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DEPARTMENT OF DEFENSE

ELECTROMAGNETIC COMPATIBILITY ANALYSIS CENTER

FUTURE INSTRUMENT LANDING SYSTEM CHANNEL REQUIREMENTS

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

October 1970

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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

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FOREWORD

The Electromagnetic Compatibility Analysis Center (ECAC) is a Department of Defense Facility, established to provide advice and assistance on electromagnetic compatibility matters to the Secretary of Defense, the Joint Chiefs of Staff, the military departments and other DOD components. The Center, located at North Severn, Annapolis, Maryland 21402, is under executive control of the Director of Defense Research and Engineering and the Chairman, Joint Chiefs of Staff or their designees who jointly provide policy guidance, assign projects, and establish project priorities. ECAC functions under the direction of the Secretary of the Air Force and the management and technical direction of the Center are provided by military and civil service personnel. The technical operations function is provided through an Air Force sponsored contract with the IIT Research Institute (IITRI).

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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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.

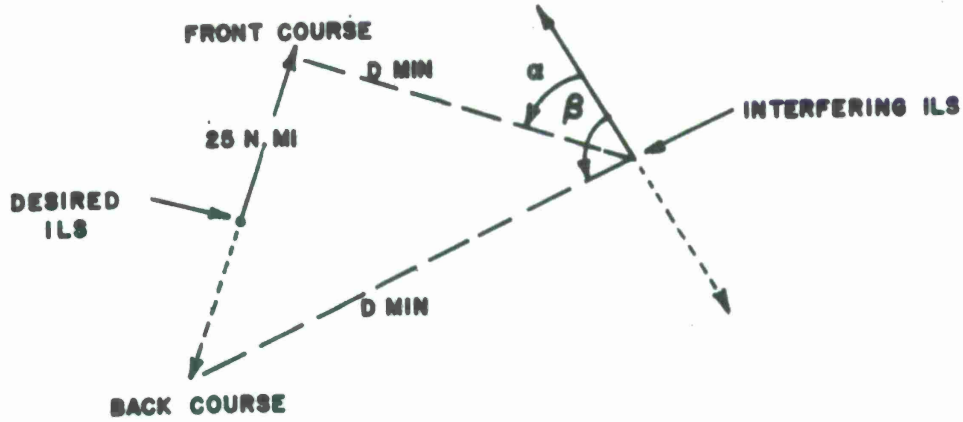
The next factor affecting the co-channel assignment constraints is the service volume. Two cases are considered. In the first case, referred to as the standard service volume, the ILS provides service for distances out to 25 nautical miles (nmi) along the centerline of the

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 ‡	18 § / 14	24 / 18	32 / 22	41 / 25
	Standard	VOR	19 / 15	25 / 19	33 / 23	42 / 26
	Reduced	VOR	17 / 13	23 / 16	27 / 18	36 / 21
	Standard	Proposed ILS	21 / 17	27 / 20	35 / 24	50 / 28
	Reduced	Proposed ILS	18 / 14	23 / 17	31 / 21	40 / 24
All ILS Facilities Employ V-Ring Antenna	Standard	Proposed ILS	20 / 16	27 / 20	33 / 23	42 / 27
	Reduced	Proposed ILS	18 / 14	23 / 17	28 / 19	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)																	
			Front Course, Angle α									Back Course, Angle β								
Antenna Type	Service Volume	Assignment Criteria	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 B-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 BE PA
ABI	322556	0994104	35L		350	3	ABII					P		1103		ABILENE TEX
ABQ	350340	1063637	35		350	3	ABQI							1103		ALBUQUERQUE NM
ABQ	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	1	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
ALO	423308	0922315	12		122	3	ALOI					P		1099		WATERLOO IOWA
ALW	460600	1181700	02		020			P	3			P				WALA WALA WASH
AMA	351405	1014141	03		035	3	AMAI					P		1103		AMARILLO TEX
ANB	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
BAB	390631	1212533	14		144	3	BABI							1095		BEALE AFB CALI
BAD	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
BDL	415711	0724011	06		058	3	BDLIV					P		1103		WINSOR LKS CONN
BDL	415711	0724011	15		150			P				P				WINSOR LKS CONN
BDR	411000	0730800	24		240	3	BDRP									BRIGPORT CONN
BED	422808	0711610	11		112	3	BEDI							1095		BEDFORD MASS
BEH	420740	0862615	27		270	3	BEHIV							1085		BENTON HBR MICH
BFD	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 BOEING
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		BINGHAMTON NY
BGR	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	X03I							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 RALYWVA
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	BMGP					P				BLOOMTN IND
BMI	402900	0885600	11		110	3	BMIP					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	LIPI		3			P		1107		BOSTON LGN MASS
BOS	422256	0705950	04R		035	3	BOSIV		3			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 MC
BTR	303130	0910831	13		127	3	BTRI					P		1103		BATON ROUGE LOU
BTV	442753	0730826	15		146	3	BTVI					P		1103		BURLINGTON VT
BUF	425652	0784313	05		052	3	GBII		3		BUFI			1085	1 1 1 3	BUFFALO NY
BUR	341153	1182158	08		076	3	BURI							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
CHD	331912	1114006	30R		301	3	CHDI							1103		WILLIAM AF ARIZ
CHK	350919	0975806	18		180	3	CHKI							1105		CHICKASHA OKLA
CHO	380847	0782627	03		027	3	CHOI					P		1117		CHARLOTVLE 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	CLEIV		3			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
CMI	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
COD	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	425446	1062618	07	074	3	CPRI		1103		CASPER WYO
CPR	425448	1062618	21	210		P				CASPER WYO
CRP	274540	0972946	13	127	3	CRPI	P	1103		CORPUS CHRI 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		CVGP 3	P			CINCINATTI OHIO
CVG	390159	0844008	18	180	3	SICI 3	CVGI	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	364314	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		1103	DAYTON OHIO
DAY	395410	0841201	18	180	3	P	P			DAYTON OHIO
DAY	395442	0841254	06L	056	3	ATDI		1089		DAYTON OHIO
DBQ	422400	0904300	13	130		DBOP 3	P			DEBUQUE IOWA
DCA	385152	0770222	36	003	3	DCAIV3	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	DTWIV3	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			AUCLRE WISC
ECG	361600	0761100	10	100		ECGP	P			LIZABETH CT NC
EDW	345330	1175436	22	224	3	EDWI		1101		UROC EDAFB CAL
EEN	425422	0721610	02	017	3	EENI	P	1089		ILL-HOP NH
EKO	404900	1154700	05	050		EKOP	P			LKO NEV

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1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
ELM	420910	0765417		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
END	362111	0975451		17C	170	3	LVCI							1089		VANCE AFB OKLA
EPH	471800	1193100		02	020			P				P				EPHRATA MU WASH
ERI	420517	0800946		06	060	3	ERIIV					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		FALMOTH 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 FALS 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		GBGP					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		MALSTROMAFBMON
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	GPBIV		5			P		1103		PITTSBURGH PA
GPB	403005	0801355		A10L	097	3	LXBIV		5			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
GPB	403005	0801355	23	230			P				PITTSBURGH PA
GPT	302343	0890335	13	131	3	GPTI		P	1109		GULF PORT MISS
GRB	442929	0880659	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
GRR	425236	0853231	26	262	3	GRRI		P	1097		GRN RAPIDS MICH
GSB	352044	0775558	08	078	3	GSBI			1093		GOLDSBORO NC
GSO	360507	0795607	14	138	3	GSOIV		P	1099		GREENSBORO NC
GSP	345428	0821234	03	033	3	GSPI		P	1093		GREENVILLE SC
GS*	324902	0970205	13	129	3	GSWI			1095		FORT WORTH TEX
GS*	324902	0970205	35	350			P				FORT WORTH TEX
GTF	472947	1112219	34	341	3	GTFI			1103		GT FAS INTL MON
GTF	472947	1112219	03	030			P				GT FAS INTL MON
GUS	403900	0860800	04	045	3	GUSI			1095		GRISSOM AFB IND
GVW	385143	0943322	36	360	3	GVWI			1093		GRAND VIEW MO
HAR	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			CHISHOLM MINN
HIF	410600	1115700	14	136	3	HIFI			1099		OGDEN AFB UTAH
HKY	354400	0812300	06	060		HKYP	3	P			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		WHITE PLAINS NY
HRL	261818	0973927	17R	170	3		P	P			HARLINGEN 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		HUTCHINSON 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	IAHIV	3	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		WILMINGTON DEL
ILG	394123	0753607	09	090			P				WILMINGTON DEL
ILM	341654	0775435	34	343	3	ILMIV		P	1103		WILMINGTON NC
IMT	454858	0880643	01	010	3	IMTP					IRON MT FD MICH
IND	394409	0861728	31	313	3	CDAI		P	1105		INDIANOLIS IND
IND	394411	0861621	04	044	3	INDIV		P	1093		INDIANOLIS IND
INL	483400	0932400	13	130		INLP	3	P			INTL FALLS MINN
INR	461325	0842703	15	154	3	INRI			1103		SAU ST MARI MCH
INT	360822	0801338	33	328	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
ISO	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				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									JONESBORO ARK
JFK	403847	0734517	04L		042	3		P								JFK INTL NY
JFK	403934	0734740	31R		311	3	RTHIV	3			TLKI			1115	1111	JFKENNEDY INTL
JFK	403847	0734517	13R		130	3		P	3			P				JFK INTL NY
JFK	403847	0734517	04R		042	3	JFKI	3			IWYI			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	0984100	12		120		JMSP					P				JAMESTOWN ND
JST	401900	0785000	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				P				LAS VEGAS NEV
LAW	343400	0982500	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	5		P	5			P				LOS ANGLES CAL
LAX	335603	1182449	A24C		248	5		P	5			P				LOS ANGLES CAL
LBB	333849	1014942	17R		169	3	LBVI					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		LBLP					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	LGAIV	3			URDIV			1099	1110	LAGUARDIA NY
LGB	334937	1180942	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	LMTI							1095		KLAMATH FLS ORE
LNK	405202	0964541	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
LRD	273153	0992746	17C		170	3	LRDI	3			LTLI			1095	1111	LAREDO TEX
LRF	345434	0921019	24		245	3	LRFI							1099		JACKSONVLLE 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 AFB 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	P			MERCED MUNI CAL
MCF	275002	0823208	22	219	3	MCFI		1095		TAMPA AFB FLA
MCI	391916	0944315	36	005	3	MCII	P	1105		KC MID CONT MO
MCI	391716	0944122	09	088	3	RNII	P	1097		KANSAS CI MO
MCN	324156	0833838	05	047	3	MCNI	P	1095		MACON 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	P	1109		MIDDLETOWN PA
MDW	414645	0874436	13R	132	3	MDWI 3	MXTI	1099	1095	CHICAGO MIDWAY
MDW	414645	0874436	04R	040	3	P	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
MFE	261100	0981400	13	130	3	P	P			MCALLEN TEX
MFR	422135	1225155	14	140	3	MFRI		1103		MEDFORD 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			MOULTRIE 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		MANCHESTR MU NH
MIA	254710	0801826	27L	267	3	MIAI		1095		MIAMI INTNL FLA
MIA	254805	0801602	09L	087	3	MFAI		1103		MIAMI INTNL FLA
MIB	482543	1012326	29	292	3	MIBI		1099		MINOT AFB ND
MID	410800	0814600	18	180		P				MEDINA OHIO
MIE	401400	0852400	14	140	3	P				MUNCIE 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	P			MILWALKEE WISC
MKE	425700	0875400	A36L	006	5	P 5	P			MILWALKEE WISC
MKE	425700	0875400	A01R	006	5	P 5	P			MILWALKEE WISC
MKE	425700	0875400	A01C	006	5	P 5	P			MILWALKEE WISC
MKG	431037	0861424	32	317	3	MKGI		1099		MUSKEGON MICH
MKG	431037	0861424	05	050		P	P			MUSKEGON MICH
MKL	353600	0885500	02	020	3	MKLP	P			MCKELLAR TENN
MLB	280600	0803800	09	090	3	MLBP	P			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
MOD	373600	1205700	29	290	3	P	P			MODESTO CAL
MOT	482500	1012100	12	120		MOTP 3	P			MINOT INTL ND
MQT	463200	0873400	08	080	3	MQTP	P			MARQUETTE 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		P								MARTINSBURG WVA
MRY	363459	1214954	10		096	3	MRYI					P		1101		MONTEREY PA CAL
MSI	430907	0892028	36		359	3	MSNI					P		1099		MADISON WISC
MSL	344500	0873700	29		290	3	MSLP					P				MUSCLE SHOL ALA
MSO	465500	1140500	11		110	3		P								MISSOULA MON
MSP	445340	0931326	29R		294	3	INNI					P		1099		MINN STPAUL MIN
MSP	445340	0931225	04		039	3	APLI					P		1093		MINN STPAUL MIN
MSP	445321	0931414	29L		295	3	MSPI	3				P		1103		MINN STPAUL MIN
MSY	295916	0911455	A10C		099	3	MSYIV					P		1099		NEW ORLEANS LOU
MSY	295916	0901455	01		010	3		P				P				NEW ORLEAN LOU
MSY	295916	0911455	A10R		099	5		P	5			P				NEW ORLEANS LOU
MSY	295916	0911455	A10L		099	5		P	5			P				NEW ORLEANS LOU
MSY	295916	0911455	A09R		099	5		P	5			P				NEW ORLEANS LOU
MSY	295916	0911455	A09L		099	5		P	5			P				NEW ORLEANS LOU
MTC	423600	0825010	18		185	3	MTCI							1101		MT CLEMENS MICH
MTO	392840	0881711	06		060		MTOP					P				MATTOON ILL
MUO	430118	1155050	12		117	3	MUOI							1103		MT HOLM IDAHO
MVN	381905	0885139	05		050		MVNP					P				MT VERNON ILL
MVY	412311	0703726	24		240	3	EGOI					P		1087		MARTHAS VI MASS
MWA	374515	0890042	02		020		MWAP	3				P				MARION ILL
MWH	471347	1191938	32R		321	3	MWHI							1095		GRANT CO WASH
MWO	393130	0842415	23		230	3	MWOI							1111		MIDDLETON OHIO
MXF	322220	0862130	14		145	3	MXFI							1093		MONTGOMERY ALA
MYR	334100	0765600	05		050		MYRP	3				P				MYRTLE BEACH SC
NEW	300200	0900147	17		170	3	NEWI							1113		N ORLEAN LF LOU
NYC	405000	0725000	A14C		130	5		P	5			P				NEW YORK CITY
NYC	405000	0725000	A14L		130	5		P	5			P				NEW YORK CITY
NYC	405000	0725000	A14R		130	5		P	5			P				NEW YORK CITY
NYC	405000	0725000	A13C		130			P	5			P				NEW YORK CITY
NYC	405000	0725000	A13L		130			P	5			P				NEW YORK CITY
NYC	405000	0725000	A13R		130			P	5			P				NEW YORK CITY
NZJ	334121	1174337	34R		345	3	NZJI							1089		EL TORO CAL
OAK	374315	1221433	29		293	3	INBI					P		1087		OKLAND CAL
OAK	374400	1221342	27R		275	3	OAKI							1099		OKLAND CAL
OCF	291000	0821300	18		180		OCFP					P				OCALA MUNIC FLA
OEX	352400	0973700	27		270	3	OEXI							1117		OKC TRAIN OKLA
OEX	352402	0973711	20		200	3	OEXI							1093		OKC TRAIN OKLA
OEX	352402	0973711	10		100	3	OEXI							1085		OKC TRAIN OKLA
OFF	410758	0955549	30		302	3	OFFI							1095		OMAHA AFB NEB
OHA	415957	0875340	04		038	3	HNAI					P		1113		CHICAGO OHARE
OHA	415800	0875400	A14C		138	5		P	5			P				CHICAGO OHARE
OHA	415902	0875512	27R		268	3	IACI	3				P		1105		CHICAGO OHARE
OHA	415808	0875529	27L		268	3	TSLIV	3			MEDIV			1111	1119	CHICAGO OHA ILL
OHA	415750	0875412	14R		138	3	ORDI	3			RVGI			1097	1091	CHICAGO OHARE
OHA	415842	0875317	14L		138	3	OHAIV	3			IDNIV			1101	1087	CHICAGO OHARE
OKC	352421	0973619	35L		351	3	OKCI							1099		OKC OKLA
OKC	352400	0973600	35R		351	3	RGRI	3				P		1109		WILL ROGER OKLA
OKK	403200	0860400	04		040		OKKP					P				KOKOMO IND
OLM	465800	1225400	17		168	3		P								OLYMPIA WASH
OMA	411729	0955302	14		136	3	OMAIV					P		1103		OMAHA EPPLY NER
OMA	411729	0955302	17		170			P								OMAHA EPPLY NEB
ONT	340326	1173733	25		255	3	ONTI					P		1097		ONTARIO CAL
ORF	365415	0761127	04		045	3	ORFI					P		1091		NORFOLK MUN VA
ORH	421557	0715152	11		108	3	RSRI					P		1109		WORCESTER MASS
ORL	283259	0811914	07		067	3	ORLI							1099		ORLANDO FLA
OSC	442758	0832156	06		065	3	OSCI							1095		OSCODA AFB MICH
OSH	435939	0883251	09		089	3	OSHI							1105		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	3		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	3	OWBP					P				OWNSBORO DAV KY
OWD	421149	0711048	35		348	3	XRDI							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	3	PBGI							1097		PLATTSBURGH NY
PBI	264052	0800435	09		093	3	PBII					P		1093		PALM BEACH FLA
PDK	335300	0841800	27		270	3		P								DEKALB PCH GEO
PDT	454140	1185124	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		PEORIA ILL
PIC	405535	0724738	05		047	3	CTOI							1107		PICONIC NY
PIE	275355	0824112	17		170	3	PIEI							1091		ST PETERSBURGFL
PIH	425403	1123605	21		208	3	PIHI					P		1103		POCATELLO IDAHO
PIR	442300	1001700	25		250	3	PIRP									PIERRE MUN SD
PIR	442300	1001700	30		300			P								PIERRE MUN SD
PKB	392110	0812613	03		031	3	PKBI 3					P		1107		WOOD CO WVA
PLN	453400	0844800	05		050			P				P				PELLSTON MICH
PLN	453400	0844800	32		320	3		P								PELLSTON MICH
PMD	343800	1180600	25		250	3		P								PALMDALE CAL
PMD	343647	1180547	04		040	3	XPDI							1091		PALMDALE AF CAL
PNE	400432	0750124	24		238	3	PNEI							1111		NC PHILA PA
PNS	302750	0871108	16		163	3	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
POI	464100	0680300	01		010	3	POIP					P				PRESQUE ISL ME
PRB	354000	1203800	19		190			P				P				PASO ROBLES CAL
PSB	335212	1162544	30		300			P				P				PALM SPRING CAL
PSC	461600	1190700	20R		200	3		P				P				PASCALL WASH
PSK	323400	0825900	05		050	3	PSKP					P				DUBLIN NRV VA
PSM	430541	0705030	34		344	3	PSMI							1101		PORTSMOUTHAFBNH
PTK	424000	0832500	09		090	3		P								OAKLAND PO MICH
PUB	381715	1042804	07L		075	3	PUBI					P		1095		PUEBLO MEM COL
PUK	370400	0884600	04		040	3	PUKP					P				PADUCAH KY
PVD	414356	0712511	05R		046	3	PVDI					P		1093		PROVIDENCE RI
PVD	414356	0712511	16		160			P								PROVIDENCE RI
PWM	433838	0701752	11		112	3	PWMI					P		1099		PORTLAND MUN ME
RAL	335707	1172654	27		270			P				P				RIVERSIDE CAL
RAP	440311	1030350	32		319	3	RAPI					P		1093		RAPID CITY SD
RCA	440932	1030738	30		304	3	RCAI							1103		RAPID CTY AF SD
RDD	403000	1221800	16		160	3		P				P				REDDING MUN CAL
RDG	402309	0755747	36		001	3	RDGI					P		1095		READING 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	RDRI							1099		GRD FORK AFB ND
RDU	355347	0764643	05		049	3	RDUI						P	1095		RALEIGH DUR NC
RFD	421236	0890517	36		002	3	RFDI						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 AFCAL
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	RMTP						P			ROCKY MT NC
RNO	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	LUBBOCK AFB TEX
RWI	355157	0775302	04		039	3	RWII							1083		ROCKY MT NC
SAC	383118	1212906	02		016	3	SACI							1103		SACRAMENTO MUNI
SAF	353700	1060500	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	3	SANI	5					P	1109		SAN DIEGO CAL
SAT	293131	0982747	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 BENDSTJOS
SBY	382000	0753100	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	381121	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						P	1095		STAUNTON VA
SHR	444600	1065900	13		130		SHRP	3					P			SHERIDAN CO WYO
SHV	322609	0934906	13		136	3	SHVI						P	1103		GTR SHREVEPT LO
SJC	372224	1215617	30L		302	3	SJCI						P	1109		SAN JOSE CAL
SJT	312147	1002905	03		033	3	SJTI							1097		STANGELO MT TEX

TABLE I-1 (Sheet 11 of 13)

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	0963406	15	152	3	SKFI				1101		SAN ANTINIO 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
SRQ	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		SMYRNA 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
TCM	470933	1222831	34	338	3	TCMI				1099		TACOMA WASH
TEB	405130	0740312	06	059	3	TEBI				1093		TETERBORO NJ
TIK	352558	0972254	35	350	3	TIKI				1095		OKLAHOMA CTY AF
TIW	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		BRISTOL 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	110	TULSA OKLA
TUS	320700	1105700	30	300	3		P		P			UCSON ARIZ
TVC	444500	0853500	10	100		TVCP			P			TRAVERSE C MICH
TWF	422900	1142900	25	250		TWFP 3			P			WIN FALLSIDAHO

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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
TYS	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	VBGI			1101		LOMPOC CAL
VIS	362204	1192852	12	120		VISP		P			VISALIA CAL
VLD	304700	0831700	35	350	3	VLDP					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
AM3	462900	0843000	11	113	3	AM	I		1095		SAULT ST MARIE
AX3	510600	1140100	34	340	3	YC	I		1099		CALGARY
AX3	510600	1140100	28	278	3	AX	I		1097		CALGARY
BO3	493800	1124800	30	300	3	BD	I		1099		LETHBRIDGE
BO3	493800	1124800	05	050	3	QL	I		1095		LETHBRIDGE
CG3	491800	1173800	15	150	3	CG	I		1095		CASTLEGAR
DO3	452800	0734500	24L	238	3	MQ	I		1105		MONTREAL
DO3	452800	0734500	10	103	3	DO	I		1099		MONTREAL
DO3	452800	0734500	06L	058	3	UL	I		1093		MONTREAL
FC3	455343	0662510	15	152	3	FC	I		1099		FREDERICTON
FG3	460700	0644100	29	292	3	QM	I		1093		MONCTON
FG3	460800	0643400	07	067	3	FG	I		1097		MONCTON
HM3	431000	0795700	06	055	3	HM	I		1099		HAMILTON
HU3	453100	0732500	24	242	3	HU	I		1091		ST HUBERT
JG3	445522	0632410	24	240	3	JG	I		1099		HALAFAX CANADA
JG3	445522	0632410	15	148	3	HZ	I		1091		HALIFAX
JT3	483300	0583500	28	280	3	JT	I		1095		STEPHENVILLE CA
KU3	493100	1154700	16	157	3		P				E KOOTENAY
NP3	495500	0971500	13	130	3	NP	I		1095		WINNEPEG CANADA
NP3	495500	0971500	36	359	3	WG	I		1099		WINNEPEG
OW3	452000	0754100	35	350	3	OT	I		1107		OTTOWA
OW3	452000	0754100	07	070	3	OW	I		1095		OTTOWA CANADA
QB3	464800	0712300	06	063	3	QB	I		1095		QUEBEC
QG3	421622	0825814	25	246	3	QG	I		1103		WINDSOR
QI3	435436	0660611	24	243	3	QI	I		1097		YARMOUTH
QR3	502325	1043630	12	121	3	QR	I		1095		REGINA
QT3	482200	0891900	07	069	3	QT	I		1095		LAKEHEAD
QX3	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
QX3	485653	0543315	04		039	3	QX	I						1095		SANDER
QY3	461300	0595900	19		191	3	NS	I						1095		SYDNEY
QY3	461009	0600222	07		072	3	QY	I						1103		SYDNEY
SB3	463900	0805500	22		217	3	SB	I						1103		SUDBURY
SJ3	452330	0654915	23		233	3	SJ	I						1103		ST JOHN
ST3	521110	1064640	32		323	3	XF	I						1095		SASKATOON
ST3	521100	1064100	08		083	3	ST	I						1099		SASKATOON
TO3	473700	0524400	17		167	3	YT	I						1095		TORBAY
TO3	473700	0524500	11		110	3		P								TORBAY
TR3	440700	0773200	06		060	3	TR	I						1097		TRENTON
TX3	431400	0793800	05		050	3	TX	I						1095		TORONTO CANADA
VR3	491100	1231100	08		077	3	VR	I						1095		VANCOUVER
XU3	430200	0810900	14		145	3	XU	I						1095		LONDON
XX3	490100	1222920	06		063	3	XX	I						1097		ABBOTSFORD
YB3	462300	0792800	26		262	3	YB	P								NORTH BAY
YF3	492800	1193600	16		158	3	YF	I						1103		PENTICTON
YJ3	483909	1232627	26		264	3		P								FLAT BAY
YZ3	434100	0793800	14		144	3	RW	I						1105		TORONTO
YZ3	434100	0793800	10		100	3	YZ	I						1099		TORONTO
YZ3	434100	0793800	05R		054	3	JS	I						1091		TORONTO
YZ3	434100	0793800	05L		054	3	TX	I						1097		TORONTO
ZV3	501200	0660900	10		095	3	ZV	I						1095		SEVEN ISLANDS
ZT3	504100	1272500	10		107	3	ZT	P								P HARDY
TI5	323224	1165857	28		280			P								T JUANA

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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.

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