

REPORT NO: ST32-23R-63  
 WEPTASK NO: RAV09P003  
 PROBLEM NO: 27  
 DATE: 28 Jun 1963

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 APPROVED FOR MAILING

SIGNATURE *C.M. Baker* DATE *8 July*

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**NATC REPORT OF TEST RESULTS**

AD 669901

FROM: Commander, Naval Air Test Center

TO: Chief, Bureau of Naval Weapons

WEPTASK	PROBLEM ASSIGNMENT	EFFORT LEVEL	AIRCRAFT BUONO
RAV09P003	27	Normal	

PROJECT TITLE  
 Flight Test and Evaluation of ASTEK Instrument Corporation Large Numeral Drum-Pointer Altimeters, Type A0009 20101 and Type B0001 22107; Final Report

DATES OF TESTS	LOCATION OF TEST	COGNIZANT BUWEPS DIVISION
3-4-63 to 6-21-63	NATC	Inst Displays & Landing Aids (R1AV-9)
NATC PROJECT OFFICER/ENGINEER	NATC DIVISION	COGNIZANT BUWEPS ENGINEER
CAPT C. M. Baker, USMC	Service Test	ICDR H. G. Heininger

ENCLOSURES  
 PHOTOGRAPHS     DRAWINGS     TABLES     CURVES   

RESULTS (Introduction, Results and Discussion)

1. The type A0009 20101 altimeter, enclosure (1), figure 1, was installed in P-3A airplane BuNo 148889, TF-9J airplane BuNo 142441, and F-8D airplane BuNo 147044. The type B0001 22107 altimeter, enclosure (1), figure 2, was installed in F-4A airplane BuNo 146819. The altimeters were similar in operation and presentation. Scales, numeral size and pointer size were identical. The B0001 altimeter was integrally lighted and incorporated a counter-type barometric setting scale; the A0009 altimeter was post lighted and contained the window and dial-type barometric setting scale.

2. The A0009 and B0001 altimeters were evaluated as follows:

Altimeter	Acft	No. of Pilots	Flights	Flight Hours	Instrument Hours
A0009	P-3A	16	20	183.1	57.5
	TF-9J	3	5	8.3	5.2
	F-8D	4	8	16.0	2.2
B0001	F-4A	6	12	20.8	5.6

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3. Test flights included climbs, dives, penetrations, pull-ups, instrument approaches, radar intercepts, and aerobatic maneuvers in smooth and turbulent air in an altitude range of 0 to 50,000 ft, an airspeed range of 0 to 690 KIAS, and a Mach range of 0 to 2.0 IMN.

4. Evaluation of the A0009 and B0001 altimeters indicated that:

a. Readability (size and clarity of pointer and numerals) was satisfactory; however, the pointer hand partially obscured the one-thousand- and ten-thousand-foot digits when positioned within the 650- to 800-ft range as shown in enclosure (1), figure 3.

b. Interpretability of the altimeters was unsatisfactory; reading errors of one thousand feet and ten thousand feet were frequent. Portions of as many as four digits were visible on the numeral drum at some altitudes (enclosure (1), figure 4) making interpretation difficult and significantly increasing comprehension time. Movement of the thousand-foot drum, as a direct function of pointer displacement, facilitated the monitoring of altitude change and interpretation of indicated altitude. The drum feature was desirable, but the presentation of independently rotating digits for the multiple digit readout was unsatisfactory.

c. Barometric pressure-setting provisions were satisfactory on both altimeters; however, the direct digital readout type provided in the B0001 altimeter was distinctly superior.

d. Both integral lighting of the B0001 altimeter and post lighting of the A0009 altimeter were satisfactory.

5. The B0001 altimeter, installed in F-4A BuNo 146819, was subjected to four field carrier arrestments to airplane limit load factor and three field catapult launches to within 0.7 g of airplane limit load factor (6.1 g). Results of these tests were satisfactory.

6. No malfunctions developed on either altimeter during the course of the evaluation.

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7. Installation time and procedures for the A0009 altimeter in the P-3A, TF-9J and F-8D airplanes were comparable to currently used altimeters. Installation of the B0001 altimeter in the F-4A airplane was identical in procedure except a pigtail on the airplane wiring was required to adapt the lighting plugs to the indicator. The pigtail was constructed of three ten inch leads, one Amphenol plug #AN3106A-10SL-3S-(c) and one Amphenol plug #AN3100A-10SL-3P. Installation time required for the B0001 altimeter was 0.5 man-days.

8. Counter-pointer altimeters presently in use characteristically exhibit pointer sticking or hang-up tendencies during one-thousand-foot altitude transitions. The A0009 and B0001 altimeters showed no sticking tendencies; pointer transit was smooth.

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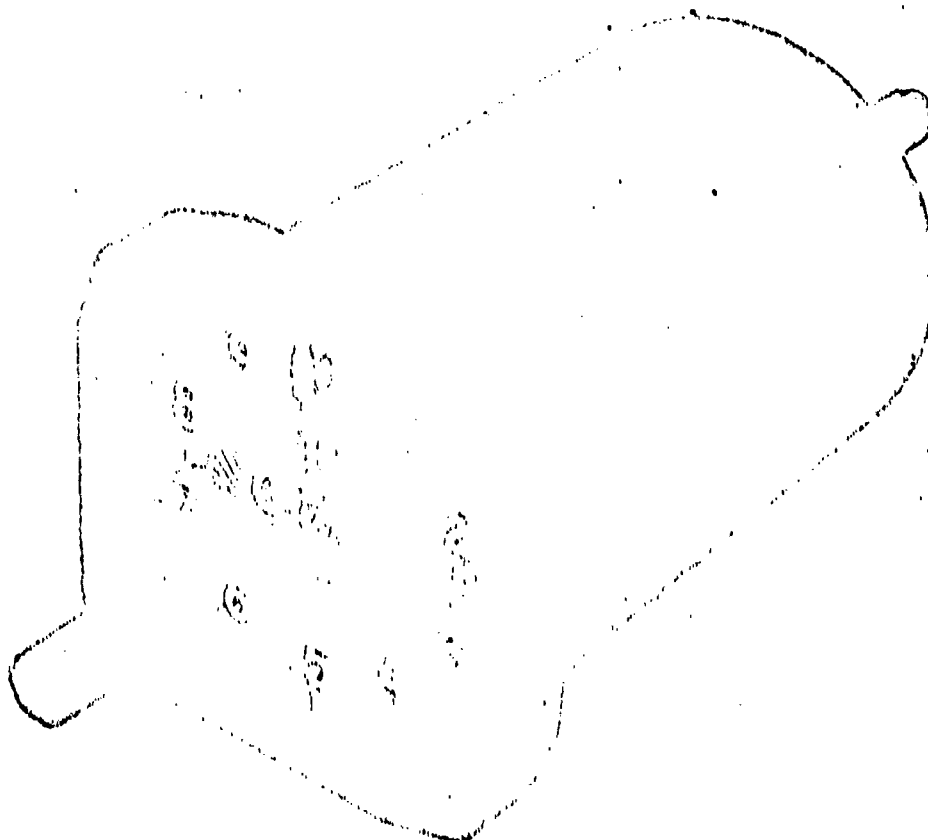


FIGURE 1

ASTEK LARGE NUMERAL DRUM-POINTER ALTIMETER  
TYPE A0009 20101

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ENCLOSURE (1)

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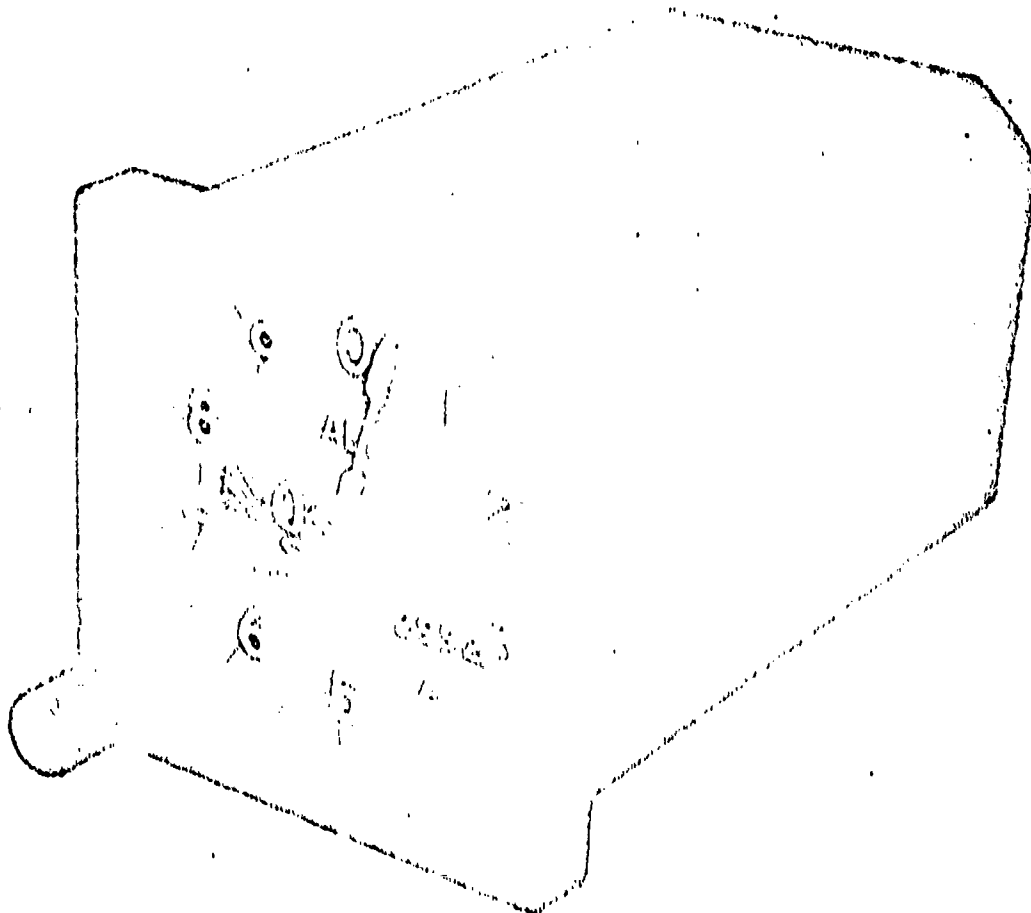


FIGURE 2

ASTEK LARGE NUMERAL DRUM-POINTER ALTIMETER  
TYPE B0001 22107

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ENCLOSURE (1)

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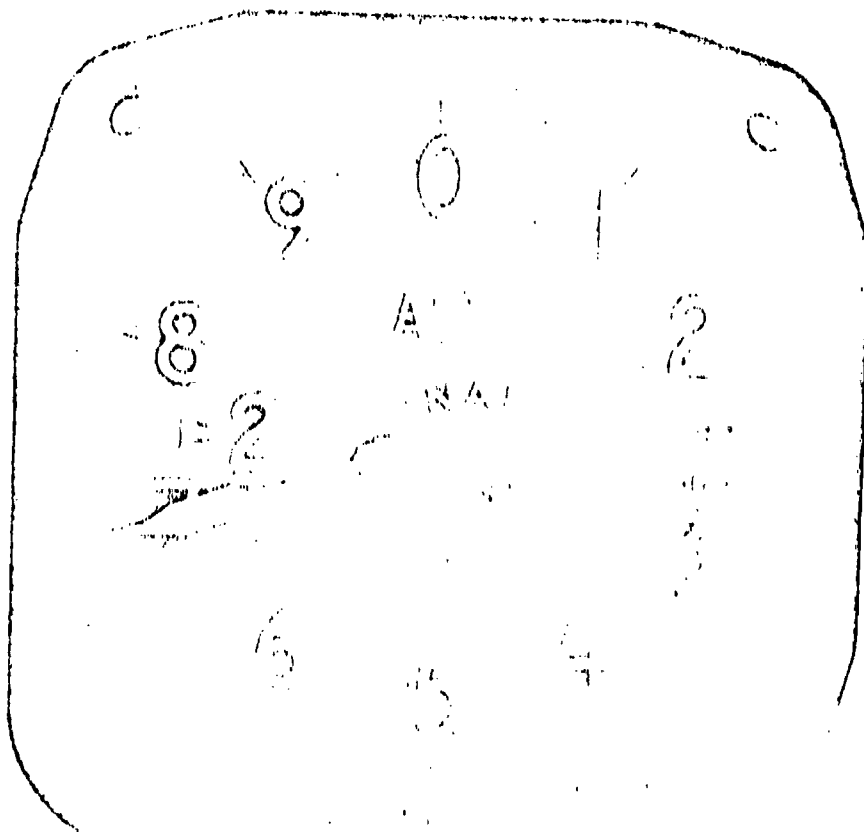


FIGURE 3

ASTEK TYPE A0009 20101 DRUM-POINTER ALTIMETER  
SHOWING PARTIAL OBSCURATION OF NUMERAL DRUM DIGITS

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ENCLOSURE (1)

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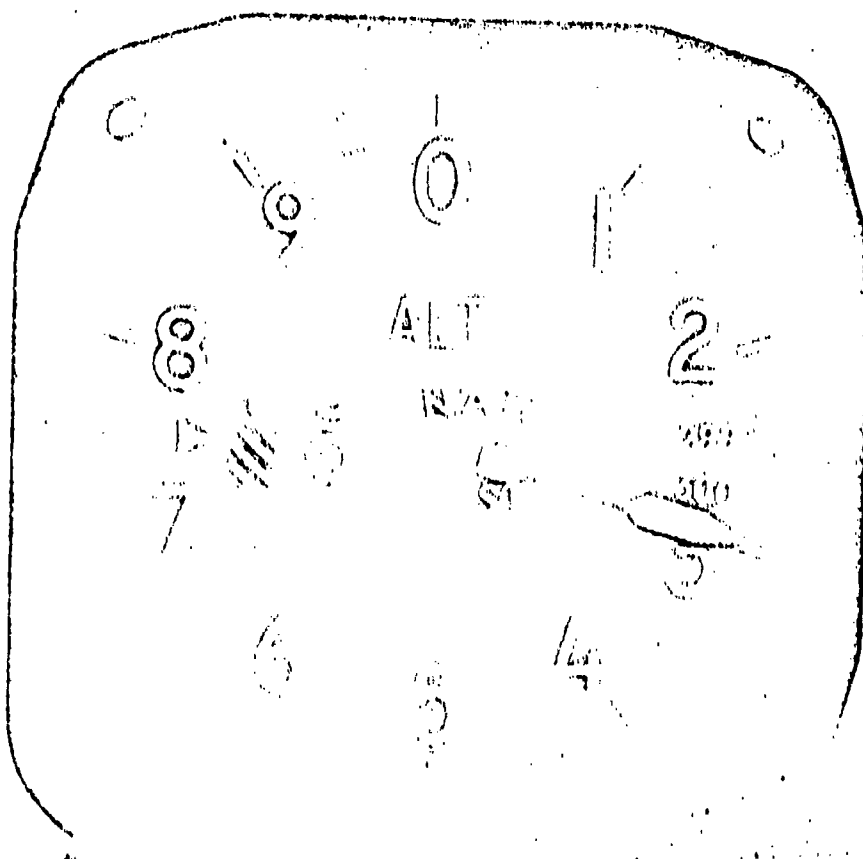


FIGURE 4

ASTEK TYPE A0009 20101 DRUM-POINTER ALTIMETER  
SHOWING MULTIPLE PORTIONS OF NUMERAL DRUM DIGITS

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ENCLOSURE (1)