

ENR 1.6 **ATS SURVEILLANCE SERVICES AND PROCEDURES**

1. **PRIMARY RADAR**

1.1 **General provisions**

Secondary and primary radar stations are a composite part of the radio navigation equipment for ATM purposes. The main aid of radar control in the airspace of the Republic of Kazakhstan is secondary surveillance radar (SSR). The primary surveillance radar (PSR) operates "on request" mode.

ATC units provide radar service and they use following call signs:

- a. Air traffic control unit – CONTROL;
- b. Approach control unit – APPROACH (APP);
- c. Circuit control unit – CIRCUIT;
- d. Aerodrome control tower – TOWER (TWR).

Coordinates and radar coverage areas are in table ENR-1.6. Table-6.

1.2 **The application of radar control service**

The radar control service is provided on airways and in aerodrome areas and it includes:

- a. radar separation of arriving, departing and on en-route aircraft;
- b. radar control of arriving, departing and on en-route aircraft in order to provide information to the aircraft crew about any significant deviations from the flight path;
- c. radar guidance of aircraft (if necessary);
- d. assistance to aircraft in an emergency;
- e. warning and providing information about the location of other aircraft that could create a risk of hazardous situation;
- f. providing information for navigation purposes;
- g. provision of weather and hazardous weather condition information.

The minimum values of horizontal radar separation are:

- a. by area control service - not less than 10 nautical miles;
- b. by approach control service - not less than 5 nautical miles;
- c. by aerodrome control service – the minimums are applied based on wake turbulence separation according to ICAO Doc.4444.

1.3 **Radar and air-ground communication failure procedures**

Radar failure

In the event of a radar failure, the aircraft crews are instructed to increase the separation values as for flights without radar control:

- a. not less than 15 minutes for aircraft following on intersecting routes (at intersection angles of at least 70°);
- b. not less than 10 minutes for aircraft following on the same flight level (altitude) along the same route under the air traffic control service and / or approach control service;
- c. not less than 3 minutes for aircraft following on the same flight level (altitude) and the same route under

aerodrome control service;

- d. not less than 20 minutes before crossing the same direction or opposite flight level (altitude) occupied by another aircraft.

Air-ground communication failure

The ATS controller gives to the aircraft crew a command to execute the turns and, if the turns are observed, the controller continues to provide radar service to an aircraft.

In the event of a total failure of the onboard radio station in the airspace of the Republic of Kazakhstan, the aircraft crew must perform the procedures for the radio equipment failure.

Actions to be made by the crew in the case of air-ground communications failure

After communication failure in the Kazakhstan airspace, the pilot-in-command shall continue its flight in accordance with the flight plan, taking at the same time all measures to re-establish radio communication. For this purpose, he uses the channels of ACC, APP, supplementary radio stations and on-board radio stations of other aircraft.

If two-way communication was not re-established and the aircraft radio receivers are working fine, the aircraft crew shall nevertheless obtain the necessary flight information and the ATC instructions. For this purpose, he shall continuously monitor the radio communication channels of ground radio stations of the ACC and APP controllers, as well as the frequency of non-directional radio beacon and the VOR (DVOR) omnidirectional radio beacon of landing aerodrome or the nearest aerodrome along the route located in the ATS area.

In the case of radio communication failure while VFR flight performing, the aircraft shall proceed to the first landing aerodrome in accordance with the flight plan. If proceeding to the first landing aerodrome under VFR is impossible, the aircraft shall fly to the alternate aerodrome (departure aerodrome) where the weather conditions allow to land under VFR procedure. If the flight involves crossing Kazakhstan state border, the provisions of section ENR-1.6.1.1 should be applied.

Crossing the state border without radio communication is prohibited, except for cases when radio communication failure occurred in flight under the direct control of ATC unit of the Republic of Kazakhstan or after obtaining its clearance to cross the state border.

In the case of radio communication failure at a descending, the pilot-in-command reaches flight level (height) assigned earlier by the ATC unit and the aircraft is flying to the landing aerodrome at this level (height) with further approach to it by the established scheme.

In the case of radio communication failure after take-off, the pilot-in-command shall perform the flight by the established scheme and land at the departure aerodrome. In this case, the aircraft crew is allowed to land in meteorological conditions below the operating aerodrome minimum.

If a landing to an arriving aerodrome is impossible after bailed landing or missed approach, the pilot-in-command should proceed to the alternate aerodrome according to the SID schemes climbing to the lowest safe flight level. Alternatively he should follow to the alternate aerodrome to backward direction of flight path on the nearest opposite lower FL stated in the flight plan or to the alternate aerodrome in the direction of flight path on the FL stated in the flight plan.

An aircraft returns to the departure aerodrome or diverts to an alternate aerodrome located to backward direction of flight path on the nearest opposite lower FL stated in the flight plan and not lower than the lowest safe flight level.

In the case of radio communication failure while IFR flight performing and transition from IFR to VFR is not possible, the aircraft:

- a. in airspace where procedural separation is being applied, maintain the last assigned speed and level, or minimum flight altitude if higher, for a period of 20 minutes following the aircraft's failure to report its position over a compulsory reporting point and thereafter adjust level and speed in accordance with the filed flight plan;
- b. in airspace where an ATS surveillance system is used in the provision of air traffic control, maintain the last assigned speed and level, or minimum flight altitude if higher, for a period of 7 minutes following:
 - the time the last assigned level or minimum flight altitude is reached, or

- the time the transponder is set to Code 7600, or
 - the aircraft's failure to report its position over a compulsory reporting point, whichever is later and thereafter adjust level and speed in accordance with the filed flight plan.
- c. when being radar vectored or having been directed by ATC to proceed offset using area navigation (RNAV) without a specified limit rejoin the current flight plan route no later than the next significant point, taking into consideration the applicable minimum flight altitude;
- d. proceed according to the current flight plan route to the appropriate designated navigation aid or fix serving the destination aerodrome. Then it shall hold over this aid or fix until commencement of descent taking into account the provisions of below sub-item (e) if necessary;
- e. commence descent from the navigation aid or fix at, or as close as possible to, the expected approach time last received and acknowledged; or, if no expected approach time has been received and acknowledged, at, or as close as possible to, the estimated time of arrival resulting from the current flight plan;
- f. complete a normal instrument approach procedure as specified for the designated navigation aid or fix;
- g. lands, if possible, within 30 (thirty) minutes after the estimated time of arrival or the last acknowledged expected approach time, whichever is later.

In the case of communication failure with the TOWER controller while executing a missed approach, the crew shall switch to other frequency with the RADAR or APPROACH controller and follow his instructions.

If the aircraft has not appeared and has not landed within 30 min for landing, all limitations for other aircraft at the aerodrome are removed.

2. SECONDARY SURVEILLANCE RADAR (SSR)

2.1 Operating procedures

Operating procedures of ATC transponder in mode A (4096 code) and mode C are subject to compulsory implementation.

When entering the airspace of the Republic of Kazakhstan the pilot-in-command shall:

- a. maintain the SSR code assigned by the controller of an ATC area adjacent to the territory of the Republic of Kazakhstan until a new code is assigned;
- b. set mode A code 2000 five minutes before border crossing of the airspace of the Republic of Kazakhstan, if no SSR code was used in the adjacent area.

The pilot-in-command shall set the individual identification code assigned by ATC unit and switch-on the airborne identification equipment immediately after take-off from aerodromes of the Republic of Kazakhstan.

2.2 Emergency procedures

In emergency the pilot-in-command shall set the mode 7700 unless otherwise are directed by ATC.

If an unlawful interference occurred in crew performance and the aircraft are equipped with an SSR transponder, the pilot-in-command shall establish mode A code 7500.

If the failure of onboard SSR transponder was discovered before departure the pilot-in-command shall:

- a. inform appropriate ATC unit about the aircraft transponder failure;
- b. plan the flight to the landing aerodrome, where the transponder can be repaired;
- c. insert a letter "N" in item 10 of the flight plan in the event of a total failure of transponder or indicate the nature of the failure in the event of a partial failure (in accordance with Doc 4444, Appendix 2).

2.3 Radio communication failure procedures

In case of aircraft radio receiver failure, the pilot-in-command shall set mode A code 7600 and follow the established procedures.

2.4 System of SSR code assignment

The following codes are designated for Republic of Kazakhstan according to SSR code management plan (Doc 023):

05, 06, 11, 34 - transit;
35, 57, 45, 72 - domestic.

International SSR codes within territory of Republic of Kazakhstan are assigned according to following table:

Table 1: TRANSIT CODES BETWEEN AIR TRAFFIC SERVICES

№	Departure aerodrome	Codes	№	Departure aerodrome	Codes
1	Astana	0601-0627	9	Shymkent	3430-3437
2	Karaganda	0630-0637	10	Aktobe	3440-3447
3	Pavlodar	0640-0645	11	Atyrau	3450-3457
4	Ust-Kamenogorsk	0650-0657	12	Aktau	3460-3467
5	Kostanay	0660-0665	13	Uralsk	3470-3473
6	Zhezkazgan	0670-0673	14	Kyzylorda	3474, 3475
7	Semey	0674-0677	15	Taraz	3476, 3477
8	Almaty	3401-3427	16	Turkistan	0646, 0647, 0666, 0667

Table 2: TRANSIT CODES BETWEEN FIRS OF REPUBLIC OF KAZAKHSTAN

№	FIR	Sector	Codes	№	FIR	Sector	Codes
1	Almaty	A3A	0501-0523	7	Aktobe	A2B	1140-1147
2	Almaty	A4A	0570-0577	8	Aktobe	A5B	1150-1164
3	Astana	A2C	0540-0557	9	Aktobe	A6B	1165-1177
4	Astana	A3C	0560-0567	10	Aktobe	A6BU	1165-1177
5	Aktobe	A1B	1101-1117	11	Shymkent	A1I	0524-0531
6	Aktobe	A4B	1120-1137	12	Shymkent	A2I	0532-0537

Table 3: DOMESTIC CODES BETWEEN AIR TRAFFIC SERVICES

№	Departure aerodrome	Codes	№	Departure aerodrome	Codes
1	Almaty	3501-3517	11	Kostanay	7230-7237
2	Balkhash	3520-3523	12	Pavlodar	7240-7247
3	Taraz	3524-3527	13	Ust-Kamenogorsk	7250-7253
4	Shymkent	3530-3537	14	Semey	7254-7257
5	Aktobe	3540-3547	15	Petropavlovsk	7260-7263
6	Aktau	3550-3557	16	Kokshetau	7264-7267
7	Atyrau	3560-3567	17	Kyzylorda	7270-7273

Table 3: DOMESTIC CODES BETWEEN AIR TRAFFIC SERVICES

№	Departure aerodrome	Codes	№	Departure aerodrome	Codes
8	Uralsk	3570-3577	18	Zhezkazgan	7274-7277
9	Astana	7201-7217	19	Taldykorgan	7228-7229
10	Karaganda	7220-7227			

Table 4: DOMESTIC CODES BETWEEN FIRS OF REPUBLIC OF KAZAKHSTAN

№	FIR	Sector	Codes	№	FIR	Sector	Codes
1	Almaty	A1A	3701-3707	9	Aktobe	A5B	4570-4577
2	Almaty	A3A	3720-3727	10	Astana	A1C	4501-4507
3	Almaty	A4A	4540-4547	11	Astana	A2C	4510-4517
4	Almaty	A5A	3730-3737	12	Astana	A3C	4520-4527
5	Aktobe	A1B	3740-3747	13	Astana	A4C	4530-4537
6	Aktobe	A2B	3750-3757	14	Shymkent	A1I	3710-3717, 4560-4567
7	Aktobe	A3B	3760-3767	15	Shymkent	A2I	4550-4557
8	Aktobe	A4B	3770-3777				

Table 5: ALLOCATION OF CODES SERIES 00 BETWEEN ATS UNITS

№	FIR	Group of codes	Departure aerodrome	Codes
1	Astana	0,1	Astana	0001-0003
			Pavlodar	0004-0007
			Kokshetau	0010-0013
			Petropavlovsk	0014-0017
		2,3	Kostanay	0020-0027
			Arkalyk	0030-0037
		4,5	Zhezkazgan	0040-0047
			Karaganda	0050-0057
2	Almaty	2,3	Almaty	0020-0027
			Taldykorgan	0030-0037
		0	Balkhash	0001-0007
		6,7	Semey	0060-0063
			Ust-Kamenogorsk	0064-0067
			Urdzhar	0070-0071
			Usharal	0074-0077
			Zaisan	0072-0073

Table 5: ALLOCATION OF CODES SERIES 00 BETWEEN ATS UNITS

No	FIR	Group of codes	Departure aerodrome	Codes
3	Aktobe	0,1	Aktobe	0001-0007
			Uralsk	0010-0017
		2,3	Aktau	0020-0027
			Atyrau	0030-0037
		7	Aralsk	0070-0077
4	Shymkent	1,4,5,6	Shymkent	0040-0047
			Kyzylorda	0050-0057
			Taraz	0060-0067
			Turkistan	0010-0017

Table 6: SSR COVERAGE OPERATING IN RANGE OF INTERNATIONAL FREQUENCIES

SSR Points	SSR Type	Maximum Radius of coverage (NM)	Upper Limit (ft)	Coordinates	Remarks
Aktau	En-route and aerodrome mono-impulse	215	65000	N435146 E0510535	
Aktau	En-route and aerodrome mono-impulse	215	65000	N435146 E0510541	
Aktobe	En-route and aerodrome mono-impulse	215	65000	N501414 E0571235	
Aktobe	En-route and aerodrome mono-impulse	215	65000	N501416 E0571237	
Almaty	En-route, mono-impulse	215	65000	N432113 E0770145	
Almaty	En-route and aerodrome mono-impulse	215	65000	N432116 E0770144	
Almaty	En-route and aerodrome mono-impulse	215	65000	N432117 E0770145	
Almaty	En-route	215	65000	N432115 E0770143	
Atyrau	En-route, mono-impulse	215	65000	N470641 E0514735	
Atyrau	En-route and aerodrome mono-impulse	215	65000	N470716 E0514857	

Table 6: SSR COVERAGE OPERATING IN RANGE OF INTERNATIONAL FREQUENCIES

SSR Points	SSR Type	Maximum Radius of coverage (NM)	Upper Limit (ft)	Coordinates	Remarks
Aralsk	En-route, mono-impulse	215	65000	N464937 E0613720	
Arkalyk	En-route, mono-impulse	215	65000	N501905 E0670131	
Astana	En-route, mono-impulse	215	65000	N510254 E0712848	
Astana	En-route and aerodrome mono-impulse	215	65000	N510106 E0712736	
Ayaguz	En-route, mono-impulse	215	65000	N475557 E0802649	
Balkhash	En-route	195	40000	N465313 E0750137	
Balkhash	En-route and aerodrome mono-impulse	215	65000	N465254 E0745940	
Beineu	En-route, mono-impulse	215	65000	N452011 E0550734	
Karaganda	En-route and aerodrome mono-impulse	215	65000	N494002 E0732002	
Karaganda	Aerodrome	108	33000	N494008 E0732001	
Kokshetau	En-route and aerodrome mono-impulse	215	65000	N531938 E0693555	
Kokshetau	En-route, mono-impulse	215	65000	N531940 E0693557	
Kyzylorda	En-route, mono-impulse	215	65000	N444141 E0653623	
Kostanay	En-route, mono-impulse	215	65000	N531136 E0633202	
Pavlodar	En-route and aerodrome mono-impulse	215	65000	N521136 E0770437	
Petropavlovsk	En-route and aerodrome mono-impulse	215	65000	N544618 E0691109	
Taldykorgan	Aerodrome	205	32808	N450730 E0782626	
Taraz	En-route and aerodrome mono-impulse	215	65000	N425112 E0711746	

Table 6: SSR COVERAGE OPERATING IN RANGE OF INTERNATIONAL FREQUENCIES

SSR Points	SSR Type	Maximum Radius of coverage (NM)	Upper Limit (ft)	Coordinates	Remarks
Taraz	En-route and aerodrome mono-impulse	215	65000	N425114 E0711741	
Turkistan	En-route and aerodrome mono-impulse	215	65000	N431833 E0683321	
Uralsk	En-route, mono-impulse	215	65000	N510951 E0513344	
Uralsk	En-route and aerodrome mono-impulse	215	65000	N510858 E0513252	
Ust-Kamenogorsk	Aerodrome	108	33000	N500205 E0823012	
Semey	En-route, mono-impulse	215	65000	N501855 E0801146	
Semey	En-route, mono-impulse	257	65000	N501858 E0801142	
Shymkent	En-route and aerodrome	195	40000	N422200 E0692848	
Zhezkazgan	En-route, mono-impulse	215	65000	N474222 E0674429	
Zhezkazgan	En-route and aerodrome mono-impulse	215	65000	N474224 E0674429	
Control center Zharkent	En-route, mono-impulse	226	65616	N441400 E0795720	

3. AUTOMATIC DEPENDENT SURVEILLANCE - BROADCAST (ADS-B)

Installed at the aerodromes:

Aktau, Aktobe, Almaty, Astana, Atyrau, Balkhash, Karaganda, Kokshetau, Kostanay, Kyzylorda, Pavlodar, Petropavlovsk, Semey, Shymkent, Taldykorgan, Taraz, Turkistan, Uralsk, Urdzhar, Ust-Kamenogorsk, Zaisan, Zhezkazgan.

Equipped with ADS-B aircraft automatically and often send reports of surveillance conditions to the ground station via a data link. The basic data elements in broadcasting reports are:

1. aircraft identification index and 24-bit address;
2. location data (and relevant accuracy and integrity information);
3. speed vector (and the accuracy vector);
4. barometric altitude.

4. OTHER RELEVANT INFORMATION AND PROCEDURES

Nil