Howard Aircraft Corporation

5301 WEST SIXTY-FIFTH STREET, CHICAGO, ILLINOIS, U.S.A.

JAN 7 12 48 PM '43 RECEIVED

RECEIVED 1-7-43

JAN 7 1943

AIRCRAFT AIRWORTHINESS
MID-WEST BRANCH

January 13, 1942

Serial No. 2493
Assigned F.M.B.
Ack.
Ans. 1-12-43
To note
File
Cross Refs.

Mr. Wm. H. Weeks, Acting Chief
Aircraft Engineering Branch, Midwest
Department of Commerce
Civil Aeronautics Administration
9th Floor, City Hall
Kansas City, Missouri

Dear Mr. Weeks: Subject: Howard DGA-15P Airplane

This is in reply to your letter of December 4 regarding fuel system tests on the subject airplane. Reference to the DGA-18 fuel system is answered by separate letter.

Inasmuch as a definite proposal was made in Mr. Aldrich's letter of July 14, 1942, to C.A.A. in Washington (Attention:A297) regarding placarding the fuel system, it was not thought necessary to submit a formal Service Bulletin until the proposal was approved. Since it appears, however, that the approval is being held up pending receipt of the Service Bulletin, we are enclosing herewith Service Bulletin No. 3.

We trust that this bulletin will clarify this situation and permit release of the required information to Howard owners.

We are also submitting herewith for approval Drawing F-685, which gives fuel system operating information supplied with the present NH-1.

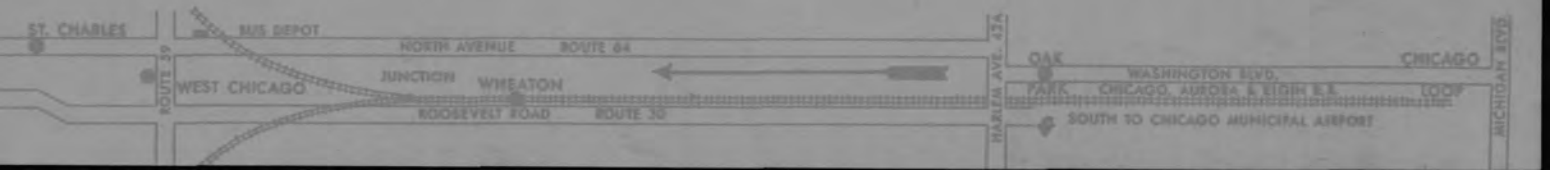
Yours very truly,

HOWARD AIRCRAFT CORPORATION

[redacted]

Wm. J. Perfield
Chief Engineer

WJP:PL
Enclosures



Not approved
RWB
1-12-43

HOWARD AIRCRAFT CORPORATION
5301 WEST 65th ST.
CHICAGO, ILL.

SERVICE BULLETIN NO. 3 MODEL DGA ~~15P~~ 8, 9, 11, 12, 15 series DATED: JAN. 13, 1943

SUBJECT: Possible Fuel System Failure and Placarding of Fuel System.

TO: All Howard Owners.

Tests conducted indicate that under certain low fuel conditions, the engine ~~may have the tendency to~~ suddenly cut-out ~~following a simulated~~ during a take-off ~~climb and enter a glide~~ and/or climb in ~~a semi-stalled condition.~~ best angle of climb condition.

Each airplane should be checked to determine the fuel gauge indications when the airplane is in a level flight position and also in a 3 point position, with 18 gallons of fuel in the main tank. The indicated readings should be stamped in the blank spaces provided on the placard shown on Figure No. 1.

1. With the airplane in a 3 point position, on level ground, drain the front and main tank and refill accurately with 18 gallons of fuel respectively. Observe the fuel gauge reading and stamp the indicated reading in the blank space provided on the placard (Min. Fuel for Take-off ____) as shown on Figure No. 1.

2. To simulate level flight conditions:
Remove the side panel near the tail wheel assembly.
Place a small level on the lower longeron adjacent to the tail wheel assembly.
Raise the tail of the airplane until a level position is indicated.

With the airplane in level flight position and with 18 gallons of fuel in the main tank, observe the fuel gauge reading. Stamp the indicated reading in the blank space provided on the placard (Min. Fuel for Take-off (3 Pt. Pos.)____) as shown on Figure No. 1.

3. The placard shall be installed in full view of the Pilot in the position shown on Figure No. 1. Drill four #44 (.086) holes using the placard as a template. Secure the placard by means of four #2994 Tinnerman Speed Clips in the manner shown on Figure No. 1.

Plat approved
[redacted]

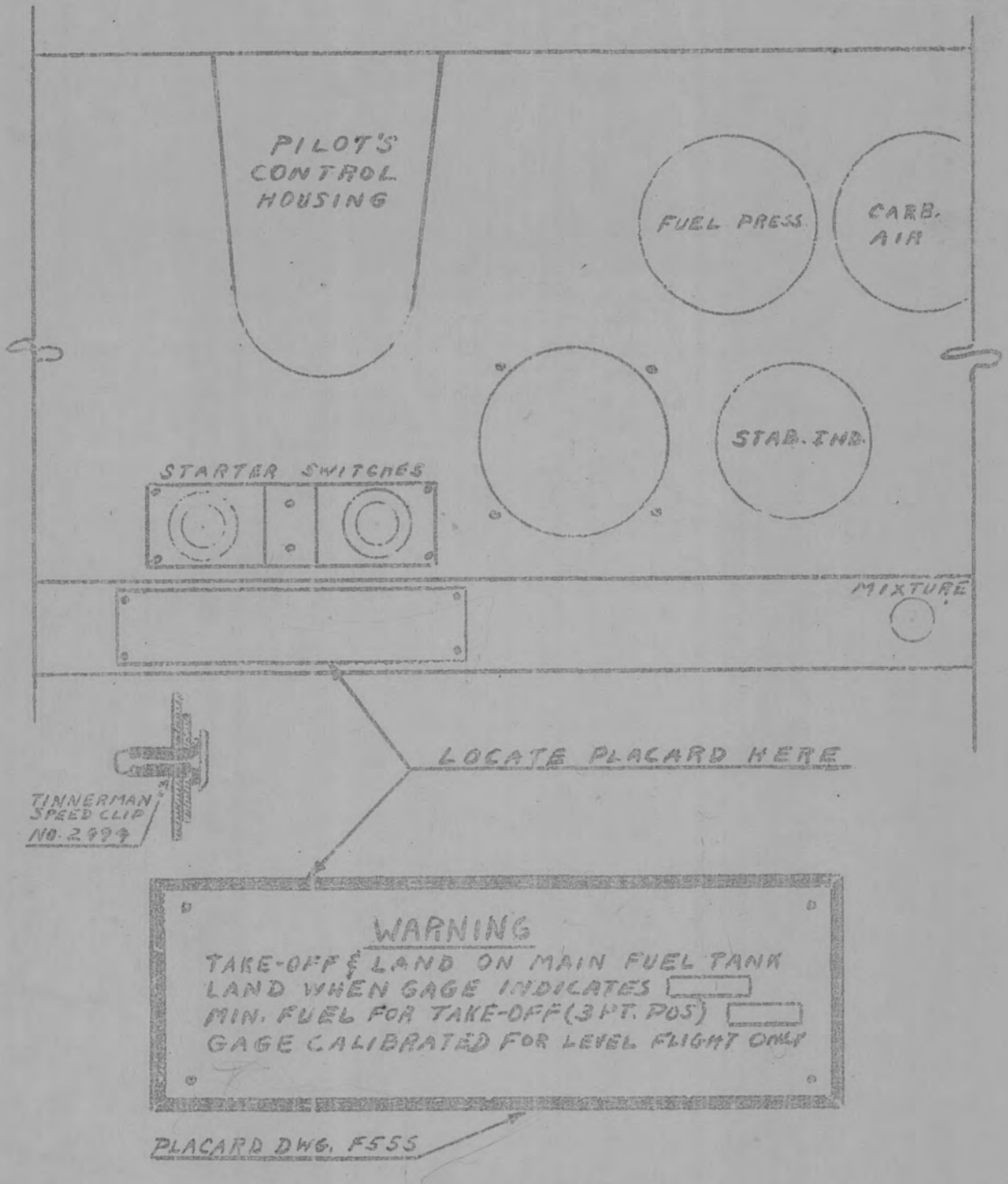


FIG NO 1

Howard Aircraft Corporation

5301 WEST SIXTY-FIFTH STREET, CHICAGO, ILLINOIS, U.S.A.

1-9-43

January 13, 1942

Mr. Wm. H. Weeks, Acting Chief
Aircraft Engineering Branch, Midwest
Department of Commerce
Civil Aeronautics Administration
9th Floor, City Hall
Kansas City, Missouri

Dear Mr. Weeks: Subject: Howard DGA-15P Airplane

This is in reply to your letter of December 4 regarding fuel system tests on the subject airplane. Reference to the DGA-18 fuel system is answered by separate letter.

Inasmuch as a definite proposal was made in Mr. Aldrich's letter of July 14, 1942, to C.A.A. in Washington (Attention:A297) regarding placarding the fuel system, it was not thought necessary to submit a formal Service Bulletin until the proposal was approved. Since it appears, however, that the approval is being held up pending receipt of the Service Bulletin, we are enclosing herewith Service Bulletin No. 3.

We trust that this bulletin will clarify this situation and permit release of the required information to Howard owners.

We are also submitting herewith for approval Drawing P-685, which gives fuel system operating information supplied with the present NH-1.

Yours very truly,

HOWARD AIRCRAFT CORPORATION

WJP:PL
Enclosures

Wm. J. Perfield
Chief Engineer

HOWARD AIRCRAFT CORPORATION
5301 WEST 65th ST.
CHICAGO, ILL.

not approved [redacted] 1-12-1943

SERVICE BULLETIN NO. 3 MODEL DGA-15P DATED: JAN. 13, 1943

SUBJECT: Possible Fuel System Failure and Placarding of Fuel System.

TO: All Howard Owners.

Tests conducted indicate that under certain low fuel conditions, the engine may have the tendency to cut-out following a simulated take-off from a semi-stalled condition.

Each airplane should be checked to determine the fuel gauge indications when the airplane is in a level flight position and also in a 3 point position, with 18 gallons of fuel in the main tank. The indicated readings should be stamped in the blank spaces provided on the placard shown on Figure No. 1.

1. With the airplane in a 3 point position, on level ground, drain the main tank and refill accurately with 18 gallons of fuel. Observe the fuel gauge reading and stamp the indicated reading in the blank space provided on the placard (Min. Fuel for Take-off ____) as shown on Figure No. 1.

2. To simulate level flight conditions:
Remove the side panel near the tail wheel assembly.
Place a small level on the lower longeron adjacent to the tail wheel assembly.
Raise the tail of the airplane until a level position is indicated.

With the airplane in level flight position and with 18 gallons of fuel in the main tank, observe the fuel gauge reading. Stamp the indicated reading in the blank space provided on the placard (Min. Fuel for Take-off (3 Pt. Pos.)____) as shown on Figure No. 1.

3. The placard shall be installed in full view of the Pilot in the position shown on Figure No. 1. Drill four #44 (.086) holes using the placard as a template. Secure the placard by means of four #2994 Tinnerman Speed Clips in the manner shown on Figure No. 1.

Not approved
[redacted]
1-12-43

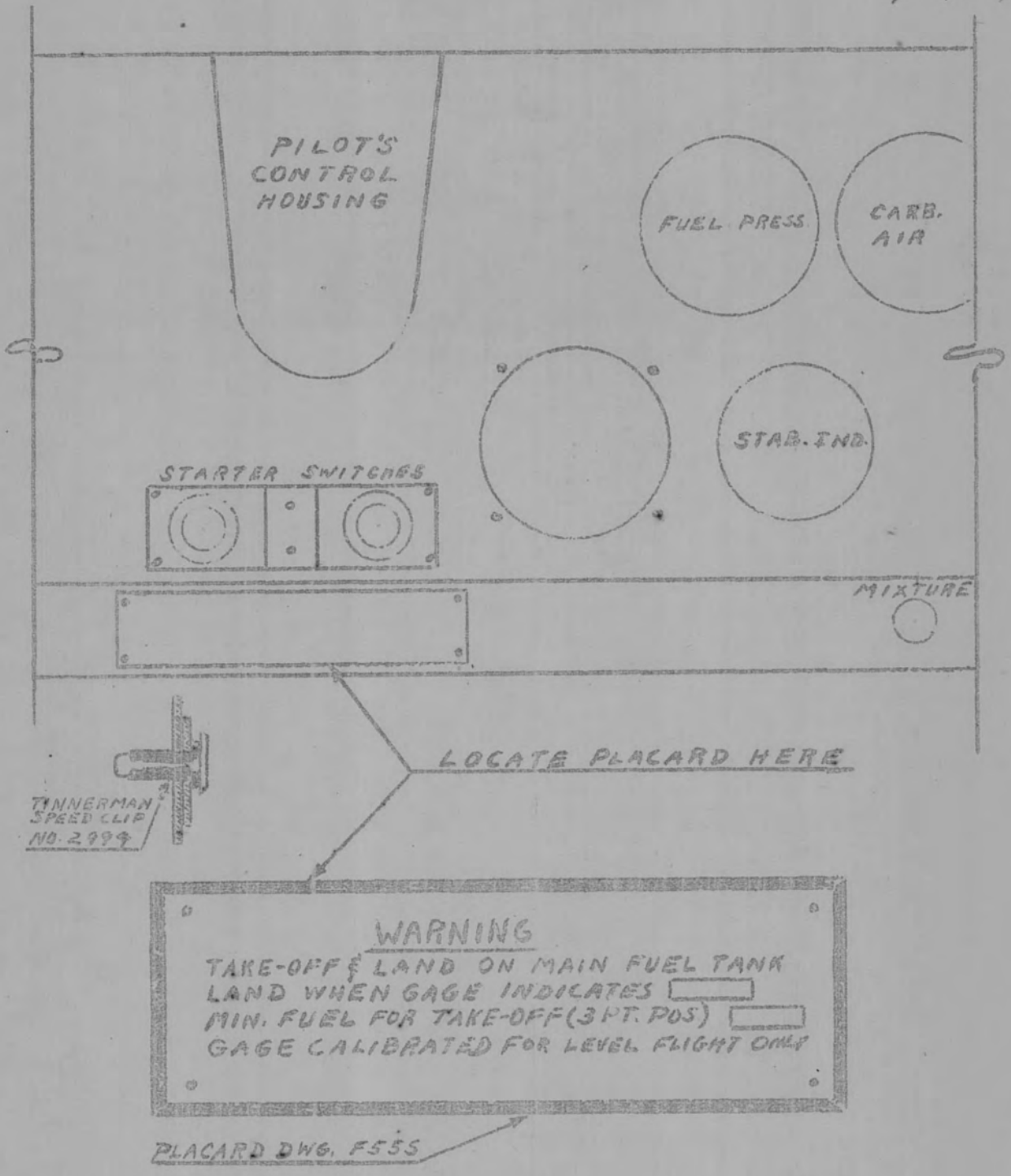


FIG NO 1

Howard Aircraft Corporation

5301 WEST SIXTY-FIFTH STREET, CHICAGO, ILLINOIS, U.S.A.

1-7-43

January 13, 1942

Mr. Wm. H. Weeks, Acting Chief
Aircraft Engineering Branch, Midwest
Department of Commerce
Civil Aeronautics Administration
9th Floor, City Hall
Kansas City, Missouri

Dear Mr. Weeks: Subject: Howard DGA-15P Airplane

This is in reply to your letter of December 4 regarding fuel system tests on the subject airplane. Reference to the DGA-18 fuel system is answered by separate letter.

Inasmuch as a definite proposal was made in Mr. Aldrich's letter of July 14, 1942, to C.A.A. in Washington (Attention:A297) regarding placarding the fuel system, it was not thought necessary to submit a formal Service Bulletin until the proposal was approved. Since it appears, however, that the approval is being held up pending receipt of the Service Bulletin, we are enclosing herewith Service Bulletin No. 3.

We trust that this bulletin will clarify this situation and permit release of the required information to Howard owners.

We are also submitting herewith for approval Drawing F-685, which gives fuel system operating information supplied with the present NH-1.

Yours very truly,

HOWARD AIRCRAFT CORPORATION

WJP:PL
Enclosures

Wm. J. Perfield
Chief Engineer

Not approved
[redacted]
1-12-43

HOWARD AIRCRAFT CORPORATION
5301 WEST 65th ST.
CHICAGO, ILL.

SERVICE BULLETIN NO. 3 MODEL DGA-15P DATED: JAN. 13, 1943

SUBJECT: Possible Fuel System Failure and Placarding of Fuel System.

TO: All Howard Owners.

Tests conducted indicate that under certain low fuel conditions, the engine may have the tendency to cut-out following a simulated take-off from a semi-stalled condition.

Each airplane should be checked to determine the fuel gauge indications when the airplane is in a level flight position and also in a 3 point position, with 18 gallons of fuel in the main tank. The indicated readings should be stamped in the blank spaces provided on the placard shown on Figure No. 1.

1. With the airplane in a 3 point position, on level ground, drain the main tank and refill accurately with 18 gallons of fuel. Observe the fuel gauge reading and stamp the indicated reading in the blank space provided on the placard (Min. Fuel for Take-off ____) as shown on Figure No. 1.

2. To simulate level flight conditions:
Remove the side panel near the tail wheel assembly.
Place a small level on the lower longeron adjacent to the tail wheel assembly.
Raise the tail of the airplane until a level position is indicated.

With the airplane in level flight position and with 18 gallons of fuel in the main tank, observe the fuel gauge reading. Stamp the indicated reading in the blank space provided on the placard (Min. Fuel for Take-off (3 Pt. Pos.)____) as shown on Figure No. 1.

3. The placard shall be installed in full view of the Pilot in the position shown on Figure No. 1. Drill four #44 (.086) holes using the placard as a template. Secure the placard by means of four #2994 Tinnerman Speed Clips in the manner shown on Figure No. 1.

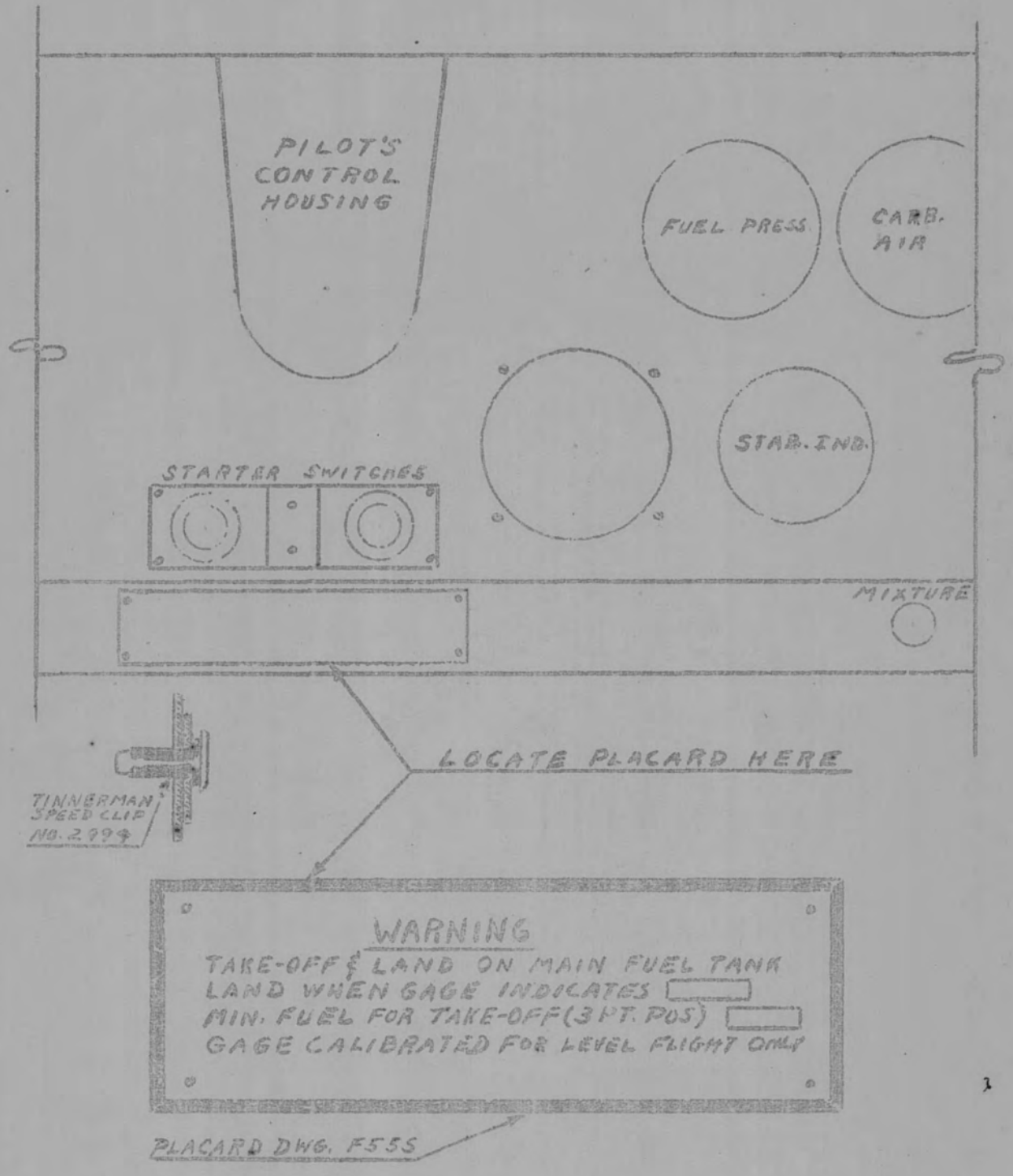

PILOT'S CONTROL HOUSING
FUEL PRESS.
CARB. AIR
STAB. IND.
STARTER SWITCHES
MIXTURE
LOCATE PLACARD HERE
TINNERMAN SPEED CLIP NO. 2994
WARNING
TAKE-OFF & LAND ON MAIN FUEL TANK
LAND WHEN GAGE INDICATES
MIN. FUEL FOR TAKE-OFF (3 PT. POS)
GAGE CALIBRATED FOR LEVEL FLIGHT ONLY
PLACARD DWG. F555

FIG NO 1

IN REPLY ADDRESS
REGIONAL MANAGER
DEPARTMENT OF COMMERCE
CIVIL AERONAUTICS ADMINISTRATION
608 S. Dearborn St.
Chicago, Illinois

DEPARTMENT OF COMMERCE
CIVIL AERONAUTICS ADMINISTRATION

IN REPLY REFER TO
FILE

RECEIVED
JAN 18 1943
CIVIL AERONAUTICS ADMINISTRATION
KANSAS CITY MISSOURI
AIRWORTHINESS
JAN 18 10 29 AM '43

January 16, 1943

Regional Manager
Civil Aeronautics Administration
Department of Commerce
City Hall Building
Kansas City, Missouri

290

[redacted]

Serial No. 2577
Assigned F M B
Ackn.
An[redacted]-1-26-43
F[redacted] 15
File
Cross Refs.

Attention: 5-290

Subject: Howard DGA-15P - Malfunctioning of Fuel System

Reference: (1) Your letter dated January 12, 1943, relative fuel system placard for Howard DGA-15P.

(2) Your letter to Mr. William J. Perfield dated January 12, 1943.

(3) Our letter to you dated August 14, 1942.

(4) Our letter to A-297 dated July 14, 1942.

References (1) and (2) appear to be incomplete in regard to one phase of the subject difficulty, i.e. the recommended placard will not preclude engine failure if strictly observed. As previously reported in References (3) and (4), the fuel gauge indicates a considerably higher quantity in the three-point attitude than in the level flight attitude. For this reason, a red mark as indicated in Reference (2) would be correct only for level flight attitudes.

The above matter has been discussed with Mr. Perfield of the Howard Aircraft Corporation, and it is our understanding that they will submit a Service Bulletin to install a red mark as indicated in Reference (2) and in addition a yellow mark for the corresponding indicator reading in the three-point attitude, with an appropriate placard to cover both operating conditions. Since it is our understanding that a placard of this type was originally proposed by the Howard Aircraft Corporation to cover all conditions and all models, it is believed no Aircraft Inspection Request will be necessary.

[redacted]

K. R. Aldrich
Chief, Flight Engineering and Factory
Inspection Branch

cc: A-297, Insp. Long,
Shapter
Howard Aircraft Corp.,Mr.Perfield

608 S. Dearborn St.
Chicago, Illinois

January 16, 1943

Regional Manager
Civil Aeronautics Administration
Department of Commerce
City Hall Building
Kansas City, Missouri

Attention: 5-290

Subject: Howard DGA-15P - Malfunctioning of Fuel System

Reference: (1) Your letter dated January 12, 1943, relative fuel system placard for Howard DGA-15P.

(2) Your letter to Mr. William J. Perfield dated January 12, 1943.

(3) Our letter to you dated August 14, 1942.

(4) Our letter to A-297 dated July 14, 1942.

References (1) and (2) appear to be incomplete in regard to one phase of the subject difficulty, i.e. the recommended placard will not preclude engine failure if strictly observed. As previously reported in References (3) and (4), the fuel gauge indicates a considerably higher quantity in the three-point attitude than in the level flight attitude. For this reason, a red mark as indicated in Reference (2) would be correct only for level flight attitudes.

The above matter has been discussed with Mr. Perfield of the Howard Aircraft Corporation, and it is our understanding that they will submit a Service Bulletin to install a red mark as indicated in Reference (2) and in addition a yellow mark for the corresponding indicator reading in the three-point attitude, with an appropriate placard to cover both operating conditions. Since it is our understanding that a placard of this type was originally proposed by the Howard Aircraft Corporation to cover all conditions and all models, it is believed no Aircraft Inspection Request will be necessary.

Original Signed by
K. R. Aldrich

K. R. Aldrich
Chief, Flight Engineering and Factory
Inspection Branch

cc: A-297, Insp. Long,
Shapter
Howard Aircraft Corp., Mr. Perfield

5-290

290

[redacted]

January 16, 1943

file Howard DGA-15P

To Route IMB 3 cc

Chief, Flight Engineering and Factory Inspection Branch

Inspector F. L. Long, Chicago (Clearing) Office

Installation of Pratt & Whitney Engines in Howard DGA-15P Aircraft

Enclosures:

(A) Copy of ltr from Chief, Aircraft Engineering Branch (Midwest) to W. J. Perfield, Howard Aircraft Corporation, dated January 11, 1943.

(B) Copy of E. S. Newberger, Howard Aircraft Corporation, ltr dated January 15, 1943, to Chief, Aircraft Engineering Branch (Midwest).

The discrepancies noted in enclosure (A) are felt to be of minor importance although technically they are correct. It is felt that the information contained in enclosure (B) will clear this matter for all concerned.

Apparently we are all at fault for missing the engine model designation as noted in A.I.R. M-7-3.

This office concurs with second paragraph, enclosure (B), in that since the engines in question are furnished by the U. S. Navy for installation in Navy aircraft, even though these engines differ from the commercial version, they were approved in this aircraft.

Since the Service is aware of their own operating difficulties and the extreme urgency for this particular type of aircraft, it is felt that some leniency should be granted to the company in this matter and the Power Plant Section of the Aircraft Engineering Branch be so advised.

[redacted]

Original Signed by
F. L. Long

F. L. Long
Senior Aircraft Factory Inspector

CIVIL AERONAUTICS AUTHORITY

9th [illegible] City Hall

IN REPLY REFER TO
FILE
641.3 - Howard Engines
DGA-8, 9, 11, 12 and 15 Series

Kansas City, Missouri
January 25, 1943

Mr. William J. Perfield, Chief Engineer
Howard Aircraft Corporation
5301 West 65th Street
Chicago, Illinois

Dear Mr. Perfield:

This refers to your Mr. Arens' predated letter of January 26, which forwarded Howard Service Bulletin No. 3 dated January 26 relative to the fuel system of airplanes of the subject models.

Service Bulletin No. 3 is considered satisfactory as of this date.

It is deemed advisable to revise the present fuel placard note of the aircraft specifications for the subject models as follows:

DGA-15 Series:

A. Fuel tanks and selector valves must be placarded as shown in pertinent weight and balance reports. Fuel tank placard on bottom of fuselage near drain plugs must state, "Remove both drain plugs from each fuel tank and drain water and sediment at least every 25 hours."

B. The fuel gauge placard on the instrument panel:

(1) At the bottom of the gauge must state, "Only level flight authorized on any tank with fuel below red mark."

(2) Directly below the starter buttons must state, "Take-off prohibited on any tank with fuel below yellow mark."

DGA-8, 9, 11, 12:

A. Fuel tanks and fuel selector valves must be placarded as shown in pertinent weight and balance report.

B. The fuel gauge placard on the instrument panel:

(1) At the bottom of the gauge must state, "Only level flight authorized on any tank with fuel level below red mark."

(2) Directly below the starter buttons must state, "Take-off prohibited on any tank with fuel below yellow mark."

In addition, it is considered necessary to issue an Airworthiness Maintenance Inspection Note (Special Note) as follows:

"The fuel system must be placarded according to Howard Aircraft Corporation Service Bulletin No. 3 dated January 26."

Please forward a revised drawing F-685. Also forward a drawing of the fuel tank and selector valve placard which is installed adjacent to these items of equipment.

Very truly yours,

Wm. H. Weeks
Chief, Aircraft Engineering Branch

cc: A-290
3-297 (2)
Haley

FJBondor:2598:ML

[redacted]

IN REPLY REFER TO

FILE

CIVIL AERONAUTICS AUTHORITY

641.3 - Howard Engines
DGA-8, 9, 11, 12, 15 Series

9th F[illegible]ity Hall

Kansas City, Missouri
January 25, 1943

Civil Aeronautics Administration
Department of Commerce
Washington, D. C.

Attention: Aircraft Engineering Division, A-290

Subject: Revision of Aircraft Specification for Howard DGA-8, 9, 11, 12, 15 Series

Reference: (a) MWB letter to Howard dated January 25 (attached)

Please revise the Aircraft Specification for Howard DGA-8, 9, 11, and 12 Aircraft (pages 115, 116, and 117 of Inspection Handbook, Chapter XVIII) as follows:

Note ---

A. Fuel tanks and fuel selector valves must be placarded as shown in pertinent weight and balance report.

B. The fuel gauge placard on the instrument panel:

(1) At the bottom of the gauge must state, "Only level flight authorized on any tank with fuel level below red mark."

(2) Directly below the starter buttons must state, "Take-off prohibited on any tank with fuel below yellow mark."

Please revise the Aircraft Specification for Howard DGA-15 Series Aircraft (A-1432) as follows. It is suggested that this revision be delayed pending our transmittal of other specification changes pertinent to the model DGA-15-P at a standard weight of 4,500 pounds.

Note 2 -

A. Fuel tanks and selector valves must be placarded as shown in pertinent weight and balance report. Fuel tank placard on bottom of fuselage near drain plugs must state, "Remove both drain plugs from each fuel tank and drain water and sediment at least every 25 hours."

B. The fuel gauge placard on the instrument panel:

(1) At the bottom of the gauge must state, "Only level flight authorized on any tank with fuel level below red mark."

(2) Directly below the starter buttons must state, "Take-off prohibited on any tank with fuel below yellow mark."

Please issue the following Airworthiness Maintenance Inspection Note (Special Note) on all of the subject model aircraft:

"The fuel system must be placarded according to Howard Aircraft Corporation Service Bulletin No. 3 dated January 26."

Original Signed By,
O. C. LeBoutillier

O. C. LeBoutillier
Superintendent,
Safety Regulation

cc: Maloy

FMBondor:ML

CIVIL AERONAUTICS AUTHORITY

IN REPLY REFER TO

FILE

9th Floor, City Hall
Kansas City 6, Missouri

July 6, 1943

Civil Aeronautics Administration
Department of Commerce
Washington, D. C.

Attention: Aircraft Engineering Division, A-290

Subject: Aircraft Specification A-717-1, Howard DGA-15 Series

Forwarding of the subject Aircraft Specification A-717-1 to Howard Aircraft Corporation is being withheld pending your comments concerning the omission of Part B of Note No. 3. It is believed this omission was an oversight and the note should include the following part.

B. Fuel gauge placard on the instrument panel.

(1) At the bottom of the gauge, must state, "Only level flight authorized on any tank with fuel level below red mark."

(2) Directly below the starter button, must state, "Take-off prohibited on any tank with fuel below yellow mark."

Please advise concerning this matter.

O. C. LeBoutillier
Superintendent
Safety Regulation

By Original Signed By
Wm. H. Weeks
Wm. H. Weeks

BGWilcox:Ref.5265:GD

FMB

Howard DGA-15P, W. J

9th Floor City Hall

Kansas City, Missouri
July 21, 1942

Regional Manager
Department of Commerce
Civil Aeronautics Administration
22nd Floor Transportation Bldg.
608 South Dearborn
Chicago, Illinois

Attention: Flight Engineering & Factory Inspection Branch, A-237

Subject: Howard DGA-15P. Malfunctioning of Fuel System.

References: (a) Your letter to A-237 dated July 16.
(b) Our letter dated November 3, 1941.
(c) Aircraft Specification A-1432.

The review of Reference (a) in conjunction with Reference (c) together with a number of Weight and Balance Reports on the DGA-15 series airplanes reveals the following:

1. The weight and balance consideration requires placards covering the sequence that the fuel is to be used from the tanks in flight as follows:

(1) With the front tank (30 gallon capacity) and the main tank (38 gallons capacity) installed the following placards are required:

(a) At filler cap,
"Fill front tank first, main tank last"
(b) At fuel selector valve,
"Use main tank first, front tank last"

(2) With the front, main and rear (38 gallons capacity) tanks installed the following placards are necessary:

(a) At filler cap,
"Fill main tank first, rear tank second, front tank last"
(b) At fuel selector valve,
"Use front tank first, rear tank second, main tank last"

(3) With the main tank and the rear tank installed the following placards are necessary:

(a) At filler cap,
"Fill main tank first, rear tank last"
(b) At fuel selector valve,
"Use rear tank first, main tank last"

(4) When combination rear seat and folding bed is provided the following placards are necessary:

(a) At filler cap,
"Fill main tank first, front tank second, rear tank last"
(b) At fuel selector valve,
"Use rear tank first, front tank second, main tank last"

II. It will be noted from the above placards that the placard which the Howard Aircraft Corporation agreed to send out will, in the case of some airplanes of the subject models, conflict with the placards necessary from the weight and balance consideration.

III. Since from the airworthiness viewpoint it is important to operate aircraft at all times within the established c.g. range, it is imperative that the placard placed on the fuel system shall not introduce a hazard which might be equally as great or greater than the malfunctioning of the engine with low fuel supply in the fuel tank.

IV. The review of the entire fuel system installation in the Howard DGA-15 series model airplane together with the weight and balance consideration indicates that the following is a rational solution; however, there may be others equally as good:

(1) Re-calibrate the fuel gauge for each tank with particular attention given to the marking at various levels below the 1/2 full level of the tank. The fuel gauge should not indicate gasoline in the tank, with the airplane in any normal flight attitude, when the tank is empty; however, it may indicate empty when there is usable gasoline in the tank.

(2) Determine the gasoline level necessary in each tank to assure normal engine operations during simulated take-off and climb at the best angle of climb on each tank.

(3) Mark the dial of each fuel tank gauge as shown on the enclosed sketch and place a placard beneath the gauges as follows:

"Do not take-off with gasoline supply in critical range"

V. The Howard Aircraft Corporation should then prepare a proposed Service Bulletin outlining the procedure the operators of airplanes of the DGA-15 series should follow in calibrating and marking the fuel gauge dials.

VI. In view of the discussions your Messrs. Aldrich and Long have had with the manufacturer relative to the Service Bulletin, and to preclude misunderstandings at this stage, it is suggested that your office take up the points outlined in this letter with the manufacturer and witness and conduct whatever additional flights are necessary to preclude fuel system failures in service. However, the proposed Service Bulletin should be forwarded to this office for examination and comment prior to being sent out to the operators.

VII. A comparison of the results of the main tank fuel gauge calibration (Item 2 of Reference (a)) with the results as listed on Form 338 dated December 10, 1939 (DGA-15P) reveals:

July 14, 1942		December 10, 1939		
Gauge Reading	Actual Gasoline in tank	Gauge Reading	Actual Gasoline in tank	
1/16 full	0 gallons			
1/4 full	15 gallons	1/4 full	25.6 gallons	
7/16 full	20 gallons			
1/2 full	25 gallons	1/2 full	41.9 gallons	
5/8 full	30 gallons			
3/4 full	35 gallons	3/4 full	62.1 gallons	
7/8 full	40 gallons			
Full	47 gallons	full	77.8	(Airplane level 83 (Airplane tail down 88

In view of the magnitude of the discrepancy between the two calibrations, it appears as if the calibration may not have been made on the main tank. If the calibration was conducted on either the front or rear tank we do not understand how either of these could hold 47 gallons because the aircraft specification and technical data file show that the capacity of these tanks is 30 and 35 gallons, respectively. Your comments on this point will be appreciated.

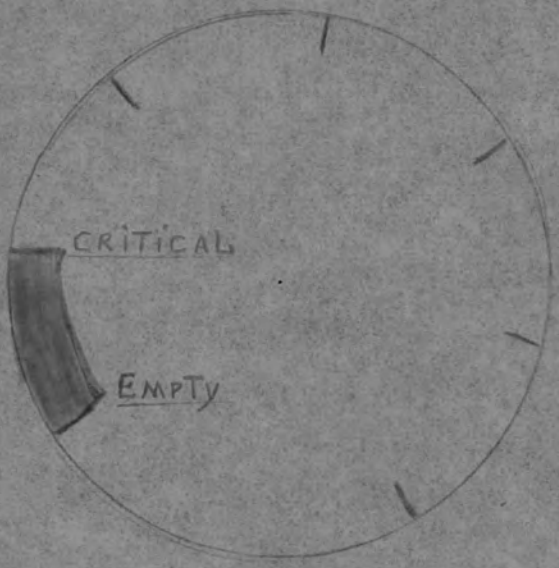
Original Signed By
Wm. H. Weeks

Wm. H. Weeks, Acting Chief
Aircraft Engineering Branch
Mid-West

Enclosure

Copy to: A-297 (2)

FIGondor:MD



Fuel Gauge Dial