

MIL-I-5392A(USAF)
14 December 1956
 Superseding
 MIL-I-5392 (USAF)
 29 June 1950

MILITARY SPECIFICATION

INDICATOR, AIRSPEED, PITOT STATIC, TYPE K-3

1. SCOPE

1.1 This specification covers one type of pitot static, sensitive, maximum allowable speed, range 40 to 400 knots, airspeed indicator, designated Type K-3.

2. APPLICABLE DOCUMENTS

2.1 The following documents, of the issue in effect on date of invitation for bids, form a part of this specification:

SPECIFICATIONS

Federal

TF-C-595 Colors; (For), Ready-Mixed Paints

Military

MIL-I-5415 Indicators; Airspeed, Pitot and Static Pressure, General Specification For
 MIL-L-25142 Luminescent Material, Fluorescent

STANDARDS

Military

MIL-STD-129 Marking For Shipment and Storage
 MIL-STD-130 Identification Marking of U. S. Military Property
 MS33550 Case, Instrument, 2-3/4 Dial, Without Sump, Standard Dimensions For

PUBLICATION

Air Force-Navy Aeronautical Bulletin

405 Storage Life - Aeronautical Articles

(Copies of documents required by contractors in connection with specific procurement functions should be obtained from the procuring activity or as directed by the contracting officer.)

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3. REQUIREMENTS

3.1 QUALIFICATION.- The indicator furnished under this specification shall be a product which has been tested and has passed the qualification tests herein.

3.2 GENERAL SPECIFICATION.- The requirements of MIL-I-5415 apply as requirements of this specification with the exceptions and additions called out herein. When the two specifications conflict, this specification shall govern.

3.3 DESIGN AND CONSTRUCTION

3.3.1 The indicator shall conform to figures 1 and 2.

3.3.2 POINTERS.- The pointers shall be in accordance with figure 3. The shaded portion of the speed pointer shall be finished in fluorescent-luminescent material in accordance with MIL-L-25142, type I or III as applicable. The unshaded portion of the speed pointer shall be finished in color no. 3725 of TT-C-595. The non-indicating end of the pointer shall not obscure the drum.

3.3.2.1 The two pointers shall be concentric with the maximum speed pointer closest to the dial, and the indicated airspeed pointer nearest the cover glass.

3.3.3 DIALS.- The dial and drum shall conform to figure 2. The drum shall make one revolution for each 100-knot change in airspeed and shall be geared to the indicated airspeed pointer so that the proper relationship is maintained at all speeds. The portion of the drum directly below the triangular index shall be flush with the dial.

3.3.3.1 A triangular index conforming to figure 2 shall be provided to show the Mach number to which the instrument is adjusted. The Mach numbers shall be placed on the dial as shown on figure 2 and mechanism shall be arranged so that values of Mach number between the numerals may be set by linear interpolation between the numerals.

3.4 WEIGHT.- The weight of the indicator shall not exceed 1.8 pounds.

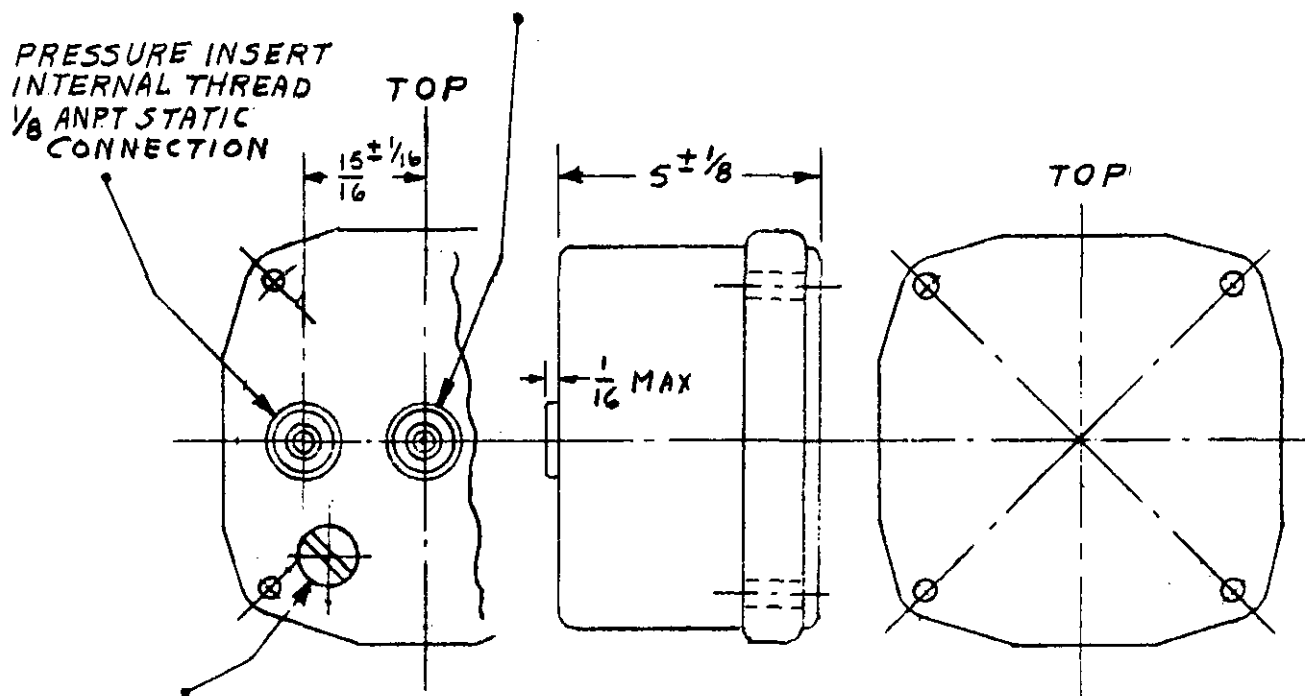
3.5 LIMITATION OF POINTER MOVEMENT

3.5.1 AIRSPEED POINTER.- The airspeed pointer movement shall be limited by suitable stops in the mechanism in such a way that the pointer will not be permitted to rotate more than 350° of arc clockwise from the "no pressure" position when the indicator is submitted to over-pressure tests. The design of the stops shall be subject to the approval of the procuring activity.

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MEASURE INSERT CENTERED
WITHIN $\frac{1}{16}$ - INTERNAL THREAD
 $\frac{1}{8}$ ANPT PITOT CONNECTION

PRESSURE INSERT
INTERNAL THREAD
 $\frac{1}{8}$ ANPT STATIC
CONNECTION



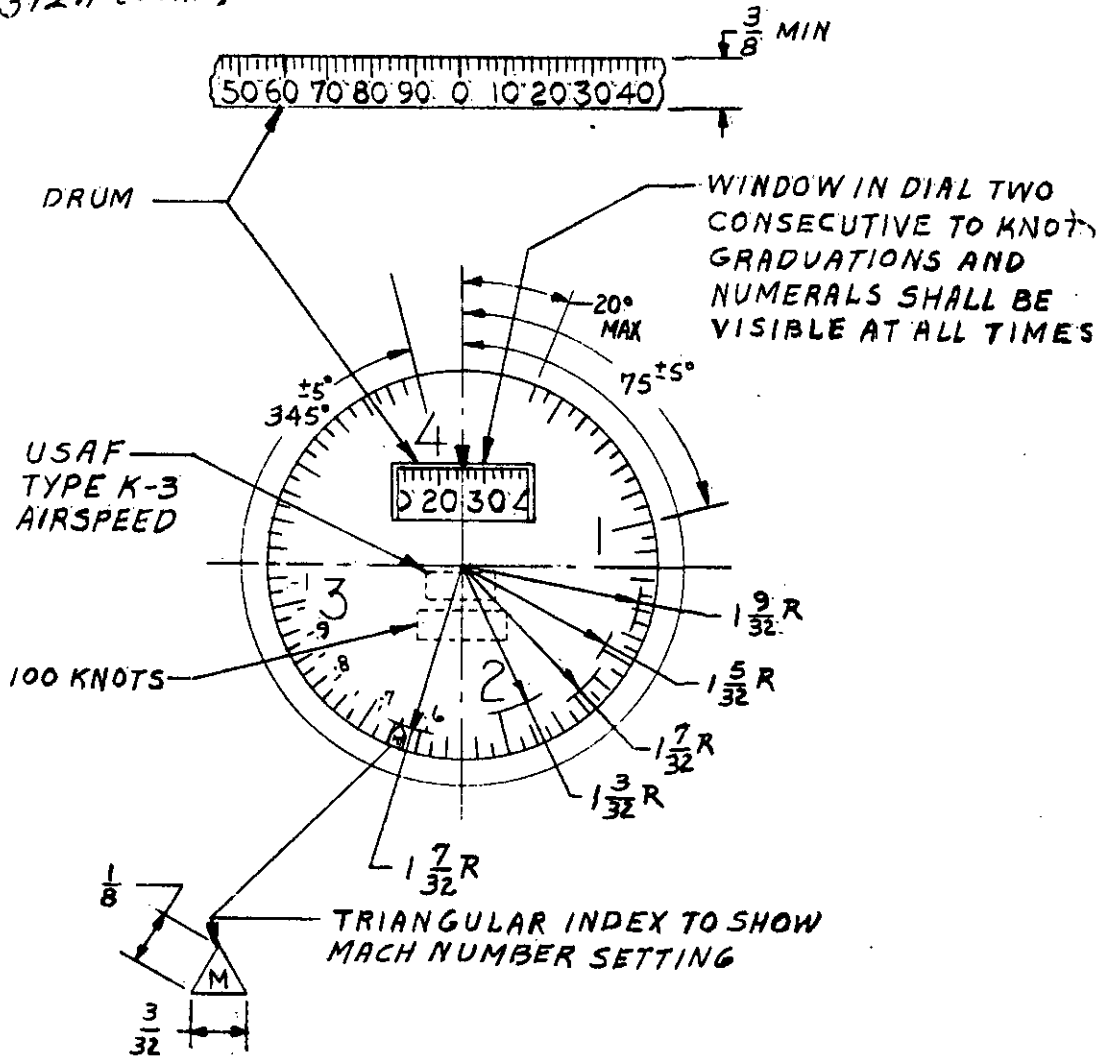
PLUG COVERING MACH NO
ADJUSTMENT MECHANISM
LOCATION OPTIONAL

DIMENSIONS IN INCHES
UNLESS OTHERWISE SPECIFIED
TOLERANCES
FRACTIONS $\pm \frac{1}{64}$

CASE IN ACCORDANCE WITH M533550 EXCEPT AS SHOWN

FIGURE 1.

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ALL GRADUATIONS SHALL BE LINEAR

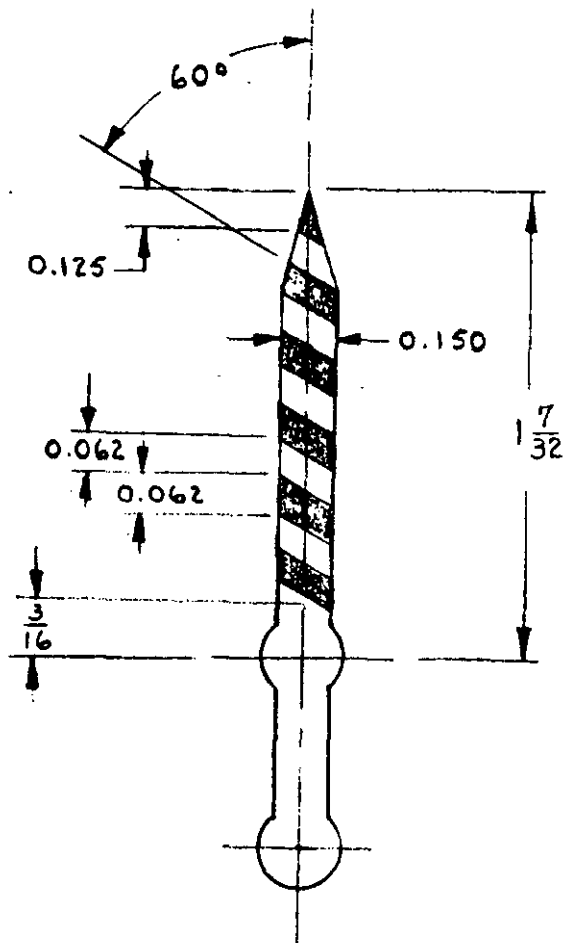
ALL GRADUATIONS ARE PARTIAL RADIAL LINES

DIMENSIONS IN INCHES
UNLESS OTHERWISE SPECIFIED
TOLERANCES
FRACTIONS $\pm \frac{1}{64}$

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FIGURE 2 DIAL

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DIMENSIONS IN INCHES
UNLESS OTHERWISE SPECIFIED
TOLERANCE
FRACTIONS $\pm \frac{1}{64}$
DECIMALS ± 0.005
ANGLES $\pm 0^{\circ} 15'$

FIGURE 3 POINTER

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3.5.2 MAXIMUM SPEED POINTER.- The maximum speed pointer shall be limited by a stop which is adjustable from the front of the indicator by a screw driver slot in the lower left mounting lug. The range of the stop shall be from 100 knots, or less, to 400 knots. The design of this adjustable stop shall be such that it will in no way effect the indication of the pointer when the altitude and Mach number setting are such that the limiting speed will be lower than that set by the adjustable stop.

3.6 MACH NUMBER ADJUSTMENT.- The method of adjustment of the Mach number shall be such that it may be made by removing a plug from the rear of the case and adjusted by use of standard tools. The design of this adjustment shall be subject to the approval of the procuring activity.

3.7 MARKINGS

3.7.1 FLUORESCENT=LUMINESCENT MATERIAL.- The following markings shall be finished in fluorescent=luminescent material, in accordance with MIL-L-25142, type I or III, as applicable. The dimensions of the markings shall be as follows:

	Height or Length Inch $\pm 1/64$	Width of Line or Graduation Inch ± 0.005
Graduations corresponding to numerals and to 50, 150, 250, and 350 knots	As shown on figure 2	0.031
Numerals 1, 2, 3, and 4	5/16 Min.	0.031
5 Knot graduations	As shown on figure 2	0.016
10 Knot graduations	As shown on figure 2	0.016
Triangular index to show drum indication	3/32 on each edge	
Graduations on drum corresponding to numerals	1/8	0.031
2 Knot graduations on drum	3/32	0.016
Numerals on drum	3/16	0.031
Lettering 100 KNOTS	1/8	0.016

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3.7.2 GLOSSY BLACK ENAMEL.- The following markings shall be finished in glossy black, color No. 1770 of TT-C-595. The dimensions of the markings shall be as follows:

	<u>Height or Length</u> <u>Inch $\pm 1/64$</u>	<u>Width of Line</u> <u>or Graduation</u> <u>Inch ± 0.005</u>
Triangular index for Mach number setting	As shown on figure 2	As shown on figure 2
Graduations corresponding to Mach number setting	3/64	0.016
Numerals representing Mach number settings	1/16	0.016

3.7.3 DURABLE DULL BLACK.- The following markings shall be permanently and legibly marked on the dial. These markings, and all other markings not otherwise specified, shall be finished in accordance with color No. 3725 of TT-C-595. The height of the markings shall be as follows:

	<u>Height, Inch</u>
USAF	3/64
TYPE K-3	3/64
AIRSPEED	3/64
Letter M on triangular index	----

3.7.4 VISIBILITY OF DIAL MARKINGS.- All graduations, numerals, pointers and other markings on the dial shall be readable from any point within the frustum of a cone the side of which makes an angle of not less than 30° with the perpendicular to the dial and the small diameter of which is the aperture of the dial.

3.7.5 The back of the case, adjacent to the connections, shall be marked as follows:

P	Pressure connection
S	Static connection
MACH NUMBER ADJUSTMENTS	Mach number adjustment cover

3.8 IDENTIFICATION OF PRODUCT.- Equipment, assemblies, and parts shall be marked for identification in accordance with MIL-STD-130.

4. QUALITY ASSURANCE PROVISIONS

4.1 GENERAL.- The sampling, inspection, and test procedures shall be in accordance with MIL-I-5415.

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4.2 TEST CONDITIONS.- The maximum speed pointer stop shall be adjusted so that the maximum speed pointer will not be stopped until 400 knots is reached.

4.2.1 Whenever tests are specified on the airspeed pointer, the test shall include the airspeed drum.

4.2.2 For the purpose of this specification the "Qualification Tests" of MIL-I-5415 shall be identified herein as "Sampling plan B."

4.3 INDIVIDUAL TESTS

4.3.1 LEAKAGE

4.3.1.1 CASE LEAK.- The indicator shall be subjected to the case leak test specified in MIL-I-5415, except it shall not be subjected to the pressure of 10 inches Hg.

4.3.1.2 DIAPHRAGM CAPSULE.- The diaphragm capsule leak test shall be accomplished only on the airspeed pointer.

4.3.2 MAXIMUM SPEED SCALE ERROR AT ROOM TEMPERATURE.- The maximum speed pointer shall be tested for scale error at the points of the scale indicated by asterisks in table I. The test shall be accomplished by adjusting the Mach number adjustment to the setting listed at the top of table I. During this test the pitot and static connection shall be connected together to a mercury barometer and to sources of vacuum and pressure. The reduction in pressure, as indicated by the barometer, shall be made at a rate corresponding to an increase in altitude of approximately 6000 feet per minute. The scale errors shall not exceed the tolerances specified in table I. This test shall be combined at each Mach number setting with the hysteresis test. An additional tolerance of 1 knot for any two test points will be allowed, except no test point shall exceed 5 knots.

4.3.2.1 HYSTERESIS.- Not more than 15 minutes after the indicator has been subjected to the pressure corresponding to the highest altitude specified in table I, the pressure shall be increased at a rate of corresponding to a decrease in altitude of approximately 3000 feet per minute until the pressure corresponding to 30,000 feet is reached. The indicator shall remain at this pressure for at least 5 minutes, but not more than 15 minutes before the test reading is taken. After the reading has been taken, the pressure shall be further increased at the above rate until the pressure corresponding to 10,000 feet is reached. The indicator shall remain at this pressure for at least 1 minute, but not more than 10 minutes before a test reading is taken. After the reading has been taken, the pressure shall be further increased at the above rate until atmospheric pressure is reached. The reading of the maximum speed pointer at either of the 2 test points shall not differ from the corresponding reading, with decreasing pressure, by more than 2 knots.

TABLE I

Altitude 1000 Ft.	Mach 0.6		Mach 0.7		Mach 0.8		Mach 0.9		Mach 1.0	
	Airspeed Knots	Tolerance Knots	Airspeed Knots	Tolerance Knots	Airspeed Knots	Tolerance Knots	Airspeed Knots	Tolerance Knots	Airspeed Knots	Tolerance Knots
0			400*	4	400*	4	400*	4	400*	4
5	364	4	400	4	400	4	400	4	400	4
10	333*	4	390*	4	400*	4	400*	4	400*	4
15	303	4	356	4	400	4	400	4	400	4
20	275*	3	323*	3	373*	3	400*	4	400*	4
25	248	3	292	3	337	3	384	3	400	3
30	223**	3	262*	3	303*	3	346*	3	390**	3
35	199	3	235	3	272	3	310	3	350	3
40	177*	3	209*	3	242*	3	277*	3	312*	3
45	157	3	186	3	216	3	247	3	279	3
50	140*	3	165*	3	192*	3	220*	3	248**	3
55	124	4	147	4	171	4	195	4	221	4
60	110**	5	131*	5	152*	5	174*	5	197*	5

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4.3.2.2 AFTER EFFECT.- Not less than 1 minute and not more than 5 minutes after the completion of the maximum speed scale error at room temperature and hysteresis test, the maximum speed pointer shall have returned to its original reading, corrected for any change in atmospheric pressure, within 3 knots.

4.3.3 FRICTION MAXIMUM SPEED POINTER.- The indicator shall be tested for friction at alternate test points marked with an asterisk in table I beginning with the first asterisk. The pressure shall be decreased to bring the pointer to the desired reading and held constant while the two readings are taken, the first before the indicator is tapped, and the second after the indicator is tapped. The difference between any two readings shall not exceed the tolerance specified in table II. The pointer shall move smoothly while the pressure is varied uniformly without vibration of the indicator. This test may be combined with the test for scale errors.

4.3.4 POSITION ERROR, INDICATED AIRSPEED AND MAXIMUM SPEED POINTERS.- The pointer reading, taken while the indicator is held in any desired position, and while it is being tapped, shall not differ from its reading when held in normal operating position, by more than the amount specified in table II. At least one of these positions shall be at approximately 45° with the horizontal, simulating a 45° climb or dive or both. This test shall be conducted at the test points marked with a double asterisk in tables I and III. This test may be combined with the test specified in 4.3.3.

4.4 SAMPLING PLAN A

4.4.1 LOW TEMPERATURE.- The indicator shall be tested at low temperature as specified in MIL-I-5415, except that the test shall be conducted at alternate test points marked with an asterisk in tables I and II beginning with the first asterisk. The scale errors in this test shall not exceed the tolerances specified in tables I and III by more than 2 knots. During and after this test, the maximum airspeed pointer stop adjustment shall operate properly. The hysteresis and after effect tests shall not be repeated at low temperature.

4.4.2 HIGH TEMPERATURE.- The indicator shall be tested at high temperature as specified in MIL-I-5415, except that the test shall be conducted at alternate test points with an asterisk in tables I and II beginning with the first asterisk. The scale errors in this test shall not exceed the tolerance specified in tables I and III by more than 2 knots. During and after this test, the maximum airspeed pointer stop adjustment shall operate satisfactorily. The hysteresis and after tests shall not be repeated at high temperature.

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TABLE II

TESTS	TOLERANCES AND TEST POINTS
Position error test Airspeed pointer Maximum speed pointer	 3 Knots 3 Knots
Friction test Maximum speed pointer Airspeed pointer	 3 Knots 3 Knots
Vibration error Mach number setting Altitudes Airspeeds	 0.6 0 and 20,000 feet 100 and 300 Knots
Maximum Vibration (either pointer) Variation from original position (either pointer)	 2 Knots 2 Knots
Vibration Failure Test altitude Test airspeed Mach number setting Tolerance	 20,000 feet 350 Knots 0.8 2 Knots
Overpressure test Static connection Pitot connection Test points, Altitude Airspeeds Tolerance	 6 inches water 10 inches Hg 0 and 20,000 feet 100 and 300 Knots 2 Knots
Seasoning test, tolerance	2 Knots
Aging test	3 Knots
Zero position of drum Tolerance	 25 Knots ±10
Damping test The time required for pointer to travel from 200 Knot graduation to the 40 knot graduation shall be 1.0 second Tolerance	 +1.0 -0.5 second

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TABLE III

SPEED KNOTS	TOLERANCE KNOTS	SPEED KNOTS	TOLERANCE KNOTS
40	3.0	230	3.0
50	2.0*	240	3.0
60	2.0**	250	3.0
70	2.0	260	3.0**
80	2.0	270	3.0
90	2.0	280	3.0
100	2.0**	290	3.0
110	2.0	300	4.0**
120	2.0*	310	4.0
130	2.0*	320	4.0
140	2.5	330	4.0
150	2.5*	340	4.0
160	2.5	350	4.0**
170	2.5	360	4.0
180	2.5**	370	4.0
190	2.5	380	4.0
200	3.0**	390	4.0
210	3.0	400	5.0**
220	3.0*		

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4.4.3 VIBRATION ERROR.- The indicator shall be subjected to the vibration error test specified in MIL-I-5415, except that the Mach number setting shall be that specified in table II and the maximum amplitude of pointer vibrations and the pointer variation, from their original positions, shall not exceed the tolerances specified in table II.

4.4.4 MAXIMUM POINTER STOP TEST.- The indicator shall be disconnected from external sources of vacuum or pressure and adjusted to 1.0 Mach number, the stop mechanism tested for range by turning the screw in the lower left mounting lug to determine the limits of adjustment. The adjustment shall operate smoothly throughout the range of 400 to at least 100 knots on the airspeed scale. No damage or loosening in the mechanism shall result from this test.

4.4.5 DRUM-POINTER RELATIONSHIP.- The indicated airspeed pointer shall be set on the graduation and the drum indication noted. The difference between the respective readings of the drum and pointer shall not differ by more than 2 knots. This test shall be at the points marked with a double asterisk in table III.

4.5 SAMPLING PLAN B

4.5.1 GROUP I.- One group of samples shall be subjected to the following test:

4.5.1.1 LOW TEMPERATURE.- The indicator shall be subjected to the low temperature test specified in MIL-I-5415, except that the scale errors shall not exceed the tolerances specified for the routine low temperature tests.

4.5.2 GROUP II.- The second group of samples shall be subjected to the following test:

4.5.2.1 VIBRATION FAILURE.- The indicator shall be subjected to the vibration failure test specified in MIL-I-5415, except that the Mach number setting, the differential pressure, and altitude shall be as specified in table II. The difference between the indication of the pointers at the beginning and at the end of the 3-hour vibration period shall not exceed the tolerance specified in table II.

5. PREPARATION FOR DELIVERY

5.1 GENERAL.- The indicator shall be packaged, packed, and marked for shipment in accordance with MIL-I-5415 and as specified herein.

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5.2 MARKING OF SHIPMENTS.- Interior packages and exterior shipping containers shall be marked in accordance with MIL-STD-129. The nomenclature shall be as follows:

Indicator, Airspeed, Pitot Static, Type K-3

5.2.1 REINSPECTION MARKING.- The reinspection date markings shall be in accordance with ANA Bulletin 405.

6. NOTES

6.1 INTENDED USE.- The Type K-3 airspeed indicator covered by this specification is intended to indicate the airplane's speed and the maximum allowable speed as set by the Mach number adjustment at the rear of the case. This is accomplished by the use of two pointers.

6.2 ORDERING DATA.- Procurement documents should specify the following:

- a. Level of packaging and packing desired.
- b. Specify whether sampling plan B is to be omitted.

6.3 QUALIFICATION.- With respect to products requiring qualification, awards will be made only for such products as have, prior to the bid opening date, been tested and approved for inclusion in the applicable qualified products list whether or not such products have actually been so listed by that date.

6.3.1 The attention of suppliers is called to this requirement, and manufacturers are urged to arrange to have the products that they propose to offer to the Federal Government tested for qualification in order that they may be eligible to be awarded contracts or orders for the products covered by this specification. Information pertaining to qualification of products covered by this specification may be obtained from:

Commander
Wright Air Development Center
Attn: WCLC
Wright-Patterson Air Force Base, Ohio

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