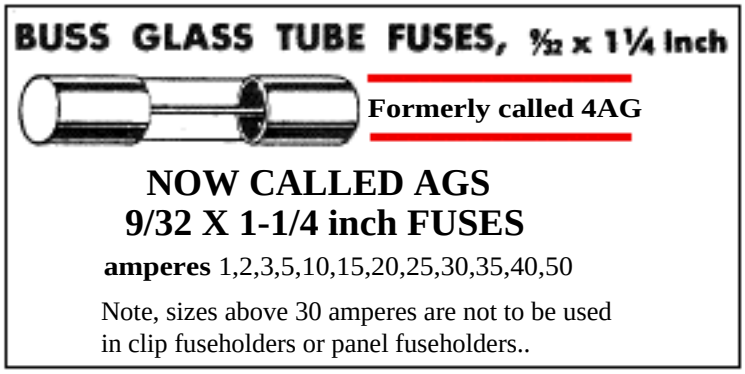
FUSES FOR THE CESSNA 120/140/140A

What they were called then and what they are called today and where to find them.

In the Beginning

The fuse type used in all the planes was identified as a **4AG** type, with the ampacity also listed in its part number in the Cessna parts manual. At one time, the "AG" referred to the main use of the fuses of those type...Auto Glass...but the careful control of size versus number was soon corrupted and no longer could be used to discern features. The **4AG** physical parameters are: 9/32" diameter X 1-1/4" long. From the figure by Buss, note that the **4AG** was discarded a long time ago, more than thirty years, and that is one of the reasons the fuses are so hard to find today. Many retail resources have the equivalents or the re-named types, but they don't know it and so cannot pass along that knowledge when you are searching for "a **4AG**".

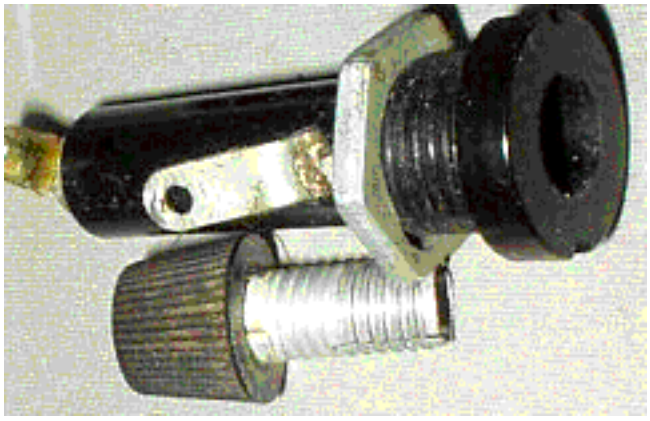


The **4AG**'s became known as **AGS**.

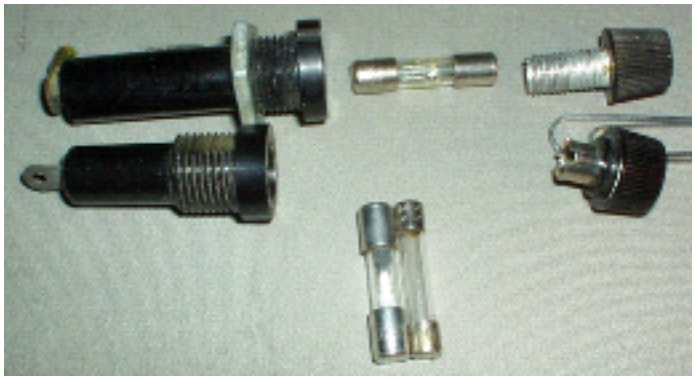
Some of the good news is the listing of the equivalents or replacements near the end of this article, and you can use those when you start calling around for "what was a **4AG**" fuse. More good news is that the much more common fuses which are 1/4" in diameter and 1-1/4" in length is that they can be used in your existing fuse holders and in the new replacement fuseholders. Those fuses are best known as **AGC** type and you can find them in every auto parts store if they still sell parts for American cars.

Fuseholders:

Note the 9/32's diameter of the fuses, because that is what makes the **4AG**'s special. Note, too, the fuseholder features.



This picture illustrates the features of the original fuseholder; a still--usable unit with good detail of the knob end and the attachment nut. The cutout in the attachment nut is to allow it to pass over the side terminal. In our planes, the bus wire was soldered to the end terminal and the power from the fuse to the accessory was soldered to the side terminal. On the right, one that was too well "welded" to itself to come apart the normal way during the plane dissassembly.



The original fuse holder and the new replacement fuse holder are both shown here, with a large paper clip included to indicate scale. Both fuseholders have a spring inside to maintain solid electrical contact of both ends of the fuse terminals. 4AG and AGC fuses are shown for comparison.

The reason the **4AG** knob assembly holds the **4AG** fuses so well is that there are two splits in the corrugated metal tube which allows expansion for the 9/32cds diameter. The **4AG** goes in only as far as the dark section on the corrugated tube. The smaller AGC fuse goes in just beyond the split section and is retained to allow secure loading.

An example of the nut with the cutout is shown along with the original 4AG fuse and a ceramic tube fuse.

The ceramic type is also eligible for use in the planes, identified as MDA if the 1/4 X 1-1/4 inch size or as 4AB if the 9/32 X 1-1/4 inch size and the latter now called ABS as shown in the excerpt from the Bussman catalog.

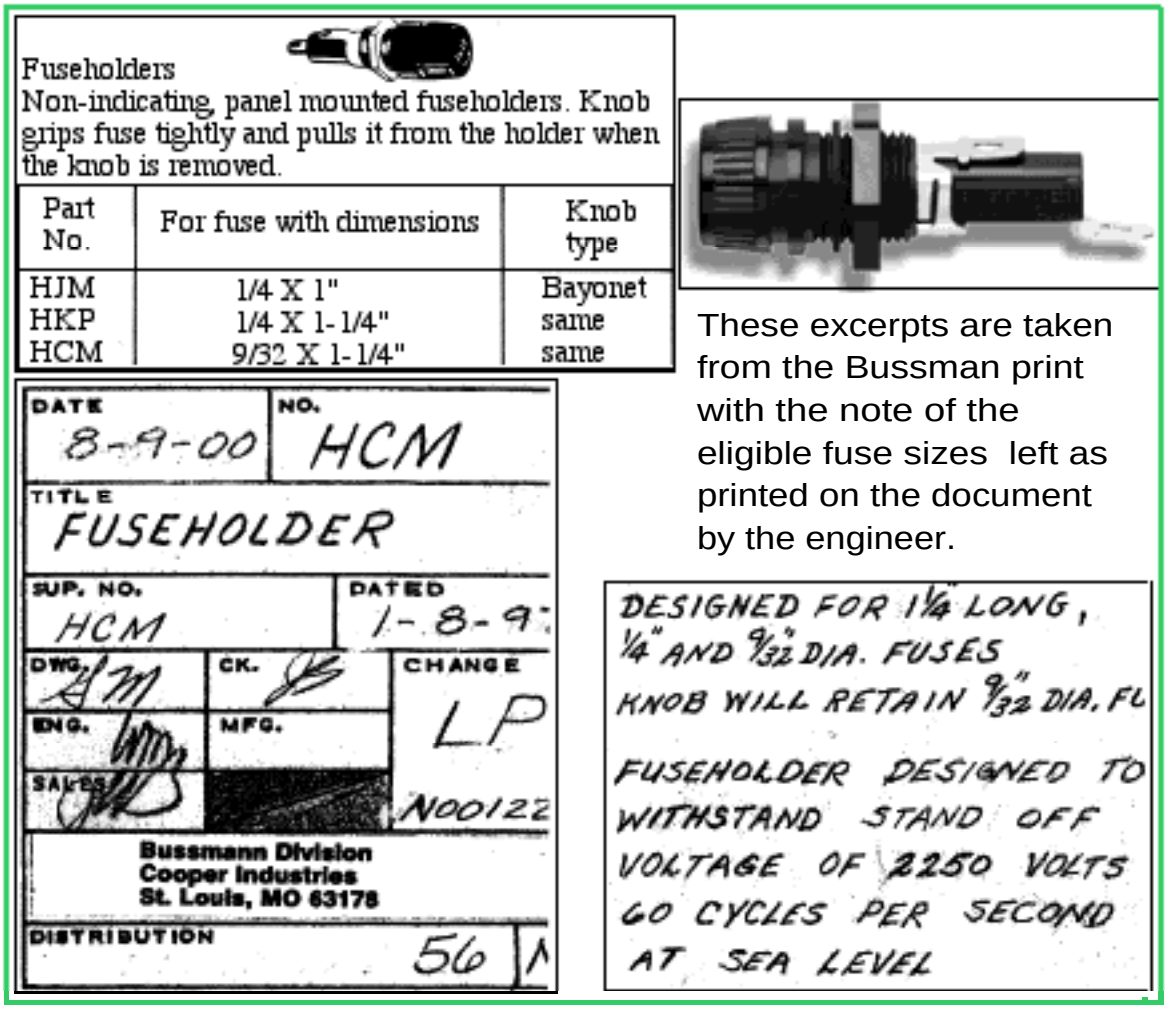
BUSS CERAMIC TUBE FUSES,
9/32 x 1¼ inch

Formerly called 4AB

Voltage	Symbol	Amperes
250 or less	ABS	1, 2, 3, 5, 8, 10, 15 or 20
125 or less	ABS	25 or 30
32 or less	ABS	35 or 40

In the figure above, the ceramic is the white unit on the right with an old **4AG** on the left and a better view of the cutout in the retaining nut of the fuseholders on the planes. The cutout permitted the nut to slide over the side terminal. There is no electrical difference in the ceramic versus the glass tubes, but you cannot simply view the element to determine if the fuse is still good in any except the glass tube types.

The following data from Cooper-Bussman is for the new style fuseholders, with HCM being the model which can handle both the 9/32cds diameter and the 1/4 diameter fuses. I made sure the note telling of the utility of the holders for both sizes was included here.



Fuseholders

Non-indicating, panel mounted fuseholders. Knob grips fuse tightly and pulls it from the holder when the knob is removed.

Part No.	For fuse with dimensions	Knob type
HJM	1/4 X 1"	Bayonet
HKP	1/4 X 1-1/4"	same
HCM	9/32 X 1-1/4"	same

DATE 8-9-00 NO. HCM

TITLE FUSEHOLDER

SUP. NO. HCM DATED 1-8-9

DWG. CK. CHANGE LP

ENG. MFG.

SALES N00122

Bussmann Division
Cooper Industries
St. Louis, MO 63178

DISTRIBUTION 56

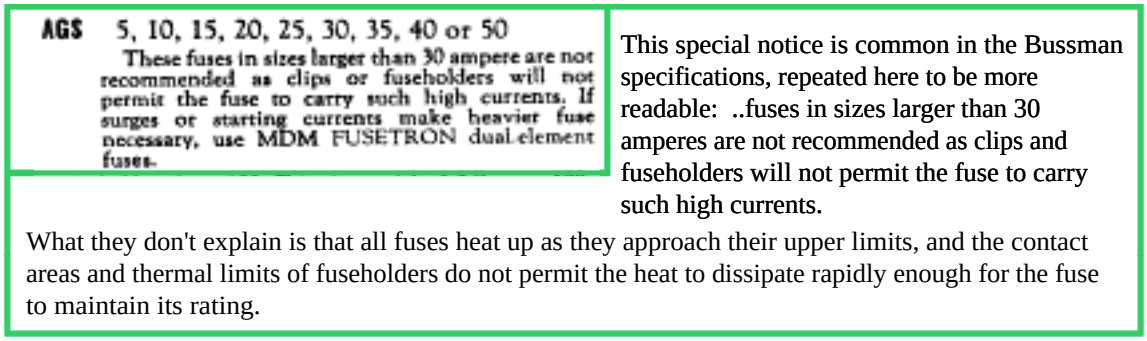
DESIGNED FOR 1¼ LONG,
¼" AND 9/32" DIA. FUSES
KNOB WILL RETAIN 9/32 DIA. FU

FUSEHOLDER DESIGNED TO
WITHSTAND STAND OFF
VOLTAGE OF 2250 VOLTS
60 CYCLES PER SECOND
AT SEA LEVEL

These excerpts are taken from the Bussman print with the note of the eligible fuse sizes left as printed on the document by the engineer.

Limits:

One of the reasons this alert from the first figure is repeated is to accentuate the statement that fuseholders are not to be used for fuses of 30 amps or larger, which means that many planes which were converted to the 35 amp generators should have been changed to a circuit breaker, and all of the 60 amp alternator circuits should be protected by circuit breakers IF the protective device is of greater than 30 amps capacity.



This special notice is common in the Bussman specifications, repeated here to be more readable: ..fuses in sizes larger than 30 amperes are not recommended as clips and fuseholders will not permit the fuse to carry such high currents.

What they don't explain is that all fuses heat up as they approach their upper limits, and the contact areas and thermal limits of fuseholders do not permit the heat to dissipate rapidly enough for the fuse to maintain its rating.

Replacements:

NOTE...WHERE THE 4AG TYPE WENT: The 4AG type became AGS as noted old listing. Many!! sources will not know that, so be prepared to ask for the new type listings as noted in the following.

Was **4AG** by Busstron, now **AGS**, glass tube
Was **4AB** by Busstron, now **ABS**, ceramic tube but sizes and ratings the same
MDM by Busstron, slow blowing, glass tube, 9/32" X 1-1/4"
MDC by Busstron, slow blowing same as **MDM**, ceramic tube
3AG fuses are now **AGC** type

Fusetron dual element glass tube, slow blowing, 9/32cds X 1-1/4 inches, called type **MDM** in sizes 4 , 5, 6, 8, 10, 15, 20, 25, and 30 amp sizes.

Fusetron dual element ceramic tube slow blowing fuses are 9/32cds X 1-1/4 inches. Called Type **MDC** in ampacities of 4, 5, and up to 30.

Buss ceramic tube fuses 9/32cds X 1-1/4 inches now called type **ABS** in ampacities of 1,2,3,5,8,10,15,20, 25,30,35, 40. Formerly called **4AB**. Note that fuses in sizes larger than 30 amperes are not recommended because clips or fuseholders will not permit the fuse to carry such high currents.

The **AGS** fuses have Slow Blow counterparts called out as MDM and they could be used. And the **AGC** type fuses have a slow blow mate listed as MDL, both shown in the chart which follows.

STANDARD TYPE PART NO.	SLOW BLOW TYPE PART NO.	AMPERES	DIMENSIONS (INCHES)
AGC-1/4		1/4	
AGC-1/2	MDL-1/2	1/2	
AGC-3/4		3/4	
AGC-1	MDL-1	1	
AGC-1 1/2		1 1/2	
AGC-2	MDL-2	2	
AGC-3	MDL-3	3	
AGC-4		4	
AGC-5	MDL-5	5	1/4 x 1 1/4
AGC-7 1/2		7 1/2	
AGC-10	MDL-10	10	
AGC-15	MDL-15	15	
AGC-20	MDL-20	20	
AGC-25		25	
AGC-30		30	
AGC-35		35	
AGS-1	MDM-1	1	
AGS-2	MDM-2	2	
AGS-3	MDM-3	3	
AGS-5	MDM-5	5	
AGS-10	MDM-10	10	
AGS-15	MDM-15	15	9/32 x 1 1/4
AGS-20	MDM-20	20	
AGS-25		25	
AGS-30		30	
AGS-35		35	
AGS-40		40	
AGS-50		50	

This table is from the FAA's <u>new</u> AC43, item 11-3.

TABLE 11-3. DC wire and circuit protector chart.

Wire AN gauge copper	Circuit breaker amp.	Fuse amp.
22	5	5
20	7.5	5
18	10	10
16	15	10
14	20	15
12	30	20
10	40	30
8	50	50
6	80	70
4	100	70
2	125	100
1		150
0		150

Sources:
From the net, this: Ha! I know the answer! Fuses unlimited is where I get them from. I think they're in the SF East Bay somewhere. Luckily they have a website: http://www.fusesunlimited.com/ I just checked their inventory and they have all the sizes that the 120/140 uses. Price was reasonable, so I ordered extra...

http://www.meci.com/ has 4AG fuses

http://www.socalfuse.com/ maybe....offers 24 hour service and there is an 800 number on the site

Electrical Products: sales@electricalproducts.com
Yes usually have all amperages in stock, if you need a quote advise quantity of each & amperage you need. We will need a Fax number to quote, we do not quote via email.
Alan So then I asked supersalesman Alan what I had to do to get the fax number?
From: sales@electricalproducts.com Friday, June 13, 2003 4:31 PM Subject: 4AG fuses?
You may send the quote via Email or Fax to 954-429-1511. We will need your Fax number to return the quote. Alan

EDMO DISTRIBUTORS, INC. www.edmo.com, Spokane, WA @ 800/235-3300,
BILMAR AVIONICS INC., Kissimmee, FL @ 404/935-9466,
EASTERN AVIONICS INTERNATIONAL, Punta Gordo, FL @ 800/628-2667 or 941/637-8585,
GULF COAST AVIONICS, Tampa, FL @ 863/709-9714,
H S ELECTRONICS, Hialeah, FL @ 305/821-5802.

Buckles and Smith 800 822 5090 Livermore, CA

Gull electronics Oakland CA 510-834 5888

Cooper Bussman won't tell you where to find them (they say "all distributors") but if you want to contact Cooper Bussmann: fusebox@buss.com fusetech@buss.com
For more urgent requests please call 636-527-3877 to speak with a Customer Service Representative.
Bussman claims that they still make all sizes of the fuses

Littelfuse made the fuse holders and fuses as well.

Note that the Buss and Bussman brand names tend to confuse many as to how to call out an electrical bus; bus means "common carrier", which is what an electrical bus is, but buss means to kiss, to osculate if you get fancy. Bus is so often mis-spelled that a reader might assume that I have mis-spelled it here.

There is significant confusion about what a “slo-blo” does and whether you can use it instead of a “normal blow” or a “fast-blo”. All of the fuses I listed are normal blow or slow blow because, for our usage, they are the same. Note in the specs for the normal fuse and the slow blowing fuse the: “carry 110 percent (forever), opens at 135 percent within one hour”?

All fuses are made to carry their rated load and a bit more “forever” provided the heat is removed as expected by the maker. A slow blow fuse acts like a normal fuse as long as the current through it does not exceed its rating, but if the slow blow is used in a circuit which has a much higher momentary starting current (such as an incandescent lamp or a motor), the second element in the example carries that load without allowing the rated link to blow.

9/32 X 1-1/4 Inch FUSES

BUSS GLASS TUBE FUSES, 9/32 x 1¼ Inch

Formerly called 4AG

Test specification — carry 110%, open at 135% within 1 hour except 35 and 40 ampere which open at 300% in 2 to 4 seconds when tested in a standard 30 ampere test circuit.

FUSETRON dual-element glass tube — slow blowing fuses

9/32 x 1¼ inch

1/8 to 2 amp. 2½ to 30 amp.

These fuses avoid needless blows from starting currents or surges. They have a fuse link which operates only on very high overloads or short-circuits — they have a thermal cutout which functions on low overloads — the thermal cutout cannot operate quickly at any load, hence long time-lag is obtained. Yet protection is afforded against short-circuits or continued overloads.

Test specification — carry 110%, open at 135% within 1 hour.
Approximate blowing time: at 200% load 25 seconds.
at 300% " 8 "
at 500% " 3 "

Neal

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