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**FUTURE INSTRUMENT LANDING SYSTEM
CHANNEL REQUIREMENTS**

Prepared by B. H. Metzger
of the IIT Research Institute

October 1970

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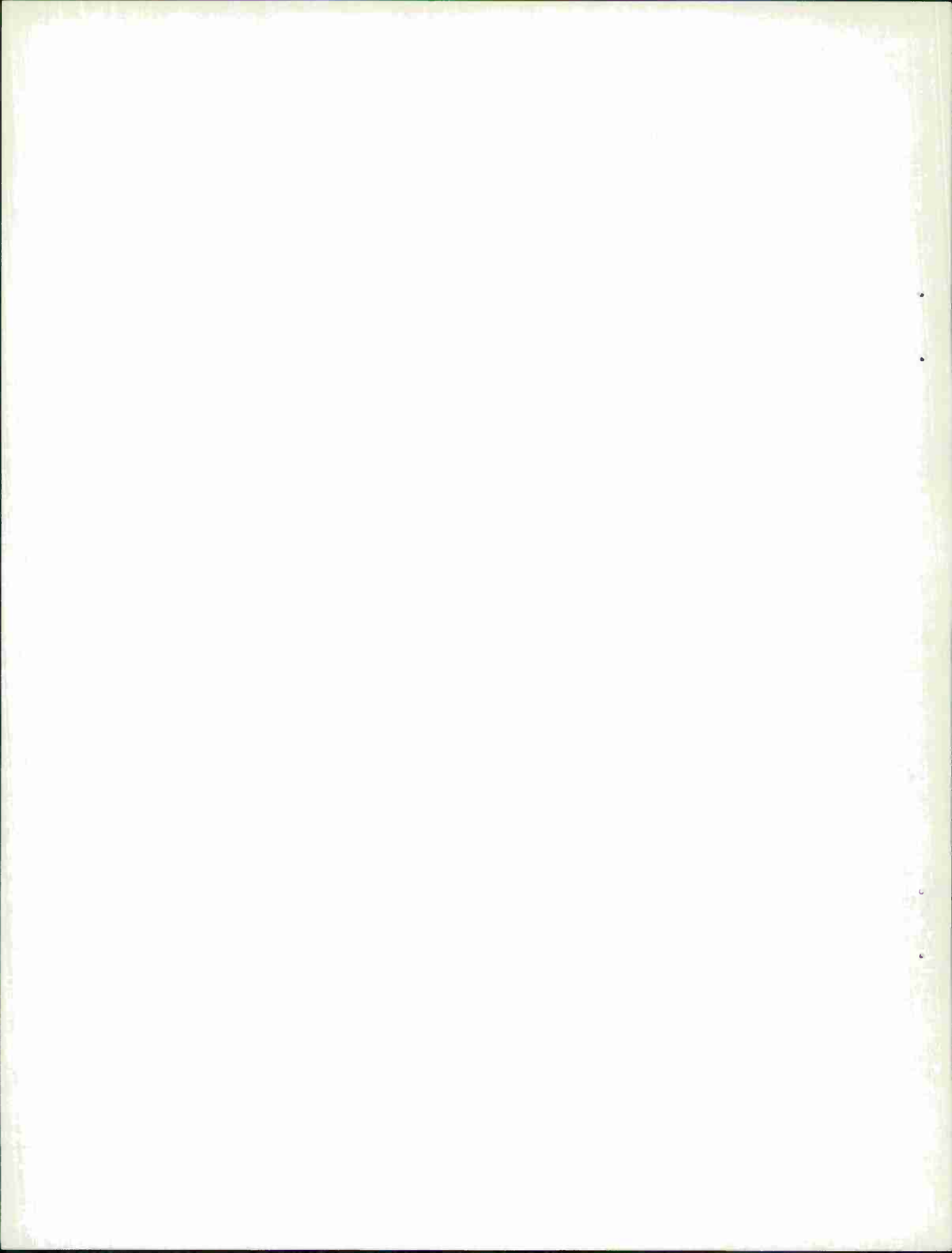
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**FUTURE INSTRUMENT LANDING SYSTEM
CHANNEL REQUIREMENTS**

Technical Report

October 1970

**DEPARTMENT OF DEFENSE
Electromagnetic Compatibility Analysis Center**

**Prepared by B. H. Metzger
of the IIT Research Institute**

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**Published by
Electromagnetic Compatibility Analysis Center
North Severn
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FOREWORD

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This report was prepared as part of AF Project 649E under Contract F-19628-70-C-0291 by the staff of the IIT Research Institute at the Department of Defense Electromagnetic Compatibility Analysis Center.

To the extent possible, all abbreviations and symbols used in this report are taken from American Standard Y10.19 (1967) "Units Used in Electrical Science and Electrical Engineering" issued by the United States of America Standards Institute.

The cooperation of FAA staff members, in particular, Mr. R. Johnson of the Spectrum Plans and Programs Branch, was essential to the performance of this study.

Users of this report are invited to submit comments which would be useful in revising or adding to this material to the Director, ECAC, North Severn, Annapolis, Maryland 21402, Attention ACV.

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ABSTRACT

As an aid to spectrum planning, estimates of the minimum channel requirements for the Instrument Landing System localizer are obtained for the 1970-1975 time period. Several alternatives in antenna systems, service volumes, assignment criteria and operational procedures are considered with respect to their possible impact on channel requirements.

KEYWORDS

INSTRUMENT LANDING SYSTEM
CHANNEL REQUIREMENTS
SPECTRUM MANAGEMENT
FREQUENCY MANAGEMENT

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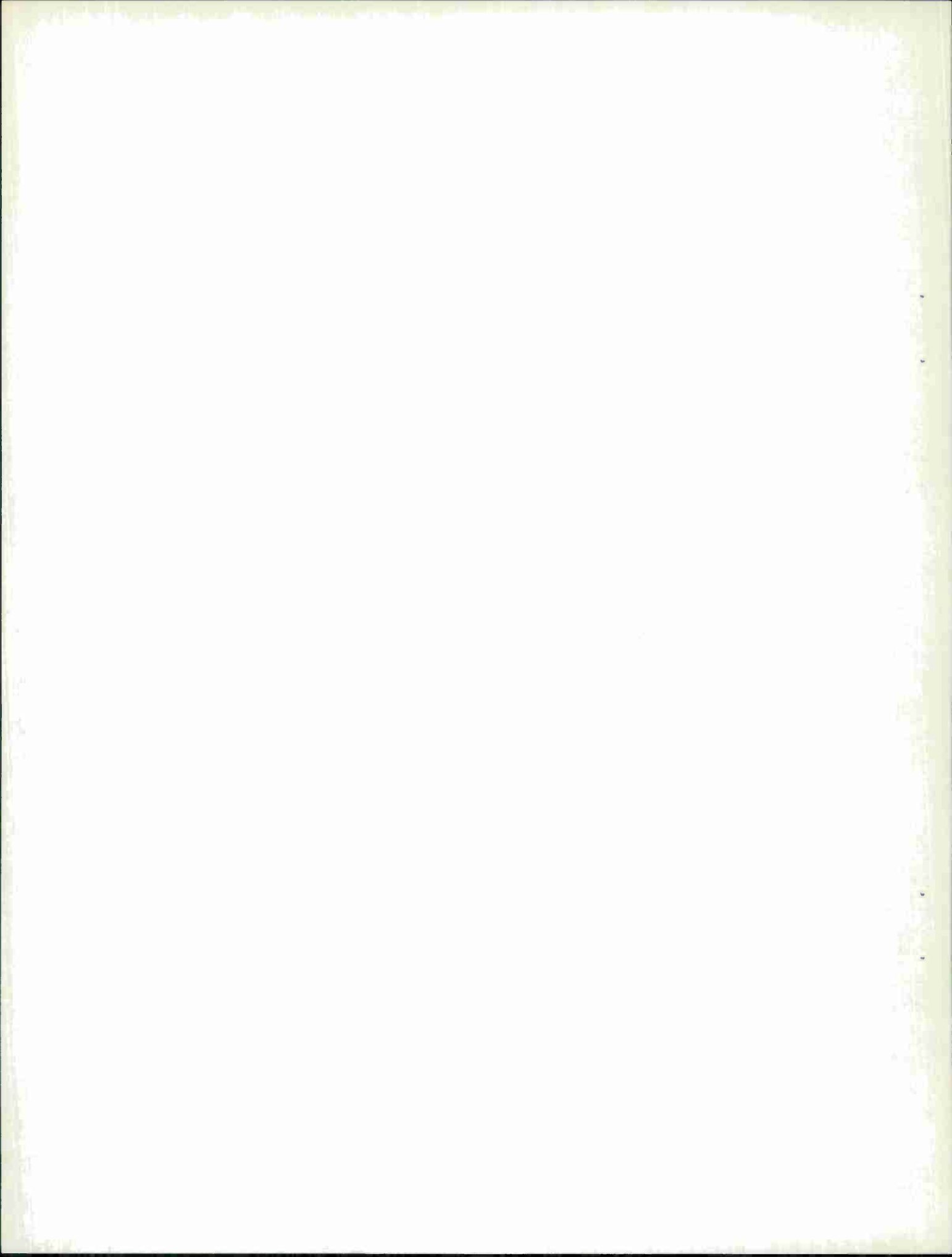
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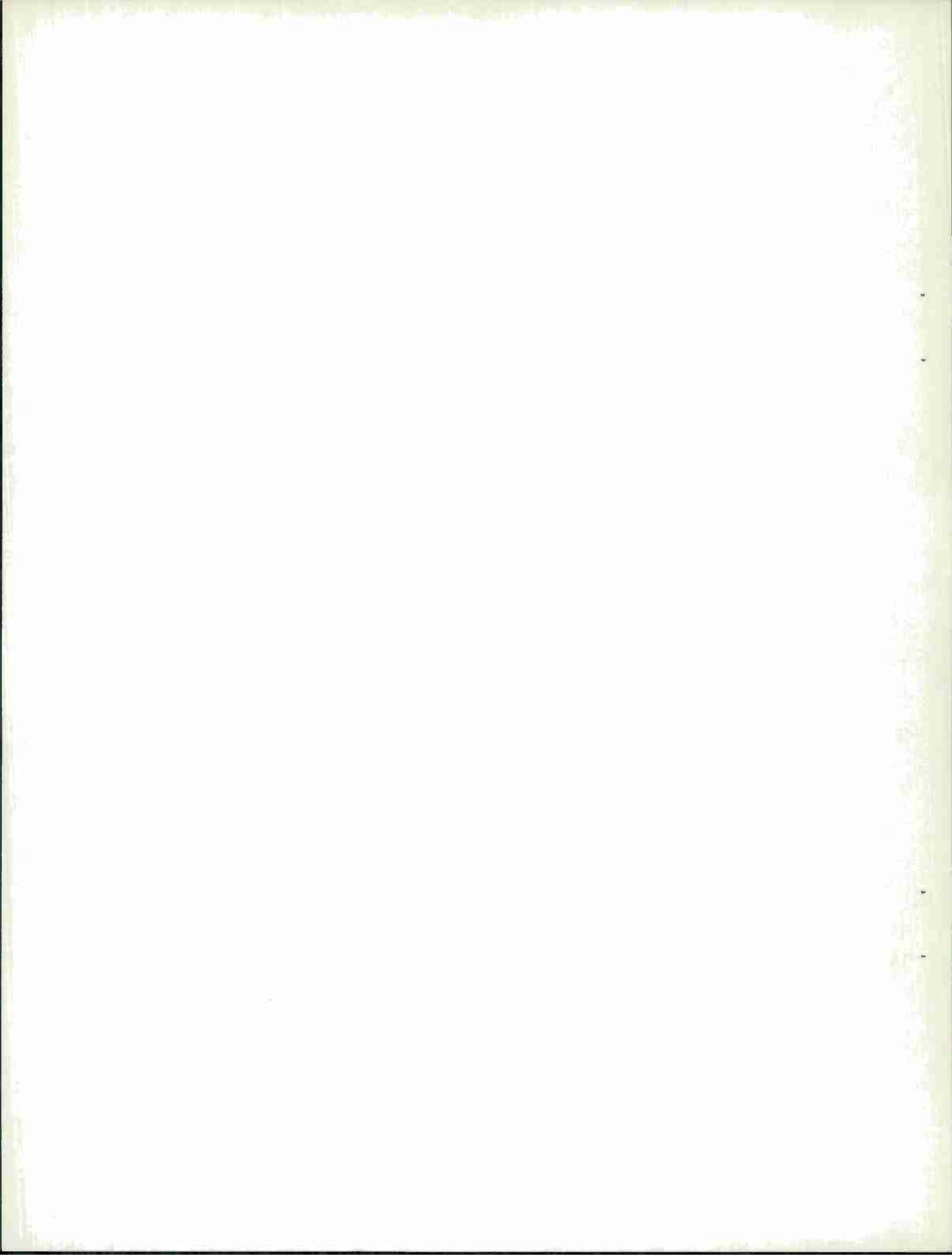


SECTION 1

INTRODUCTION

The Instrument Landing System (ILS) provides low-altitude approach radionavigation service to aircraft landing at air terminals. In 1975, according to Federal Aviation Administration (FAA) projections, the number of ILS facilities at air terminals in the continental United States and near-by parts of Canada and Mexico will be more than double the number currently installed. From the spectrum management point of view, with only 20 channels in the 108-112 MHz frequency band allocated for ILS localizer assignments, the projected growth in the number of ILS facilities raises the question of the inadequacy of the present allocation of channels for ILS service to accommodate future needs. The objective of this analysis is to obtain estimates of the minimum channel requirements for ILS facilities in the 1970 to 1975 time period, thereby providing a basis for determining both the necessity and timing for implementing appropriate measures to cope with the impending spectrum congestion.

In estimating the minimum channel requirements, the two primary factors to be considered are (1) the total ILS implementation and (2) the co-channel assignment constraints. A specification of the current and projected ILS facilities, including locations and orientations, in the 1970 to 1975 time period was provided by the FAA for the purposes of this study. The co-channel assignment constraints for ILS facilities depend on several factors: service volumes, antenna systems, airport operational procedures and the assignment criteria. Alternatives in each of these factors are considered. Details on the ILS complexes and channel assignment constraints employed in this study are set forth in SECTION 2. The results of the study, which consists of estimates of the minimum ILS channel requirements, are also presented in SECTION 2.



SECTION 2

RESULTS AND ANALYSIS

SUMMARY OF RESULTS

The primary results of this study are summarized in TABLE 2-1. Estimates of the minimum number of distinct channels are provided for the current (1970) ILS complex and for three possible future ILS complexes. For each complex, the minimum channel requirements are estimated for co-channel assignment constraints derived from alternative possibilities in the antenna system employed for the ILS localizer, the service volume provided by the ILS for approaching aircraft, and the assignment criteria employed to protect the ILS signal within its service volume. In addition, two alternatives in airport operational procedure are considered. In the first case, ILS facilities on the same runway but serving opposite approach directions are required to operate on different channels. The minimum channel requirements, if this condition is imposed, are given by the upper number of each entry in the table. If co-channel operation for such facilities is permitted, then the minimum channel requirements are indicated by the lower number of each entry in the table. Details for each of the factors on which these estimates of minimum channel requirements depend are discussed in the following subsections.

AIR TERMINAL COMPLEXES

Four air terminal complexes and their associated ILS facilities, located in the continental United States and nearby parts of Canada and Mexico, are considered for the 1970 to 1975 time period. These are the current 1970 ILS implementation and the projected ILS implementations for the years 1973 and 1975. The fourth ILS complex considered consists of the 1975 complex with the addition of ILS facilities for eighteen high-capacity air terminals, or so-called superports, which may be realized by 1975. The specification of the numbers, locations and orientations of the ILS facilities in each case was provided by the FAA for the purposes of this study and were drawn from their planning documents on future requirements for ILS service at air terminals. A complete listing of the ILS complex is given in Appendix I.

The number of air terminals, runways and ILS facilities in each complex is given in TABLE 2-1. It should be noted that while the number of ILS facilities more than doubles from 1970 to 1975, the number of ILS equipped runways increases by only about fifty percent, so that a significant part of the increase in ILS facilities consists of providing an additional ILS facility for a runway already equipped for one-way service. This fact

accounts for the relatively significant reduction in the 1975 ILS complex channel requirements when opposing ILS facilities on the same runway are permitted to operate co-channel as compared with the case of requiring different channels.

Considerable uncertainty surrounds the location and orientation, not to mention the possible realization, of the superports and their associated ILS facilities. The 1975 complex with superport facilities is included here, however, to estimate the impact on the ILS channel requirements in the event such high-capacity air terminals are implemented. The unexpectedly high estimate of a minimum of 50 channels (see TABLE 2-1) required for this air terminal complex is, in part, due to the superports at Baltimore, Washington (Dulles) and Philadelphia. Under the indicated co-channel assignment constraints and the particular runway orientations selected, each of the 36 ILS facilities at these three superports would require a distinct channel.

CO-CHANNEL ASSIGNMENT CONSTRAINTS

The co-channel assignment constraints applicable to ILS facilities are primarily determined by three factors: (1) the antenna system used for the ILS localizer, (2) the service volume over which the ILS signal must be protected, and (3) the assignment criteria employed to provide the necessary level of signal protection from other potentially interfering co-channel ILS facilities.

Two antenna systems are considered: the 8-loop antenna system and the more directional V-ring antenna system. Both are in current use for ILS operations, however, only a very few V-rings have been implemented. Although designed primarily to combat multipath propagation problems, the directional properties of the V-ring do have some influence on the co-channel assignment constraints and hence, on the channel requirements for the ILS complex. To see this effect, two cases were considered in evaluating the minimum channel requirements for each of the ILS complexes. In the first case, all ILS facilities are considered to employ 8-loop antennas exclusively, and in the second case, V-ring antennas are employed exclusively. From TABLE 2-1, it appears that the directivity of the V-ring antenna system resulted in some reduction of channel requirements over the 8-loop antenna for comparable service volumes and assignment criteria.

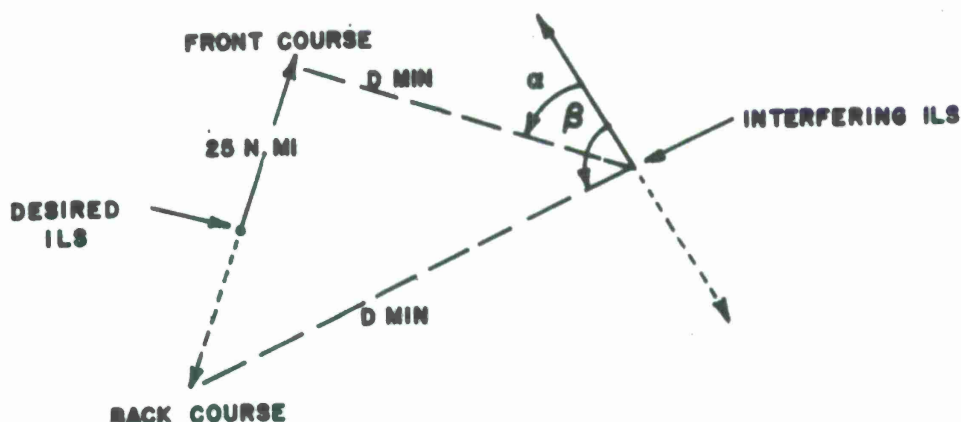
The next factor affecting the co-channel assignment constraints is the service volume. Two cases are considered. In the first case, referred to as the standard service volume, the ILS provides service for distances out to 25 nautical miles (nmi) along the centerline of the

runway in the approach direction and for altitudes to 6250 feet. In the second case, referred to as the reduced service volume, the distances and altitudes are reduced to 18 nmi and 4500 feet, respectively. In each case, the ILS must also provide similar service in the opposite direction for missed or aborted approaches and for backcourse approaches. The reduced service volume is now under consideration for adoption by the FAA to replace the standard service volume. As reflected in TABLE 2-1, the reduced service volume, if adopted, will significantly reduce the channel requirements for the future ILS complex.

The third factor influencing the co-channel assignment constraints is the assignment criteria, i.e., the level of protection afforded an ILS signal within its service volume from potential interfering co-channel sources. Three sets of assignment criteria are considered. The first case represents current FAA practice in assigning channels to ILS facilities with standard service volumes (Reference 1). In this case, signal-to-interference ratio (SIR) predictions originally derived for VOR systems are employed to determine the minimum distance separation between the aircraft receiver at the extremes of the service volume of one ILS facility and the transmitter location of another potentially interfering co-channel ILS facility so as to maintain a SIR of at least 20 dB with 95% reliability (i.e., 95% of the time). In TABLE 2-1, the top line of entries indicates the minimum channel requirements if this criterion is continued to be used in the future. The remaining two assignment criteria also employ 20 dB of signal protection at 95% reliability, but in addition allow for a 3 dB drop in transmitter power for the desired ILS signal. In these cases, estimates of channel requirements are obtained for both the VOR SIR predictions, in the event these are continued in use, and for the more recently proposed ILS SIR predictions (Reference 2).

An adjustment was made to the data for ILS SIR predictions in Reference 2 by adding 3 dB to the ILS aircraft receiver antenna gain for the desired signal. This was necessary to overcome the apparent 3 dB discrimination in favor of an interfering signal implicit in the antenna statistics employed in Reference 2. The adjustment was not necessary when using the VOR SIR prediction data criteria. The newly proposed ILS assignment criteria require greater distance separations between potentially interfering co-channel ILS facilities than currently employed criteria and are reflected in the higher channel requirements indicated in TABLE 2-1.

The composite of the three factors (antenna system, service volume and assignment criteria) considered above yields the co-channel assignment constraints in terms of the minimum distance separation between the aircraft receiver at the extremes of the service volume of the desired ILS and the location of each potentially interfering co-channel ILS facility. For the directional antennas employed by ILS facilities, minimum co-channel distance separation depends on the relative orientations of the antennas as indicated by the following diagram.



In this diagram, the signal from the desired ILS must be protected at a point 25 nmi. (18 nmi. for the reduced service volume) in the forward or front course direction (indicated by the solid line) and for the same distance on the back course (dotted line). The power from the interfering ILS in the direction of these critical points depends on the angles α and β . The minimum separation distance for cochannel operation depends on these angles as indicated in TABLE 2-2. The antenna patterns are assumed to be symmetric about the runway centerline.

In addition to the above factors (antenna system, service volume and assignment criteria), airport operational procedures also affect the co-channel assignment constraints. Two cases are considered: (1) two ILS facilities on the same runway, but serving opposite approach directions, are required to operate on different channels, and (2) two such ILS facilities are permitted to operate co-channel. ILS facilities at a common airport but on different runways are always assumed to require different channels in this study. Since approximately half the runways, as specified for this study, have two ILS facilities, the impact on minimum channel requirements of this operational constraint is considerable as indicated in TABLE 2-1.

ESTIMATES OF CHANNEL REQUIREMENTS

The analytical procedure employed in estimating channel requirements is based on graph theoretic concepts. In particular, the classical node-coloring problem of graph theory and the notion of chromatic numbers are related to the problem of determining the minimum number of distinct channels required for a system under a given set of constraints.

This method of analysis, including the basic node-coloring algorithms, is discussed in detail in Reference 3.

It should be emphasized that the estimates obtained in this study are minimum channel requirements under the specified conditions. Departures from these estimates may be expected due to uncertainties in specifying the future airport/runway complex, special operational requirements, terrain, propagation anomalies, etc. Furthermore, an optimal assignment to an evolving airport complex may imply substantial revision to the existing assignments from time to time as new ILS facilities are introduced. To minimize the need to revise assignments, an excess of channels, perhaps 10 to 20 percent, might be necessary.

TABLE 2-1
ILS CHANNEL REQUIREMENTS

Co-channel Assignment Constraints			Minimum ILS Channel Requirements			
Antenna Type	Service Volume	Assignment Criteria	1970 ILS Complex 373 Air Terminals 433 Runways 456 ILS Facilities	1973 ILS Complex 476 Air Terminals 551 Runways 589 ILS Facilities	1975 ILS Complex 527 Air Terminals 644 Runways 933 ILS Facilities	1975 ILS Complex * 535 Air Terminals 708 Runways 1133 ILS Facilities
All ILS Facilities Employ 8-Loop Antenna	Standard †	VOR ‡	$\frac{18}{14}$ §	$\frac{24}{18}$	$\frac{32}{22}$	$\frac{41}{25}$
	Standard	VOR	$\frac{19}{15}$	$\frac{25}{19}$	$\frac{33}{23}$	$\frac{42}{26}$
	Reduced	VOR	$\frac{17}{13}$	$\frac{23}{16}$	$\frac{27}{18}$	$\frac{36}{21}$
	Standard	Proposed ILS	$\frac{21}{17}$	$\frac{27}{20}$	$\frac{35}{24}$	$\frac{50}{28}$
	Reduced	Proposed ILS	$\frac{18}{14}$	$\frac{23}{17}$	$\frac{31}{21}$	$\frac{40}{24}$
All ILS Facilities Employ V-Ring Antenna	Standard	Proposed ILS	$\frac{20}{16}$	$\frac{27}{20}$	$\frac{33}{23}$	$\frac{42}{27}$
	Reduced	Proposed ILS	$\frac{18}{14}$	$\frac{23}{17}$	$\frac{28}{19}$	$\frac{37}{22}$

Notes: * Includes ILS facilities for eighteen superports.

† Standard service volume is for distances of 25 nmi and altitudes to 6250 feet.

Reduced service volume is for distances of 18 nmi and altitudes of 4500 feet.

‡ Represents current FAA assignment criteria.

All other criteria provide for possible 3 dB drop in desired signal transmitter power.

§ Upper number applies if two ILS facilities on the same runway must operate on different channels; lower number applies if co-channel operation is permitted.

TABLE 2-2
MINIMUM DISTANCE SEPARATION FOR CO-CHANNEL ILS FACILITIES

Co-channel Assignment Constraints			Minimum Distance Separation, D _{min} (nmi)																	
Antenna Type	Service Volume	Assignment Criteria	Front Course, Angle α									Back Course, Angle β								
			0°-5°	6°-15°	16°-35°	36°-50°	51°-90°	91°-129°	130°-154°	155°-174°	175°-180°	0°-5°	6°-15°	16°-35°	36°-50°	51°-90°	91°-129°	130°-154°	155°-174°	175°-180°
All ILS Facilities Employ S-Loop Antenna	Standard †	VOR ‡	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80
	Standard	VOR	88	88	88	88	88	88	88	88	88	88	88	88	88	88	88	88	88	88
	Reduced	VOR	67	67	67	67	67	67	67	67	67	67	67	67	67	67	67	67	67	67
	Standard	Proposed ILS	101	101	101	100	98	98	100	101	101	101	101	101	100	98	98	100	101	101
	Reduced	Proposed ILS	83	83	83	83	81	81	83	83	83	83	83	83	83	81	81	83	83	83
All ILS Facilities Employ V-Ring Antenna	Standard	Proposed ILS	102	94	90	84	78	67	71	82	94	108	102	99	97	95	91	92	97	102
	Reduced	Proposed ILS	84	75	72	68	64	54	58	67	75	93	84	82	79	77	73	74	79	84

Notes:

† Standard service volume is for distances of 25 nmi and altitudes to 6250 feet.

Reduced service volume is for distances of 18 nmi and altitudes of 4500 feet.

‡ Represents current FAA assignment criteria.

All other criteria provide for possible 3 dB drop in desired signal transmitter power.

APPENDIX I

AIRPORT/RUNWAY/ILS DATA

TABLE I-1 contains a list of ILS facilities included in this study. The table indicates the following information:

1. Airport Identifier — airport code name assigned by the FAA.
2. Latitude.
3. Longitude.
4. Not used in this study.
5. Runway Direction — primary landing direction for the runway; e.g., 24L means the landing direction is approximately 240° magnetic, the L indicates the left runway.
6. Runway Magnetic Bearing.
7. ILS Implementation — for the primary direction, 3 indicates facility will be operating in 1973, 5 indicates superport facility, blank indicates facility will be operating in 1975.
8. ILS Station Identifier — station code name assigned by FAA for the primary runway direction (if implemented).
9. ILS Status — for the primary direction, I indicates currently installed; P indicates proposed facility; blank indicates no facility planned.
10. ILS Antenna Type — V indicates V-ring; blank indicates 8-loop (if implemented).
11. ILS Implementation — for the opposing ILS (if any).
12. ILS Station Identifier — for the opposing ILS station on the runway (if implemented).
13. ILS Status — for the opposing ILS.
14. ILS Antenna Type - for the opposing ILS.
15. Frequency — current assignment for ILS in the primary direction (e.g., 1085 — 108.5 MHz).
16. Frequency — current assignment for the opposing direction (if implemented).
17. Location.

TABLE I-1 (Sheet 1 of 13)
ILS FACILITY DATA

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
ABE	403938	0752544	06	061	3	ABLI					P			1107		ALLENTOWN RE PA
ABI	322556	0994104	35L	350	3	ARII					P			1103		ABILENE TEX
ABU	350340	1063637	35	350	3	AROI								1103		ALBUQUERQUE NM
ABU	350340	1063637	08	080			P									ALBUQUERQUE NM
ABR	452700	982500	12	120		ABRP	3				P					ABERDEEN MU SD
ABY	313200	0841200	04	040	3		P				P					ABERDEEN MU SD
ACK	411450	0700421	24	240	3	ACKI					P			1091		NANTUCKET MASS
ACT	313606	0971349	18	185	3	ACTI					P			1097		WACO MUNI TEX
ACV	405913	1240643	31	314	3	ACVI					P			1095		ARCATA CAL
ACY	392700	0743326	13	128	3	ACYIV								1105		ATLANTIC CTY NJ
ADM	341800	0970100	30	300	3		P									ARDMORE OKLA
ADW	384937	0765216	01L	007	3	RWSI	3			MXKI				1105	11 5	ANDREWS AFB MD
AGC	402114	0795625	27	275	3	AGCI								1091		PITTS PA ALEG
AGS	332236	0815810	35	349	3	AGSIV					P			1105		AUGUSTA GEO
AKR	410154	0812855	25	246	3	AKRI								1109		AKRON OHIO
ALB	424404	0734817	19	191	3	ALBI					P			1095		ALBANY NY
ALU	423308	0922315	12	122	3	ALOI					P			1099		WATERLOO IOWA
ALW	460600	1181700	02	020			P	3								WALA WALA WASH
AMA	351405	1014141	03	035	3	AMAI					P			1103		AMARILLO TEX
ANA	333500	0855100	05	053	3		P									ANNISTON ALA
APN	450500	0833400	18	180		APNP					P					ALPENA MICH
ART	435900	0760100	06	060	3	ARTP					P					WATERTOWN NY
ATL	333919	0842610	33	329	3	AZAI								1093		ATLANTA GEO
ATL	333848	0842440	09L	089	3	ATLI					P			1099		ATLANTA GEO
ATL	333805	0842426	09R	089	3	ALRI	3				P			1105		ATLANTA GEO
ATY	445500	0970900	17	170	3	ATYP					P					WATERTN MUN SD
AUS	301824	0974238	30L	305	3	AUSI					P			1095		AUSTIN MUEL TEX
AVL	352638	0823246	34	341	3	AVLIV								1105		ASHVILLE NC
AVP	412041	0754302	04	043	3	AVPI					P			1099		WILKES BARRE PA
AYS	311609	0823324	18	180		AYSP					P					WAYCROSS GEO
AZO	421435	0853308	35	352	3	AZOI					P			1109		KALAMAZOO MICH
BAE	390631	1212533	14	144	3	BABI								1095		BEALE AFB CALI
BAU	323112	0934027	32	324	3	BADI								1099		SHREVEPORT LOU
BAL	390939	0763934	15	150	3	FNDI					P			1117		BALTIMORE MD
BAL	391021	0763909	A10L	102	3	BALI					P			1097		BALT FRIEND MD
BAL	391021	0763909	A11L	102	5		P	5			P					BALT FRIEND MD
BAL	391021	0763909	A11R	102	5		P	5			P					BALT FRIEND MD
BAL	391021	0763909	A10R	102	5		P	5			P					BALT FRIEND MD
BAL	391021	0763909	A10C	102	5		P	5			P					BALT FRIEND MD
BOL	415711	0724011	06	058	3	BOLIV					P			1103		WINSOR LKS CONN
BOL	415711	0724011	15	150			P									WINSOR LKS CONN
BOR	411000	0730800	24	240	3	BORP										BRIQPORT CONN
BEO	422808	0711610	11	112	3	BEOI								1095		BEDFORD MASS
BEH	420740	0862615	27	270	3	BEHIV								1085		BENTON HBR MICH
BFJ	414837	0783903	32	322	3	BFDI					P			1083		BRADFORD PA
BFF	415300	1033600	12	120		BFFP	3				P					SCOTT BLF NEB
BFI	473054	1221710	13R	128	3	BFIIV								1109		SEATTLE ROFING
BFL	352625	1190346	30R	299	3	BFLI					P			1099		BAKERSFIELD CAL
BFT	413038	0814137	24R	242	3	BFTIV					P					CLEVE LF OHIO
BGM	421301	0755907	34	338	3	BMYI					P			1103		RINGHAMTON NY
BGN	444913	0685050	33	334	3	DAFI					P			1103		BANGOR DOWAF ME
BGS	321147	1013106	17L	170	3	BGSI								1101		BIG SPRING TEX
BHM	333417	0864433	05	052	3	BHMIV					P			1103		BIRMINGHAM ALA
BIL	454802	1083037	09	095	3	BILI					P			1103		BILLINGS LN MON
BIS	464710	1004551	31	306	3	BISI					P					BISMARCK ND
BIX	302400	0885300	05	050	3	XO3I								1083		BILOXI MISS
BJC	395400	1050700	29	290	3		P									BROOMFIELD COL

TABLE I-1 (Sheet 2 of 13)

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
BKW	374700	0810800	10	100	3		P				P					BECKLEY RALY WVA
BLF	371800	0811200	22	220	3		P									BLUEFIELD WVA
BLH	333700	1144354	26	260	3	BLHI								1089		BLYTHE CAL
BLV	383300	0895100	31	312	3	BLVI								1099		SCOTT AFB ILL
BMG	390838	0863647	17	170	3	BMGF					P					BLOOMTN IND
BMI	402900	0885600	11	110	3	BMIH					P					BLOOMINGTON ILL
BNA	360823	0864040	02L	016	3	BNAI					P			1099		NASHVILLE TENN
BNA	360823	0864040	31	310			P									NASHVILLE TENN
BOI	433335	1161220	10L	096	3	BOII					P			1099		BOISE IDAHO
BOS	422256	0705950	A04C	035	5		P 5				P					BOSTON LGN MASS
BOS	422256	0705950	A04L	035	5		P 5				P					BOSTON LGN MASS
BOS	422256	0705950	A03R	035	5		P 5				P					BOSTON LGN MASS
BOS	422256	0705950	A03L	035	5		P 5				P					BOSTON LGN MASS
BOS	422216	0710052	33	330	3	LPII 3					P			1107		BOSTON LGN MASS
BOS	422256	0705950	04R	035	3	BOSIV3					P			1103		BOSTON LGN MASS
BPT	295639	0940024	11	114	3	BPTI					P			1095		BEAUMONT JE TEX
BRL	404700	0910700	18	180		BRLP 3					P					BURLINGTON IOWA
BRO	255347	0972446	13R	127	3	BROI					P			1103		BROWNSVILLE TEX
BSM	301302	0974045	35	350	3	BSMI								1103		AUSTIN AFB TEX
BTL	421754	0851546	22	224	3	BTLI					P			1105		BATTLE CREEK MI
BTR	303130	0910831	13	127	3	BTRI					P			1103		BATON ROUGE LOU
BTU	442753	0730826	15	146	3	BTUI					P			1103		BURLINGTON VT
BUF	425652	0784313	05	052	3	BUII 3					BUFI	1085	1113			BUFFALO NY
BUR	341153	1182158	08	076	3									1095		BURBANK CAL
BYH	355615	0895647	17	175	3	BYHI								1103		BLYTHVILLE ARK
BZN	454700	1111000	12	120	3	BZNP										BOZEMAN MON
CAE	335615	0810627	10	107	3	CAEI					P			1103		COLUMBIA MET SC
CAK	405538	0812625	01	006	3	CAKI					P			1095		AKRON OHIO
CAK	405538	0812625	23	230			P									AKRON OHIO
CBI	383500	0921000	02	020		CBIP 3					P					COLUMBIA JEF MO
CBM	333730	0882530	13	131	3	CBMI								1093		COLUMBUSAFB MIS
CEC	414700	1241400	35	350			P									CRESENT CTY CAL
CEC	414700	1241400	11	110			P									CRESENT CTY CAL
CEF	421045	0723130	23	228	3	CEFI								1099		CHICOPEE AF MAS
CGF	413400	0812900	23R	234	3		P									CLEVE CUY OHIO
CGI	371338	0893420	10	100	3	CGIP					P					C GIRARDEAU MO
CHA	350129	0851224	20	196	3	CHAI					P			1095		LOVELL FLD TENN
CHO	331912	1114006	30R	301	3	CHOI								1103		WILLIAM AF ARIZ
CHK	350919	0975806	18	180	3	CHKI								1105		CHICKASHA OKLA
CHO	380847	0782627	03	027	3	CHOI					P			1117		CHARLOTTE VA
CHS	325321	0800149	15	149	3	CHSI					P			1097		CHARLESTON SC
CIC	394800	1215100	13	130	3		P				P					CHICO MUNI CAL
CID	415303	0914144	08	085	3	CIDI					P			1093		CEDAR RAPIDS IO
CKB	391800	0801400	21	210	3		P									CLARKSBURG WVA
CLE	412502	0815128	28R	277	3	CEEI					P			1107		CLEVELAND OHIO
CLE	412502	0815128	36R	360	5		P 5				P					CLEVELAND OHIO
CLE	412502	0815128	05C	050	5		P 5				P					CLEVELAND OHIO
CLE	412502	0815128	05L	050	5		P 5				P					CLEVELAND OHIO
CLE	412506	0815015	05R	054	3	CLEIV3					P			1099		CLEVELAND OHIO
CLE	412502	0815128	36L	360			P 5				P					CLEVELAND OHIO
CLL	303500	0962200	16	160	3		P									COLLEGE STA TEX
CLT	351324	0805549	05	050	3	CLTIV					P			1095		CHARLOTTE NC
CLT	351324	0805549	36	360			P									CHARLOTTE NC
CMH	395945	0825445	28L	276	3	CMHI					P			1095		COLUMBUS OHIO
CMH	400006	0825245	10L	096	3	CBPIV								1091		COLUMBUS OHIO
CMH	400249	0881706	31	313	3	CMII					P			1091		CHAMPAIGN ILL
CMX	471000	0882900	13	130		CMXP					P					HANCOCK MO MICH

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1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
CNM	322000	1041600	03	030			CNMP				P					CARLSBAD NM
COU	443715	1085753	04	040			CODP				P					CODY MUNIC WYO
COK	382000	0815000	09R	090			COKP									HUNT CHARLS WVA
COK	382000	0815000	09L	090						P						HUNT CHARLS WVA
COS	384940	1044255	35	347	3		COSI				P		1099			COLORADO SP COL
CPR	425448	1062618	07	074	3		CPRI						1103			CASPER WYO
CPH	425448	1062618	21	210						P						CASPER WYO
CRP	274540	0972946	13	127	3		CRPI				P		1103			CORPUS CHPI TEX
CRW	382213	0813559	23	230	3		CRWI						1103			CHARLESTON WVA
CSG	323108	0845557	05	053	3		CSGI				P		1103			MBUS GEO
CSM	352204	0991205	18	180	3		CSMI						1095			CLINTON AF OKLA
CVG	390159	0844008	27L	270			CV6P	3			P					CINCINATTI OHIO
CVG	390159	0844008	18	180	3		SICI	3			CV6I		1115	1099		CINCINATTI OHIO
CVS	342230	1032000	21	213	3		CVSI						1117			CANNON AFB NM
CWA	444000	0894000	08	080			CWAP				P					MOSINEE WISC
CWI	415000	0902000	03	030			CWIP				P					CLINTON IOWA
CYS	410927	1044930	26	262	3		CYSI				P		1101			CHEYENNE WYO
DAA	384314	0771119	32	321	3		DAAI						1089			FT BELVOIR VA
DAB	291109	0810240	06L	065	3		DABI				P		1097			DAYTONA BEA FLA
DAL	325114	0965158	31L	308	3		LVFIV						1117			DALLAS LOVE TEX
DAL	325023	0965010	13L	128	3		DALI						1103			DALLAS LOVE TEX
DAY	395410	0841201	24L	240				P	3		DAYI			1113		DAYTON OHIO
DAY	395410	0841201	18	180	3			P			P					DAYTON OHIO
DAY	395442	0841254	06L	056	3		ATDI						1089			DAYTON OHIO
DBG	422400	0904300	13	130			DBOP	3			P					DEBUQUE IOWA
DCA	385152	0770222	36	003	3		DCAIV	3			ASOI		1099	1081		WASH NAT DC
DEC	395000	0885200	06	056	3		DECI				P		1109			DECATUR ILL
DEN	394744	1045245	35	350	3		SPOI				P		1081			DENVER STPL COL
DEN	394518	1045354	26L	257	3		DENI				P		1103			DENVER STPL COL
DET	422422	0830016	15R	146	3		DETIV						1113			DETROIT CITY MI
DFI	412000	0842500	12	120				P								DEFIANCE OHIO
DHN	311900	0852700	36	360	3		DHNP				P					DOTHAN ALA
DLF	292029	1004531	13C	125	3		DLFI	3			ILHI		1103	1101		DEL RIO TEX
DLH	465028	0921001	09	087	3		DLHI				P		1103			DELUTH MINN
DLH	465028	0921001	03	030				P								DELUTH MINN
DLX	385615	0772736	19R	186	3		DLXI				P		1113			WASH DULLES VA
DLX	385739	0772611	01R	006	3		DIAIV				P		1093			WASH DULLES VA
DLX	385700	0772700	A20R	186	5			P	5		P					WASH DULLES VA
DLX	385700	0772700	A20L	186	5			P	5		P					WASH DULLES VA
DLX	385700	0772700	A19C	186	5			P	5		P					WASH DULLES VA
DLX	385739	0772611	12	120				P			P					WASH DULLES VA
DMA	321107	1105414	30	303	3		DMAI						1093			TUCSON AFBARIZ
DNV	363500	0792000	03	030			DNVP				P					DANVILLE ILL
DOV	390852	0752746	01	013	3		DOVI						1101			DOVER AFB DEL
DPA	415500	0881500	10	100	3			P								DU PAGE ILL
DRO	370900	1074500	02	020			DROP				P					DURANGO LP COL
DSM	413250	0934035	30	305	3		DSMI				P		1103			DES MOINES IOWA
DTW	421300	0832208	27	271	3		DMII				P		1085			DETROIT MICH
DTW	421401	0832054	03L	032	3		DTWIV	3			DWCI		1093	1107		DETROIT METRO
DTW	421401	0832054	03R	032				P			P					DETROIT METRO
DUJ	411028	0785426	07	069	3		DUJI						1099			DUBOIS PA
DYS	322639	0995035	34	338	3		DYSI						1099			BILENE AFB TEX
EAU	445200	0912900	04	040			EAUP	3			P					LAUCLRE WISC
ECG	361600	0761100	10	100			ECGP				P					ELIZABETH CT NC
EDW	345330	1175436	22	224	3		EDWI						1101			EDAFB CAL
EEN	425422	0721610	02	017	3		EENI				P		1089			ILL-HOP NH
EKO	404900	1154700	05	050			EKOP				P					ILKO NEV

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1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
ELM	420910	0705417	24	239	3	ELMI					P			1091		ELMIRA CHMG NY
ELP	314748	1062422	22	218	3	ELPI								1095		ELPASO INTL TEX
ELP	314748	1062422	26	260		P										ELPASO INTL TEX
ELY	391754	1145051	18	180		ELYP					P					ELY YELL NEV
END	362111	0975521	35L	350	3	ENDI								1101		VANCE AFB OKLA
ENU	362111	0975451	17C	170	3	LVC1								1089		VANCE AFB OKLA
EPH	471800	1193100	02	020		P						P				EPHRATA MU WASH
ERI	420517	0800946	06	060	3	ERIV					P			1103		ERIE INTL PA
ESC	454300	0870600	09	090	3	ESCP					P					ESCANABA MICH
ESF	312340	0921835	26	260	3	ESFI					P			1115		ALEXANDRIA LOU
EUG	440646	1231203	16	159	3	EUGI					P			1095		EUGENE ORE
EVV	380144	0873216	22	215	3	EVVI					P			1099		EVANSVILLE IND
EWB	414103	0705706	05	053	3	EWBI								1097		NEW BEDFORD MAS
EWN	350400	0770300	04	040		EWNP					P					NEW BERN MRE NC
EWR	404159	0740937	11	110	3	P					P					NEWARK NJ
EWR	404202	0740949	04L	037	3	EWRI	3	ARKI						1087	1087	NEWARK NJ
FAR	465613	0964856	35	351	3	FARI					P			1103		FARGO HECTOR ND
FAT	364654	1194324	29R	289	3	FATI					P			1103		FRESNO CAL
FAY	345954	0785232	03	035	3	GRAIV					P			1105		FAYETTEVILLE NC
FFO	394834	0840424	23R	229	3	FFOI	3	FBNI						1097	1113	WRIGHT PAT OHIO
FLL	260436	0800829	09L	090	3	LHII					P			1101		FT LAUDERDL FLA
FLO	341100	0794300	05	050	3	FLOP					P					FLORENCE SC
FMH	413852	0703159	23	233	3	FMHI								1101		FALMOUTH AF MASS
FMY	263500	0815200	04	040	3	FMYP					P					FT MYRES FLA
FNM	364400	1081400	05	050		FNMP					P					FARMINGTON NM
FNT	425809	0834345	09	091	3	FNTI					P			1099		FLINT MICH
FOD	423300	0941100	12	120		FODP					P					FT DODGE IOWA
FOE	385806	0954052	31	307	3	FOEI								1101		TOPEKA KAN
FSD	433541	0964356	03	026	3	FSDI					P			1099		SIOUX FALLS SD
FSM	351958	0942312	25	254	3	FSMI					P			1095		FORT SMITH ARK
FTW	324829	0972132	17	174	3	FTWI								1099		FORT WORTHAFTEX
FTY	334700	0843100	26L	260	3	P										FULTON CO GEO
FUC	325000	0970000	13R	130	5	P 5					P					DALLAS FTW TEX
FUC	325000	0970000	13C	130	5	P 5					P					DALLAS FTW TEX
FUC	325000	0970000	13L	130	5	FUCP	5				P					DALLAS FTW TEX
FUC	325000	0970000	22R	220		P					P					DALLAS FTW TEX
FUC	325000	0970000	22C	220		P					P					DALLAS FTW TEX
FUC	325000	0970000	22L	220		P					P					DALLAS FTW TEX
FWA	405918	0851149	31	315	3	FWAI					P			1099		FORT WAYNE IND
FWA	405918	0851149	22	220		P 3					P					FORT WAYNE IND
FWH	324646	0972622	35	353	3	FWHI								1093		FT WORTH AF TEX
GBG	405622	0902538	02	020		GRGP					P					GALESBURG ILL
GEG	473545	1173231	21	205	3	GEGI								1099		SPOKANE INT WAS
GEG	473545	1173231	07	070		P										SPOKANE INT WAS
GFA	472926	1111219	20	205	3	GFAI								1095		MALSTROMAFBON
GFK	475700	0971100	35	350	3	P					P					GRD FORK INT ND
GFL	432000	0733700	01	010	3	GFLP					P					GLEN FALLS NY
GGG	322251	0944221	13	127	3	GGGI					P			1095		LONGVIEW CR TEX
GJT	390705	1063048	11	110	3	GJTI					P			1103		GRAND JUNCT COL
GLH	332900	0905900	17	170	3	GLHP					P					GREENVILLE MISS
GNV	294100	0821600	10	100		GNVP	3				P					GAINSVILLE FLA
GON	412000	0720300	05	050		GONP					P					GROTON CONN
GPB	403005	0801355	A10C	097	5	P 5					P					PITTSBURGH PA
GPB	403005	0801355	A09R	097	5	P 5					P					PITTSBURGH PA
GPB	403005	0801355	A09L	097	5	P 5					P					PITTSBURGH PA
GPB	402923	0801421	A28L	277	3	GPBIV5					P			1103		PITTSBURGH PA
GPB	403005	0801355	A10L	097	3	LXBIV5					P			1117		PITTSBURGH PA

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1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
GPI	403005	0801355	23	230			P									PITTSBURGH PA
GPT	302343	0890335	13	131	3		GPTI		P		1109					GULF PORT MISS
GRD	442929	0890659	06	059	3		GRBI		P		1095					GREEN BAY WISC
GRI	405853	0981852	35	350	3		GRIP		P							GRAND ISL NEB
GRL	345127	0822054	36	002	3		GRLI				1097					GREENVILLE SC
GRH	425236	0853231	26	262	3		GRRH		P		1097					GRN RAPIDS MICH
GSH	352044	0775558	08	078	3		GSHI				1093					GOLDSBORO NC
GSU	360507	0795607	14	138	3		GSOIV		P		1099					GREENSBORO NC
GSP	345428	0821234	03	033	3		GSPI		P		1093					GREENVILLE SC
GSN	324902	0970205	13	129	3		GSWI				1095					FORT WORTH TEX
GSN	324902	0970205	35	350			P									FORT WORTH TEX
GTF	472947	1112219	34	341	3		GTFI				1103					IT FAS INTL MON
GTF	472947	1112219	03	030			P									IT FAS INTL MON
GUS	403900	0860800	04	045	3		GUSI				1095					CRISOM AFB IND
GVW	385143	0943322	36	360	3		GVWI				1093					GRAND VIEW MO
HAK	401312	0765030	08	079	3		HARIV				1091					HARRISBURG PA
HBR	342042	0985916	17	170	3		FDRI				1111					FREDERICK OKLA
HDN	402000	1073030	10	100			HDNP			P						HAYDEN YAN COL
HEW	441609	0883044	02	020	3		ATWI				1091					APPLETON WIS
HIB	471806	0924214	13	130			HIBP 3		P							CRISHOLM MINN
HIF	410600	1115700	14	136	3		HIFI				1099					OIGEN AFB UTAH
HKY	354400	0812300	06	060			HKYP 3		F							HICKORY NC
HLG	401051	0803836	03	030	3		HLGI				1097					WHEELING WVA
HLN	463600	1115900	26	260	3		HLNP									HELENA MUN MON
HON	442247	0981246	12	118	3		HONI				1103					HURON SD
HOT	342803	0930513	05	050	3		HOTI				1115					MEMORIAL FD ARK
HOU	293921	0951518	04	036	3		HOUI				1099					HOUSTON HOB TEX
HPN	410328	0734201	16	162	3		HPNI			P	1097					WH TE PLAINS NY
HRL	261818	0973927	17R	170	3		P			P						HALLINGEN TEX
HSP	375650	0795036	24	240	3		HSPI				1087					HOT SPRINGS VA
HST	253002	0802204	05	049	3		HSTI				1099					HOMESTED AF FLA
HSV	344051	0865522	18R	179	3		HSVIV			P	1093					HUNTSVILLE ALA
HTS	382152	0823249	11	114	3		HTSI				1099					HUNTINGTON WVA
HUF	392735	0871748	05	045	3		HUFI			P	1097					TERRE HAUTE IND
HUT	380328	0975115	13	129	3		HUTI				1101					HUTKINSON KAN
HVN	411600	0725300	02	020	3		P									TWEED N H CONN
HYA	413950	0701703	24	245	3		HYAI			P	1105					HYANNIS MASS
IAB	373832	0971538	36R	002	3		IABI				1099					WICHITA AFB KAN
IAG	430634	0785820	28R	278	3		IAGI				1101					NIAGARA FALL NY
IAH	295936	0951917	A08R	080	5		P 5			P						HOUSTON INT TEX
IAH	295936	0951917	A08C	080	5		P 5			P						HOUSTON INT TEX
IAH	295936	0951917	A07R	080	5		P 5			P						HOUSTON INT TEX
IAH	295936	0951917	A07L	080	5		P 5			P						HOUSTON INT TEX
IAH	295936	0951917	08L	080	3		IAHIV3			P	1093					HOUSTON INT TEX
IAH	295936	0951917	14	140			P			P						HOUSTON INT TEX
ICT	373954	0972457	01	011	3		ICTI			P	1103					WICHITA KAN
IDA	433100	1120400	02	020			IDAP 3			P						IDAHO FALLS IDH
ILG	394123	0753607	01	014	3		ILGI				1103					WILLIAMINGTON DEL
ILG	394123	0753607	09	090			P									WILLIAMINGTON DEL
ILM	341654	0775435	34	343	3		ILMIV			P	1103					WILLIAMINGTON NC
IMT	454858	0880643	01	010	3		IMTP									IRON MT FD MICH
IND	394409	0861728	31	313	3		COAI			P	1105					INDIANAPOLIS IND
IND	394411	0861621	04	044	3		INDIV			P	1093					INDIANAPOLIS IND
INL	463400	0932400	13	130			INLP 3			P						INTL FALLS MINN
INR	461325	0842703	15	154	3		INRI				1103					SAU S. MARI MCH
INT	360822	0801338	33	320	3		INTI			P	1103					WINSTON SALEM NC
IPL	325000	1153400	32	320			P			P						IMPERIAL CAL

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1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
IPT	411419	0765605	27	266	3		IPTIV		P		1101					WILLIAMSPORT PA
ISU	352000	0773700	04	040	3		ISOP		P							KINSTON NC
ISP	404816	0730532	06	057	3		ISPI		P		1083					ISLIP MAGRTR NY
ITH	422900	0762800	14	140			ITHP 3		P							ITHICA TOMPK NY
JAC	433600	1104402	18	180	3			P								JACKSON HOLE WY
JAN	321817	0900356	15L	153	3		JANIV		P		1105					JACKSON TOM MIS
JAX	303024	0814003	07	070	3		JAXIV		P		1107					JACKS INTL FLA
JBR	355000	0904500	22	220			JBRP		P							JONESBORO ARK
JFK	403847	0734517	04L	042	3			P								JFK INTL NY
JFK	403934	0734740	31R	311	3		RTHIV3		TLKI		1115	111				JFKENNFY INTL
JFK	403847	0734517	13R	130	3			P 3		P						JFK INTL NY
JFK	403847	0734517	04R	042	3		JFKI 3		IWI		1095	1109				JFK INTL NY
JHW	420854	0791610	25	246	3		JHWIV				1097					JAMESTOWN NY
JLN	370838	0942929	13	131	3		JLNI		P		1103					JOPLIN MO
JMS	465600	0944100	12	120			JMSP		P							JAMESTOWN ND
JST	401900	0735000	15	146	3			P								JOHNSTOWN PA
JVL	423700	0890200	04	040	3			P								JANESVILLE WISC
JXN	421521	0842802	23	233	3		JXNIV				1091					JACKSON MICH
LAF	402439	0865536	10	098	3		LAFI		P		1103					LAFAYETTE IND
LAN	424641	0843621	27	273	3		LANI		P		1101					LANSING MICH
LAS	360436	1151011	25	254	3		LASI		P		1103					LAS VEGAS NEV
LAS	360500	1150900	01	010				P								LAS VEGAS NEV
LAW	343400	0942500	35	350	3		LAWP		P							LAWTON OKLA
LAX	335603	1182449	25L	250	3		LAXIV		P		1099					LOS ANGELES CAL
LAX	335647	1182619	24L	248	3		OSSIV		P		1085					LOS ANGELES CAL
LAX	335624	1182242	07L	068	3		IASI		P		1099					LOS ANGELES CAL
LAX	335603	1182449	06L	060	3			P		P						LOS ANGELES CAL
LAX	335603	1182449	A25C	248	3			P 5		P						LOS ANGELES CAL
LAX	335603	1182449	A24C	248	5			P 5		P						LOS ANGELES CAL
LBU	333849	1014942	17R	169	3		LRVI		P		1095					LUBBOCK TEX
LBB	333849	1014942	26	260				P								LUBBOCK TEX
LBE	401604	0792502	23	230	3		LBEI				1109					LATROBE PENN
LBF	410800	1004200	12	120			LBFP		P							N PLATTE NEB
LBL	370300	1005800	17	170			LRLP		P							LIBERAL KAN
LBY	413500	0744000	14	140			LBYP		P							LIB MONTCELO NY
LCH	300632	0931303	15	148	3		LCHI		P		1091					LAKE CHLS LOU
LCK	394744	0825656	23	227	3		LCKI				1101					COLUMBUS AFB O
LEB	433800	0721800	25	250			LEBP 3		P							LEBENON NH
LEX	380231	0843557	04	042	3		LEXI		P		1101					LEXINGTON KY
LFI	370524	0762026	07	073	3		LFII				1097					LANGLEY AFB VA
LFT	301136	0915935	19	193	3		LFTI		P		1095					LAYAFETTE LOU
LGA	404620	0735134	13	134	3		GDII 3		P		1085					LAGUARDIA NY
LGA	404651	0735229	04	043	3		LGAIV3		URDIV		1099	110				LAGUARDIA NY
LGB	334937	1160942	30	300	3		LGBI		P		1103					LONG BEACH CAL
LIT	344415	0921307	04	041	3		LITI		P		1103					LITTLE ROCK ARK
LIZ	465813	0675334	01	008	3		LIZI				1103					LIMESTONE AF ME
LMT	421020	1214430	32	319	3		L'ITI				1095					KLAMATH FLS ORE
LNK	405202	0944541	35L	351	3		LNKI		P		1099					LINCOLN MUN NEB
LNN	414100	0812500	09	090				P								LST NATION OHIO
LNS	400733	0761707	08	080	3		LNSI				1083					LANCASTER PA
LOI	273300	0992800	15	150	3			P		P						LAREDO MUNI TEX
LOZ	370500	0840400	05	050	3			P		P						LONDON CORBN KY
LRU	273153	0992746	17C	170	3		LRDI 3		LTLI		1095	111				LAREDO TEX
LRP	345434	0921019	24	245	3		LRFI				1099					JACKSONVILLE ARK
LSE	435300	0911500	18	180	3		LSEP		P							LACROSSE WISC
LSF	322043	0845955	32	323	3		LSFIV				1107					FT BENNING GEO
LTS	344012	0991625	35	351	3		LTSI				1103					ALTUS AFR OKLA

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1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
LUK	390524	0842515	20L	201	3	LUKI								1109		CINN LUNKEN O
LWS	462300	1170100	25	250	3	LWSP					P					LEWISTOWN IDHO
LYH	371959	0791147	03	032	3	LYHI					P			1101		LYNCHBURG VA
MAF	315617	1021125	10	103	3	MAFI					P			1103		MIDLIND OD TEX
MAF	315617	1021125	16R	160						P						MIDLIND OD TEX
MBS	433228	0840409	05	049	3	MBSI					P			1087		SAGINAW MICH
MCC	383852	1212400	16	162	3	MCCI								1099		SACRAMENTOAFB
MCE	371700	1203100	12	120						P						MERCED MUNI CAL
MCF	275002	0823208	22	219	3	MCFI								1095		TAMPA AFB FLA
MCI	391916	0944315	36	005	3	MCII					P			1105		MC MID CONT MO
MCI	391716	0944122	09	088	3	RNII					P			1097		KANSAS CI MO
MCN	324156	0833838	05	047	3	MCNI					P			1095		JACON MUNI GEO
MCO	282712	0811938	36L	360	3	MCOI					P			1093		ORLANDO AFB FLA
MCO	282712	0811938	36R	360						P						ORLANDO AFB FLA
MCW	431000	0932000	17	170		MCWP 3					P					MASON CITY IOWA
MDT	401113	0764448	13	125	3	MDTIV								1109		MIDDLETOWN PA
MDW	414645	0874436	13R	132	3	MDWI 3					MXTI			1099	1095	CHICAGO MIDWAY
MDW	414645	0874436	04R	040	3					P						CHI MIDWAY ILL
MEI	322041	0884504	01	004	3	MEII					P			1101		MERIDIAN KY MIS
MEM	350327	0895707	09	087	3	MEMI								1095		MEMPHIS TENN
MEM	350326	0895835	35	354	3	TSEIV3					P			1105		MEMPHIS TENN
MER	372351	1203537	30	303	3	MERI								1095		MERCED AFB CAL
MFD	404940	0823115	32	320	3	MFDI								1105		MANSFIELD OHIO
MFL	261100	0981400	13	130	3					P						MALLEN TEX
MFR	422135	1225155	14	140	3	MFRI								1103		MIDFORD ORE
MGE	335500	0843100	10	100	3	XDOIV								1085		MARRIETTA GEO
MGJ	413108	0741552	03	030	3	MGJI								1117		ORANGE CO NY
MGM	321759	0862250	09	093	3	MGMIV					P			1099		MONTGOMERY ALA
MGR	310500	0834800	04	040		MGRP					P					MCULTREE GEO
MGW	393900	0795500	18	180	3					P						MORGANTOWN WVA
MHK	390900	0964000	03	030		MHKP					P					MANHATTAN KAN
MHR	383233	1211904	22L	218	3	MHRI								1107		MATHER AFB CAL
MHT	425633	0712625	35	352	3	MHTIV					P			1083		MALCHESTR MU NH
MIA	254710	0801826	27L	267	3	MIAI								1095		MI MI INTNL FLA
MIA	254805	0801602	09L	087	3	MFAI								1103		MI MI INTNL FLA
MIB	462543	1012326	29	292	3	MIBI								1099		MILIT AFB ND
MID	410800	0814600	18	180						P						MELINA OHIO
MIE	401400	0852400	14	140	3					P						MURCIE IND
MKC	390651	0943543	18	185	3	MKCIV								1099		KC MUNICIPL MO
MKE	425649	0875310	07R	070	3	GMFI					P			1107		MILWALKEE WISC
MKE	425750	0875331	A01L	006	3	MKEI					P			1103		MILWALKEE WISC
MKE	425700	0875400	A36R	006	5					P 5						MILWALKEE WISC
MKE	425700	0875400	A36L	006	5					P 5						MILWALKEE WISC
MKE	425700	0875400	A01R	006	5					P 5						MILWALKEE WISC
MKE	425700	0875400	A01C	006	5					P 5						MILWALKEE WISC
MKG	431037	0861424	32	317	3	MKGI								1099		MUSIEGON MICH
MKG	431037	0861424	05	050						P						MUSIEGON MICH
MKL	353600	0885500	02	020	3	MKLP					P					MCKELLAR TENN
MLB	280600	0803800	09	090	3	MLBP										MELBORNE FLA
MLI	412655	0902944	09	087	3	MLII					P			1103		MOLINE DVPT ILL
MLU	323113	0920133	04	039	3	MLUI					P			1095		MONROE MUNI LOU
MMU	404732	0742514	23	230	3	MMUI								1103		MORRISTOWN NJ
MOB	304048	0881415	14	140	3	MOBI					P			1099		MOBILE ALA
MOC	401145	0740715	14	140	3	ETTI								1091		MONMOUTH CO NJ
MOL	373600	1205700	29	290	3					P						MODETO CAL
MOT	482500	1012100	12	120		MOTP 3					P					MINO INTL ND
MQT	463200	0873400	08	080	3	MQTP					P					MARGUERITE MICH

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1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
	392400	0775900	08	060	3											MARTINSBURG WVA
MSY	363459	1214954	10	096	3											MONTEREY PA CAL
MSI	430907	0892028	36	359	3											MADISON WISC
MSL	344500	0873700	29	290	3											MUSCLE SHO. ALA
MSO	465500	1140500	11	110	3											MISSOULA MON
MSP	445340	0931326	29R	294	3											MINN STPAUL MIN
MSP	445340	0931225	04	039	3											MINN STPAUL MIN
MSP	445321	0931414	29L	295	3											MINN STPAUL MIN
MSY	295916	0911455	A10C	099	3											NEW ORLEANS LOU
MSY	295916	0901455	01	010	3											NEW ORLEAN LOU
MSY	295916	0911455	A10R	099	5											NEW ORLEANS LOU
MSY	295916	0911455	A10L	099	5											NEW ORLEANS LOU
MSY	295916	0911455	A09R	099	5											NEW ORLEANS LOU
MSY	295916	0911455	A09L	099	5											NEW ORLEANS LOU
NTC	423600	0825010	18	185	3											MT CLEMENS MICH
NTO	392840	0881711	06	060												MATTOON ILL
MUO	430118	1155050	12	117	3											MT HOLM IDAHO
MVN	381905	0885139	05	050												MT VERNON ILL
MVY	412311	0703726	24	240	3											MARTHAS VI MASS
MWA	374515	0890042	02	020												MARION ILL
MWH	471347	1191938	32R	321	3											GRANT CO WASH
MWO	393130	0842415	23	230	3											MIDDLETON OHIO
MXF	322220	0862130	14	145	3											MONTGOMERY ALA
MYR	334100	0765600	05	050												MYRTLE BEACH SC
NEW	300200	0900147	17	170	3											N ORLEAN LF LOU
NYC	405000	0725000	A14C	130	5											NEW YORK CITY
NYC	405000	0725000	A14L	130	5											NEW YORK CITY
NYC	405000	0725000	A14R	130	5											NEW YORK CITY
NYC	405000	0725000	A13C	130												NEW YORK CITY
NYC	405000	0725000	A13L	130												NEW YORK CITY
NYC	405000	0725000	A13R	130												NEW YORK CITY
NZJ	334121	1174337	34R	345	3											EL TORO CAL
OAK	374315	1221433	29	293	3											OKLAND CAL
OAK	374400	1221342	27R	275	3											OKLAND CAL
OCF	291000	0821300	18	180												OCALA MUNIC FLA
OEX	352400	0973700	27	270	3											OKC TRAIN OKLA
OEX	352402	0973711	20	200	3											OKC TRAIN OKLA
OEX	352402	0973711	10	100	3											OKC TRAIN OKLA
OFF	410758	0955549	30	302	3											OMAHA AFB NEB
OHA	415957	0875340	04	038	3											CHICAGO OHARE
OHA	415800	0875400	A14C	138	5											CHICAGO OHARE
OHA	415902	0875512	27R	268	3											CHICAGO OHARE
OHA	415808	0875529	27L	268	3											CHICAGO OMA ILL
OHA	415750	0875412	14R	138	3											CHICAGO OHARE
OHA	415842	0875317	14L	138	3											CHICAGO OHARE
OKC	352421	0973619	35L	351	3											OKC OKLA
OKC	352400	0973600	35R	351	3											WILL ROGER OKLA
OKK	403200	0860400	04	040												KOKOMO IND
OLM	465800	1225400	17	168	3											OLYMPIA WASH
OMA	411729	0955302	14	136	3											OMAHA EPPLY NEB
OMA	411729	0955302	17	170												OMAHA EPPLY NEB
ONT	340326	1173733	25	255	3											ONTARIO CAL
ORF	365415	0761127	04	045	3											NORFOLK MUN VA
ORH	421557	0715152	11	108	3											WORCESTER MASS
ORL	283259	0811914	07	067	3											ORLANDO FLA
OSC	442758	0832156	06	065	3											OSCODA AFB MICH
OSH	435939	0883251	09	089	3											OSHKOSH WISC

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1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
OSH	435939	0883251	18	180			P				P					OSHKOSH WISC
OTH	432500	1241500	13	130	J		P									N BEND ORE
OTH	432500	1241500	04	040			P									COOS BAY ORE
OTM	410600	0922700	14	140			OTMP				P					OTTUMWA IOWA
OWB	374500	0871000	35	350	J		OWBP				P					OWNSBORO KY
OWU	421149	0711048	35	348	3		XROI							1085		NORWOOD MASS
OZR	311641	0852221	06	059	3		OZRI							1097		OZARK ARMY ALA
PAE	475335	1221703	16	158	3		PAEI3				P			1093		EVERETT WASH
PAM	300503	0853520	31R	312	3		PAMI 3			TYFI				1101	1109	PANAMA CITY FLA
PBG	443755	0732725	17	172	J		PRGI							1097		PLATTSBURGH NY
PBI	264052	0800435	09	093	3		PRII				P			1093		PALM BEACH FLA
PDK	335300	0841800	27	270	3		P									DEKALB PCH GEO
PDT	454140	1165124	25R	250	3		PDTI				P			1103		PENDELTON ORE
PDX	453554	1223558	28R	278	3		IAPIV							1113		PORTLAND IN ORE
PDX	453444	1223444	10R	098	3		PDXIV							1099		PORTLAND IN ORE
PDX	453554	1223558	20	200			P									PORTLAND IN ORE
PFN	301300	0854100	14	139	3		PFNI				P			1105		PANAMA CITY FLA
PHF	370816	0762846	06	065	3		PHFI				P			1101		NEWPORT NEWS VA
PHL	395300	0751400	A09C	085	5		P 5				P					PHILA INT PA
PHL	395300	0751400	A08R	085	5		P 5				P					PHILA INT PA
PHL	395300	0751400	A08C	085	5		P 5				P					PHILA INT PA
PHL	395300	0751400	A08L	085	5		P 5				P					PHILA INT PA
PHL	395300	0751400	A09R	085	5		P				P					PHILA INT PA
PHL	395233	0751312	09L	085	3		PHLIV3				P			1093		PHILADELPHIA PA
PHX	332600	1120100	26L	260			P 3				P					PHOENIX ARIZ
PIA	404017	0894234	30	303	3		PIAI				P			1099		PIORIA ILL
PIC	405535	0724738	05	047	3		CTOI							1107		PICONIC NY
PIE	275355	0824112	17	170	3		PIEI							1091		S PETERSBURGFL
PIH	425403	1123605	21	208	3		PIHI				P			1103		PICATELLO IDAHO
PIK	442300	1001700	25	250	3		PIRP									P ERRE MUN SD
PIR	442300	1001700	30	300			P									P ERRE MUN SD
PKB	392110	0812613	03	031	3		PKBI 3				P			1107		WOOD CO WVA
PLN	453400	0844800	05	050			P				P					PILSTON MICH
PLN	453400	0844800	32	320	3		P									PILLSTON MICH
PMU	343800	1160600	25	250	3		P									PILMDALE CAL
PMU	343647	1180547	04	040	3		XPDI							1091		PILMDALE AF CAL
PNE	400432	0750124	24	238	3		PNEI							1111		NC PHILA PA
PNS	302750	0871108	16	163	J		PNSI				P			1095		PENSACOLA FLA
PNX	334158	0964021	17L	173	3		PNXI							1101		SHERMAN AF TEX
POB	350931	0790139	22	225	3		POBI							1109		POPE AFB NC
PQI	464100	0680300	01	010	3		PQIP				P					PRISQUE ISL ME
PRB	354000	1203800	19	190			P				P					PAJO ROBLES CAL
PSB	335212	1162544	30	300			P				P					PA M SPRING CAL
PSC	461600	1190700	20R	200	3		P				P					PA CALL WASH
PSK	323400	0825900	05	050	3		PSKP				P					DUBLIN NRV VA
PSM	430541	0705030	34	344	3		PSMI							1101		POITSMOUTHAFBNH
PTK	424000	0832500	09	090	3		P									OAKLAND PO MICH
PUB	361715	1042804	07L	075	3		PURI				P			1095		PUEBLO MEM COL
PUK	370400	0884600	04	040	3		PUKP				P					PAUCAH KY
PVU	414356	0712511	05R	046	3		PVDI				P			1093		PROVIDENCE RI
PVU	414356	0712511	16	160			P									PROVIDENCE RI
PWM	433838	0701752	11	112	3		PWMI				P			1099		PORTLAND MIN ME
RAL	335707	1172654	27	270			P				P					RIVERSIDE CAL
RAP	440311	1030350	32	319	J		RAPI				P			1093		RAPID CITY SD
RCA	440932	1030738	30	304	3		RCAI							1103		RAPID CTY AF SD
RDU	403000	1221800	16	160	J		P				P					RED BING MUN CAL
RDG	402309	0755747	36	001	3		RDGI				P			1095		RED BING PA

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1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
RDR	475826	0972403	35	351	3	RDR1								1099		GRD FORK AFB ND
RDU	355347	0704643	05	049	3	RDUI					P			1095		RALEIGH DUR NC
RFU	421236	0890517	36	002	3	RFUI					P			1093		ROCKFORD ILL
RIC	373024	0771822	06	063	3	RICI								1103		RICHMOND VA
RIC	373024	0771822	15	150			P	3				P				RICHMOND VA
RIV	335406	1171626	31	314	3	RIVI								1101		RIVERSIDE AFB CAL
RIW	430400	1082700	10	100		RIWP					P					RIVERTON LA WYO
RKS	413554	1090454	25	254	3	RKSI								1103		ROCK SPRING WYO
RME	431452	0752537	33	325	3	RMEI								1101		ROME AFB NY
RMG	341756	0850951	36	360		RMGP										ROME RUSSEL GEO
RMT	355800	0774800	03	030	3	RMTI						P				ROCKY MT NC
RNU	293204	0981636	32R	320	3	RNDI								1093		SAN ANTONIO TEX
RNO	392918	1194606	16	162	3	RNOI						P		1093		RENO MUNI NEV
ROA	371949	0795857	33	332	3	ROAI								1097		ROANOKE MUN VA
ROC	430722	0774045	28	277	3	ROCI						P		1095		ROCHESTER NY
ROC	430702	0774012	04	041	3	MCUIV						P		1107		ROCHESTER NY
ROW	331701	1043222	21	213	3	ROWI	3					P		1099		ROSEWELL AFB NM
RST	435509	0923038	31	307	3	RSTI						P		1085		ROCHESTER MINN
RVO	333445	1020234	17C	170	3	RVOI	3				REEI			1099	1099	LURBOCK AFB TEX
RWI	355157	0775302	04	039	3	RWII								1083		ROCKY MT NC
SAC	363118	1212906	02	016	3	SACI								1103		SACRAMENTO MUNI
SAF	353700	1000500	02	020	3	SAFP						P				SANTE FE NM
SAN	324414	1171216	A10R	092	5				P	5		P				SAN DIEGO CAL
SAN	324414	1171216	A10C	092	5				P	5		P				SAN DIEGO CAL
SAN	324414	1171216	A10L	092	5				P	5		P				SAN DIEGO CAL
SAN	324414	1171216	A09C	092	5				P	5		P				SAN DIEGO CAL
SAN	324414	1171216	A09L	092	5				P	5		P				SAN DIEGO CAL
SAN	324414	1171216	A09R	092	5	SANI	5					P		1109		SAN DIEGO CAL
SAT	293131	0902747	12R	123	3	ANTI						P		1109		SANANTONIO TEX
SAT	293200	0982800	A04R	032	5				P	5		P				SAN ANTONIO TEX
SAT	293200	0982800	A04L	032	5				P	5		P				SAN ANTONIO TEX
SAT	293200	0982800	A03R	032	5				P	5		P				SAN ANTONIO TEX
SAT	293200	0982800	A03C	032	5				P	5		P				SAN ANTONIO TEX
SAT	293212	0982721	A03L	032	3	SATI	5					P		1097		SAN ANTONIO TEX
SAV	320742	0811110	09	092	3	SAVI						P		1099		SAVANNAH GEO
SAW	462238	0872342	01	010	3	SAWI								1099		MARQUETTEAF MIC
SBA	342530	1194950	07	073	3	SBAI						P		1103		SANA BARBARA CL
SBD	340620	1171410	05	055	3	SBDI								1093		SAN BERADINOCAL
SBN	414216	0861931	27	269	3	SBNI						P		1093		SOUTH RENDSTJOS
SBY	382000	0733100	04	040	3				P							SALISBURY MD
SCK	375421	1211503	29R	291	3	SCKI						P		1091		STOCKTON CAL
SDF	361050	0854456	29	290	3	LKSI								1091		LOUISVILLE KY
SDF	361121	0853400	01	010	3	SDFIV3						P		1103		LOUISVILLE KY
SEA	472546	1221824	16	158	3	SZIIV3					SEAI			1115	1103	SEATTLE TACOMA
SEM	322009	0865903	32	323	3	SEMI	3				CRAI			1105	1117	SELMA CRAIG ALA
SFO	373618	1222250	A20L	191	5				P	5		P				SAN FRANCISCO
SFO	373618	1222250	A19R	191	5				P	5		P				SAN FRANCISCO
SFO	373618	1222250	A19C	191	5				P	5		P				SAN FRANCISCO
SFO	373737	1222333	28L	281	3	SFOIV5						P		1095		SAN FRAN CAL
SFO	373618	1222250	A19L	191	3	SIAIV5						P		1089		SAN FRANCISCO
SFO	373737	1222333	28R	281	3				P	5		P				SAN FRAN CAL
SGF	371509	0932251	01	015	3	SGFI						P		1099		SPRINGFIELD MO
SHD	381617	0785323	04	040	3	SHDI								1095		STAUNTON VA
SHK	444600	1065900	13	130		SHRP	3					P				SHERIDAN CO WYO
SHV	322609	0934906	13	136	3	SHVI								1103		GTR SHREVEPT LO
SJC	372224	1215617	30L	302	3	SJCI						P		1109		SAN JOSE CAL
SJT	312147	1062905	03	033	3	SJTI								1097		STANGELO MT TEX

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1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
SJT	312147	1002905	18	180					P		P					STANGELO MT TEX
SKA	473622	1174035	23	226	3		SKAI							1103		SPOKANE AF WASH
SKF	292150	0963408	15	152	3		SKFI							1101		SAN ANTONIO TEX
SLC	404807	1115830	34L	339	3		SLCI							1095		SALT LK CTY UTH
SLC	404807	1115830	16L	160	3			P								SALT LK CTY UTH
SLE	445509	1230009	31	309	3		SLEI				P			1103		SALEM ORE
SLK	442304	0741218	05	050			SLKP				P					SARANAC LAKE NY
SLN	384903	0973843	35	351	3		SLNI				P			1105		SALINA KAN
SMF	384032	1213605	16	163	3		SMFIV				P			1083		SACRAMENTO CAL
SMX	345400	1202700	30	300	3		SMXP				P					SANA MARIA CAL
SNA	333955	1175228	19R	193	3		SNAI				P			1083		SANTA ANA CAL
SPI	395115	0893959	04	038	3		SPII				P			1095		SPRINGFLD ILL
SPS	340029	0983004	33L	329	3		SPSI				P			1097		SHEPPARD AFBTEX
SQI	414430	0894100	06	060			SQIP				P					STERLING ILL
SRF	380410	1223117	30	298	3		SRFI							1097		SANRAFAEL AFCAL
SRW	272400	0823300	13	130	3		SRQP				P					SARASOTA FLA
SSC	335913	0802738	04	037	3		SSCI							1101		SUMTER AFB SC
STJ	394718	0945424	35	352	3		STJI				P			1103		ST JOSEPH MO
STL	384446	0902258	24	238	3		STLI				P			1103		ST LOUIS LMB MO
STL	384500	0902200	A12C	117	5			P 5			P					ST LOUIS LMB MO
STL	384500	0902200	A12L	117	5			P 5			P					ST LOUIS LMB MO
STL	384500	0902200	A11R	117	5			P 5			P					ST LOUIS LMB MO
STL	384500	0902200	A11L	117	5			P 5			P					ST LOUIS LMB MO
STL	384418	0902052	12R	117	3		LMRIV3				P			1097		ST LOUIS LMB MO
STP	445600	0930400	30	300	3			P								ST PAUL DT MINN
STS	383100	1224900	32	320	3		STSP				P					SANA ROSA CAL
SUU	381523	1215557	21L	210	3		SUUI							1101		FAIRFIELD A CAL
SUX	422443	0962405	31	307	3		SUXI				P			1093		SIOUX CITY IOWA
SUX	422443	0962405	04	040				P								SIOUX CITY IOWA
SVN	320038	0811015	27	273	3		SVNI							1095		SAVANAH AFB GEO
SYM	360110	0863155	32	316	3		SYMI							1095		SHYRNA AFB TENN
SYR	430629	0760803	28	278	3		SYRI				P			1099		SYRACUSE NY
SYR	430629	0760803	14	140				P			P					SYRACUSE NY
SZL	384505	0933232	36	003	3		SZLI							1103		WHITEMAN AFB MO
TBN	374500	0920900	14	140			TBNP				P					FT LENARDWOD MO
TCL	331300	0873700	04	040	3		TCLP				P					TUSCALOOSA ALA
TCH	470933	1222831	34	338	3		TCHI							1099		TACOMA WASH
TEB	405130	0740312	06	059	3		TEBI							1093		TETERBORO NJ
TIK	352558	0972254	35	350	3		TIKI							1095		OKLAHOMA CTY AF
TI*	474100	1221500	17	170	3			P			P					TACOMA IND WASH
TLH	302452	0842133	36	358	3		TLHI				P			1103		TALLAHASSEE FLA
TNT	255141	0805225	09	089	3		TNTI							1083		MIAMI FLA
TOA	334800	1182000	29R	290	3			P								TORRANCE CAL
TOI	315147	0860025	07	067	3		TOII							1089		TROY ALA
TOL	413540	0834723	07	069	3		TOLI				P			1097		TOLEDO EXP OHIO
TOL	413540	0834723	16	160				P								TOLEDO EXP OHIO
TOP	390336	0953648	13	126	3		TOPI				P			1095		TOPEKA KAN
TPA	275933	0823230	36L	001	3		AMPI							1087		TAMPA FLA
TPA	275751	0823145	18L	181	3		TPAI				P			1103		TAMPA FLA
TPL	311233	0972529	15	150	3			P			P					TEMPLE TEX
TRI	363319	0821905	22	224	3		TRIIV				P			1099		TRISTOL KNG TEN
TRT	293200	0931600	32	320	3		TRTI							1113		SAN ANTONIO TEX
TTN	401655	0744819	06	056	3		TTNI							1113		TRENTON NJ
TUL	361053	0955300	17L	175	3		DWEI 3				TULI			1097 1107		TULSA OKLA
TUS	320700	1105700	30	300	3			P			P					UCSON ARIZ
TVC	444500	0853500	10	100			TVCP				P					RAVERSE C MICH
TWF	422900	1142900	25	250			TWFP 3				P					WIN FALLS IDAHO

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1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
TXK	332638	0940014	22	220	3	TXKI								1113		TEXARCANA ARK
TXK	332700	0935900	31	310		P										TEXARKANA ARK
TYR	322056	0952330	13	127	3	TYRI					P			1099		TYLER TEX
TYL	354928	0835851	04L	045	3	TYSI					P			1103		MGEE TYSON TENN
UBS	332907	0883049	17	170		UBSP	3				P					COLUMBUS MISS
UCA	430922	0752349	33	329	3	UCAI					P			1093		UTICA ONIDA NY
UIN	395700	0911106	03	035	3	UINI					P			1101		QUINCY ILL
VAD	305856	0831128	36R	360	3	MDGI	3				VADI			1097	1093	MOODY AFB GEO
VBG	344432	1203521	30	300	3	VRGI								1101		LOMPOC CAL
VIS	362204	1192852	12	120		VISP					P					VISALIA CAL
VLU	304700	0831700	35	350	3	VLOP										VALDOSTA GEO
VPS	302928	0863326	30	297	3	VPSI								1091		EGLIN AFB FLA
VPZ	412709	0870103	27	270	3	VPZI								1117		PORTER CO IND
VRB	273900	0802500	11	110		VRBP					P					VERO BEACH FLA
VSF	432000	0723100	05	048	3	P										SPRINGFIELD VT
WAL	375500	0752800	04	040	3	XWAI								1107		WALLOPS ISL VA
WRB	323928	0833626	32	322	3	WRBI								1101		ROBBINS AFB GEO
WRI	400135	0743406	06	056	3	WRII								1097		WRIGHTSTWN AFNJ
YIP	421447	0833103	05	050	3	YIPIV								1095		DETROIT MICH
YIP	421447	0833103	A27C	270	5	P 5					P					DETROIT MICH
YIP	421447	0833103	A27R	270	5	P 5					P					DETROIT MICH
YIP	421447	0833103	A27L	270	5	P 5					P					DETROIT MICH
YIP	421447	0833103	A26C	270	5	P 5					P					DETROIT MICH
YIP	421447	0833103	A26R	270	5	P 5					P					DETROIT MICH
YIP	421447	0833103	A26L	270	5	P 5					P					DETROIT MICH
YKM	463420	1203322	27	269	3	YKMI					P			1101		YAKIMA WASH
YNG	411619	0804022	32	320	3	YNGI					P			1101		YOUNGSTOWN OHIO
YUM	323953	1143548	03L	030	3	YUMI								1109		YUMA ARIZ
YUM	323900	1143700	08	080		P 3					P					YUMA ARIZ
AMJ	462900	0843000	11	113	3	AM I								1095		SAULT ST MARIE
AXJ	510600	1140100	34	340	3	YC I								1099		CALGARY
AXJ	510600	1140100	28	278	3	AX I								1097		CALGARY
BOJ	493800	1124800	30	300	3	BD I								1099		LETHBRIDGE
BOJ	493800	1124800	05	050	3	QL I								1095		LETHBRIDGE
CGJ	491800	1173800	15	150	3	CG I								1095		CASTLEGAR
DOJ	452800	0734500	24L	238	3	HQ I								1105		MONTREAL
DOJ	452800	0734500	10	103	3	DO I								1099		MONTREAL
DOJ	452800	0734500	06L	058	3	UL I								1093		MONTREAL
FCJ	455343	0662510	15	152	3	FC I								1099		FREDERICTON
FGJ	460700	0644100	29	292	3	QM I								1093		MONCTON
FGJ	460800	0643400	07	067	3	FG I								1097		MONCTON
HMJ	431000	0795700	06	055	3	HM I								1099		HAMILTON
HUJ	453100	0732500	24	242	3	HU I								1091		ST HUBERT
JGJ	445522	0632410	24	240	3	JG I								1099		HALAFAX CANADA
JGJ	445522	0632410	15	148	3	HZ I								1091		HALIFAX
JTJ	483300	0583500	28	280	3	JT I								1095		STEPHENVILLE CA
KUJ	493100	1154700	16	157	3	P										E KOOTENAY
NPJ	495500	0971500	13	130	3	NP I								1095		WINNEPEG CANADA
NPJ	495500	0971500	36	359	3	WG I								1099		WINNEPEG
OWJ	452000	0754100	35	350	3	OT I								1107		OTTOWA
OWJ	452000	0754100	07	070	3	OW I								1095		OTTOWA CANADA
QBJ	464800	0712300	06	063	3	QB I								1095		QUEBEC
QBJ	421622	0825814	25	246	3	QG I								1103		WINDSOR
QIJ	435436	0660611	24	243	3	QI I								1097		YARMOUTH
QRJ	502325	1043630	12	121	3	QR I								1095		REGINA
QTJ	482200	0891900	07	069	3	QT I								1095		LAKEHEAD
QXJ	485653	0543315	09	090	3	GJ I								1099		GANDER

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1	2	3	4 5	6	7	8	9 10 11	12 13 14	15	16	17
QXJ	485653	0543315	04	039	3	QX	I		1095		SANDER
QYJ	461300	0595900	19	191	3	NS	I		1095		SYDNEY
QYJ	461009	0600222	07	072	3	QY	I		1103		SYDNEY
SBJ	463900	0805500	22	217	3	SR	I		1103		SUDBURY
SJJ	452330	0654915	23	233	3	SJ	I		1103		ST JOHN
STJ	521110	1064640	32	323	3	XF	I		1095		SASKATOON
STJ	521100	1064100	08	083	3	ST	I		1099		SASKATOON
TOJ	473700	0524400	17	167	3	YT	I		1095		TORBAY
TOJ	473700	0524500	11	110	3		P				TORBAY
TRJ	440700	0773200	06	060	3	TR	I		1097		TRENTON
TXJ	431400	0793800	05	050	3	TX	I		1095		TORONTO CANADA
VRJ	491100	1231100	08	077	3	VR	I		1095		VANCOUVER
XUJ	430200	0810900	14	145	3	XU	I		1095		WINDON
XXJ	490100	1222920	06	063	3	XX	I		1097		WILKESBORO
YBJ	462300	0792800	26	262	3	YB	P				WORTH BAY
YFJ	492800	1193600	16	158	3	YF	I		1103		WENTWICK
YJJ	483909	1232627	26	264	3		P				WAT BAY
YZJ	434100	0793800	14	144	3	RW	I		1105		WILKESBORO
YZJ	434100	0793800	10	100	3	YZ	I		1099		WILKESBORO
YZJ	434100	0793800	05R	054	3	JS	I		1091		WILKESBORO
YZJ	434100	0793800	05L	054	3	TX	I		1097		WILKESBORO
ZVJ	501200	0660900	10	095	3	ZV	I		1095		WILKESBORO
ZTJ	504100	1272500	10	107	3	ZT	P				WILKESBORO
TIJ	323224	1165857	28	280			P				WILKESBORO

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(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)

1. ORIGINATING ACTIVITY (Corporate author)		2a. REPORT SECURITY CLASSIFICATION	
Electromagnetic Compatibility Analysis Center		UNCLASSIFIED	
		2b. GROUP	
3. REPORT TITLE			
FUTURE INSTRUMENT LANDING SYSTEM CHANNEL REQUIREMENTS			
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)			
Technical Report			
5. AUTHOR(S) (Last name, first name, initial)			
Metzger, B.			
6. REPORT DATE		7a. TOTAL NO. OF PAGES	7b. NO. OF REFS
October 1970		31	3
8a. CONTRACT OR GRANT NO.		9a. ORIGINATOR'S REPORT NUMBER(S)	
F-19628-70-C-0291		ESD-TR-70-362	
b. PROJECT NO.			
c. 649E		9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
d.			
10. AVAILABILITY/LIMITATION NOTICES			
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11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY	
		Department of Defense	
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As an aid to spectrum planning, estimates of the minimum channel requirements for the Instrument Landing System localizer are obtained for the 1970-1975 time period. Several alternatives in antenna systems, service volumes, assignment criteria and operational procedures are considered with respect to their possible impact on channel requirements.			

14. KEY WORDS	LINK A		LINK B		LINK C	
	ROLE	WT	ROLE	WT	ROLE	WT
INSTRUMENT LANDING SYSTEM CHANNEL REQUIREMENTS SPECTRUM MANAGEMENT FREQUENCY MANAGEMENT						

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