</td>
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<tr>
<td>8.</td>
<td>AN/APS-4 radar with 5&quot; scope</td>
<td>200.0</td>
</tr>
<tr>
<td>9.</td>
<td>AN/APX-2 IFF</td>
<td>55.0</td>
</tr>
<tr>
<td>10.</td>
<td>ABA-1 IFF (provisions)</td>
<td>-</td>
</tr>
<tr>
<td>11.</td>
<td>AN/APG-17 bombing (space provisions)</td>
<td>-</td>
</tr>
</tbody>
</table>

Estimated Total Weight Installed: 563.0 lbs.

(m) Recalculate structural strength to establish the resulting design load factor. The minimum strength considered acceptable for this type of aircraft is 9g at a gross load for a normal attack condition. This loading will consist of full internal protected fuel, two man crew, one 2000 lb. bomb, six .20 mm fixed cannon with 200 rounds per cannon, and all radio and radar equipment installed.

(n) Determine an approximate limit dive speed based on flutter analysis for this airplane as modified.
(o) As an alternate engine installation, it is requested that a single stage dual rotation R-4360 engine also be studied with all modifications from (d) to (n) included, if preliminary investigation shows an appreciable gain in performance by use of a dual rotating propeller.

A copy of the letter written by Comdr. Hollister requesting the above study was forwarded with comments to the Director of Engineering setting forth reasons for the study. The comments further set forth a brief preliminary summary of the feasibility of incorporating the above modifications. It was understood that if the contractor felt the above modifications to be feasible, an amendment to the original contract for three airplanes would be requested to provide a fourth airplane to incorporate the changes resulting from this study.
CONFIDENTIAL

7 December 1944

MEMORANDUM

From: VTB Design Branch
To: Technical Data Branch
Subj: BuAer War History
Ref: (a) Engineering Division Memo 8-44 dated 17 February 1944.
Encl: (A) VTB Design Branch History for November 1944.

1. Enclosure (A) is submitted in accordance with reference (a).

W. W. Hollister
Commander, USN

Classification (changed to unclassified) by authority of
NavAp 2545
on 6/29/45

Bureau of Aeronautics
Department of the Navy
MEMORANDUM

From: VTB Design Branch
To: Technical Data Branch

Subj: BuAer War History

Ref: (a) Engineering Division Memo 8-44 dated 17 February 1944.

Encl: (A) VTB Design Branch History for November 1944.

1. Enclosure (A) is submitted in accordance with reference (a).

W. W. Hollister
Commander, USN

Classification (eemed) (changed to unclassified) by authority of
Navy Adm. 2541

on 6/29/45

Bureau of Aeronautics
Department of the Navy
In answer to Douglas proposal letter B2-3170 of 2 Oct. 1944, for the installation of jet propulsion provisions in the XTB2D-1 airplane, BuAer confidential letter, Aer-E-17-WWH, Serial C30745 dated 10 November 1944, was forwarded to BAR, El Segundo, disapproving the incorporation of changes proposed to add jet propulsion. The disadvantages incurred by this installation are namely:

1. The small difference between the high drag of the jet unit and the thrust at Vmax showed only a very slight increase in performance.

2. It gives deck interference in the three-point attitude - six inch clearance on carrier decks is required.

3. The jet may produce a destabilizing effect due to distance between its thrust line and the horizontal plane of center of gravity of the airplane.

Although the Bureau disapproves this special equipment installation on the second flight article at the present time, further consideration may be given to the installation after flight tests of the XTB2D-1 are completed and as the production program of jet motors becomes more definite.

Performance improvement on the second flight article is under consideration and action is being initiated by the Bureau to modify the second flight article as follows:

(a) Remove bomber's tub, bombsight, tunnel gun, ammunition boxes, armor protection, and associated hydraulic and electric equipment.

(b) Remove turret and all associated armor plate and equipment.

(c) Provide suitable metal fairings to cover turret and tub openings.

(d) Relocate radio-radar operator's station aft of present turret location with maximum of electronic equipment at this station.

XTSF-1

Due to the heavy engineering load now prevailing at Grumman Aircraft Engineering Corporation, the cancellation of the XTSF
project was discussed and agreed upon at a Bureau of Aeronautics Production Planning Conference of 22 November 1944. Accordingly, a Termination Request for Contract NOa(s) 1564 was drawn up and is at the present time awaiting signature in the Bureau. This Termination Request, if executed, will cover two experimental flight articles (XTSF-1) plus one static test item.

**XF8B-1**

BuAer confidential letter Aer-E-17-WNH, serial C30724 of 10 November 1944, signed by Chief of BuAer, was forwarded to BAR, Seattle (Boeing Aircraft Company) requesting a study of modifications as described in VTB War History for Oct. 1944.

At the present time the first XF8B-1 is complete. Nov. 15 taxi tests were begun and about 80% of propeller vibration survey had been completed. On November 27 the first flight was made for a period of one hour and three minutes. Power plant and performance were both considered very good.

**XTBF**

The preliminary Detail Specification (SD-387) was drafted by the Bureau of Aeronautics dated 8 November 1944, and submitted to the Grumman Co. for comment. The contract number assigned for this high priority model is NOa(s) 4946.

A memo of 20 November 1944 from VTB Design Branch to Power Plant Design Branch requested that a mock-up of the Westinghouse 2AC Jet Unit and Curtiss 4-blade propeller be made available to contractor by 1 February 1945 to be installed in the mock-up of subject airplane. The jet unit and propeller are as yet undeveloped and if delay is unavoidable by the mock-up date as specified, flight schedules will require revision accordingly. For inclusion also in the mock-up, VTB Branch requested Armament by memo 28 Nov. 1944, to forward drawings and data on .60 caliber machine gun installation to Grumman Aircraft Engineering Corp.

The Grumman Aircraft Engineering Corp. indicated to this Bureau that the airplane mock-up is scheduled for 1 Feb. 1945 and a first flight to take place by the end of July 1945.

**THY-2**

The first THY-2 was accepted on 20 November. This plane is now at NAS, Patuxent for production acceptance trials.

On 17 November 1944, a conference attended by BuAer and Contractor representatives, was held at Chance Vought, Allentown, Pa. covering the immediate production problems on this airplane, the important items being Manpower, Tooling, Sub-contracting and Inspection. There is a drastic shortage of labor at present and everything possible is being done to assist the contractor in
manpower recruitment. The tooling situation is suffering from the labor shortage and it is probable that some capable tooling engineers will be sent to Allentown from the Consolidated Vultee San Diego plant. Inspection and workmanship on the first planes is of poor quality. It is claimed by Consolidated Vultee Aircraft Corp. that rigid inspection will hold up production. The inspection policy at this time places safety of flight paramount and such features shall be rigidly supervised and inspected. The main decision resulting from this conference was that no engineering changes will be incorporated on the present design except flight safety changes, thereby expending all available manpower on immediate production.

Armament memo of 24 November 1944 to VTB Design Branch pointed out wherein TBY armament features were lacking in comparison with operational uses. They recommended use of the fifth production TBY-2 as the armament mock-up plane, with the suggestion that the contractor first submit to the Bureau an enumeration of material, man-hours, and time needed for the armament installation mock-up.

**TBM-3**

The Chief of BuAer by Procurement Directive dated 14 November 1944 authorized Divisions and Sections concerned to initiate action for the procurement of 1,070 additional TBM-3 airplanes from Eastern-Trenton. These planes are scheduled for production from September to December 1945 after completion of the 4,695th TBM-3 (including four XTHM-3) airplanes. Eastern is still continuing to turn out TBM-3's in excess of schedule.

In connection with the gross weight reduction of TBM model airplanes, BuAer letter addressed to ComAirLant and ComAirPac requested comments on conversion of TBM-3 into a two-place configuration. No directive reducing weight of Avengers will be issued until comments from the Fleet are received.

Classification (changed to unclassified) by authority of

W.W. Hollister
Commander, USN

on 6/29/45

(Date) (Signature) (Rank)
Bureau of Aeronautics
Department of the Navy

Declassified under NND 913043
NAVY DEPARTMENT
BUREAU OF AERONAUTICS
WASHINGTON 25, D.C.

5 January 1945

MEMORANDUM

From: VTB Design Branch
To: Technical Data Branch
Subj: BuAer War History
Ref: (a) Engineering Division Memo 8-44 dated 17 February 1944
Encl: (A) VTB Design Branch History for December 1944.

1. Enclosure (A) is submitted in accordance with reference (a).

W.W. Hollister
Commander, USN

Classification (changed to unclassified) by authority of

NavAir 234-1
on 6/29/15

Bureau of Aeronautics
Department of the Navy

Declassified under NND 913043
TBM-3

ComAirPac by confidential dispatch 212344 December in reply to BuAer confidential dispatch 251635 November, conditionally agreed to the removal of the tunnel gun and aft armor plate from the TBM. ComAirLant and ComFairWest Coast concur in the gun removal. Such revision of the airplane will result in approximately 100 pounds weight decrease. In place of these items one flak suit and two flak certain will be installed in each TBM airplane.

December production changes on TBM-3's include provisions for wing package guns and installation of APS/4 wing radar units.

TBY-2

Production problems at Allentown, Pa., are still the prevalent factor affecting the delivery of this airplane. BAGR letter A19(C155) LJM/d of 1 December 1944, set forth certain recommendations resulting from a conference of 28 November, with a view to improving the present situation as regards clearance of special test planes; allotting additional time to tooling and training of new personnel, and providing greater experience of line crews and improved morale generally.

Landing gear failure is the cause of grounding airplanes at the contractor's plant. A fix has been found for the difficulty.

The Bureau has approved removal of the tunnel gun and aft armor plate from this airplane, with the proviso that additional armor plate be added to the second seat to protect the radar operator.

XTB3F

Highest priority has been assigned this airplane, the reason being its possible replacement of the TBM. However, delivery of the engine and Westinghouse jet units will hold back the XTB3F program, the earliest estimated jet delivery date being 1 December 1945. This date is estimated on the basis of probable allocation of XFR-1 spares to the XTB3F.

Unclassified (canceled) (changed to classified) by authority of

[Signature] 2545

on 6/29/45 (Date) (Rank)

Bureau of Aeronautics

Declassified under NND 913043
BuAer letter Aer-E-17-WWH, Ser. C34949, 15 December 1944, requested Grumman Aircraft Engineering Corporation to submit delivery requirement schedules on these units, based on an accelerated program for completion of the three flight articles.

**XTB2D**

All structures for the first airplane and the greater part of the installation work has been completed. On 19 Dec. 1944, the Hamilton Standard 8-bladed dual rotation propeller, the most critical item delaying completion of the airplane, was shipped from Hartford, Conn. to El Segundo, California.

Demonstration of the first flight article is the subject of priority discussion between the Bureau and the contractor. Douglas letter B311-26 of 4 December 1944, requests limitation of initial flight tests to minimum instrumentation, with complete costs to be submitted after this Bureau informs the contractor of the flight test program desired. BuAer TWX 281841 December requires Douglas to submit description of instrumentation as soon as possible and proposes preliminary demonstration at the contractor's plant, with the evaluation of the airplane and final demonstration to be made at NAS, Patuxent River by naval pilots.

BuAer letter Aer-E-2421-RLC, #43461009 dated 30 Dec. 1944, proposes that Douglas eliminate all alternate configurations as practicable, submitting one configuration as final - or possibly two if indicated, prior to the demonstration of the airplane. If the contractor proposes two or more configurations, it will be necessary to conduct preliminary flights before the BAR at El Segundo.

The contractor has been notified by BuAer Change Request Aer-E-17-ERB, 16 December 1944, to modify the second flight article, Bureau No. 36934, by removal of the blister assembly and turret assembly, and provide suitable metal fairings to cover turret and tub openings. For specific description of modifications involved, see VTB November 1944 History.

The above modifications to #36934 will mean a weight reduction of approximately 1500 pounds with a corresponding gain in performance. VTB Design Branch wishes to evaluate this XTB2D configuration as long range, high speed, torpedo scout.

**XP3B**

By long distance telephone conversation, 26 Dec. 1944,
Lieut. Comdr. Farrington of BuAer, Military Requirements Division, and Mr. Edward Wells, Assistant Chief Engineer, Boeing Aircraft Company, discussed the conversion of the XF8B to an attack type. At that time BuAer stated the definite interest of the Navy in this model and requested Boeing's engineering proposal on an attack configuration. Lieut. Comdr. Farrington also stated that BuAer is willing to drop some of the design requirements set forth in BuAer confidential letter Aer-E-17-WWH, Serial C30724 of 10 November 1944, consideration being given to the ease of conversion and production problems. Boeing replied that the entire matter is now before company officials for consideration.

VTB confidential letter, Aer-E-17-WWH to BAR, Seattle, corroborated the statements of Lt. Cdr. Farrington and further requested the contractor to expedite study of conversion, particularly applicable to the third flight article. In lieu of modifying the third flight article, an estimate was requested on completion dates of two attack configuration flight articles, designed and built as such.

XTSF

The Termination Request mentioned in VTB November History was replaced by a 30-day Stop Work Order on Contract NOA(s) 1564. This Stop Work Order was later cancelled by BuAer letter to BAR, Grumman Aircraft Engineering Corp., CX-21644, approximately 30 December 1944, due to BuAer's desire to continue the XTSF-1 project, reducing it to a low priority with the proviso that it was not to interfere with other projects of a higher priority nature at the contractor's plant. The contractor is not in accord with this Bureau request.

Considerable discussion centered upon the manufacturing of the XTSF by a contractor other than Grumman. However, the slow progress of engineering, plus the fact that the TSF and F7F are so closely related, make it mandatory that both planes be built by the same contractor, thereby deciding the issue of retaining the present contractor on this design.

Classification (canceled) (changed to unclassified) by authority of

Manuscript 25745

on 6/29/55

(Date) (Signature) (Rank)

Bureau of Aeronautics

Department of the Navy

Declassified under NND 913043
13 February 1945

MEMORANDUM

From: VTB Design Branch
To: Technical Data Branch
Subj: BuAer War History
Ref: (a) Engineering Division Memo 8-44 dated 17 February 1944
Encl: (A) VTB Design Branch History for January 1945.

1. Enclosure (A) is submitted in accordance with reference (a).

W.W. Hollister
Commander, USN

Classification (eemedied) (changed to unclassified) by authority of
NavArc 5945
on 6/29/55

(Date) (Signature) (Rank)
Bureau of Aeronautics
Department of the Navy

Declassified under NND 913043
XTB3F

BuAer Confidential letter, Aer-E-17-WWH, Serial 01008 of 10 January 1945, requested the contractor to prepare new contract performance and weight guarantees for this model, substituting the Pratt & Whitney R-2800-34W engine and the 19XB Westinghouse jet unit for the R-3350-24 engine and W-24C jet unit originally specified, as it is now evident the latter two items will not be available to meet completion date of this high priority project. The detail Specification will be revised to permit easy change over to the original power plant units when they become available. Contract guarantees will also be revised to new estimates. The contractor's latest delivery estimate for the first XTB3F-1 is September 1945.

Notice of the XTB3F mock-up was sent to various naval activities concerned with the mock-up, advising them of the proposed inspection to be held at the Grumman Aircraft Engineering Corp., Bethpage, L.I., New York, during the period 19 to 21 February 1945, and requesting that names of representatives be submitted to the VTB Design Branch as soon as possible.

XTSF

In view of recent developments at Grumman Aircraft Engineering Corporation, and the necessity of eliminating interference with projects having a higher priority, a Contract Termination notice has been forwarded to the contractor cancelling the XTSF airplane.

TBV-2

During the month of January, eight airplanes were delivered making a total of nine airplanes delivered on this contract. The first airplane is undergoing preliminary and final tests and dives at the contractor's plant. These tests are expected to terminate approximately February 15, and it is indicated that performance and stability of this airplane will be superior to the TBM-3.

The production situation at Allentown, Pa. has improved somewhat with the addition of personnel moved in from other CVAC plants to assist in expediting production.
TBM-3


ComAirLant by confidential letter, Serial 0195 dated 26 Jan. 1945, to Chief of BuAer, heartily endorsed the weight reduction program for the Avenger airplane. He pointed out that Avengers under his command are used solely for anti-submarine warfare, and the gear carried on such missions differs considerably from that of strictly combat aircraft of the Pacific area. ComAirLant favors removal of the tunnel gun, but considers the floor armor plate and .50 cal. power driven turret of definite value. TBM's in that theatre are using the second heater for the tunnel compartment, since to date no electrically heated suits are available for the crews.

VTB has set up a project at NAMU, Johnsville, Pa., to convert the TBM-3 airplane to a two-seat version with an approximate weight decrease of 900 pounds and increased performance. Itemized list of major changes includes:

1. Removal of tunnel gun and tunnel armor.
2. Removal of turret and all related equipment.
4. Removal of overturn structure.
5. Removal of horizontal bombing provisions.
6. Locate radar operator's station at scarf ring.
7. Removal of seat in tunnel compartment.
8. Add twin .30 cal. scarf ring and guns.
9. Relocate radio equipment in aft end.
10. Install gun sliding canopy.
11. Fair in tunnel compartment.
12. Install 18 inches on wing tips.
13. Install open wiring.

The conversion should be completed by approximately 15 February, at which time this prototype will be delivered to NAS, Patuxent for evaluation and tests.

XTB2D-1

Representatives of VTB Design Branch visited Douglas Aircraft Company, Inc. at El Segundo, California, on the 22nd, 26th and 27th of January 1945 to observe the first flight test of this model. Due to engineering difficulties, contractor and Navy inspection necessitating minor changes following final assembly,
and power plant trouble causing delay in engine tests, the airplane was not ready for flight during that period. The estimated flight date has been advanced to 15 February 1945.

By BuAer TWX 292115, January, Douglas Company test pilot, L.W. Browne, was authorized to make the demonstration flights of the XTB2D-1. A later BuAer TWX made an allowance of $3500 fee for first flight and 37 hours preliminary evaluation flight. The contractor estimates that preliminary evaluation will require approximately 37 hours prior to sending the airplane to Patuxent for evaluation by naval pilots. The fee of $3500 will be in addition to that paid for the complete demonstration. Final demonstration fee has not been decided upon at this time. Preliminary and final demonstration will be undertaken following return of the airplane to the contractor from NAS, Patuxent.

Personal inspection of the XTB2D-1 by members of this Branch conducted by Douglas engineering officials, occupied the major portion of time spent at the contractor's plant. This inspection covered the first flight article, 2nd article (modified) and the static test structure of the new all purpose full span flap design.

The contractor has submitted a broad scope of instrumentation prior to first flight, with the detailed instrumentation to be delayed until after the preliminary evaluation flights.

**XF8B-1**

On January 24 and 25, 1945, representatives of the VTB Design Branch visited the Boeing Aircraft Company to inspect the XF8B airplane and discuss the possibilities of conversion of the present model to a two place, attack airplane. The first XF8B was observed in flight on January 24, 1945, and in general, it appears that the airplane is well constructed of simple design, with exceptional performance characteristics.

Discussion with Boeing officials followed on the contractor's conversion proposal. Detail design of the second seat to be installed for the radioman and location of his equipment, plus means of access and entry for this crew member, are the paramount features of the conversion. However, unless the need for an extra man to operate radar on only special missions is imperative, the XF8B as now designed is an ideal carrier attack airplane and can be utilized much more effectively in combat than a two-seat version. Provisions for armament and radar installations are expected to be easily adapted to the converted model.
Production of the proposed attack model is very favorable. The Boeing Aircraft Company states that from a manpower standpoint, sufficient labor could be drawn from several branch plants, in addition to subcontracting, to schedule production delivery of the attack airplane approximately one year from date of contract, with a peak of 100 planes per month in six months from first production.

The third article of the present model XF8E-1 will be converted to the proposed attack airplane, when the Change Request pending Bureau approval, is issued to the contractor for the necessary modifications. Negotiations are under way to have the first article delivered to NAS, Patuxent River for preliminary flight evaluation by Navy pilots. A reasonable estimate for delivery to Patuxent for evaluation is 23 February 1945. At the conclusion of tests, the airplane will be returned to the contractor.
MEMORANDUM

From: VTB Design Branch
To: Technical Data Branch
Subj: BuAer War History
Ref: (a) Engineering Division Memo 8–44 dated 17 February 1944.
Encl: (A) VTB Design Branch History for February 1945.

1. Enclosure (A) is submitted in accordance with reference (a).

W.W. Hollister
Commander, USN

Classification (canceled) (changed to unclassified) by authority of
ManAc 2745

on 6/29/45

Dept of the Navy
XF8B-1

BuAer TWX 102334 February to C.O., NAS, Patuxent notified the addressee of expected delivery of this airplane to that air station for preliminary evaluation trials, estimated date of arrival being 3 March 1945. More recent information has just been received from the contractor, however, that the airplane will not arrive at Patuxent for another week due to minor engine corrections and propeller rework. The Patuxent flight tests have been set up under project PTR 1706.

The following information has been requested from Flight Test at NAS, Patuxent.

(a) Take-off distance of various gross weights and C.G. positions. This airplane is being considered for an attack airplane with the result that this information is desired up to the maximum gross weight.
(b) Maximum allowable C.G. travel.
(c) Handling characteristics at various gross weights and C.G. positions.
(d) Stability at these gross weights and C.G. positions in level flight, landing and wave-off conditions.
(e) Stalling characteristics.

Modifications indicated by evaluation tests and current proposed design changes will be incorporated on the third model XF8B, thereby converting that article to the attack airplane. The third airplane is presently estimated to be 75% complete on detail and 50% assembled, less engine. The VTB Design Branch of BuAer will be cognizant design desk on the attack model.

XTB3F-1

During the period 19 February through 21 February 1945, the Mock-Up Board convened at Grumman Aircraft Engineering Corp. at Bethpage, Long Island to inspect this airplane. The contractor's tentative schedule calls for completion of 3 experimental articles by January 1946, delivery of the first airplane estimated for September 1945.

The major changes recommended by the Mock-Up Board involve armor protection, cockpit rearrangement and wing bomb rack installation. Due to the incomplete status of the 20mm fixed gun installation, a re-mock-up of this particular item was requested. Also, the contractor was requested to submit a redesign classification (canceled) (changed to unclassified) by authority of

NavAer 2545

on 6/29/45

(Date) (Signature) (Rank)
of the inboard center section drop tank installation to provide for better clearances and for carrying larger rockets on this station.

From mock-up observation, this airplane appears to have very good possibilities as an effective torpedo attack airplane. Latest estimated performance figures with the R-2800-34 and 19XB-2B Westinghouse jet unit, the normal torpedo load with 370 gallons, internal protected fuel, are as follows:

| Gross Weight - one torpedo | 18968 pounds |
| Vmax S.L. (Combat power & jet) | 367 mph |
| Vmax S.L. (Military power, main engine alone) | 302 mph |
| T.O. 25 knot (main engine alone) | 330 feet |
| Combat Radius (Nautical Miles) | 212 miles |

VTB Confidential Memorandum to Director, Military Requirements dated 27 February 1945, recommended that a production contract for 1000 TBF-1 airplanes be considered immediately with production commencing in January 1946, and reaching a peak of 250 per month by August 1946. If approval is given on this suggestion, a Procurement Directive will be initiated by VTB Design Branch.

TBM-3

In reply to VTB Design Branch request for TBM-4 model designation for the TBM airplane with increased flight strength (5 g at 16,000 lbs. gross weight) Aviation Planning Directive 20-A-45, 22 February 1945, was issued, establishing XTBM-4 and TBM-4 model designation. Production models of the XTBM-4 prototype will be the TBM-4's.

The changes to be incorporated on three uncompleted production TBM-3's under model designation of XTBM-4 were described in the January history for this Branch. Approximate delivery date of the first prototype will be 15 April 1945.

By Change Request to the contractor, the present TBM-3 instrument panel is to be modified to provide for fluorescent lighting in addition to the inadequate red lighting now being used. The installation will consist of two ultra violet fluorescent spotlighters on either side of the cockpit enclosure, the exact location subject to the approval of BuAer.
TBY-2

During the month of February, six airplanes were delivered. The first flight airplane has completed preliminary demonstration flights and is now at NAS, Patuxent River for final demonstration.

Several pilots from the Bureau of Aeronautics have flown the TBY-2 and their opinions, recommendations, etc. are contained in VTB Design Branch memo to Chief, BuAer dated 13 February. Consensus is that this model appears as good as the TBM-3 in most respects and better in flight characteristics and performance. It is considered that with a little effort on the part of the contractor, all discrepancies can be corrected and combat ready airplanes can be delivered in quantity by June or July 1945.

XTB2D-1

The first taxi tests of the XTB2D-1 airplane, #36933, were successfully completed at the contractor's plant, El Segundo, Calif., February 17, 1945. However, an investigation of the oil strainer revealed metallic fragments and foreign matter, and additional ground running of the engine was necessary. Further difficulties developed namely, damage to oil scavenge pumps and the cracking and breakage of two of the pump gears. This engine trouble indicated the necessity of procuring the spare engine, XR-4360-8, now at Pratt and Whitney, Hartford, Connecticut, undergoing modification for installation in the 2nd airplane to be used on the first flight article in order to delay initial flight as little as possible. According to L.W. Browne, the Douglas Company Test Pilot who conducted the taxi tests on this airplane, general steering and handling characteristics on the ground are considered excellent. At low speeds there is adequate lateral control, determined by rocking the plane at 80 mph with flaps up, from one main wheel to the other with ailerons alone. With flaps partially extended (25° on the inboard flap and 15° on the outboard flap), at a speed between 80 to 85 miles per hour, two lift-offs were made with adequate control about all three axes. A horizontal stabilizer setting was used throughout these tests with no attempt to use the -3° setting.

Pratt & Whitney has been requested by the Bureau and the contractor to expedite delivery of the P-32 engine, and the best completion date obtainable is April 20, 1945. This unavoidable delay postpones flight test of #36933 airplane until sometime in May 1945.

classification (removed) (changed to unclassified) by authority of

\[\text{62} - 3 \text{- May 25, 1945}\]

\[\text{6/29/45} \quad \text{Deer} \quad \text{Bureau of Aeronautics}
\]

\[\text{D/E/45} \quad \text{Department of the Navy}\]
MEMORANDUM

From: VTB Design Branch
To: Technical Data Branch

Subj: BuAer War History
Ref: (a) Engineering Division Memo 8-44 dated 17 February 1944.

Encl: (A) VTB Design Branch History of March 1945.

1. Enclosure (A) is submitted in accordance with reference (a).

W.W. Hollister
Commander, USN

Classification (censored) (changed to unclassified) by authority of

Mark: 2545

Date: 6/29/45

Signature: (Date) (Rank)

Bureau of Aeronautics
Department of the Navy

Declassified under NND 913043
The TBM-4 will be identical to the TBM-3 so far as configuration is concerned but will be strengthened to withstand 5g at 16,000 pounds gross weight by the use of 75 ST aluminum alloy with no actual change in physical size of structural members. Latest schedule from the contractor on this program calls for delivery of the static test article to NAMC, Phila. by early April, test flights on the first flight article by June and change over in production to TBM-4's by August.

The tentative TBM-5 model will be an improved version of the TBM-4 with removal of the turret and substitution of a twin .30 cal. free gun mount for radioman-gunner; a reduced crew of two men; installation of jet stacks and general aero-dynamic clean-up. Weight reduction compared to present TBM-3's will be approximately 1,000 pounds. One prototype TBM-5 model is being constructed at NAMU, Johnsville and will be ready for test flights by 15 April.

The contractor, Eastern Aircraft Company at Trenton, N.J. is increasing and meeting production of 14 TBM's per day.

TBY-2

The contractor has successfully completed the final demonstration of the TBY-2 airplane at NAS, Patuxent. The airplane has been turned over to Flight Test Section for commencement of BIS trials. These trials are in the process of completion and so far no serious difficulties have been encountered. The portion of the BIS trials pertaining to catapulting and arrested landings are being conducted at NAMC, Philadelphia on a second airplane simultaneously with the flight test program at Patuxent. Numerous catapult shots and arrested landings have been made without encountering any major problems.

A mock-up was held at the contractor's plant relative to a revised electronic installation pertaining to rerouting of radio-radar cables and electronic wiring. The prototype installation as presented by the contractor was a vast improvement over the installations now being made in production airplanes. The contractor hopes to introduce this new electronic installation in production in the very near future.

The second mock-up was held at the contractor's plant relative to hydraulic system which also constituted a vast improvement over the present production installation. An all-out effort is being expended to introduce this new system into production as soon as possible.

Unclassified by authority of

MacAren 2545

on 6/29/55 (Date) (Rank)
The contractor met the present production schedule of deliveries during the month of March 1945.

XTB2D-1

Since 17 February 1945 to the present date, this airplane has been grounded at the contractor's plant awaiting delivery of a Pratt-Whitney R-4360-8 engine to replace the one damaged during taxi tests in February.

At a recent conference of BuAer Power Plant Design representatives and Pratt & Whitney officials at East Hartford on 20 and 21 March, 1945, regarding the R-4360-8 engine and the Hamilton Standard propeller, the matter of completing the P-32 engine for the XTB2D-1 in the fastest possible time was discussed. This engine was expected to be fully modernized and ready for shipment to El Segundo by 29 March 1945. At this writing the Bureau has received no notice of completion and/or shipment from East Hartford to El Segundo, Calif., of any engine. The present schedule for R-4360-8 engines is as follows: Serial P-32, 29 March; P-13, 22 May; P-42, 5 June 1945. Top priority has been given production of these engines and schedules are expected to be met as labor and parts are stable and adequate and the modernization line is starting to move smoothly. BuAer has approved the contractor's engineering proposal on installation of modified production engine in airplane #36934.

The contractor has submitted a proposal to the Bureau by letter B300-JWR-74 March 1945, requesting that, due to the numerous changes in the basic airplane resulting in approximately three separate configurations, an additional quotation of $20,000 be considered for complete demonstration costs. This sum includes the $3500 pilot fee approved for first flight and 37 hours preliminary evaluation. No decision on this suggestion has been made by the Bureau at the present time.

XTB3F

A mock-up was held at the contractor's plant on the wing gun installation and embodies the service changes and revisions as recommended by the Mock-Up Board during its session of February 19-21, 1945. The contractor is expending every effort possible to have the first experimental model flying by September 1, 1945. The fuselage forms are practically completed and the contractor hopes to start shaping the fuselage skin for assembly within the jig in approximately two weeks.
The preliminary evaluation trials on this airplane were officially established under Project No. PTR 1706 by letter Aer-E-17-EJW, 1 March 1945 and held at NAS, Patuxent River shortly after arrival of the XF8B-1 on 11 March 1945. To date no written test reports have been received by the Bureau, but the attack configuration trials, covering T.O. distances, and C.G. limits at high gross weights, have been satisfactorily completed and the airplane released to NAS, Anacostia for short period of inspection by BuAer personnel before its return to the contractor's plant at Seattle, Washington.

Completion date of the second model is scheduled for approximately 1 May 1945.

The aileron now installed on the airplane is a temporary measure using geared balance tabs, to reduce the flutter tendency at 275 mph until an improved aileron installation has been completed by the contractor. All the evaluation tests were flown with the temporary aileron installation, providing greater safety to the pilot, with no appreciable effect on performance characteristics other than slightly increased stick forces required for lateral displacement of the airplane at speeds above 250 mph.
MEMORANDUM

From: VTB Design Branch
To: Technical Data Branch
Subj: BuAer War History
Ref: (a) Engineering Division Memo 8-44 dated 17 February 1944.
Encl: (A) VTB Design Branch History of April 1945.

1. Enclosure (A) is submitted in accordance with reference (a).

W.W. Hollister
Commander, USN

Classification (canceled) (changed to unclassified) by authority of
Madden 2545
on 6/29/55

Bureau of Aeronautics
Department of the Navy

Declassified under NND 913043
It has come to the attention of the VTB Design Branch that a complete review of the radio equipment in VTB aircraft is an immediate necessity, and following consideration of all factors involved, it has been recommended to Military Requirements Division that all VHF radio equipment be removed from TBM and TBY aircraft. It is believed that the new 10 channel VHF is adequate for all operations required by this type aircraft. Advantages to be gained in removal of such equipment will be as follows:

(a) Weight reduction of 150 pounds.
(b) Simplification of cockpit and pilot's controls.
(c) Reduction in cost.
(d) Reduction in radio maintenance.
(e) Reduction of radio spares.

By letter Aer-F-1-4-WAK 30 April 1945, Chief BuAer directed BuAer Divisions and Sections to initiate action to procure 1200 additional TBM airplanes with a production schedule from May to September 1946, after completion of the 2000 TBM-3 airplanes now being procured under Contract NOa(s) 5485.

Under project BIS 2179 tests were set up at NAS, Patuxent for the performance evaluation and comparison of the XTBW-5 with the present TBM-3. Specific test data is required as stated in BuAer letter Aer-E-17-GLB dated 6 April 1945, to BIS, Washington, D.C. This data will cover:

(a) CG limits for approximately 16,000 pounds gross weight loading.
(b) Stability and control characteristics at recommended maximum forward and aft CG locations at approximately 17,500 pounds gross weight load.
(c) Stall, landing and wave-off characteristics at recommended maximum forward and aft CG locations at approximately 15,000 pounds gross weight load.
(d) Take-off speed and distance.
(e) Vmax at sea level and critical altitude.
(f) Rate of climb curve from sea level to service ceiling.
(g) Maximum combat radius with internal fuel only, in accordance with Formula B-1 of NavAer Spec SE-152.
(h) Best cruising speed for maximum range.
(i) Evaluation of twin .30 cal. flexible guns.

TBY-2

The Bureau is in receipt of the Final Demonstration report on Project BIS 2168 which summarizes the tests showing TBY-2 as satisfactory except for failure to demonstrate full rudder yaw.
There is satisfactory strength and rigidity to withstand speeds and accelerations specified, provided the methods of canopy release is modified. It has been decided to conduct certain performance flight tests to further complete the preliminary and final demonstrations, at Consolidated Vultee Plant, Allentown, Pennsylvania.

Nine TBY-2's have been assigned to BIS Acceptance trials at NAMC, Philadelphia and NAS, Patuxent River. Complete reports have not been submitted as yet but are expected in the near future.

BuAer letter Aer-F-1-4-WAK of 30 April, from the Chief of BuAer to all sections concerned, directed that action be initiated to procure 600 additional TBY airplanes from Consolidated Vultee Aircraft Corp. Production is scheduled from February to June 1946, after the completion of 1,100 TBY-2's now under procurement on Contract Noa(s) 159.

All TBY-2's are at present restricted to 260 knots and 3 g awaiting installation of a reinforced wing fold gap cover. This cover has been failing at speeds above 260 knots, affecting lateral control on landings. The contractor will supply these replacements for all delivered airplanes. A beef-up of the wing flaps is being made for rocket firing tests at Armament Tests at Patuxent River and upon satisfactory completion of these tests said change will be incorporated in production.

Effective in the 551st TBY-2 airplane, the contractor has been requested to increase the strength in certain structural members, which will result in a 5g airplane at 16,000 pounds. Airplane designation XTBY-3 will be conducted in progressive stages in the TBY-2 until all structural changes have been finally completed. Production models will bear the designation TBY-3.

A total of 41 TBY-2 airplanes have been delivered to date.

XTB2D-1

To date, XTB2D-1, No. 36933, has remained inactive at the Contractor's plant, El Segundo, California, awaiting installation of Pratt and Whitney R-4360-8 engine, serial #P-32. #P-32 was shipped from Pratt & Whitney to El Segundo by rail express on 18 April 1945 and received by Douglas Aircraft Co. on 26 April 1945. However, no carburetor was delivered with the engine, as separate shipment was made on this item via Naval Air Transport Service, delay being due to bad weather. First flight of the airplane has again been postponed until early in May. Arrangements are in process to procure a carburetor for the engine locally.
Following the airplane mock-up held at the contractor's plant in February, photographs of the mock-up, and the cockpit in particular, were received by the Bureau about 20 April 1945. These photographs are being routed through BuAer for the attention of cognizant personnel.

The first experimental unit designated for the XTB3F will go on test stand 10 May 1945. It will take approximately one month to complete the "green" run on these engines. Thus, this engine should be available for delivery to the contractor by 15 June, provided no unforeseen problems arise as a result of test runs. A second jet engine designated for the XTB3F program is scheduled to go on the test stand July 1st and should be available for delivery to the contractor by August 1, 1945.

**XTB3F**

**XF8B-1**

The preliminary evaluation of tests on the XF8B-1 airplane were conducted at NAS, Patuxent River under Project PIR #1706, completion date being 4 April 1945. A final report on these trials has been submitted to the Bureau and in general indicates that the airplane performed very satisfactorily while under flight tests. This Design Branch is interested in the following data compiled from NAS, Patuxent preliminary evaluation tests in connection with employing the airplane as torpedo attack model, converting the 3rd article to the specific design:

**Torpedo Load Conditions**

(a) Take-off distance (25 kn, t wind) Gross Wt. 20,000#- 380 ft.
(b) Vmax, sea level, normal rated power
   Military power
   - 320 mph
   - 342 mph
(c) Lateral stability controls free - unacceptable
(d) Control forces - unacceptable.

The contractor has expressed his prior knowledge of control force difficulties and stability problems and is considered fully capable of finding satisfactory solutions.

On 5 April 1945, the XF8B-1 departed NAS, Patuxent and arrived at NAS, Anacostia, D.C. for familiarization flights by ten interested Bureau of Aeronautics aviators. These pilots were favorably impressed as to flight characteristics and performance of the airplane. The minor problems they experienced arose from radio and brake operations. On 7 April 1945 the XF8B departed NAS, Anacostia for the contractor's plant at Seattle, Washington.

By VTDB Design Branch memo, 19 April 1945, a summary of test performance and airplane characteristics was forwarded to Military Requirements Division, recommending consideration of production,
with as few changes as possible from the present configuration, except the added provisions for torpedo loading. At this time no decision has been reached by the Bureau on the production question. Comparative performance data with other experimental airplanes of this type is being formulated on the XF8B to reach the most satisfactory decision on the desirability of it as a production combat airplane.

Completion of the second and third XF8B-1, Nos. 57895 and 57896, is being delayed at the contractor's plant pending receipt of production R-4360-10 engines from Pratt & Whitney. Airplane No. 57895 was scheduled for completion approximately 1 May 1945.
MEMORANDUM

From: VTB Design Branch
To: Technical Data Branch
Subj: BuAer War History
Ref: (a) Engineering Division Memo 8-44 dated 17 February 1945
Encl: (A) VTB Design Branch History of May 1945.

1. Enclosure (A) is submitted in accordance with reference (a).

W.W. Hollister
Commander, USN

Classification (OA-3849) changed to unclassified by authority of NOD 2545

6/29/45

Bureau of Aeronautics
Department of the Navy
XF8B-1

No decision during this month has been reached regarding the procurement of XF8B-1 airplane as a future torpedo attack plane. All characteristics pertaining to this type are under study by cognizant sections of BuAer, Engineering Division.

XTB2D-1

As stated in April History, no carburetor was received with the P-32 engine when the power plant arrived at El Segundo, 26 April 1945, for installation in Bu.No.36933. Subsequently the carburetor was received and installed, with the result that the initial flight of the airplane was completed 7 May 1945. During the month of May, three flights were made, totaling 3 hours 45 minutes, to determine control effectiveness about the three axes.

Results of flights are as follows:

Flight #1 - Moderate high rudder and elevator forces - Excellent effectiveness except in power-off low speed conditions.

Flight #2 - Spring forces reduced and now satisfactory, except as noted above.

Flight #3 - Prop vane motor plug leaked oil necessitating emergency landing.

During the period Contractor was awaiting replacement of props from Hamilton Standard Propeller, it was decided to utilize this delay to install the short vertical stabilizer, 108 inches in height, and the 80° dihedral alternate wings. The prop removal and replacement delayed flight tests approximately two weeks.

XTB3F

VTB Design Branch was informed by Power Plant Design memo Serial #76863 of 8 May 1945, of the shipping schedule for the 19XB-2A units on the Grumman XTB3F installation as follows:

1. One unit by 15 June 1945
2. One unit by 1 August 1945

The 19XB-2A jet is interchangeable with the 19XB-2B model. The availability of the -2A unit will meet the contractor's estimated date of first flight in September 1945.

Classification (changed to unclassified) by authority of

NavAer 2545

on 6/29/45

(Date) (Signature) (Rank)

Bureau of Aeronautics

Declassified under NND 913043
TBV-2

At the contractor's plant at Allentown, Pa., failure to meet production schedules can still be attributed to lack of planning and insufficient skilled labor in the final assembly lines. However, approximately 20 TBV-2 airplanes have been delivered to the Aircraft Pool, VT-97 and CASU 22, based at NAS, Quonset Point for pilot familiarization, preparatory to Fleet assignments within this year. A total of 30 airplanes will be delivered to NAS, Quonset Point in the near future.

By BuAer letter, Aer-E-333-LRH, 30 May 1945, revision of the present instrument panel and cockpit arrangement mock-up was forwarded to the BAR. This letter specified the use of a newly devised sketch proposed for the instrument panel, and suggested relocation for various armament switches. The chart-board is to be retained on the instrument panel at the location indicated on the new layout, moving it 1/4" starboard of the present installation.

The contractor is working on the problem of elimination of CO conditions in the cockpit and crew compartments. Several points of entry have been discovered namely, openings in the wheel wells, bomb bay openings, etc., and steps are being taken to correct this defect.

XTBV-3

At the conclusion of conferences held in the Bureau to determine suitable provisions for strengthening the TBY-2 model, the contractor was informed by BuAer TWX Aer-E-17-WWH of 26 May 1945, to proceed in accordance with MCR 187, calling for 5g maximum strength effective on the 551st airplane. The wing hinge fittings would not meet the required factor and it was therefore directed that the contractor conduct static tests of these fittings at NAMC, Philadelphia. Also it was requested that contractor use 758T material for the leading edge skin and stringers.

TBM

There has been nothing of interest occur on the production airplane during the month of May 1945.

XTBM-4

The major difference between the current TBM-3 and the XTBM-4 will consist of new design of the wing hinge fitting to provide
additional strength. Other changes involve material strengthening of wing members. Wing tip slots will be eliminated. Line production of the TBM-4 will commence in August 1945.

**XTBM-5 (Tentative Designation)**

Conversion of the present TBM to a two seat model in addition to several other major changes, will probably result in a TBM-5 designation. The turret will be removed with either the substitution of a twin .30 cal. free gun mount or no free armament. Two prototypes on this alternate armament are undergoing test at NAS, Patuxent and the contractor's plant. Decision as to the final configuration to be established for the TBM-5 model will depend on completion of flight test and approval of changes by the Fleet.

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*Classification (General) (changed to unclassified) by authority of Navel 2545 on 12/29/55.*

(Bureau of Aeronautics
Department of the Navy)
MEMORANDUM

1 July 1945

From: VTB Design Branch
To: Technical Data Branch

Subj: BuAer War History

Ref: (a) Engineering Division Memo 8-44 dated 17 February 1945

Encl: (A) VTB Design Branch History of June 1945.

1. Enclosure (A) is submitted in accordance with reference (a).

W.W. Hollister
Commander, USN

Classification (canceled) (changed to unclassified) by authority of

MajGen 2545

on 6/29/55

(Date) (Signature) (Rank)

Bureau of Aeronautics
Department of the Navy
XTB2D

The contractor by the middle of June was nearing completion of his part of the preliminary evaluation before sending the airplane to Patuxent for evaluation by the Navy. Since it was indicated that the airplane would leave El Segundo, California approximately 30 June 1945 for NAS, Patuxent River, Maryland, a memo from the Head of VTB Design Branch to the Head of Design Coordination requested a project be set up to cover the preliminary evaluation by the Navy. The date of this memo was 16 June 1945.

On 22 June 1945 while investigating the two torpedo configuration, the last contractor test before delivery to Patuxent, both inboard flaps left the airplane structure during retraction from the dive brake position at 250 mph. The pilot was able to trim the airplane and fly to Long Beach and land without further incident. This necessarily delays delivery of an XTB2D airplane for preliminary evaluation by the Navy as planned. The present tentative program is to send the second XTB2D, Bu. No. 36934, after a six weeks delay required for installation of full span, all-purpose flaps. To date details of this accident are contained in TWX 231730 June 1945 from BAR, El Segundo to BuAer, Washington, D. C.

XP88

Confidential memo, #C16218 dated 4 June 1945, from the Director of Engineering Division to Director of Military Requirements Division gave a summary of the investigation of the tactical desirability of this model as a torpedo attack airplane and stated: "Engineering is unable to make a favorable recommendation for the procurement of the F8B as a torpedo airplane since this involves setting up production of an airplane which has no apparent advantages for this mission ....". A decision as to future action was requested.

Military Requirements then issued a memo stating that there was to be no future procurement of the F8B but that the present contract should be carried to completion.

Commentary on the F8B will not appear again in this history as VTB has no further interest in this model.

XTB2F

The contractor has advised the Bureau that the first flight date of this airplane will not take place before 1 Dec. 1945 because of difficulties encountered in the design and fabrication of the wing center section.
TBV

On 30 June 1945, Directive #108364 from the Chief of the Bureau of Aeronautics directed that 850 airplanes of Contract NOa(s) 159 and the 600 airplanes ordered under letter of intent for Contract NOa(s) 6748 be cancelled. Two-hundred and fifty (250) TBV-2 airplanes and spare parts in money value of 25% of the estimated cost of these airplanes will be accepted under NOa(s) 159. It further stated that BuAer has been informed that these airplanes will not be used in combat. The findings of Flight Test Section, NAS, Patuxent stated the airplane was not recommended for service use. The complete details of the unsatisfactory report may be found in Confidential Preliminary Report on the TBV-2 Production Inspection Trials, Project No. BIS 2168 dated 22 June 1945 issued by Flight Test Section, NAS, Patuxent River, Md. A meeting was held on 30 June 1945 in the board room of the Bureau attended by representatives of BuAer, Flight Test Section of NAS, Patuxent and CVAC, Allentown, to discuss the discrepancies noted and the remedial action to be undertaken by the contractor.

TBV

There have been no items during the past 30 days in regard to this model worthy of inclusion in this history. The TBV continues to give excellent service to our carrier based Naval Air Force.
MEMORANDUM

From: VTB Design Branch
To: Technical Data Branch
Subj: BuAer War History
Encl: (A) VTB Design Branch History of July 1945

1. Enclosure (A) is submitted herewith in accordance with reference (a).

W.W. Hollister
Commander, USN

Classification (canceled) (changed to unclassified) by authority of NAVCIR 2545 on 6/29/55.

Bureau of Aeronautics
Department of the Navy
XTB2D

Repairs to the first XTB2D are progressing on schedule. The second XTB2D was to be ready for flight 1 August 1945, but at this date VTB Design has not been advised. Preliminary evaluation tests at Patuxent have been cancelled due to delays in the program.

XTB3F

A change has been issued to the contractor to install the improved R-3350-C4 Wright engine with a Curtiss propeller in the second flight article. A change has also been initiated to install a Westinghouse 24C jet engine. Progress on this model has been slow due to higher priority projects at Grumman.

TBX

It has been decided to assign all TB1-2 airplanes to NAOTC for training purposes only. An airplane has been assigned to the contractor to incorporate necessary corrections to discrepancies reported on BIS Trials mentioned in history of previous month. When completed the airplane will be sent to Patuxent for additional trials. Outstanding changes have been reviewed and all changes that do not involve safety of flight or training have been cancelled or modified. Two airplanes have been delivered to the target towing detail at Norfolk for prototyping as tow planes.

TBW

CNO confidential letter, Op-03-511-RPF serial 025003 dated 2 July 1945, requested that BuAer prototype a night torpedo configuration and be prepared to modify 25 airplanes per month. The prototype is to be made at NAS, Norfolk and a current production airplane has been diverted to Norfolk for this work. VTB Design Branch confidential memo to Modification Branch – Production Division, dated 31 July 1945 established this configuration.

Based on ComAirPac restricted despatch 050647 August 1945 which concurred with CNO confidential despatch 011314 August, a change has been initiated to replace the .50 cal. turret with a satisfactory twin .30 cal. free gun installation. This change, if incorporated, will probably require a new model designation of TBW-5 for the Avenger.
MEMORANDUM

From: WTB Design Branch
To: Technical Data Branch
Subj: BuAer War History
Encl: (A) WTB Design Branch History of August 1945.

1. Enclosure (A) is submitted herewith in accordance with reference (a).

R. B. WOODHILL
Commander, USN.

Classification (removed) (changed to unclassified) by authority of

Rear Adm 2545

on 6/29/45

(Date) (Rank)

Bureau of Aeronautics
Department of the Navy

Declassified under NND 913043
VTB Design Branch History

TBY - TBM

The surrender of Japan on 14 August 1945 resulted in the termination of the production contracts for torpedo bomber aircraft controlled by this Branch. The two contracts involved were contracts NOa(s) 159 and NOa(s) 228. The terminations on 14 August were issued so that under contract NOa(s) 159 only 180 airplanes of the original contract were to be accepted. The 180th airplane under this contract was accepted on 5 September 1945. Contract NOa(s) 228 was terminated so as to provide for a total of 4664 TBM-3 airplanes to be accepted as compared to the original contract number. As of 31 August, 4640 TBM-3 airplanes had been accepted, the balance of 24 airplanes to be completed and accepted in September 1945.

Inasmuch as these two production contracts were terminated there will be no further report on the TBY-2 and TBM-3 in this history unless some item or activity regarding either of the above airplanes is worthy of mention.

The prototype of a VT(N) (night torpedo) configuration by NAS, Norfolk is proceeding. To date there have been no further negotiations initiated to modify any TBM-3's to the VT(N) configuration. This prototyping of a VT(N) model is being undertaken to establish a post war experimental project for night torpedo attack investigations. Further decisions by CNO will determine whether additional TBM-3's are to be modified to the VT(N) configuration for use in operational training.

XTB2D-1

The second XTB2D-1 airplane which was modified to the 80° wing, full span flap configuration following the accident to the first XTB2D airplane, had a first flight of 25 minutes on 9 August 1945. The airplane was found to be statically, dynamically stable about all three axes and the aileron and elevator forces were comparable to those found in the first airplane under similar conditions. Rudder forces were found to be approximately 75% higher. Further flight investigation was halted by a drop in engine oil pressure which necessitated
an immediate landing. During the descent and return to the field all engine power was lost and during the landing run-out the dual rotation nose gearing froze. The airplane is now undergoing an engine change and before further flights can be made restrictions now imposed upon the R-4360-8 dual rotation engines will have to be waived. The engine contractor is investigation the cause of this engine failure and present plans are to install a newly designed dual rotation nose section on all (-8) engines before further flights are undertaken.

The Bureau and the airplane contractor are at present negotiating to determine the basic configuration of the first airplane, BuNo. 36933, which was damaged during flight test. This incident was reported in VTB Design Branch history for June 1945.

XTB3F

The contractor is progressing with the construction of the first flight article which is expected to have its first flight in December 1945. The second airplane was to be built originally with an R-3350-C4 engine but due to the fact that the Wright Aeronautical Corporation is not going to build the (C4) engine an R-3350-C5 engine will be used.

Class VTB

Commander W.W. Hollister who acted as head of the VTB Design Branch since 15 November 1943 was detached from BuAer on 15 August 1945. Commander Roger B. Woodhull assumed duties as Head of the VTB Design Branch effective 14 August 1945.

Under the post-war experimental program there have been discussions concerning the consolidation of VTB and VSF to form one class desk in the Engineering Division of the Bureau of Aeronautics. Many of the present dive bombers are now being constructed so as to carry a torpedo and it is felt that the dive bombing mission and torpedo mission can be effectively combined into one type of VBT aircraft. This would mean
a 7 "g" airplane capable of carrying a wide range of bombs in addition to a torpedo which could be utilized as a dive bomber or torpedo airplane interchangeably. Negotiations are at present under way in the Engineering Division towards the consolidation of the VTB and VSB Design Branches.
Honorable Carl Vinson  
Chairman, House Naval Affairs Committee  
House of Representatives  
Washington, D.C.

My dear Mr. Vinson:

This review of the TBY program is submitted in accordance with your oral instructions of several days ago. It has been delayed somewhat as a result of discussions only recently completed.

The review has been broken down into two major divisions. These divisions are:

(a) A discussion of the part which the TBY has played in the Navy's over-all planning for torpedo-bomber production and
(b) A review of the history of the Allentown project with a discussion of the problems and delays which have be-set the program.

The TBY and the Navy Torpedo-Bomber Program

In a general sense, any consideration of the TBY program at Allentown must begin with a discussion of the relationship between the Navy's requirements for torpedo planes and the capacity which was and is available for their production. The balance between requirements and capacity in early 1942 dictated the initiation of the TBY program and the balance at the present time is the determining factor in the termination of the project.

At the time of Pearl Harbor no torpedo-bombers had been produced for the Navy in over two years. There were two experimental designs which were under development. These designs, which had been selected from several proposals submitted in a design competition in 1939, were the Grumman TBF-1 and the Vought-Sikorsky (later Chance-Vought) TBU-1. Late in 1940 a production contract had been given to Grumman for the TBF since it was a more conventional plane than the TBU and it appeared that it would
be possible to get it into production more rapidly than the TBU. As of 7 December, 1941, however, no planes had been accepted on this contract.

Prior to our entry into the war, the production schedule for the TBF was established at a peak rate of 100 per month. With the outbreak of hostilities requirements for all types of aircraft obviously increased immensely. The scheduled production of the TBF was far from sufficient to meet the increased requirements. Grumman's schedule was, accordingly, increased to a peak of 125 per month and the Eastern Aircraft Division of General Motors was given a contract to produce the TBF under the designation of TEN at a peak rate of 150 per month in a combination of their Trenton, Tarrytown and Baltimore plants.

By the spring of 1942, it was felt that the combined scheduled production of Grumman and Eastern (275 per month) would not be adequate to meet the probable requirements for torpedo-bombers and that another contractor should be brought into the picture to supplement the capacity already available. At this time the experimental TB1 airplane was flying. It exhibited attractive performance characteristics which indicated that it might prove to be superior to the TBF. It was accordingly decided that, since additional torpedo-bomber capacity was required, it would be preferable to set up a plant to manufacture the TBU rather than to set up another manufacturer of the basic TBF design.

As the TBU was a Vought design, first efforts were centered on a plan to set up a new facility under Bought's management. On 13 June, 1942 a letter of intent was issued to Vought calling for the manufacture of 1100 TBU airplanes and spare parts. Peak production of the model was set at 150 per month; bringing the combined scheduled total of torpedo-bomber production up to 425 per month.

Vought, however, had no capacity to produce the plane in its existing plant and it soon became apparent that the production problems incident to getting their fighter (the F4U) into production would tax their managerial staff to the utmost and that they could not afford to assign any of their executives to the management of a new facility to manufacture the TBU. Since production at an early date was urgently required, the Navy then approached Consolidated-Vultee. At this time Consolidated and Vultee were separate companies and Vultee was the organization actually dealt with in this connection. As the later merger does not substantially affect the situation and as Consolidated-Vultee is now so closely identified with the TBY program, the contractor will be referred to throughout as "Consolidated" for the sake of simplicity.
Aer-PRD-8-TBF

Subj: Review of the TBY Program at the Plant of the Consolidated-Vultee Aircraft Corporation, Allentown, Pa.

With some misgivings, Consolidated agreed to undertake the program and a letter of intent for 1100 TBUs (subsequently redesignated as TBYs) was issued on 31 October, 1943. It was understood that the Navy would provide facilities and a schedule for production was agreed on which called for the same peak rate (150 per month) as had been contemplated for Vought. In the meantime the schedules for Grumman on the TBF and for Eastern on the TBM had both been increased somewhat so that the combined potential capacity of the three torpedo-bomber facilities was then 540 planes per month.

By mid-1943 experience in the Pacific indicated that maximum production in improved types of fighters was imperative. In order to increase the production of fighters as quickly as possible, Grumman's TBF program was revised, production being tapered off and being discontinued at the end of 1943. This left the entire burden of the torpedo-bomber program on Eastern and Consolidated. Eastern agreed to undertake an accelerated schedule which increased their peak production rate from 240 to 300 per month. The potential peak capacity of the two remaining manufacturers was, therefore, about 450 per month. The Navy felt that production at this rate would just about meet the demands of the fleet so no additional source was established to replace Grumman. It is interesting and important to note that this estimate of the peak requirement for this type of plane was confirmed when the Integrated Aeronautic Program was adopted as the peak requirements developed under that program have, until recently, been between 400 and 450 planes per month.

Because of the continuing delays in getting production on the TBY under way (delays which are discussed in some detail in the second part of this review) production of torpedo-bombers has always been less than required. The situation has been relieved to a considerable extent by the fact that Eastern has been able to meet further schedule increases - first to 340 per month and subsequently to an average of about 370 per month - and has thus offset some of the lack of TBYs. Eastern, however, has never been able to assure production in sufficient quantity to meet a requirement of 450 per month and it has been necessary to keep pushing the TBY program as a supplement to the production of TBMs.

Very recently (partially as a result of the end of the European was which reduced land-lease requirements) the requirements for torpedo planes have decreased and peak requirements are now between 350 and 375 planes per month - a figure which is within the capacity of Eastern Aircraft alone. It therefore appeared to the Navy that the time had come to review the entire torpedo-bomber program. Since requirements had decreased, it was obvious that production schedules for the type should be reduced accordingly. The reduction could be accomplished either by reducing the TBM production as necessary and continuing the TBY, or by terminating the TBY.
The decision to terminate the TBY was based on consideration of many factors, the major considerations being the following:

1. The TBY, as noted above, had at no time been regarded as a replacement for the TBM but rather as a supplement for it.

2. The advantages in performance of the TBY, largely in increased speed, are offset by equally important range and deck spotting considerations.

3. The TBM is a less expensive, combat proven airplane which is capable of fulfilling the same requirements as the TBY, which is an unproven aircraft making its initial appearance in the air. Changes dictated by military necessity and safety of flight always attend the introduction of a new airplane. Flight tests at NAS, Patuxent River already indicate the necessity for changes to render the TBY acceptable for carrier use.

4. If the TBY were to be retained in production, the Allentown plant could not meet Navy requirements. This would make it necessary to continue using a considerable number of TBM's. As a result, the Fleet would be obliged to undertake the tremendous logistic and training problems which would arise from maintaining two types of torpedo-bombers at the same time. While this could be justified if it was impossible to produce enough planes of one type to fill the requirements of the Fleet, it could no longer be justified when requirements had been reduced to a figure within the capacity of Eastern Aircraft alone.

After consideration of these major factors and many other lesser ones, it appeared to be obvious that the only proper course was to terminate the TBY, particularly since its major reason for being in production, - insufficient capacity to meet torpedo-bomber requirements, - had ceased to exist.

**History of the TBY Project at Allentown**

As noted above, a letter of intent for 1100 TBY (then called TBU) airplanes was issued to Consolidated on 31 October, 1942. The original production schedule called for production to begin with one delivery in September 1943 and to reach the peak of 150 per month in June 1944. In the early negotiations Consolidated stated definitely that they would not undertake the production of this Vought designed plane unless full engineering responsibility rested with Vought. Accordingly, the Navy made a separate contract with Vought by which Vought was to assume full design responsibility for the first 300 planes, was to supply design data and drawings, test...
Subj: Review of the TBY Program at the Plant of the Consolidated-Vultee Aircraft Corporation, Allentown, Pa.

and miscellaneous data, engineering information, reports and design supervision, together with consulting services.

The Navy had agreed to furnish Consolidated with facilities for the manufacture of the TBY. The Bureau of Aeronautics had a careful survey made to determine the most desirable location. This survey conducted in large part by Comdr. J. D. Mooney, USNR, covered many suggested locations but the final recommendation was a site at Holmes Airport on Long Island. This site was chosen because of its relative nearness to Vought, because the Greater New York area had at that time the best available supply of skilled man-power in the country and because of the flying facilities which were available at the location. The War Production Board, however, rejected the request for priorities to construct a plant at that location because the Mack Truck Co. plant at Allentown, Pa. was being made available by a cut-back in Army Ordnance's truck procurement and that plant could be made available to Consolidated. Although the Navy objected to the location as being far less desirable, WPB was adamant and the Allentown location was finally accepted.

It is, of course, impossible to say to what extent this action by WPB contributed to the unsatisfactory record of the TBY program. It is certain that it had a considerable effect, however, since two of the principal problems at Allentown have proved to be the non-availability of skilled labor in the area and the interference in the engineering program caused by lack of co-ordination between Consolidated and Vought, in which the factor of distance was at least a contributory item. In any case, the program was established in Allentown, arrangements were made to clear the plant, supplementary construction and improvements were planned as required and, after WPB approval of the plans, the necessary action by DPC was requested early in 1943.

During January, 1943, at a conference held in the Bureau of Aeronautics, Mr. Girdlet, Chairman of the Board of Consolidated, stated that he anticipated that the schedule, as originally established, could be met if Vought could complete enough engineering for the start of production by May, 1943 and if the plant was at least partially available by the same time. Neither of these conditions was met. The problem of clearing the plant proved to be much greater than had been estimated at first. The Navy had agreed to supply, elsewhere, the smaller manufacturing space still required by Mack. To supply this space others had to be moved and the buildings rehabilitated before Mack could move out of the plant destined for Consolidated. The plant was not actually ready for occupancy by Consolidated until October, 1943.
although some part of it had been ready before that time.

The engineering design work had also been progressing quite slowly. Several factors, in addition to the difficulties of the engineering problems themselves, contributed to the length of time taken by the engineering program. Of these, the chief ones were: (1) the shortage of competent aeronautical engineers and draftsmen; (2) the inflexibility and complexity of handling engineering problems, created by the transfer of the production project from Vought to Consolidated while engineering responsibility remained with Vought; and (3) the delays and awkwardness resulting from doing the engineering work in Connecticut for use at Allentown. Some features of the engineering problems will be discussed more fully below, but the combination of these factors delayed Consolidated's receipt of engineering information on which to proceed. Vought did not complete their design engineering work until 20 November, 1943.

While there were many specific engineering problems encountered during 1943, by far the most serious one concerned the power plant installation. The original TBU was designed to use the Pratt & Whitney R-2800-B engine. The Navy desired that this engine be replaced by the new R-2800-C engine, which was considerably more powerful. Vought was unable to handle the engineering work involved in the engine change quickly enough to be satisfactory to BuAer. Consolidated was willing to undertake the very considerable re-engineering involved but Vought would not accept responsibility for the design of the plane if the new engine installation was engineered by Consolidated. Since there was some question as to the date at which the "C" engine would be available, it was agreed in the spring of 1943 that the change would be made on the 301st airplane - at which point Vought would transfer all responsibility for the design to Consolidated. The designation of the plane was to be changed from TBY-1 to TBY-2 when the new engine was installed.

This question was under debate during much of 1943. At about the time that the design engineering from Vought was complete, (late 1943) the question was re-opened. Due to the other delays in the program it appeared that the "C" engine would be available in time to be incorporated in all of the TBYs. In addition, the availability of the "B" type engine, which was produced in an Army plant, became subject to question. It was, accordingly, decided that the "C" engine would be installed in all of the planes, requiring that Consolidated speed up greatly the completion of the design of the "C" engine installation.
Subj: Review of the TBY Program at the Plant of the Consolidated-Vultee Aircraft Corporation, Allentown, Pa.

While it was BuAer's opinion that Consolidated had, themselves, contributed to a considerable extent to the generally unsatisfactory progress that had been made up to that time, more by a lack of initiative than anything else, it should be pointed out in fairness that the delays encountered up to late 1943 were, to a major extent, due to the action of factors which were outside of Consolidated's control.

When, by June 1943, the conditions set by Mr. Girdler in the conference mentioned above had not been fulfilled, the TBY schedule was revised; the date for the acceptance of the first plane being set back to January, 1944 and the rate of acceleration being reduced somewhat - the peak of 150 per month not being scheduled until January, 1945. In October, 1943, when the plant was ready for occupancy, the design engineering from Vought substantially complete and the change in the engine installation had been agreed on, the schedule was again revised; being set back four months so that the first delivery was then scheduled for May, 1944.

In evaluating the delays in the TBY program which are assignable to various factors, it might be said that these set-backs in production were principally the result, as noted above, of factors outside of Consolidated's control as opposed to the subsequent delays which were largely Consolidated's responsibility.

The progress of the program in 1944 continued to be very slow. The difficulties encountered at this stage were in three major areas - engineering and design change problems, production problems at Allentown and problems related to the sub-contracting program.

Progress on detail engineering continued to be very slow during the first half of 1944. Efforts were made by BuAer to give all possible assistance, but when, in May, 1944, the chief power plant design engineer resigned, no replacement was promptly made. Since the power plant installation was still the major problem, the delay in obtaining a replacement was most disquieting.

At this time the Assistant Secretary of the Navy for Air addressed a letter to Mr. Girdler concerning Consolidated's record on its various Navy programs. Mr. Gates stated:

"The importance of the TBY-2 program at Allentown has been called to your personal attention on several occasions. The original schedule submitted by your organization called for production of this plane in September 1943. The latest information available indicates that the first production
article is not likely to make its appearance until August or September—an approximately one year behind schedule. During all of the year in question the Navy will have been short of torpedo-bombers. In addition, any plane produced at Allentown will be of only limited value until a satisfactory oil cooler installation has been incorporated. The inadequacy of the present installation has been strongly emphasized by the Navy but no corrective measures have been taken by your organization up to the present time.

"While it is the desire of the Navy to assist in every way practicable in the solution of your various problems, in the final analysis the correction of conditions at...Allentown...rests primarily with your own organization. Prompt corrective action to prevent further slippage in production...appears to be imperative. I ask that you advise me as soon as possible of what measures are being taken in respect to the problems in question and that every effort of your organization be directed toward meeting your commitments in respect to the production of aircraft for the Navy."

As a result of this letter, a meeting was held in the Navy Department at which Consolidated agreed that immediate steps would be taken to remedy the situation. A new management was subsequently installed at Allentown, headed by Mr. Shelton and Mr. Larsen, both of whom were transferred from Consolidated's Stinson Division. From this point forward, engineering was speeded up and ceased to be the chief factor delaying the program. By August, 1944, the basic design engineering was virtually complete.

By August, however, trouble was encountered with sub-contractor's failure to meet schedules, particularly as to wing center sections and outer panels (Briggs) and forward fuselage sections (Truscon). Much of their delay was due to delay in the supply of engineering information. It was felt in Buier that this problem was a relatively temporary one; however, such assistance as was necessary was lent to Consolidated and by the end of the year the Allentown plant was overflowing with sub-contracted parts.

During the latter half of the year production problems in the Allentown plant became the major problem. The first airplane was completed in August and the second followed in September. When these planes were sent to the airport for pre-Flight inspection and tests the usual "first airplane" difficulties began to appear. These problems were not unusual in themselves although they were aggravated by the lack of skilled man-power. As a result the first plane was not accepted until November and only one additional plane was accepted in 1944.

During all of this time the Assistant Secretary of the Navy for Air and the Bureau of Aeronautics continued to press Consolidated to undertake corrective action. Finally in late December and January the contractor took
Review of the TBY Program at the Plant of the Consolidated-Vultee Aircraft Corporation, Allentown, P.

steps which began to bring results. Some of the better supervisory and flight test personnel from other divisions were sent to assist in expediting the delivery of the first planes. In January the management was again changed and Mr. Woodhead, the president of Consolidated, personally took charge of the Allentown plant. While improvement was still slow, the operation did begin to move. Eight planes were accepted in January but these were largely planes which had been completed previously. There were six acceptances in February, eleven in March, fourteen in April, twenty in May and thirty-three in June. While there are many problems yet unsolved, including the correction of certain deficiencies reported by NAS Patuxent River in respect to carrier operations, it appears that this facility is now definitely "on the track". There is every reason to believe that it could be counted on to be a reliable producer in the future.

To complete the productive record of the plant to date, one additional program should be mentioned. When the plant at Allentown was ready for occupancy in October, 1943, there were little productive work that could be accomplished. At this time Curtiss was coming into volume production on its SB2C (Helldiver) and the first production models of this plane required considerable modifications to make them satisfactory for combat use. The Allentown facility was well suited to this type of work, and it was also believed that work of this kind would constitute valuable training for the workers at Allentown as they had had no previous experience in aircraft manufacture. Accordingly, the Consolidated contract was amended so as to provide that Consolidated would modify up to 125 Helldivers in the coming months. In February, 1944 this modification work commenced, and by 21 September, 1944, when the last SB2C left the plant a total of 120 had been modified. These were composed partly of SB2Cs from the Curtiss-Columbus plant and partly of the Army Version, the A-25, from Curtiss' St. Louis facility.

In conclusion, it appears fairly safe to say that the remainder of the TBY program, the 156 planes yet to be completed, should be delivered on the revised schedule without undue difficulty. This schedule calls for final deliveries in October, 1945.
MEMORANDUM

From: Contract Financing Branch.
To: Director Production Division.

Subj: TBY Revised Production Program - Estimated cost of.

1. Estimated cost to cut off in Oct. 1945 at 312 equivalent airframes (250 airframes plus 25% spares). Does not include GFE. $99,825,000

2. Breakdown of total cost as stated in paragraph 1.

<table>
<thead>
<tr>
<th>Item</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accumulated cost to May 31</td>
<td>59,600,000</td>
</tr>
<tr>
<td>Estimated cost for June</td>
<td>4,000,000</td>
</tr>
<tr>
<td>Estimated cost for period July through October 1945</td>
<td>13,725,000</td>
</tr>
<tr>
<td>Estimated termination charges</td>
<td>10,000,000</td>
</tr>
<tr>
<td>Facilities</td>
<td>9,000,000</td>
</tr>
<tr>
<td>Estimated Fee</td>
<td>3,500,000</td>
</tr>
</tbody>
</table>

3. Breakdown of estimated cost (as stated in paragraph 2) of completing 312 equivalent airframes, July through October 1945.

<table>
<thead>
<tr>
<th>Month</th>
<th>Acceptances of Airplanes</th>
<th>Subcontracted Parts and Materials</th>
<th>Operation of Allentown Plant</th>
<th>Employees</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>To 30 June</td>
<td>94</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>July</td>
<td>40</td>
<td>$3,500,000</td>
<td>$1,800,000</td>
<td>$4,500</td>
</tr>
<tr>
<td>Aug.</td>
<td>40</td>
<td>2,000,000</td>
<td>1,500,000</td>
<td>3,875</td>
</tr>
<tr>
<td>Sept.</td>
<td>40</td>
<td>1,000,000</td>
<td>1,300,000</td>
<td>3,325</td>
</tr>
<tr>
<td>Oct.</td>
<td>36</td>
<td></td>
<td>1,000,000</td>
<td>2,500</td>
</tr>
<tr>
<td>Total</td>
<td>250</td>
<td>$6,500,000</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

25% Spares (62 airframes) $1,625,000

Classification (canceled) (changed to unclassified) by authority of

Naval Air 2545

on 6/29/45

(Date) (Signature) (Rank)

Bureau of Aeronautics
Department of the Navy
4. Breakdown of cost (as stated in paragraph 2) of facilities at Allentown. (Plancor's 1644, 1592, 1715 with Consolidated-Vultee, Mack Truck and Branch Motor Express)

<table>
<thead>
<tr>
<th></th>
<th>Estimated Cost</th>
<th>Estimated Recovery</th>
</tr>
</thead>
<tbody>
<tr>
<td>Land</td>
<td>$425,000</td>
<td></td>
</tr>
<tr>
<td>Airport &amp; Misc.</td>
<td>$5,835,658</td>
<td>$1,750,000</td>
</tr>
<tr>
<td>construction</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Building &amp; Improvements</td>
<td>3,925,102</td>
<td>1,222,337</td>
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<tr>
<td>Machinery &amp; Equipment</td>
<td>2,444,677</td>
<td>719,668</td>
</tr>
<tr>
<td>Unallocated funds</td>
<td>719,668</td>
<td>$3,692,005</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>§9,000,000</strong></td>
<td></td>
</tr>
</tbody>
</table>

5. Breakdown of unit cost of GFE.

- Engine: $22,000
- Propeller: $2,500
- Radio and Radar: $16,000
- Instruments: $3,000
- Armament: $13,000
- Miscellaneous: $2,000

Total per airplane: $58,500

250 equivalent airplanes: $14,625,000

/s/N.S.Ludington
Lieut. Comdr. USNR

Classification (censored) (changed to unclassified) by authority of

MajGen 2545

on 6/29/55

(Date) (Signature) (Rank)

Bureau of Aeronautics
Department of the Navy