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STANDARD TACTICAL AIR NAVIGATION

(TACAN) SIGNAL

FSC 5826

DEPARTMENT OF DEFENSE

WASHINGTON, D. C. 20301

Standard Tactical Air Navigation (TACAN) Signal

MIL-STD-291B

1. This Military Standard is mandatory for use by all Departments and Agencies of the Department of Defense.

2. Recommended corrections, additions, or deletions should be addressed to the Commander, Naval Electronic Systems Command, Department of the Navy, Washington, D. C. 20360.

CONTENTS

1. SCOPE

1.1 Purpose. The purpose of this standard is to define the Standard Tacan Signal. The characteristics and tolerances specified will insure compatibility of all airborne and ground equipments.

2. TACAN CHANNELS

2.1 Tacan channels. The Tacan system shall operate on the frequencies shown in table I.

2.1.1 Number of channels. There shall be provision for 252 channels, 126 "X" channels numbered 1X thru 126X, and 126 "Y" channels numbered 1Y thru 126Y. Each channel shall have an interrogating frequency/pulse spacing and reply frequency/pulse spacing as shown in table I. . In addition, there shall be provision for 126 pairs of air-to-air mode (A/A) channels as specified in 5.1 and also listed in table I .

2.1.1.1 Interrogating frequency. The interrogating frequency for the 252 channel Tacan system shall begin with Channel 1 (X or Y) at 1025 megahertz(MHz) and increase in 1 MHz increments until Channel 126 (X or Y) at 1150 MHz is reached. The interrogating pulse spacing shall be 12 microseconds (μsec) for X channels, 36μsec for Y channels, and 24μsec for Y mode A/A. (See table I) (NOTE: See 3.4 for definition.)

2.1.1.2 Ground reply frequency. The ground reply frequency for the 252 channel Tacan system shall begin at Channel 1X with 962 MHz (which is 63 MHz lower than the interrogating frequency) and increase in 1 MHz increments until Channel 63X is reached at 1024 MHz. Continuing, Channel 64X will be at a ground reply frequency of 1151 MHz (which is 63 MHz higher than the interrogating frequency), and increase in 1 MHz increments until Channel 126X is reached at 1213 MHz. The ground reply pulse spacing for X Channels shall be 12μsec. For Y Channels, the ground reply frequency shall begin for Channel 1Y with 1088 MHz (which is 63 MHz higher than the interrogating frequency) and increase in 1 MHz increments until Channel 63Y is reached at 1150 MHz. Continuing, Channel 64Y will be at a ground reply frequency of 1025 MHz (which is 63 MHz lower than the interrogating frequency) and increase in 1 MHz increments until Channel 126Y is reached at 1087 MHz. The ground reply pulse spacing for Y channels shall be 30μsec. (See table I .)

3. TACAN SURFACE TRANSPONDER SIGNAL

3.1 Characteristics. The standard signal, to be radiated and received by the transponder of the Tacan system, shall be vertically polarized and the radiated signal shall have the following characteristics:

3.1.1 Radio frequency (r.f.). The transmitted frequency shall be maintained within plus or minus 0.002 percent of that specified.

3.1.2 R.F. pulse spectrum. The peak effective radiated power contained in each of the two 0.5 MHz bands centered on frequencies plus or minus 0.8 MHz above and below the nominal channel frequency shall not exceed 100 milliwatts (mw), and the peak effective radiated power contained in each of the two 0.5 MHz bands centered on frequencies plus or minus 2.0 MHz above and below the nominal channel frequency shall not exceed 2.0 mw. Each lobe of the spectrum shall be less than the adjacent lobe nearer the nominal channel frequency.

3.1.3 Continuous wave (cw) output. Cw output between pulse pairs shall not exceed 5 microwatts (μw) with the beacon in normal operational mode. The peak signal amplitude for a period of 1μsec between pulses of a pair on X channels and 19μsec between pulses of a pair and pulses of the main reference group on Y channels shall be at least 20 decibel (db) below the peak pulse amplitude. During the Y channel auxiliary reference burst group, the energy shall be at least 20 db below the peak pulse amplitude for at least 4μsec between pulses of the group.

3.2 Pulse shape. The pulse envelope as detected by a linear detector shall have a rounded shape falling within the following limits:

3.2.1 Pulse top. The instantaneous amplitude of the pulse shall not, at any instant between the point of the leading edge which is 95 percent of the maximum voltage amplitude and the point of the trailing edge which is 95 percent of the maximum amplitude, fall below a line which is 95 percent of the maximum voltage amplitude of the pulse and is parallel to the base line.

3.2.2 Pulse rise time. The time required for the leading edge of the pulse to rise from 10 to 90 percent of its maximum voltage amplitude shall be 2.0 ± 0.25 μsec.

3.2.3 Pulse fall time. The time required for the trailing edge of the pulse to fall from 90 percent to 10 percent of its maximum voltage amplitude shall be 2.5 ± 0.5 μsec.

3.2.4 Pulse duration. The pulse duration which is measured between the points on the leading and trailing edges of the pulse which are 50 percent of the maximum voltage amplitude of the pulse shall be 3.5 ± 0.5 μsec.

3.3 Pulse droop. Prior to amplitude modulation by the antenna of the composite r.f. pulse train, the percentage modulation of the pulse train at 15 or 135 Hertz (Hz) shall not exceed 0.08 percent (see 3.5 and 3.6). This shall be measured with the transponder operating normally and shall include the effects of droop and recovery time of the main and auxiliary reference groups.

3.4 Pulse coding. For X channels, the pulses shall be coded in pairs with a spacing which shall be 12 ± 0.10 μsec. as measured at 50 percent voltage amplitude points from the leading edge of the first pulse to the leading edge of the second pulse. For Y channels, the ground-to-air function spacing shall be 30 ± 0.10 μsec as measured at 50 percent voltage amplitude points from the leading edge of the first pulse to the leading edge of the second pulse.

3.5 Main reference pulse group. The 15 Hz reference bearing group is called the main reference group: for X channels, it shall consist of a group of 12 pairs of pulses, with the spacing between pairs established as 12 ± 0.10 μsec ; for Y channels, it shall consist of a group of 13 single pulses spaced 30 ± 0.10 μsec. In each case, the repetition rate of the group shall be 15 Hz ± 0.2 percent.

3.6 Auxiliary reference pulse group. The 135 Hz reference bearing group is called the auxiliary reference group: for X channels, it shall consist of 6 pairs of pulses, with the spacing between pairs established as 24 ± 0.10 μsec; for Y channels, it shall consist of a group of 13 single pulses spaced 15 ± 0.10 μsec. In each case, the repetition rate of the group shall be 135 Hz which shall be synchronized with the main reference group; however, the auxiliary group which would otherwise coincide in time with the main reference group shall be removed so that only the main reference group appears in this position in the final output signal.

3.7 Precedence. Random, identity, and distance reply pulses shall not appear during a main or auxiliary reference group.

3.8 Identification signal. The identification signal shall consist of a series of paired pulses spaced as specified in 3.4, transmitted at a repetition rate of 1350 pulse pairs per second (sec) and synchronized so that the first pulse of an identity pair shall occur 740 ± 50 μsec after the first pulse of the preceeding auxiliary reference group.

3.8.1 Equalizing pulse pair. To preserve a constant duty cycle and to minimize bearing error during identity signals, an equalizing pair of pulses shall be transmitted 100 ± 10 μsec after each identity pair.

3.8.2 Identity cycle. The random and distance reply pulses shall be replaced by the identity pulses at a recurrence rate of once every 37.5 sec ± 10 percent. During identity, the beacon code shall be transmitted as dots and dashes (Morse Code) of identity pulses; the spaces between dots and dashes being occupied by distance reply and random pulses. The dots shall be 0.125 sec ± 10 percent; dashes shall be 0.375 sec ± 10 percent. Maximum message length shall not exceed 5.0 sec.

3.9 Pulse repetition rate. The signal shall have randomly distributed pulses which shall be maintained at a rate of 2700 ± 90 pairs per sec before the reference groups are added; the random pulses shall include any distance replies. The distribution of the random pulse pairs, for no interrogation load, shall fall within the limits shown on figure 1, for a deadtime of 60 μsec.

3.10 Dead time. Dead time is defined as the total time following a decoded pulse pair (from an interrogation or noise) during which there will be no response to subsequent interrogations or noise. The dead time shall not normally exceed 60 μsec and is not usually extended by the echo suppression circuits, but for special cases where the geographical site of the transponder is such as to produce undesirable reflection problems, a longer echo suppression time may be specified; this will tend to increase the average dead time. In extreme cases, this may require compensating pulses to maintain azimuth accuracy. The spacing between any two consecutively transmitted random pulse pairs that are not replies shall be not less than 60 μsec.

3.11 Composite 15 and 135 Hz variable bearing signal. The bearing signal shall be generated by rotating a directional pattern which produces, at a point in space, a composite amplitude modulation of the r.f. pulse signals at 15 and 135 Hz. Viewed from above, the direction of pattern rotation shall be clockwise. For X-mode operation the amplitude modulation shall be synchronized with the 15 Hz main reference group so that at a point due south of the beacon the 10th pulse of the main reference group will coincide with the positive slope point of inflection of the 15 Hz component of the bearing signal and at points geographically spaced by all multiples of 40 degrees from due south, the 12th pulse of each auxiliary reference group shall coincide with the positive slope point of inflection of the 135 Hz component. For Y-mode operation the coincidence points shall be midway between the 6th and 7th pulses of the 15 Hz reference group, and shall be at the 12th pulse of the 135 Hz reference group. The main reference group shall occur when the maximum of the composite signal is directed due east of the transponder. In the absence of harmonics, the modulation envelope of the detected r.f. pulse signal shall follow this formula:

$$y = 1.0 + A\sin(2\pi ft \pm \theta - \gamma) + B\sin(18\pi ft \pm \phi - 9\gamma)$$

Where:

(1) y = normalized composite 15-135 Hz signal amplitude
(2) A = represents modulation of 15 Hz component
(3) B = represents modulation of 135 Hz component
(4) θ = deviation in electrical degrees from coincidence of the 15 Hz modulation and the main reference group.
(5) ϕ = deviation in electrical degrees from coincidence of the 135 Hz modulation and the auxiliary reference group.
(6) γ = bearing to the ground or shipboard station from the point of observation.
(7) f = pattern rotation frequency in Hz.
(8) t = time in seconds from the corrected position of the 10th pulse of the X-mode main reference group or 15 μsec after the 6th pulse of the Y-mode main reference group. t is computed from the average position of the 12th pulse of each auxiliary reference group.

Tolerances

f = 15 Hz ± 0.2 percent
For angles of elevation between -45 and +45 degrees
θ = 0.3 degree maximum
ϕ = 0.3 degree maximum
A = 0.21 ± 0.09

B = 0.21 ± 0.09
Sum of A and B not greater than 0.55
Cross polarization effects up to plus or minus 45 degrees from the vertical and within elevation angles of -45 to + 45 degrees must be limited such that θ does not exceed 3 degrees and Ø does not exceed 1 degree.

3.11.1 Harmonic content. At vertical angles from the horizon to 6 degrees above the horizon the root mean square (r.m.s.) sum of the second through the sixth harmonics of the 15 Hz modulation component of the radiated signal shall not exceed 20 percent. The rms sum of the harmonics of the 135 Hz modulation component of the radiated signal shall not exceed 15 percent. The amplitude of modulation components radiated at frequencies of 105 Hz, 120 Hz, 150 Hz, and 165 Hz individually shall not exceed 15 percent nor shall the rms sum of these components exceed 20 percent.

3.12 Distance reply signal. The distance reply signal shall consist of a pair of pulses transmitted in response to a pair of interrogating pulses. The surface transponder shall be capable of delaying the response, when measured from the leading edge of the first interrogating pulse to the leading edge of the first reply pulse, 50 ± 0.1 μsec and 74 ± 0.10 μsec for X-mode and Y-mode. The user then may select the delay that is applicable.

3.12.1 Reply efficiency. The transponder shall reply with not more than 30 percent countdown to 3300 interrogations per sec.

4. TACAN INTERROGATING SIGNAL

4.1 Characteristics. The standard signal, to be radiated and received by the airborne equipment of the Tacan system, shall nominally be vertically polarized. The interrogating signal, radiated by the airborne equipment, shall have the following characteristics:

4.1.1 Radio frequency. The frequency of the transmitter output shall be maintained within plus or minus 0.005 percent of its specified frequency.

4.2 R.f. pulse spectrum. The energy contained in an 0.5 MHz band centered on a frequency plus or minus 0.8 MHz from the channel frequency shall be at least 23 db below the energy level contained in an 0.5 MHz band centered on the channel frequency. The energy level contained in an 0.5 MHz band centered on a frequency plus or minus 2.0 MHz from the channel frequency shall be at least 38 db below the energy contained in an 0.5 MHz band centered on the channel frequency. Each lobe of the spectrum shall be of less amplitude than the adjacent lobe nearer the multiplied oscillator frequency.

4.2.1 Cw output. Cw output between pulses shall not exceed 0.2 mw.

4.3 Pulse shape. The pulse envelope as detected by a linear detector shall fall within the following limits:

4.3.1 Pulse top. The instantaneous amplitude of the pulse shall not, at any instant between the point of the leading edge which is 95 percent maximum amplitude and the point of the trailing edge which is 95 percent of the maximum amplitude, fall below a line which is 95 percent of the maximum voltage amplitude of the pulse and is parallel to the base line.

4.3.2 Pulse rise time. The time required for the leading edge of the pulse to rise from 10 to 90 percent shall be 2.0 ± 0.25 μsec.

4.3.3 Pulse fall time. The time required for the trailing edge of the pulse to fall from 90 to 10 percent of its maximum voltage amplitude shall not exceed 3.0 μsec.

4.3.4 Pulse duration. The pulse duration, which is measured between the points on the leading and trailing edges of the pulse which are 50 percent of the maximum voltage amplitude of the pulse, shall be 3.5 ± 0.5 μsec.

4.4 Pulse coding. The pulses shall be coded in pairs, with a spacing which shall be 12 ± 0.5 μsec for X channels, and 36 ± 0.5 μsec for Y channels, as measured at the 50 percent maximum voltage amplitude point from the leading edge of the first pulse to the leading edge of the second pulse.

4.5 Pulse repetition rate. In the air-to-ground mode in the search condition, the interrogating signal from one aircraft shall not exceed 150 pulse pairs per sec; however, an interrogation rate of 135 ± 3 pairs per sec shall be avoided. In the track condition, this number shall not exceed 30 pulse pairs per sec . In the air-to-air mode the interrogations shall not fall below 22 pulses per seconds in both search and track conditions.

4.5.1 Pulse repetition rate variation. The spacing between successive interrogations shall be sufficiently nonuniform to preclude one equipment from locking-on to range replies intended for any other equipment interrogating the same beacon.

5. AIR-TO-AIR MODE SIGNAL

5.1 A/A mode frequency pairing. Sixty-three pairs of A/A mode channels in X-mode and 63 pairs in Y-mode shall be available for an A/A link between two airborne interrogator-transponders as shown in table I. Channel 1X or 1Y, transmitting at 1025 MHz, shall receive at 1088 MHz and pair with channel 64X or 64Y transmitting at 1088 MHz and receiving at 1025 MHz. Channel 2X or 2Y, transmitting at 1026 MHz, shall receive at 1089 MHz and pair with channel 65X or 65Y transmitting at 1089 MHz and receiving at 1026 MHz.

5.2 A/A system delay time. The single reply pulse shall occur 62 μsec ± 0.1 μsec in X-mode and 74 μsec 0.1 μsec in Y-mode after receipt of the first pulse of an interrogation pair of pulses. The range indicator of the interrogator shall read 0 miles upon receipt of a reply pulse at the antenna 62 μsec after transmission of the first pulse of an interrogation pair of pulses in X-mode and 74 μsec in Y-mode.

5.3 Signal characteristics. The interrogation pulse pairs shall have characteristics identical with those in air-to-ground operation. For X-mode A/A operation the pulse pair spacing shall be 12 ± 0.1 μsec and for Y-mode A/A operation the pulse pair spacing shall be 24 ± 0.1 μsec. Each airborne equipment shall transpond to each received interrogation from other airborne equipment with a single pulse having the same characteristics as the interrogation pulses.

6. NOTES

6.1 International standardization agreements. Certain provisions of this standard are the subject of international standardization agreement (NATO C-13). When amendment, revision, or cancellation of this specification is proposed which will affect or violate the international agreement concerned, the preparing activity will take appropriate reconciliation action through international standardization channels, including departmental standardization offices, if required.

Table I - Tacan frequencies.

Channel	Airborne Interrog. Freq. MHz	Airborne 1/ A/A Mode Trans-ponding Freq. MHz	Airborne 2/ Interrog. Pulse Spacing μsec	Airborne A/A Mode Receiving Freq. MHz	Ground Reply Freq. MHz	Ground Reply Pulse Spacing μsec
1X	1025	1025	12	1088	962	12
1Y	1025	1025	36	1088	1088	30
2X	1026	1026	12	1089	963	12
2Y	1026	1026	36	1089	1089	30
3X	1027	1027	12	1090	964	12
3Y	1027	1027	36	1090	1090	30
4X	1028	1028	12	1091	965	12
4Y	1028	1028	36	1091	1091	30
5X	1029	1029	12	1092	966	12
5Y	1029	1029	36	1092	1092	30
6X	1030	1030	12	1093	967	12
6Y	1030	1030	36	1093	1093	30
7X	1031	1031	12	1094	968	12
7Y	1031	1031	36	1094	1094	30
8X	1032	1032	12	1095	969	12
8Y	1032	1032	36	1095	1095	30
9X	1033	1033	12	1096	970	12
9Y	1033	1033	36	1096	1096	30
10X	1034	1034	12	1097	971	12
10Y	1034	1034	36	1097	1097	30
11X	1035	1035	12	1098	972	12
11Y	1035	1035	36	1098	1098	30
12X	1036	1036	12	1099	973	12
12Y	1036	1036	36	1099	1099	30
13X	1037	1037	12	1100	974	12
13Y	1037	1037	36	1100	1100	30
14X	1038	1038	12	1101	975	12
14Y	1038	1038	36	1101	1101	30
15X	1039	1039	12	1102	976	12
15Y	1039	1039	36	1102	1102	30
16X	1040	1040	12	1103	977	12
16Y	1040	1040	36	1103	1103	30
17X	1041	1041	12	1104	978	12
17Y	1041	1041	36	1104	1104	30
18X	1042	1042	12	1105	979	12
18Y	1042	1042	36	1105	1105	30
19X	1043	1043	12	1106	980	12
19Y	1043	1043	36	1106	1106	30
20X	1044	1044	12	1107	981	12
20Y	1044	1044	36	1107	1107	30
21X	1045	1045	12	1108	982	12
21Y	1045	1045	36	1108	1108	30
22X	1046	1046	12	1109	983	12
22Y	1046	1046	36	1109	1109	30
23X	1047	1047	12	1110	984	12
23Y	1047	1047	36	1110	1110	30
24X	1048	1048	12	1111	985	12
24Y	1048	1048	36	1111	1111	30
25X	1049	1049	12	1112	986	12
25Y	1049	1049	36	1112	1112	30

See footnotes at end of table.

Table I - Tacan frequencies. (Continued)

Channel	Airborne Interrog. Freq. MHz	Airborne[1/] A/A Mode Trans-ponding Freq. MHz	Airborne[2/] Interrog. Pulse Spacing μsec	Airborne A/A Mode Receiving Freq. MHz	Ground Reply Freq. MHz	Ground Reply Pulse Spacing μsec
26X	1050	1050	12	1113	987	12
26Y	1050	1050	36	1113	1113	30
27X	1051	1051	12	1114	988	12
27Y	1051	1051	36	1114	1114	30
28X	1052	1052	12	1115	989	12
28Y	1052	1052	36	1115	1115	30
29X	1053	1053	12	1116	990	12
29Y	1053	1053	36	1116	1116	30
30X	1054	1054	12	1117	991	12
30Y	1054	1054	36	1117	1117	30
31X	1055	1055	12	1118	992	12
31Y	1055	1055	36	1118	1118	30
32X	1056	1056	12	1119	993	12
32Y	1056	1056	36	1119	1119	30
33X	1057	1057	12	1120	994	12
33Y	1057	1057	36	1120	1120	30
34X	1058	1058	12	1121	995	12
34Y	1058	1058	36	1121	1121	30
35X	1059	1059	12	1122	996	12
35Y	1059	1059	36	1122	1122	30
36X	1060	1060	12	1123	997	12
36Y	1060	1060	36	1123	1123	30
37X	1061	1061	12	1124	998	12
37Y	1061	1061	36	1124	1124	30
38X	1062	1062	12	1125	999	12
38Y	1062	1062	36	1125	1125	30
39X	1063	1063	12	1126	1000	12
39Y	1063	1063	36	1126	1126	30
40X	1064	1064	12	1127	1001	12
40Y	1064	1064	36	1127	1127	30
41X	1065	1065	12	1128	1002	12
41Y	1065	1065	36	1128	1128	30
42X	1066	1066	12	1129	1003	12
42Y	1066	1066	36	1129	1129	30
43X	1067	1067	12	1130	1004	12
43Y	1067	1067	36	1130	1130	30
44X	1068	1068	12	1131	1005	12
44Y	1068	1068	36	1131	1131	30
45X	1069	1069	12	1132	1006	12
45Y	1069	1069	36	1132	1132	30
46X	1070	1070	12	1133	1007	12
46Y	1070	1070	36	1133	1133	30
47X	1071	1071	12	1134	1008	12
47Y	1071	1071	36	1134	1134	30
48X	1072	1072	12	1135	1009	12
48Y	1072	1072	36	1135	1135	30
49X	1073	1073	12	1136	1010	12
49Y	1073	1073	36	1136	1136	30
50X	1074	1074	12	1137	1011	12
50Y	1074	1074	36	1137	1137	30

See footnotes at end of table.

Table I - Tacan Frequencies. (Continued)

Channel	Airborne Interrog. Freq. MHz	Airborne 1/ A/A Mode Transponding Freq. MHz	Airborne 2/ Interrog. Pulse Spacing μsec	Airborne A/A Mode Receiving Freq. MHz	Ground Reply Freq. MHz	Ground Reply Pulse Spacing μsec
51X	1075	1075	12	1138	1012	12
51Y	1075	1075	36	1138	1138	30
52X	1076	1076	12	1139	1013	12
52Y	1076	1076	36	1139	1139	30
53X	1077	1077	12	1140	1014	12
53Y	1077	1077	36	1140	1140	30
54X	1078	1078	12	1141	1015	12
54Y	1078	1078	36	1141	1141	30
55X	1079	1079	12	1142	1016	12
55Y	1079	1079	36	1142	1142	30
56X	1080	1080	12	1143	1017	12
56Y	1080	1080	36	1143	1143	30
57X	1081	1081	12	1144	1018	12
57Y	1081	1081	36	1144	1144	30
58X	1082	1082	12	1145	1019	12
58Y	1082	1082	36	1145	1145	30
59X	1083	1083	12	1146	1020	12
59Y	1083	1083	36	1146	1146	30
60X	1084	1084	12	1147	1021	12
60Y	1084	1084	36	1147	1147	30
61X	1085	1085	12	1148	1022	12
61Y	1085	1085	36	1148	1148	30
62X	1086	1086	12	1149	1023	12
62Y	1086	1086	36	1149	1149	30
63X	1087	1087	12	1150	1024	12
63Y	1087	1087	36	1150	1150	30
64X	1088	1088	12	1025	1151	12
64Y	1088	1088	36	1025	1025	30
65X	1089	1089	12	1026	1152	12
65Y	1089	1089	36	1026	1026	30
66X	1090	1090	12	1027	1153	12
66Y	1090	1090	36	1027	1027	30
67X	1091	1091	12	1028	1154	12
67Y	1091	1091	36	1028	1028	30
68X	1092	1092	12	1029	1155	12
68Y	1092	1092	36	1029	1029	30
69X	1093	1093	12	1030	1156	12
69Y	1093	1093	36	1030	1030	30
70X	1094	1094	12	1031	1157	12
70Y	1094	1094	36	1031	1031	30
71X	1095	1095	12	1032	1158	12
71Y	1095	1095	36	1032	1032	30
72X	1096	1096	12	1033	1159	12
72Y	1096	1096	36	1033	1033	30
73X	1097	1097	12	1034	1160	12
73Y	1097	1097	36	1034	1034	30
74X	1098	1098	12	1035	1161	12
74Y	1098	1098	36	1035	1035	30
75X	1099	1099	12	1036	1162	12
75Y	1099	1099	36	1036	1036	30
76X	1100	1100	12	1037	1163	12
76Y	1100	1100	36	1037	1037	30

See footnotes at end of table.

Table I - Tacan Frequencies. (Continued)

Channel	Airborne Interrog. Freq. MHz	Airborne 1/ A/A Mode Trans-ponding Freq. MHz	Airborne 2/ Interrog. Pulse Spacing μsec	Airborne A/A Mode Receiving Freq. MHz	Ground Reply Freq. MHz	Ground Reply Pulse Spacing μsec
77X	1101	1101	12	1038	1164	12
77Y	1101	1101	36	1038	1038	30
78X	1102	1102	12	1039	1165	12
78Y	1102	1102	36	1039	1039	30
79X	1103	1103	12	1040	1166	12
79Y	1103	1103	36	1040	1040	30
80X	1104	1104	12	1041	1167	12
80Y	1104	1104	36	1041	1041	30
81X	1105	1105	12	1042	1168	12
81Y	1105	1105	36	1042	1042	30
82X	1106	1106	12	1043	1169	12
82Y	1106	1106	36	1043	1043	30
83X	1107	1107	12	1044	1170	12
83Y	1107	1107	36	1044	1044	30
84X	1108	1108	12	1045	1171	12
84Y	1108	1108	36	1045	1045	30
85X	1109	1109	12	1046	1172	12
85Y	1109	1109	36	1046	1046	30
86X	1110	1110	12	1047	1173	12
86Y	1110	1110	36	1047	1047	30
87X	1111	1111	12	1048	1174	12
87Y	1111	1111	36	1048	1048	30
88X	1112	1112	12	1049	1175	12
88Y	1112	1112	36	1049	1049	30
89X	1113	1113	12	1050	1176	12
89Y	1113	1113	36	1050	1050	30
90X	1114	1114	12	1051	1177	12
90Y	1114	1114	36	1051	1051	30
91X	1115	1115	12	1052	1178	12
91Y	1115	1115	36	1052	1052	30
92X	1116	1116	12	1053	1179	12
92Y	1116	1116	36	1053	1053	30
93X	1117	1117	12	1054	1180	12
93Y	1117	1117	36	1054	1054	30
94X	1118	1118	12	1055	1181	12
94Y	1118	1118	36	1055	1055	30
95X	1119	1119	12	1056	1182	12
95Y	1119	1119	36	1056	1056	30
96X	1120	1120	12	1057	1183	12
96Y	1120	1120	36	1057	1057	30
97X	1121	1121	12	1058	1184	12
97Y	1121	1121	36	1058	1058	30
98X	1122	1122	12	1059	1185	12
98Y	1122	1122	36	1059	1059	30
99X	1123	1123	12	1060	1186	12
99Y	1123	1123	36	1060	1060	30
100X	1124	1124	12	1061	1187	12
100Y	1124	1124	36	1061	1061	30
101X	1125	1125	12	1062	1188	12
101Y	1125	1125	36	1062	1062	30

See footnotes at end of table.

Table I - Tacan Frequencies. (Continued)

Channel	Airborne Interrog. Freq. MHz	Airborne 1/ A/A Mode Transponding Freq. MHz	Airborne 2/ Interrog. Pulse Spacing μsec	Airborne A/A Mode Receiving Freq. MHz	Ground Reply Freq. MHz	Ground Reply Pulse Spacing μsec
102X	1126	1126	12	1063	1189	12
102Y	1126	1126	36	1063	1063	30
103X	1127	1127	12	1064	1190	12
103Y	1127	1127	36	1064	1064	30
104X	1128	1128	12	1065	1191	12
104Y	1128	1128	36	1065	1065	30
105X	1129	1129	12	1066	1192	12
105Y	1129	1129	36	1066	1066	30
106X	1130	1130	12	1067	1193	12
106Y	1130	1130	36	1067	1067	30
107X	1131	1131	12	1068	1194	12
107Y	1131	1131	36	1068	1068	30
108X	1132	1132	12	1069	1195	12
108Y	1132	1132	36	1069	1069	30
109X	1133	1133	12	1070	1196	12
109Y	1133	1133	36	1070	1070	30
110X	1134	1134	12	1071	1197	12
110Y	1134	1134	36	1071	1071	30
111X	1135	1135	12	1072	1198	12
111Y	1135	1135	36	1072	1072	30
112X	1136	1136	12	1073	1199	12
112Y	1136	1136	36	1073	1073	30
113X	1137	1137	12	1074	1200	12
113Y	1137	1137	36	1074	1074	30
114X	1138	1138	12	1075	1201	12
114Y	1138	1138	36	1075	1075	30
115X	1139	1139	12	1076	1202	12
115Y	1139	1139	36	1076	1076	30
116X	1140	1140	12	1077	1203	12
116Y	1140	1140	36	1077	1077	30
117X	1141	1141	12	1078	1204	12
117Y	1141	1141	36	1078	1078	30
118X	1142	1142	12	1079	1205	12
118Y	1142	1142	36	1079	1079	30
119X	1143	1143	12	1080	1206	12
119Y	1143	1143	36	1080	1080	30
120X	1144	1144	12	1081	1207	12
120Y	1144	1144	36	1081	1081	30
121X	1145	1145	12	1082	1208	12
121Y	1145	1145	36	1082	1082	30
122X	1146	1146	12	1083	1209	12
122Y	1146	1146	36	1083	1083	30
123X	1147	1147	12	1084	1210	12
123Y	1147	1147	36	1084	1084	30
124X	1148	1148	12	1085	1211	12
124Y	1148	1148	36	1085	1085	30
125X	1149	1149	12	1086	1212	12
125Y	1149	1149	36	1086	1086	30
126X	1150	1150	12	1087	1213	12
126Y	1150	1150	36	1087	1087	30

1/ Airborne A/A mode transponding reply shall be a single pulse.
2/ Airborne A/A Y-mode interrogating pulse spacing = 24μsec.

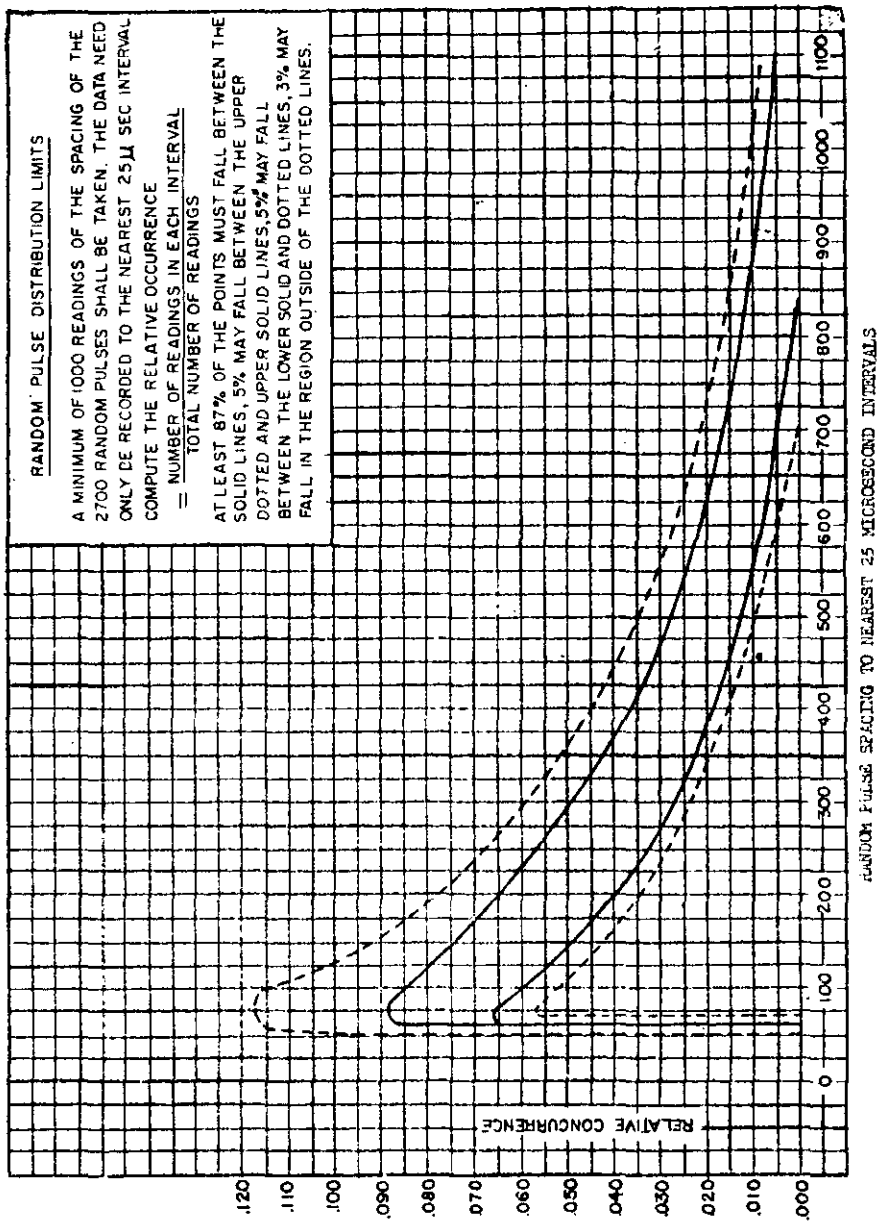

Figure 1 - Random pulse distribution limits.

Other custodians:
Army--EL
Air Force--11
Navy--EC

Review interest
Army--*EL, MU*
Navy--SH, AS, EC
Air Force--11, 85

Preparing activity:
Navy - EC
(Project 5826-0026)