MILITARY COMMUNICATIONS ELECTRONICS BOARD (MCEB)

EQUIPMENT FREQUENCY ALLOCATION GUIDANCE

Military Department	Equipment	Stage
Air Force Army	**AN/PPS-5C Radar Set**	4 - Operational

Section 1: ENCLOSURES

Enclosure Number	Description	Dated
1	J/F 12/7792/2	25 November 2003

Section 2: OPERATING CHARACTERISTICS FOR WHICH SUPPORT IS CERTIFIED

Frequency (GHz)	Emission	Power (Peak)	Type of Service	Operating Location
16.75-17.25	11M5Q3N 12M2P0N 15M4M1N 41M1P0N	6.8 Watts	Radiolocation	US&P

Section 3: MCEB GUIDANCE

1. The enclosed application, as shown in Section 2, is approved for operational use subject to the guidance provided in the following paragraphs.

2. For the intended operation in the radiolocation service, the subject equipment is in accordance with the ITU and US Tables of Frequency Allocation.

3. Based on the information provided,

a. The transmitters comply with NTIA Manual, Section 5.2.1, requirements for frequency tolerance.

b. The transmitters comply with NTIA Manual, Section 5.2.2, requirements for spurious level.

c. The transmitters comply with the requirements of the NTIA Manual, Section 5.5, Radar Spectrum Engineering Criteria A (RSEC A).

d. The transmitters comply with the requirements of MIL-STD-469B Criteria A.

e. The transmitters do not comply with the spurious emissions requirement of MIL-STD-461E.

4. Frequency assignment requests must be submitted using Standard Frequency Action Format (SFAF) and coordinated with the cognizant Area Frequency Coordinator (AFC) in accordance with ACP 190 US SUPP-1(C), Guide to Frequency Planning, prior to activation.

Steering Member ESG Working Group MCEB Frequency Panel	Signature	Date	IRAC/SPS Number	Page
		APR 21 2004	**SPS-12796/3** **Doc. 31943/3**	1 of 2

Downgrading Instructions	Distribution	MCEB J-12 Number
Classified by: NA Declassify on: NA	J-12 Holders	**7792/3**

MILITARY COMMUNICATIONS ELECTRONICS BOARD (MCEB)

EQUIPMENT FREQUENCY ALLOCATION GUIDANCE

MCEB GUIDANCE **CONTINUATION PAGE**	Equipment **AN/PPS-5C Radar Set**

Section 3: MCEB GUIDANCE (continued)

5. Coordination with NTIA/SPS was completed and the following US certification statements were received,

a. NTIA certify Stage 4 spectrum support for AN/PPS-5C Radar Set as specified in Section 2.

b. Army and Air Force be aware that failure of this system to comply with the policy guidance in the Section 8.2.46 of the NTIA Manual may increase the difficulty of coordinating interference-free frequency assignments.

6. Authorization for use outside of the US&P is dependent on receiving a statement of supportability from the appropriate COCOM. Host nation coordination has been initiated.

APPLICATION FOR EQUIPMENT FREQUENCY ALLOCATION	CLASSIFICATION UNCLASSIFIED	DATE 11/25/2003	J/F 12/07792/2
			Page 1 of 10 Pages

DOD GENERAL INFORMATION

TO	USMCEB	FROM	Office of the Army Spectrum Manager Submitted by: (Ground Combat and Support Systems; ATTN: SFAE-GCSS-W-BV)

1. APPLICATION TITLE (U) AN/PPS-5C Radar Set

2. SYSTEM NOMENCLATURE (U) AN/PPS-5C Radar Set, Man-portable Surveillance and Target Acquisition Radar (MSTAR)

3. STAGE OF ALLOCATION (U)

[ ] a. STAGE 1 CONCEPTUAL	[ ] b. STAGE 2 EXPERIMENTAL	[ ] c. STAGE 3 DEVELOPMENTAL	[X] d. STAGE 4 OPERATIONAL

4. FREQUENCY REQUIREMENTS

a. FREQUENCY(IES) (U) 16.75 GHz - 17.25 GHz

b. EMISSION DESIGNATORS (U) 41M1P0N 15M4M1N 12M2P0N 11M5Q3N

5. TARGET STARTING DATE FOR SUBSEQUENT STAGES

a. STAGE 2 (U) NA	b. STAGE 3 (U) NA	c. STAGE 4 (U) NA

6. EXTENT OF USE (U) Continous - Up to 24/7 during deployment and contingencies

7. GEOGRAPHICAL AREA FOR

a. STAGE 2 (U) NA

b. STAGE 3 (U) NA

c. STAGE 4 (U) US&P and Worldwide

8. NUMBER OF UNITS

a. STAGE 2 (U) NA	b. STAGE 3 (U) NA	c. STAGE 4 (U) 520

9. NUMBER OF UNITS OPERATING SIMULTANEOUSLY IN THE SAME ENVIRONMENT (U) 5

10. OTHER J/F 12 APPLICATION ID(S) TO BE (U)

[X] a. SUPERSEDED J/F 12/7792

[X] b. RELATED J/F 12/01294/2

11. IS THERE ANY OPERATIONAL REQUIREMENT AS DESCRIBED IN THE INSTRUCTIONS FOR PARAGRAPH 11? (U)

[ ] a. YES [X] b. NO [ ] c. NAVAIL

12. NAMES AND TELEPHONE NUMBERS (U)

a. PROGRAM MANAGER LTC Peter Ostrom	(1) COMMERCIAL 810-574-6422	(2) DSN 786-6422
b. PROJECT ENGINEER Ronald Chapp	(1) COMMERCIAL 810-574-7963	(2) DSN 786-6609

13. REMARKS (U)

Items 2/12a. The Air Force Program Manager for the AN/PPS-5C (Modified), MSTAR, is: Capt James Dobbs, ESC/FDT, Hanscom AFB, DSN 478-3444.

DOWNGRADING INSTRUCTIONS	J/F 12/07792/2
	CLASSIFICATION UNCLASSIFIED

TRANSMITTER EQUIPMENT CHARACTERISTICS

1. NOMENCLATURE, MANUFACTURER'S MODEL NO.
(U) AN/PPS-5C Transmitter

2. MANUFACTURER'S NAME
(U) Systems & Electronics Inc.

3. TRANSMITTER INSTALLATION
(U) Transportable

4. TRANSMITTER TYPE
(U) Pulse Doppler Radar

5. TUNING RANGE
(U) 16.75 GHz - 17.25 GHz

6. METHOD OF TUNING
(U) Synthesizer

7. RF CHANNELING CAPABILITY
(U) None, Fixed at (See Remarks)

8. EMISSION DESIGNATORS
(U) 41M1P0N (U) 15M4M1N (U)

9. FREQUENCY TOLERANCE
(U) 600 ppm

10. FILTER EMPLOYED
(U) [X] a. YES [ ] b. NO

11. SPREAD SPECTRUM
(U) [ ] a. YES [X] b. NO

12. EMISSION BANDWIDTH
[X] CALCULATED [ ] MEASURED

a. -3 dB	(U)	7.49 MHz	(U)	9.04 MHz	(U)
b. -20 dB	(U)	41.09 MHz	(U)	15.43 MHz	(U)
c. -40 dB	(U)	129.95 MHz	(U)	50.06 MHz	(U)
d. -60 dB	(U)	410.94 MHz	(U)	158.3 MHz	(U)
e. OC-BW	(U)	41.1 MHz	(U)	15.4 MHz	(U)

13. MAXIMUM BIT RATE
(U) NA

15. MAXIMUM MODULATION FREQUENCY
(U) NA

14. MODULATION TECHNIQUES AND CODING
(U) unmodulated pulses: 65 bit Barker code

17. DEVIATION RATIO
(U) NA

16. PRE-EMPHASIS
(U) [ ] a. YES [X] b. NO

18. PULSE CHARACTERISTICS

a. RATE	(U)	3150 pps - 7875 pps	(U)	3150 pps - 7875 pps	(U)
b. WIDTH	(U)	.1 us	(U)	6.5 us	(U)
c. RISE TIME	(U)	20 ns	(U)	20 ns	(U)
d. FALL TIME	(U)	20 ns	(U)	20 ns	(U)
e. COMP RATIO	(U)	NA	(U)	65	(U)

19. POWER

a. MEAN	(U)	NA	(U)	NA	(U)
b. PEP	(U)	6.8 W	(U)	6.8 W	(U)

20. OUTPUT DEVICE
(U) Solid state amplifier

21. HARMONIC LEVEL

a. 2nd	(U)	-70 dB
b. 3rd	(U)	-80 dB
c. OTHER	(U)	-85 dB

22. SPURIOUS LEVEL
(U) -43.5 dB

23. FCC TYPE ACCEPTANCE NO.
(U) NA

24. REMARKS (U)

Item 7. Four switched factory set frequencies listed as follows: 16.936 GHz; 16.974 GHz; 17.012 GHz; 17.049 GHz. Single switch selects transmitter and receiver RF processing paths (frequency).

Item 10. Bandpass filter with less than 0.5 dB loss and less than +/- 0.4 dB ripple in the passband. The rejection performance is as follows:

Freq	Attenuation
15.5 GHz	> 50 dB
16.25 GHz	> 25 dB
18.0 GHz	> 30 dB
19.0 GHz	> 50 dB

Item 18. The radar operates in two modes. The near range mode uses the .1 microsecond unmodulated pulse while the far range mode uses the 65 bit polyphase Barker coded emission of 6.5 microseconds.

TRANSMITTER REMARK OVERFLOW PAGE

Item 22: The spurious level, of -43.5 dB, is a maximum. The RF processing path has been optimized to control the harmonic output signal level.

TRANSMITTER EQUIPMENT CHARACTERISTICS

1. NOMENCLATURE, MANUFACTURER'S MODEL NO.
(U) AN/PPS-5C (Modified) Transmitter

2. MANUFACTURER'S NAME
(U) Systems & Electronics Inc.

3. TRANSMITTER INSTALLATION
(U) Transportable

4. TRANSMITTER TYPE
(U) Pulse Doppler Radar

5. TUNING RANGE
(U) 16.75 GHz - 17.25 GHz

6. METHOD OF TUNING
(U) Synthesizer

7. RF CHANNELING CAPABILITY
(U) None, Fixed at (See Remarks)

8. EMISSION DESIGNATORS
(U) 12M2P0N (U) 11M5Q3N (U)

9. FREQUENCY TOLERANCE
(U) 600 ppm

10. FILTER EMPLOYED
(U) [X] a. YES [ ] b. NO

11. SPREAD SPECTRUM
(U) [ ] a. YES [X] b. NO

12. EMISSION BANDWIDTH
[ ] CALCULATED [X] MEASURED

a. -3 dB	(U)	6.00 MHz	(U)	4.74 MHz	(U)
b. -20 dB	(U)	12.17 MHz	(U)	11.53 MHz	(U)
c. -40 dB	(U)	76.2 MHz	(U)	26.58 MHz	(U)
d. -60 dB	(U)	144.6 MHz	(U)	84.2 MHz	(U)
e. OC-BW	(U)	12.2 MHz	(U)	11.53 MHz	(U)

13. MAXIMUM BIT RATE
(U) NA

14. MODULATION TECHNIQUES AND CODING
(U) Unmodulated Pulses or
Non-linear FM Chirp (See Remarks)

15. MAXIMUM MODULATION FREQUENCY
(U) NA

16. PRE-EMPHASIS
(U) [ ] a. YES [X] b. NO

17. DEVIATION RATIO
(U) NA

18. PULSE CHARACTERISTICS

a. RATE	(U)	9922 pps	(U)	3206 pps - 5040 pps	(U)
b. WIDTH	(U)	0.16 us	(U)	9.7 us	(U)
c. RISE TIME	(U)	20 ns	(U)	20 ns	(U)
d. FALL TIME	(U)	20 ns	(U)	20 ns	(U)
e. COMP RATIO	(U)	NA	(U)	65	(U)

19. POWER

a. MEAN	(U)	NA	(U)	NA	(U)
b. PEP	(U)	6.8 W	(U)	6.8 W	(U)

20. OUTPUT DEVICE
(U) Solid State Amplifier

21. HARMONIC LEVEL

a. 2nd	(U)	-70 dB
b. 3rd	(U)	-80 dB
c. OTHER	(U)	-85 dB

22. SPURIOUS LEVEL
(U) -58 dB

23. FCC TYPE ACCEPTANCE NO.
(U) NA

24. REMARKS (U)

Item 7. Four switched factory set frequencies listed as follows: 16.936 GHz; 16.974 GHz; 17.012 GHz; 17.049 GHz. Single switch selects transmitter and receiver RF processing paths (frequency).

Item 10. Bandpass filter with less than 0.5 dB loss and less than +/- 0.4 dB ripple in the passband. The rejection performance is as follows:

Freq	Attenuation
15.5 GHz	> 50 dB
16.25 GHz	> 25 dB
18.0 GHz	> 30 dB
19.0 GHz	> 50 dB

Item 14/18. The radar operates in two modes. The short range mode uses the .16 microsecond unmodulated pulse at a fixed PRR of 9920 pps for 100m to 2500m while the long range mode uses the 9.7 microsecond non-linear FM

TRANSMITTER REMARK OVERFLOW PAGE

chirp pulse at a PRR of 5040 pps from 2500 to 12000m and 3206 pps beyond 12000m.

RECEIVER EQUIPMENT CHARACTERISTICS

1. NOMENCLATURE, MANUFACTURER'S MODEL NO.
(U) AN/PPS-5C Receiver

2. MANUFACTURER'S NAME
(U) Systems & Electronics Inc.

3. RECEIVER INSTALLATION
(U) Transportable

4. RECEIVER TYPE
(U) Dual Conversion Superhetrodyne

5. TUNING RANGE
(U) 16.75 GHz - 17.25 GHz

6. METHOD OF TUNING
(U) Synthesizer

7. RF CHANNELING CAPABILITY
(U) Fixed, See Remarks

8. EMISSION DESIGNATORS
(U) 41M1P0N 15M4M1N

9. FREQUENCY TOLERANCE
(U) 600 ppm

10. IF SELECTIVITY

	1st (U)	2nd (U)	3rd (U)
a. -3 dB	45 MHz	10 MHz	
b. -20 dB	54 MHz	14.5 MHz	
c. -60 dB	99 MHz	41 MHz	

11. RF SELECTIVITY
[ ] CALCULATED [X] MEASURED

a. -3 dB	(U)	500 MHz
b. -20 dB	(U)	1500 MHz
c. -60 dB	(U)	3600 MHz
d. Preselection Type	(U)	Bandpass filter

12. IF FREQUENCY
a. 1st (U) 855 MHz
b. 2nd (U) 60 MHz
c. 3rd (U)

13. MAXIMUM POST DETECTION FREQUENCY
(U) 10 MHz

14. MINIMUM POST DETECTION FREQUENCY
(U) NA

15. OSCILLATOR TUNED

	1st (U)	2nd (U)	3rd (U)
a. ABOVE TUNED FREQUENCY			
b. BELOW TUNED FREQUENCY	X	X	
c. EITHER ABOVE OR BELOW THE FREQUENCY			

16. MAXIMUM BIT RATE
(U) NA

17. SENSITIVITY

a. SENSITIVITY	(U)	- 98 dBm
b. CRITERIA	(U)	Minimum Detectable Signal
c. NOISE FIG	(U)	6 dB
d. NOISE TEMP	(U)	NA

18. DE-EMPHASIS
(U) [ ] a. YES [X] b. NO

19. IMAGE REJECTION
(U) 50 dB

20. SPURIOUS REJECTION
(U) 40 dB

21. REMARKS (U)

Item 7. Four selectable factory set frequencies as follows: 16.936 GHz; 16.974 GHZ; 17.012 GHz; 17.049 GHz. A single switch is used to set the transmitter and reciever RF processing paths (frequency).
Item 12a. Other 1st IF freq are: 892.5 MHz; 930 MHz; 967.5 MHz depending on selected center frequency of operation.

Item 15b. 2nd L.O. frequencies are: 795 MHz; 832.5 MHz; 870 MHz; 907.5 MHz depending on the selected operating frequency.

RECEIVER EQUIPMENT CHARACTERISTICS

1. NOMENCLATURE, MANUFACTURER'S MODEL NO.
(U) AN/PPS-5C (Modified) Receiver

2. MANUFACTURER'S NAME
(U) Systems & Electronics Inc.

3. RECEIVER INSTALLATION
(U) Transportable

4. RECEIVER TYPE
(U) Dual Conversion Superhetrodyne

5. TUNING RANGE
(U) 16.75 GHz - 17.25 GHz

6. METHOD OF TUNING
(U) Synthesizer

7. RF CHANNELING CAPABILITY
(U) Fixed, See Remarks

8. EMISSION DESIGNATORS
(U) 12M2P0N 11M5Q3N

9. FREQUENCY TOLERANCE
(U) 600 ppm

11. RF SELECTIVITY
[ ] CALCULATED [X] MEASURED

10. IF SELECTIVITY	1st (U)	2nd (U)	3rd (U)
a. -3 dB	45 MHz	10 MHz	NA
b. -20 dB	54 MHz	14.5 MHz	NA
c. -60 dB	99 MHz	41 MHz	NA

a. -3 dB	(U)	500 MHz
b. -20 dB	(U)	1500 MHz
c. -60 dB	(U)	3600 MHz
d. Preselection Type	(U)	Bandpass filter

12. IF FREQUENCY
a. 1st (U) 847.5 MHz
b. 2nd (U) 60 MHz
c. 3rd (U) NA

13. MAXIMUM POST DETECTION FREQUENCY
(U) 10 MHz

14. MINIMUM POST DETECTION FREQUENCY
(U) NA

16. MAXIMUM BIT RATE
(U) NA

15. OSCILLATOR TUNED	1st (U)	2nd (U)	3rd (U)
a. ABOVE TUNED FREQUENCY			
b. BELOW TUNED FREQUENCY	X	X	
c. EITHER ABOVE OR BELOW THE FREQUENCY			

17. SENSITIVITY

a. SENSITIVITY	(U)	- 98 dBm
b. CRITERIA	(U)	Minimum Detectable Signal
c. NOISE FIG	(U)	5 dB
d. NOISE TEMP	(U)	NA

18. DE-EMPHASIS
(U) [ ] a. YES [X] b. NO

19. IMAGE REJECTION
(U) 50 dB

20. SPURIOUS REJECTION
(U) 40 dB

21. REMARKS (U)

Item 7. Four selectable factory set frequencies as follows: 16.936 GHz; 16.974 GHZ; 17.012 GHz; 17.049 GHz. A single switch is used to set the transmitter and reciever RF processing paths (frequency).
Item 12a. Other 1st IF frequencies are: 885.5 MHz; 922.5 MHz; 960.5 MHz depending on selected center frequency of operation.

Item 15b. 2nd L.O. frequencies are: 787.5 MHz; 825.0 MHz; 862.5 MHz; 900.0 MHz depending on the selected operating frequency.

ANTENNA EQUIPMENT CHARACTERISTICS

1. (U) [ ] a. TRANSMITTING [ ] b. RECEIVING [X] c. TRANSMITTING AND RECEIVING

2. NOMENCLATURE, MANUFACTURER'S MODEL NO.
(U) AN/PPS-5C, AN/PPS-5C (Modified) Ant

3. MANUFACTURER'S NAME
(U) Systems & Electronics Inc.

4. FREQUENCY RANGE
(U) 16.75 GHz - 17.25 GHz

5. TYPE (U) Parabolic Reflector

6. POLARIZATION
(U) Circular or Linear

7. SCAN CHARACTERISTICS
a. TYPE (U) HORIZONTAL SECTOR SCAN
b. VERTICAL SCAN (U) NA
(1) Max Elev (U) +18 deg
(2) Min Elev (U) -18 deg
(3) Scan Rate (U) NA
c. HORIZONTAL SCAN (U) SECTOR
(1) Sector Scanned (U) +/- 6 to +/- 170 degrees
(2) Scan Rate (U) 9 ,18, 45 degrees per sec
d. SECTOR BLANKING (U) [ ] (1) YES [X] (2) NO

8. GAIN
a. MAIN BEAM
(U) 36 dBi
b. 1st MAJOR SIDE LOBE
(U) 10 dBi @ 6 deg

9. BEAMWIDTH
a. HORIZONTAL
(U) 2.4 deg
b. VERTICAL
(U) 3 deg

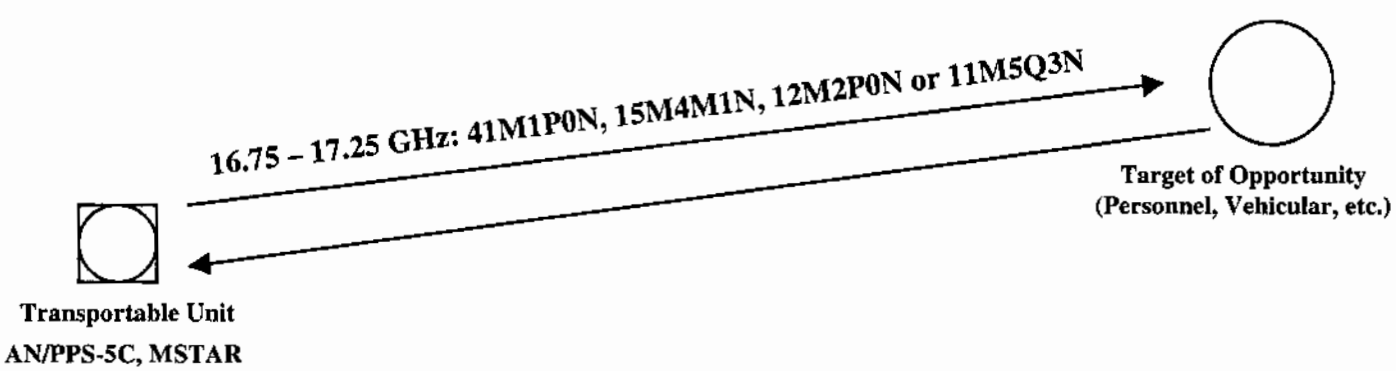
10. REMARKS (U)

Item 5. Antenna dimensions are 620 mm by 426 mm.

Item 7d. Two sectors may be programmed for search of specific areas but only one sector search is active at a given time. The radar may search 360 degrees as well. The radar may also be programmed to go active at specific times.

GENERAL CONTINUATION PAGE (LINE DIAGRAM)

AN/PPS-5C, Man-portable Surveillance and Target Radar (MSTAR)



APPLICATION FOR SPECTRUM REVIEW	CLASSIFICATION UNCLASSIFIED	PAGE 10

NTIA GENERAL INFORMATION

1. **APPLICATION TITLE** (U) AN/PPS-5C Radar Set

2. **SYSTEM NOMENCLATURE** (U) AN/PPS-5C Radar Set, Man-portable Surveillance and Target Acquisition Radar (MSTAR)

3. **STAGE OF ALLOCATION** (U) [ ] a. STAGE 1 CONCEPTUAL [ ] b. STAGE 2 EXPERIMENTAL [ ] c. STAGE 3 DEVELOPMENTAL [X] d. STAGE 4 OPERATIONAL

4. **FREQUENCY REQUIREMENTS**
   a. **FREQUENCY(IES)** (U) 16.75 GHz - 17.25 GHz
   b. **EMISSION DESIGNATORS** (U) 41M1P0N 15M4M1N 12M2P0N 11M5Q3N

5. **PURPOSE OF SYSTEM, OPERATIONAL AND SYSTEM CONCEPTS** **(WARTIME USE)** [X] a. YES [ ] b. NO
   (U) Self contained battlefield surveillance radar system for detection of moving targets. It may be used for the directing and correcting of friendly artillery fire. This system may be used in an attended or unattended operational modes.

6. **INFORMATION TRANSFER REQUIREMENTS** (U) Unmodulated and Non-linear FM Chirp Radar Pulses

7. **ESTIMATED INITIAL COST OF THE SYSTEM** (U) $250,000

8. **TARGET DATE FOR**

a. APPLICATION APPROVAL	b. SYSTEM ACTIVATION	c. SYSTEM TERMINATION
(U) 05-30-2004	(U) 06-01-2004	(U) NAvail

9. **SYSTEM RELATIONSHIP AND ESSENTIALITY** (U) System detects and locates moving targets. Essential to national security through protection of high value resources. It may also be used to observe the fall of artillery rounds.

10. **REPLACEMENT INFORMATION** (U) NA

11. **RELATED ANALYSIS AND/OR TEST DATA** (U) NA

12. **NUMBER OF MOBILE UNITS** (U) NA

13. **GEOGRAPHICAL AREA FOR**
    a. **STAGE 2** (U) NA
    b. **STAGE 3** (U) NA
    c. **STAGE 4** (U) US&P and Worldwide

14. **LINE DIAGRAM** (U) **See Page(s)** 9

15. **SPACE SYSTEMS** (U) **See Page(s)** NA

16. **TYPE OF SERVICE(S) FOR STAGE 4**
    (U) Radiolocation

17. **STATION CLASS(ES) FOR STAGE 4**
    (U) LR

18. **REMARKS** (U)

DOWNGRADING INSTRUCTIONS

J/F 12/07792/2

CLASSIFICATION
UNCLASSIFIED