

FAA-73-33

REPORT NO. FAA-RD-74-26

ILS LOCALIZER PERFORMANCE STUDY
FOR DALLAS/FORT WORTH AIRPORT,
PART 2

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INTERIM REPORT
FEBRUARY 1974

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INFORMATION SERVICE, SPRINGFIELD,
VIRGINIA 22151.

Prepared for
DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION
SYSTEMS RESEARCH AND DEVELOPMENT SERVICE
Washington DC 20590

Technical Report Documentation Page

1. Report No. FAA-RD-74-26		2. Government Accession No.		3. Recipient's Catalog No.	
4. Title and Subtitle ILS LOCALIZER PERFORMANCE STUDY FOR DALLAS/ FORT WORTH AIRPORT, PART 2				5. Report Date February 1974	
				6. Performing Organization Code	
7. Author(s) L. Jordan, D. Kahn, S. Morin, R. Silva				8. Performing Organization Report No. DOT-TSC-FAA-73-33	
9. Performing Organization Name and Address Department of Transportation Transportation Systems Center Kendall Square Cambridge MA 02142				10. Work Unit No. (TRAIS) FA 407/R 4129	
				11. Contract or Grant No.	
12. Sponsoring Agency Name and Address Department of Transportation Federal Aviation Administration Systems Research and Development Service Washington DC 20590				13. Type of Report and Period Covered Interim Report March - June 1973	
				14. Sponsoring Agency Code	
15. Supplementary Notes					
16. Abstract The Transportation Systems Center electromagnetic scattering model was used to predict the course deviation indication (CDI) at the Dallas/Fort Worth Airport in the presence of several derogating structures in the report FAA-RD-72-96 "ILS Localizer Performance Study Part 1 Dallas/Fort Worth Regional Airport and Model Validation-Syracuse Hancock Airport." In this report the recommendation was made to use a capture effect system localizer. In the present report several additional structures, the Braniff and Delta hangar buildings, are modeled. Using the recommended capture effect localizer, it is found that these two additional structures do not add significantly to the derogation, and the category 1 and category 2 operation is still possible on the four instrumented runways tested.					
17. Key Words Dallas/Fort Worth Airport, ILS, CDI, Capture Effect Localizer				18. Distribution Statement DOCUMENT IS AVAILABLE TO THE PUBLIC THROUGH THE NATIONAL TECHNICAL INFORMATION SERVICE, SPRINGFIELD, VIRGINIA 22151.	
19. Security Classif. (of this report) Unclassified		20. Security Classif. (of this page) Unclassified		21. No. of Pages 16	22. Price

PREFACE

This study was performed for the Category 1 and Category 2 Section of the Terminal Navigation Branch, Navigation Division, Systems Research and Development Service, Federal Aviation Administration.

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In this report we present the predicted course deviation indication (CDI) values for an Alford 1B (14/6) Localizer array in the presence of the Braniff and Delta Airline hangar complexes at the Dallas/Fort Worth airport. The predictions were made using the Transportation Systems Center (TSC) Localizer prediction model called ILSLOC.

The CDI predictions on all four instrumented runways tested were small, typically under a microampere (dynamic CDI). For this reason it was unnecessary to rerun our previous tests to include these two additional hangars. The previous tests included the effects of four terminal buildings, a hotel and a tower. In the worst case the CDI's obtained from these individual tests would add. Even in this worst case the total CDI would remain small enough to allow category 1 and category 2 operation.

We first describe the two additional structures tested, the Braniff and Delta hangars giving their size and locations relative to the localizers for runways 17L, 17R, 35L and 35R. The predicted CDI's due to these structures are then presented in the form of graphs of CDI versus aircraft distance from localizer position. We then present the previously obtained CDI's for the remaining structures.

Figure 1 shows the Dallas/Fort Worth airport layout. Parallel runways 17R/35L and 17L/35R are shown running in a north-south direction. The localizer locations are indicated by cross marks. Runway 17L is a category 2 runway and its localizer location is indicated by a cross mark circumscribed by a circle. The terminal buildings which are part of the first construction phase of the airport are in areas 2W, 2E, 3E and 4E. The hotel is in area 3W and the tower is between 3W and 3E. The Braniff and Delta hangars are located as sketched.

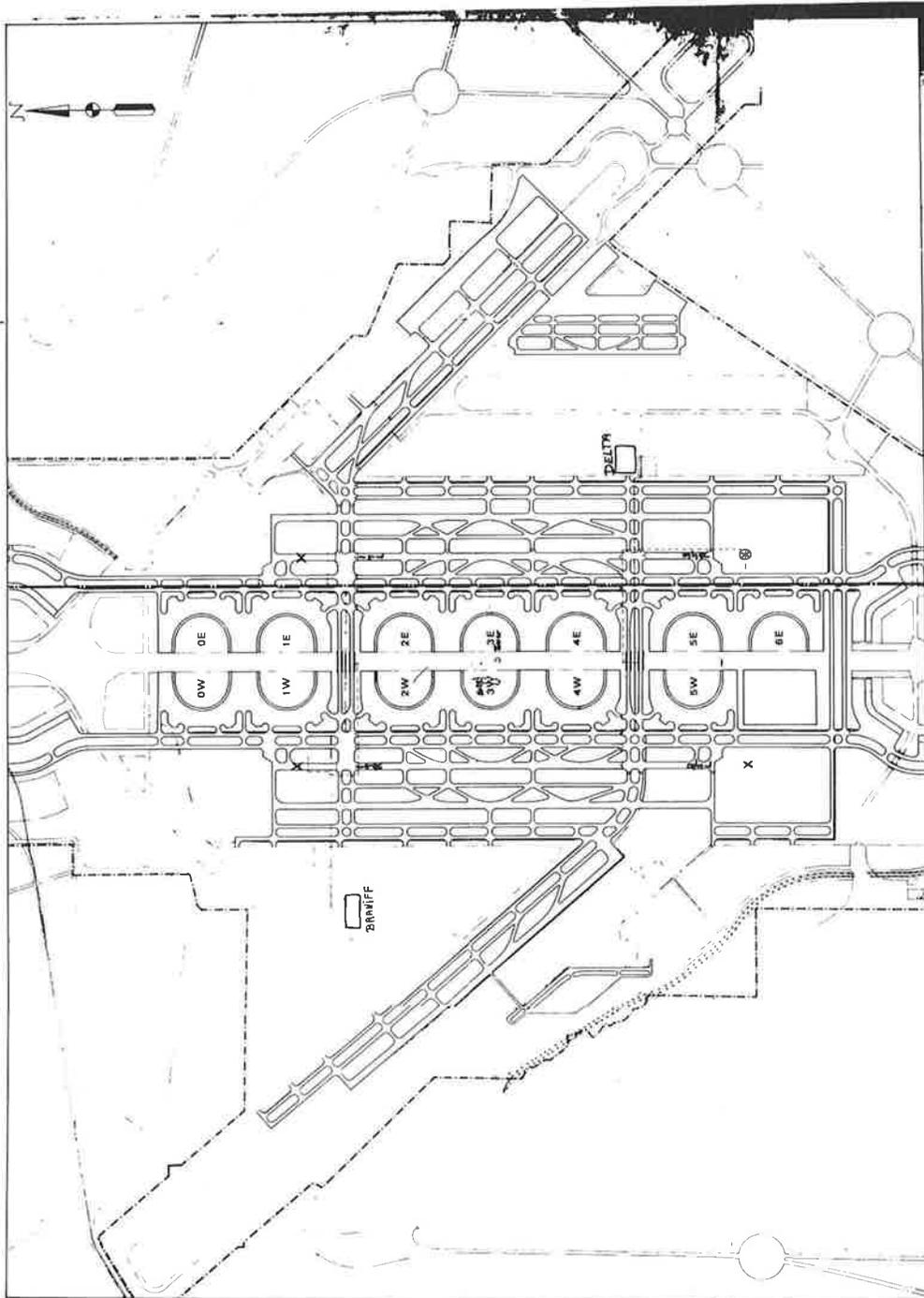


Figure 1. Dallas/Fort Worth Airport Layout

The predicted CDI for each of the four runways for an Alford 1B Localizer in the presence of the airport structures was obtained for an aircraft flying a 2.5° glide path. The tailored course width was 3.17° , the antenna array was nine feet above the ground and was located 1000 feet from the end of runways 35R, 17L and 17R and 1200 feet from the end of runway 35L. (The clearance antenna was located 200 feet behind the course array.) The aircraft speed was assumed to be 200 feet per second and the receiver time constant 0.4.

Figure 2 shows a top view of the Braniff hangar and stores building. The illuminated sections of the building are shown by solid lines and the unilluminated sections by broken lines. Small sections of the building that are not considered as sizable derogators have been omitted. The worst case runway for this structure alone was runway 17R with an approximate peak to peak range of 0.4 microamperes at 22,500 feet from the localizer.

Due to the complex structure of the Delta hangar, the three illuminated walls are shown separately in a front view in Figures 3, 4 and 5. The largest CDI excursion due to this structure occurred for an aircraft approach onto runway 35R where an approximate peak to peak range of 0.8 microamperes was predicted at a distance of 18,000 feet from the localizer.

Table 1 gives the coordinates of the two hangars relative to the localizers and Figures 6 through 9 show the predicted static and dynamic CDI's for the Alford 1B Localizer in the presence of the Braniff and Delta hangars.

As mentioned above, we see from the figures that the largest dynamic CDI predicted has an approximate 0.4 microampere total excursion at about 22,500 feet from the localizer (approximately 10,000 feet in front of the threshold) for runway 17R due to the Braniff hangar and an approximate 0.8 microampere total excursion at about 18,000 feet from the localizer (approximately 5600 feet in front of the threshold) for runway 35R due to the Delta hangar.

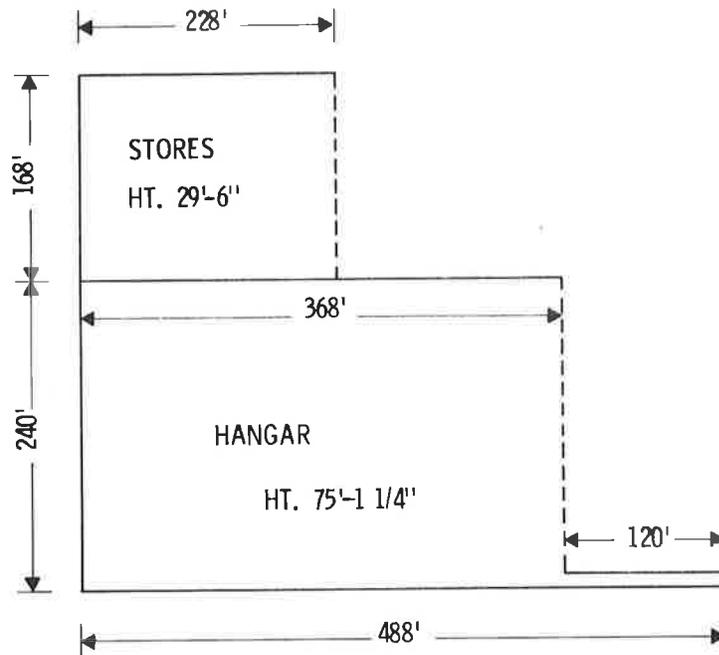


Figure 2. Braniff Hangar and Stores Building

THE CROSSHATCHED AREA IS 5 FEET FORWARD OF THE REMAINING STRUCTURE

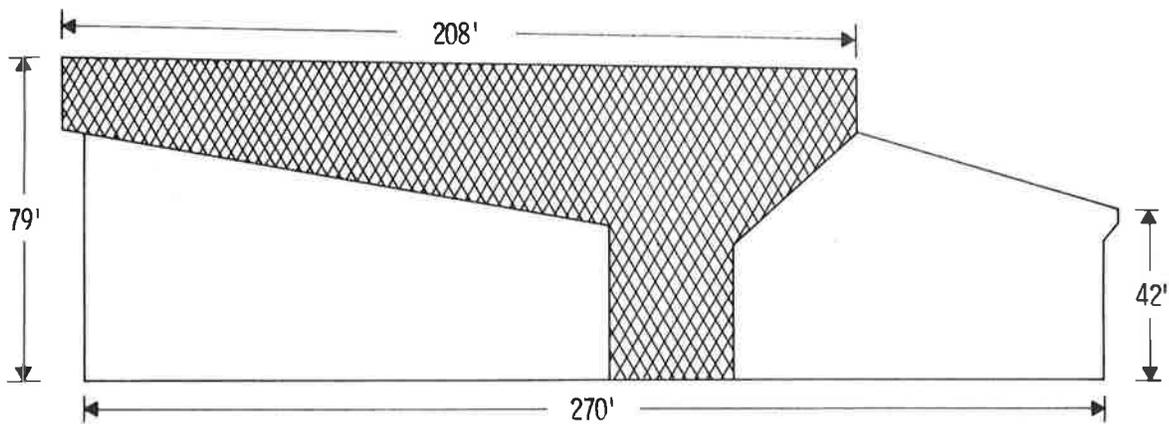


Figure 3. Delta Hangar, West Wall

THE CROSSHATCHED AREA IS 5 FEET FORWARD
OF THE REMAINING STRUCTURE

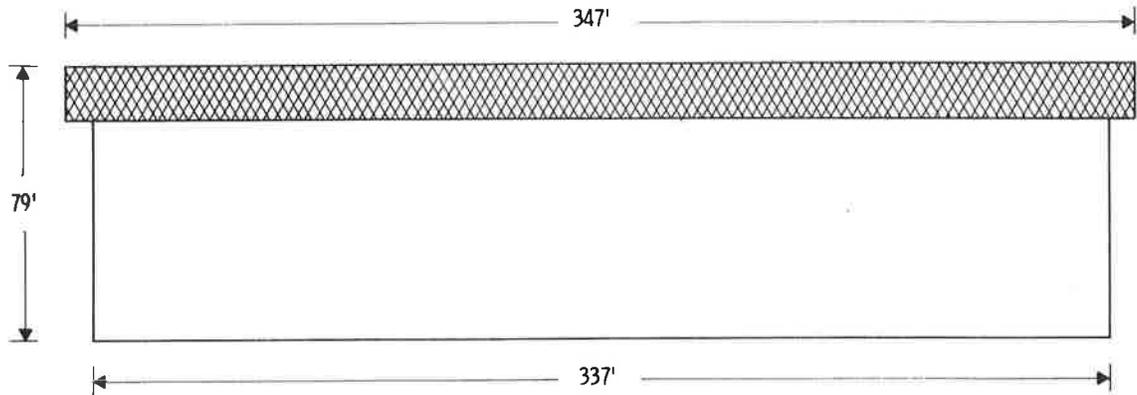


Figure 4. Delta Hangar, North Wall

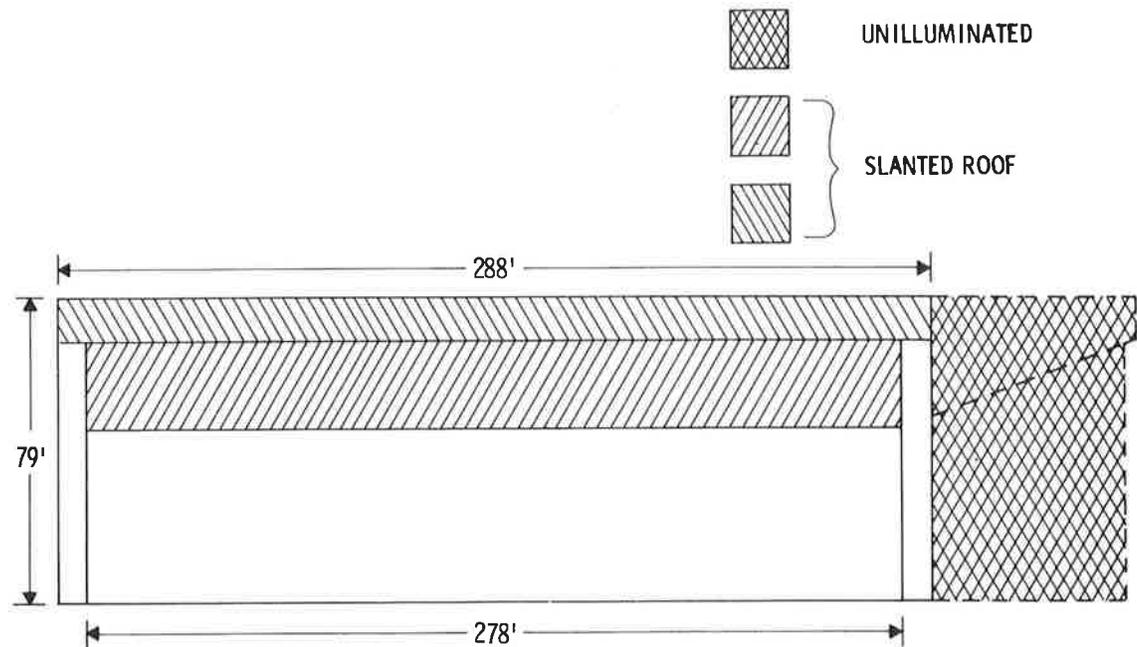
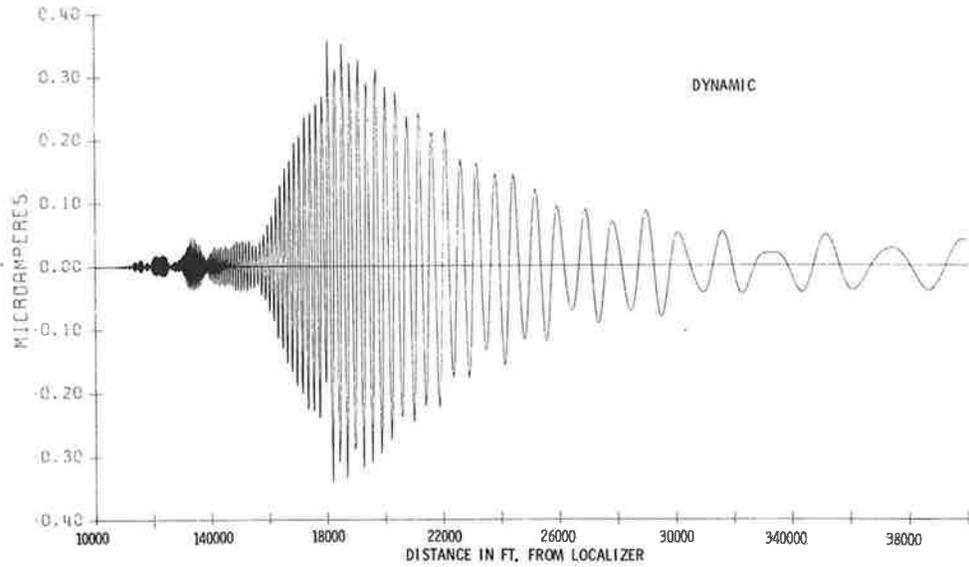


Figure 5. Delta Hangar, South Wall

TABLE 1. THE COORDINATES TO THE NORTHERNMOST EDGE OF THE HANGARS

HANGAR	RELATIVE TO LOCALIZER FOR RUNWAY 17R	RELATIVE TO LOCALIZER FOR RUNWAY 17L	RELATIVE TO LOCALIZER FOR RUNWAY 35L	RELATIVE TO LOCALIZER FOR RUNWAY 35R
BRANIFF EAST WALL	(11, 550; 3478)	(11, 550; 9878)	(2278; - 3478)	(2078; - 9878)
DELTA	(3844; - 8825)	(3844; - 2425)	(9743; 8825)	(9543; 2425)

RUNWAY 35R THIS IS DELTA HANGER ALONE. 11476 AMT. HT. 9 FT. PHASE 1A 1 07NM



RUNWAY 35R THIS IS DELTA HANGER ALONE. 11476 AMT. HT. 9 FT. PHASE 1A 1

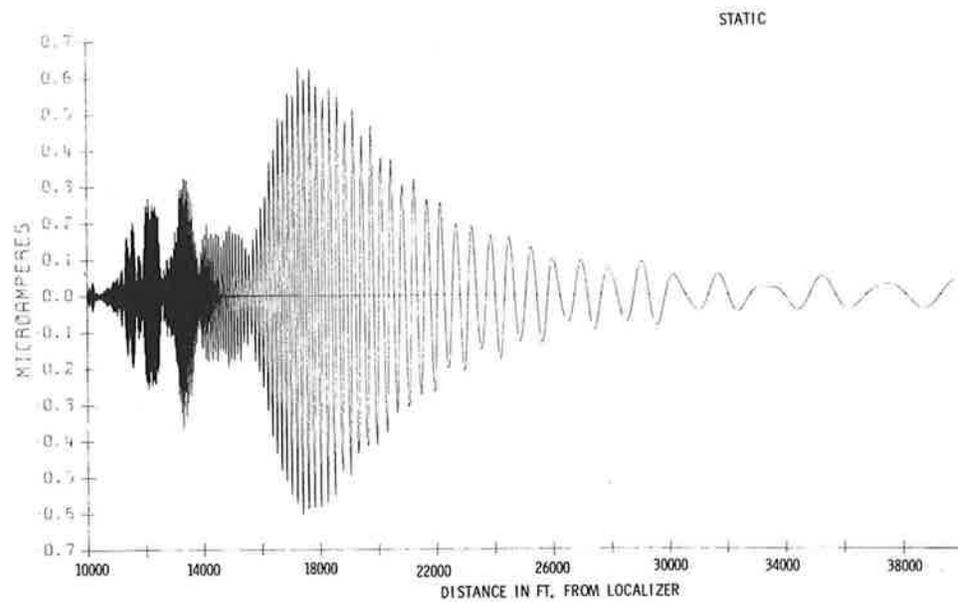
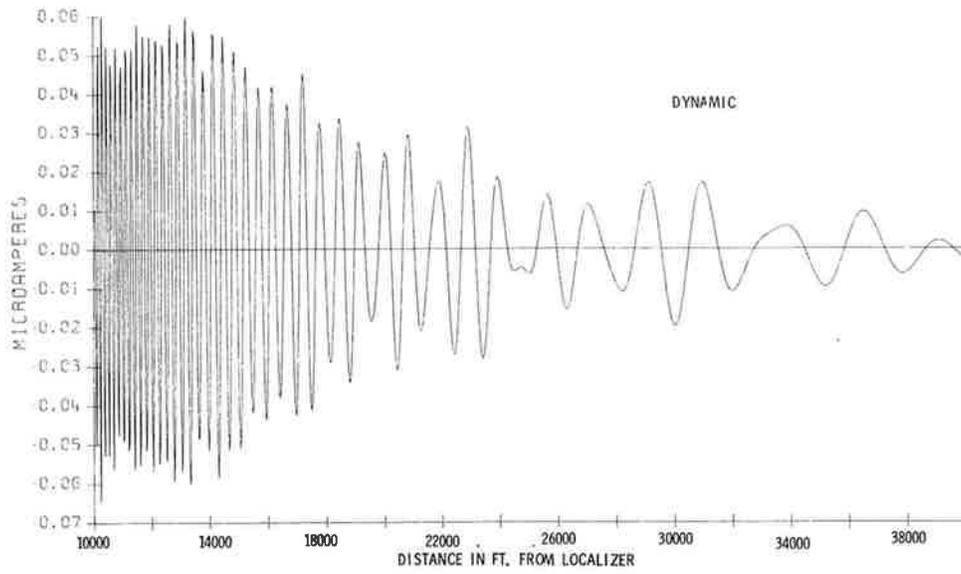


Figure 6. Dynamic/Static Due to the Delta Hanger - Runway 35R; Alford 1B Localizer

RUNWAY 17L THIS IS DELTA HANGAR H/DOME, 114.6 ANT., RT., 9 FT., PHASE 1A 1 DYNM



RUNWAY 17L THIS IS DELTA HANGAR H/DOME, 114.6 ANT., RT., 9 FT., PHASE 1A 1

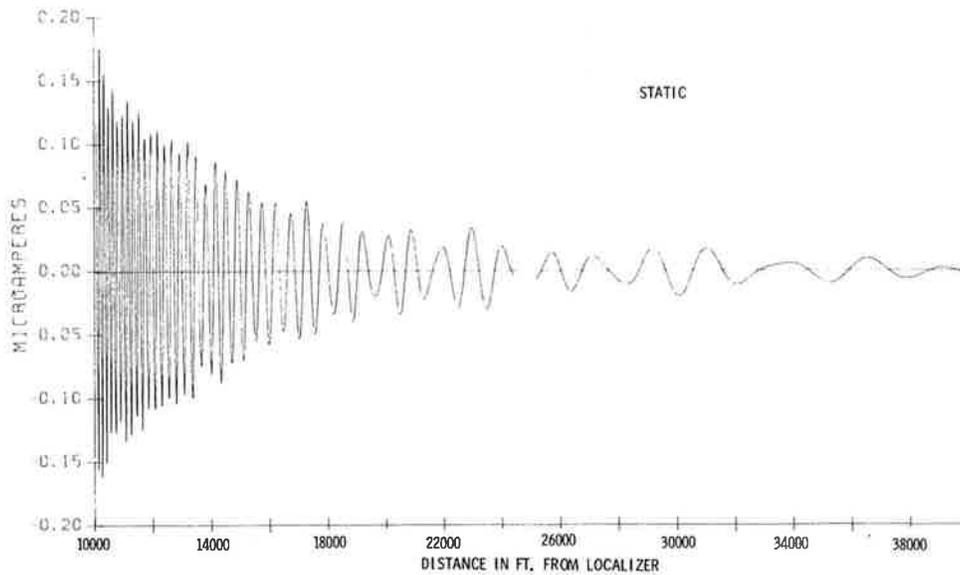
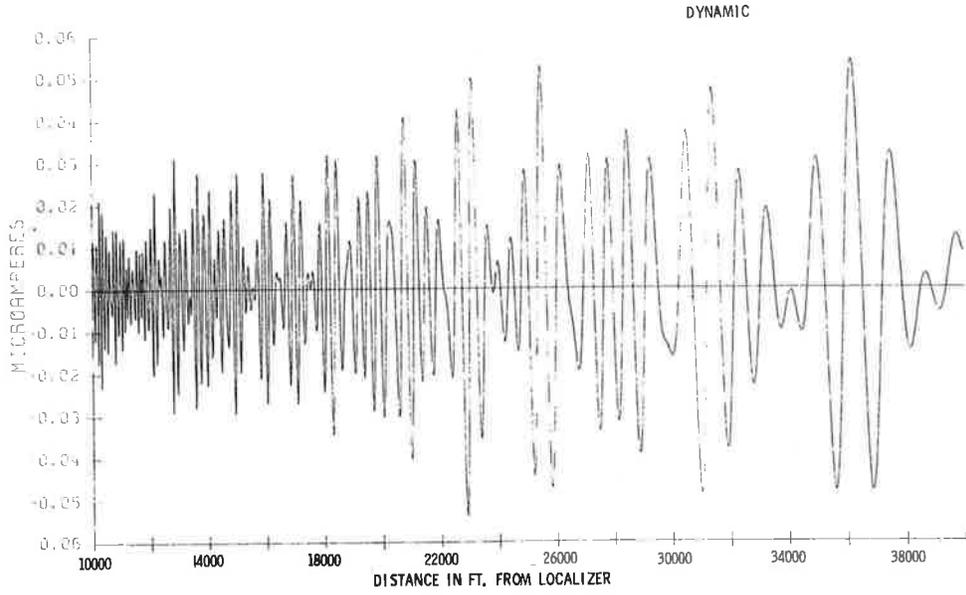


Figure 7. Dynamic/Static CDI Due to the Delta Hangar - Runway 17L; Alford 1B Localizer

RUNWAY 35L THIS IS BRANIFF HANGER ALONE (14/6 ANT. HT. 9 FT. PHASE 141 DYNM



RUNWAY 35L THIS IS BRANIFF HANGER (14/6 ANT. HT. 9 FT.)

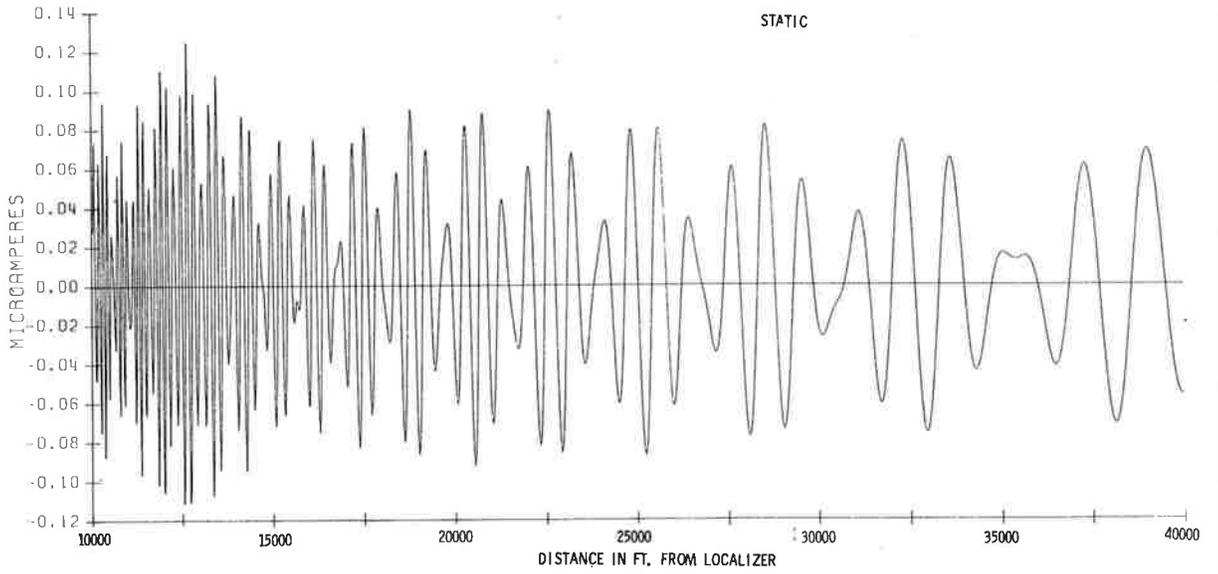
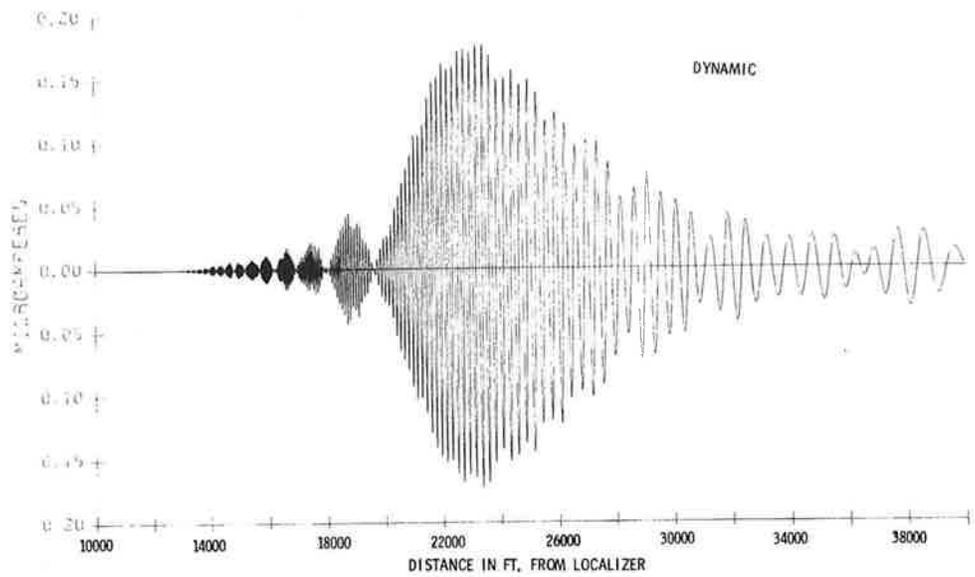


Figure 8. Dynamic/Static CDI Due to the Braniff Hanger - Runway 35L; Alford 1B Localizer

RUNWAY 17R THIS IS BRANIFF HANGAR - ONE (14) - INT. INT. V. (0.000000) (0.000000)



RUNWAY 17R THIS IS BRANIFF HANGAR - ONE (14) - INT. INT. V. (0.000000) (0.000000)

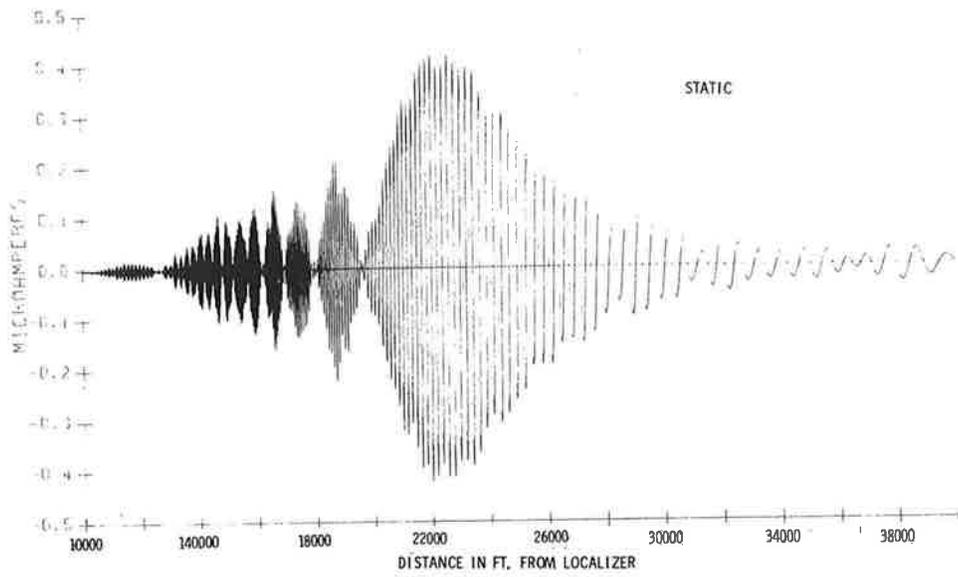


Figure 9. Dynamic/Static CDI Due to the Braniff Hangar - Runway 17R; Alford 1B Localizer

The dynamic CDI's for the Alford 1B for each of the four runways in the presence of the four terminal buildings, the hotel and tower are shown in Figures 10 through 13 taken from our previous report.¹

Even if we simply add all the CDI's due to all these structures, we see that category 1 and category 2 requirements will still be satisfied.

¹G. Chin, L. Jordan, D. Kahn, S. Morin and D. Newsom, "ILS Localizer Performance Study Part 1 Dallas/Fort Worth Regional Airport, and Model Validation-Syracuse Hancock Airport" July 1972, Report Number FAA-RD-72-96.

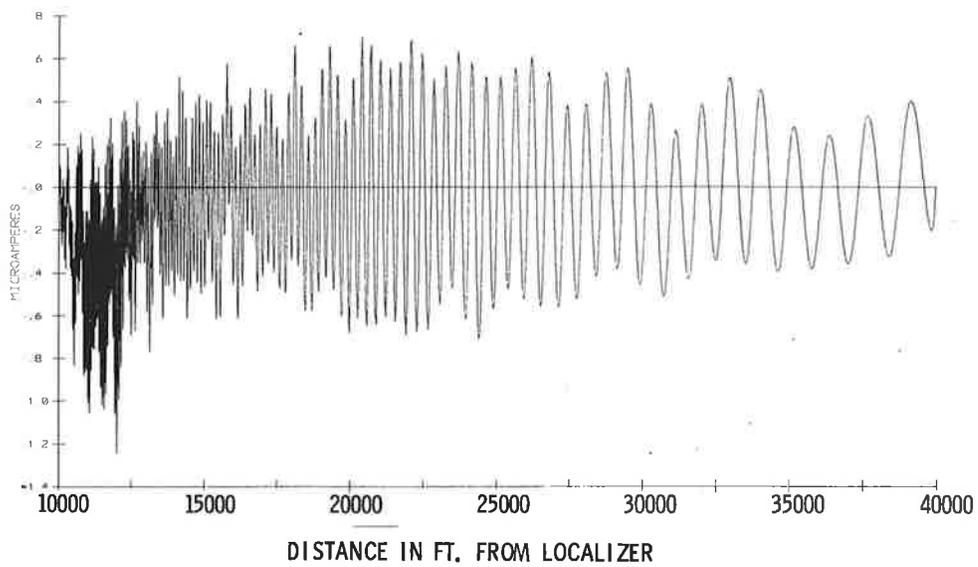


Figure 10. Dynamic CDI Due to the Terminal Buildings - Runway 35R; Alford 1B Localizer

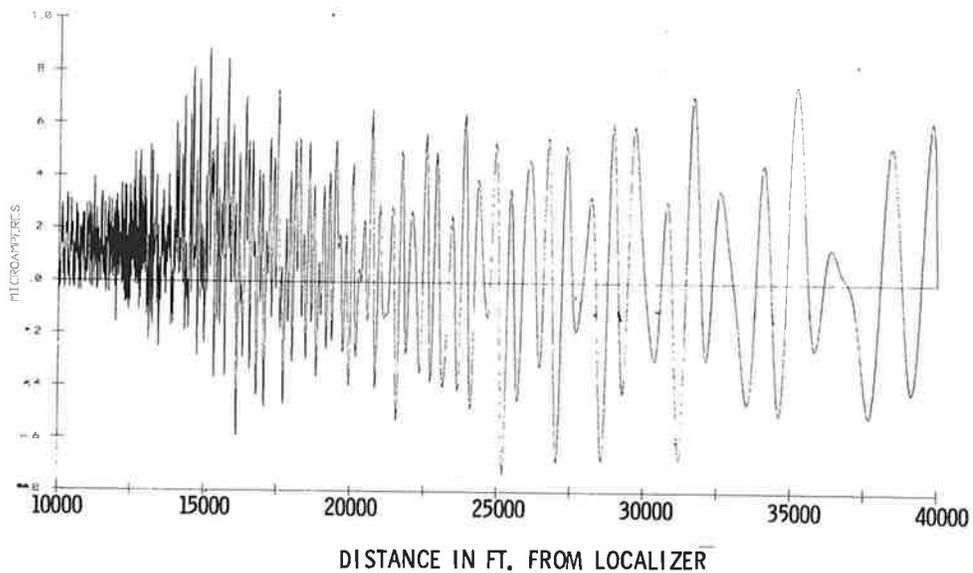


Figure 11. Dynamic CDI Due to the Terminal Buildings, Hotel and Tower - Runway 17L; Alford 1B Localizer

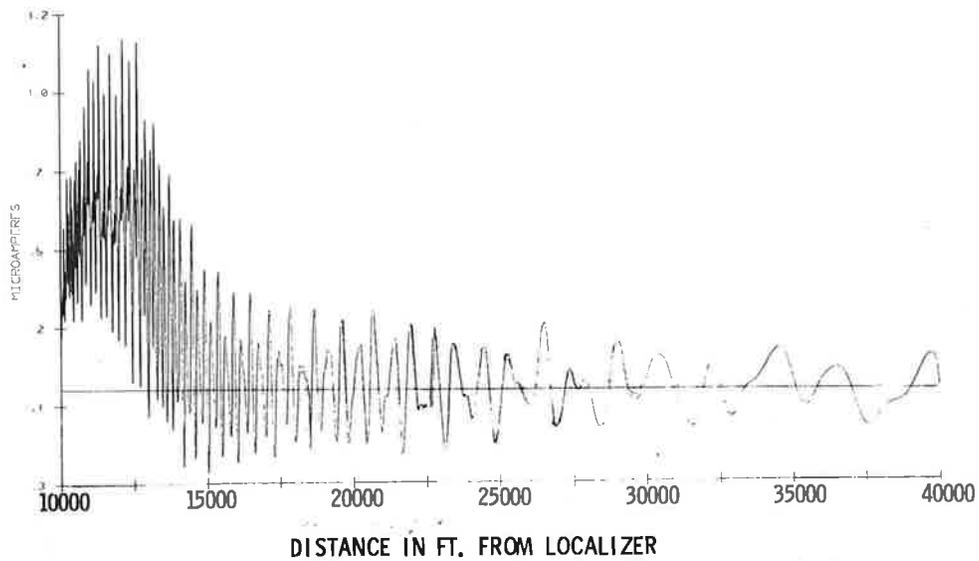


Figure 12. Dynamic CDI Due to the Terminal Buildings, Hotel and Tower - Runway 35L; Alford 1B Localizer

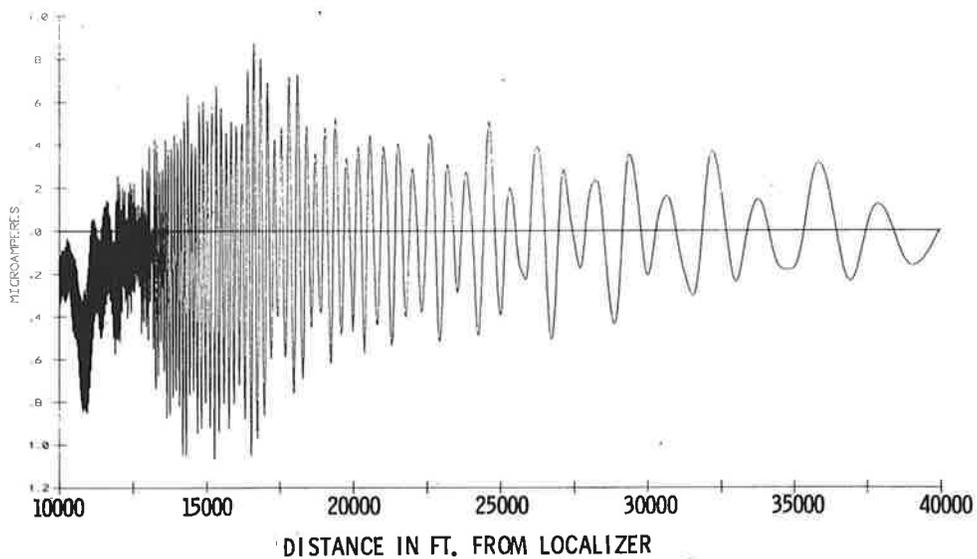


Figure 13. Dynamic CDI Due to the Terminal Buildings, Hotel and Tower - Runway 17R; Alford 1B Localizer