

TECHNICAL MANUAL

GENERAL SUPPORT AND DEPOT MAINTENANCE MANUAL

(INCLUDING REPAIR PARTS AND SPECIAL TOOLS LIST)

FOR

TEST SET, RADIO AN/USM - 306(V)1

FSN 6625- 459 - 8568

**This copy is a reprint which includes current pages from
Changes 1 and 2.**



**GENERAL SUPPORT AND DEPOT MAINTENANCE MANUAL
INCLUDING REPAIR PARTS AND SPECIAL TOOLS LIST
FOR
TEST SET, RADIO AN/USM-306(V)1
FSN 6625-459-8568**

Current as of 7 December 1973

		Paragraph	Page
CHAPTER	1. FUNCTIONING		
Section	I. General	1-1 - 1-5	1-1
	II. Functioning of Tuning Unit TN-527/U.....	1-6 - 1-53	1-2
	III. Functioning of Monitor	1-54 - 1-97	1-43
	IV. Functioning of-Spectrum Analyzer	1-98 - 1-146	1-79
CHAPTER	2. TROUBLESHOOTING		
Section	I. General Troubleshooting Techniques	2-1 - 2-3	2-1
	II. Interunit Troubleshooting	2-4 - 2-7	2-4
	III. Tuning Unit Troubleshooting, Localization Procedures	2-8 - 2-12	2-6
	IV. Tuning Unit TN-527/U, Bench Troubleshooting	2-13 - 2-23	2-17
	V. Monitor Unit Troubleshooting, Localization Procedures	2-24 - 2-28	2-83
	VI. Audio-Radio Frequency Monitor TS-2968/U, Bench Troubleshooting	2-29 - 2-36	2-92
	VII. Spectrum Analyzer Troubleshooting. Localization Procedures	2-37 - 2-41	2-133
	VIII. Spectrum Analyzer IP-1018/U, Bench Troubleshooting	2-42 - 2-51	2-142
	IX. Probe Subassembly MX-8642/U	2-52 - 2-56	2-186
CHAPTER	3. REPAIRS AND ALIGNMENT		
Section	I. Repairs	3-1 - 3-8	3-1
	II. Alignment	3-9 - 3-16	3-17*
CHAPTER	4. GENERAL SUPPORT TESTING PROCEDURES	4-1 - 4-12	4-1
CHAPTER	5. DEPOT MAINTENANCE	5-1 - 5-5	5-1
	6. DEPOT OVERHAUL STANDARD.....	6-1 - 6-4	6-1
APPENDIX	A. REFERENCES		A-1
	B. REPAIR PARTS LIST		B-1
Section	I. Introduction		B-1
	II. GENERAL SUPPORT, DIRECT SUPPORT, AND MAINTENANCE REPAIR PARTS AND SPECIAL TOOLS LIST		B-5
	SPECIAL TOOLS, TEST AND SUPPORT EQUIPMENT FOR DIRECT SUPPORT, GENERAL SUPPORT AND DEPOT MAINTENANCE (NOT APPLICABLE)		
	III. INDEX-FEDERAL STOCK NUMBER AND REFERENCE NUMBER CROSS-REFERENCE TO FIGURE AND ITEM NUMBER OR REFERENCE DESIGNATION.....		B-118
	IV. INDEX REFERENCE DESIGNATION CROSS-REFERENCE TO PAGE NUMBER		B-102
INDEX		Index 1

LIST OF ILLUSTRATION

<i>Number</i>	<i>Title</i>	<i>Page</i>
1-1	Test Set, Radio AN/USM-306(V)1	1-0
1-2	Typical 120 kHz display, spectrum analyzer.....	1-1
1-3	Typical 12-kHz display, spectrum analyzer	1-1
1-4	Typical 3.6-kHz display, spectrum analyzer	1-2
1-5	Block diagram, Tuning Unit TN-527/U.....	1-3
1-6	Block diagram, power supply section.....	1-4
1-7	Block diagram, frequency synthesizer	1-5
1-8	Block diagram, coarse tuning section	1-6
1-9	Block diagram, fine tuning section	1-7
1-10	Block diagram, frequency counter and display	1-8
1-11	Ac power supply	1-10
1-12	1-MHz clock circuit	1-11
1-13	A1 input	1-12
1-14	A1 regulator	1-12
1-15	A2 input.....	1-13
1-16	A2 regulator.....	1-14
1-17	A3 -16V bridge and input.....	1-14
1-18	A3 -16V regulator.....	1-15
1-19	A3 -6V bridge and input.....	1-15
1-20	A3 -6V regulator	1-16
1-21	1 MHz amplifier.....	1-16
1-22	Decade divider, power supply low pass filter, and 19.0 MHz oscillator input buffer.....	1-17
1-23	19.1 MHz oscillator input buffer.....	1-18
1-24	Control logic input buffer.....	1-18
1-25	Coarse tuning mixer input buffer	1-19
1-26	19.0/19.1 MHz oscillator input buffer and rectifier stage	1-20
1-27	19.0/19.1 MHz oscillator dc amplifier stage	1-21
1-28	19.0/19.1 MHz oscillator	1-22
1-29	Coarse tuning oscillator	1-23
1-30	Coarse tuning oscillator output amplifier number 1	1-23
1-31	Coarse tuning oscillator output amplifier number 2	1-24
1-32	Coarse tuning output to J9	1-25
1-33	Coarse tuning output to J7	1-25
1-34	Coarse tuning output to display logic	1-26
1-35	Mixer input amplifier	1-26
1-36	Coarse tuning mixer	1-27
1-37	Mixer output amplifier.....	1-28
1-38	Mixer output rectifier-amplifier	1-28
1-39	Coarse lock detector	1-29
1-40	Coarse lock sensor	1-30
1-41	Fine tuning oscillator	1-30
1-42	Fine tuning oscillator intermediate amplifier	1-31
1-43	Fine tuning oscillator output amplifiers	1-31
1-44	Mixer output amplifier (second amplifier).....	1-32
1-45	Phase discriminator.....	1-33
1-46	Fine lock detector	1-34
1-47	Fine lock sensor	1-34
1-48	Mole switch	1-35
1-49	18.785 to 18.885 MHz oscillator	1-36
1-50	18.785 to 18.885 MHz oscillator output amplifier	1-37
1-51	111.785 to 18.885 MHz oscillator output buffers.....	1-38
1-52	Fine tuning reference mixer	1-38
1-53	Fine tuning reference mixer 19.1 MHz input amplifier	1-39
1-54	Fine tuning reference mixer 18.785 to 18.885 MHz input amplifier.....	1-40
1-55	Centenary divider A20 input	1-40
1-56	Control logic de divider	1-40
1-57	Mode decade amplifier	1-41
1-58	Decade divider amplifiers	1-41
1-59	Decade divider display lamp drivers	1-42
1-60	Block diagram, power supply	1-44
1-61	Block diagram, attenuators, modulators, and IF stages, Monitor Unit TS-2968/U	1-45
1-62	Block diagram, bandpass filters, metering, and audio stages, Monitor Unit TS-2968/U.....	1-45

LIST OF ILLUSTRATIONS-Continued

<i>Number</i>	<i>Title</i>	<i>Page</i>
1-63	Block diagram, input section	1-46
1-64	Block diagram, 1st modulator and 40.05 MHz IF	1-47
1-65	Block diagram, 2nd modulator, mixer and 21.05 MHz IF	1-48
1-66	Block diagram, 3rd modulator, mixer and 2.215 MHz IF	1-49
1-67	Block diagram, selectivity filters	1-49
1-68	Block diagram, metering and audio detector	1-50
1-69	Ac power supply input stage	1-50
1-70	Ac power supply rectifier stage	1-51
1-71	Power supply regulator	1-52
1-72	Impedance matching pad	1-52
1-73	Low pass filter	1-53
1-74	First modulator	1-53
1-75	First modulator IF strip	1-54
1-76	First modulator output amplifier	1-54
1-77	40.1 to 73.6 MHz amplifier input, stage	1-55
1-78	40.1 to 73.6 MHz amplifier output stage	1-56
1-79	40.1 to 73.6 MHz amplifier feedback stage	1-57
1-80	19.0 MHz amplifier input stage	1-58
1-81	19.0 MHz amplifier mixer stage	1-59
1-82	Second modulator output amplifier	1-60
1-83	Second modulator and IF strip	1-61
1-84	Second modulator output followers	1-62
1-85	1 MHz gain reference oscillator	1-63
1-86	18.785 to 18.885 MHz amplifier input stage	1-64
1-87	18.785 to 18.885 MHz amplifier mixer stage	1-65
1-88	Third modulator input stage	1-66
1-89	Third modulator output amplifiers	1-67
1-90	Bandpass filters	1-67
1-91	Narrow and wide-band pass followers	1-68
1-92	Bandpass selection relays and audio preamplifier	1-69
1-93	Meter amplifier input stage	1-70
1-94	Meter amplifier intermediate stage	1-71
1-95	Meter amplifier output stage	1-72
1-96	Meter detector circuit	1-73
1-97	Meter compensation	1-73
1-98	Upper sideband-oscillator and amplifier	1-74
1-99	Lower sideband oscillator and amplifier	1-74
1-100	AUDIOMODE switch	1-75
1-101	Audio amplifier input stage	1-76
1-102	Audio amplifier intermediate stage	1-77
1-103	Audio power amplifier	1-78
1-104	Block diagram, sweep and marker section, Spectrum Analyzer IP-1018/U.....	1-79
1-105	Block diagram, sweep, vertical, high voltage, and display sections, Spectrum Analyzer IP-1018/U.....	1-80
1-106	Block diagram, power supply	1-81
1-107	Block diagram, 21.0 - 21.1 MHz input attenuator and amplifier	1-81
1-108	Block diagram, VFO amps, marker mixer and IF	1-82
1-109	Block diagram, swept IF and 1.215 MHz mixer	1-84
1-110	Block diagram, 1.215 MHz IF, detector and deflection circuits	1-86
1-111	Ac power supply and rectifier	1-87
1-112	Power supply input stage	1-87
1-113	Power supply regulator	1-88
1-114	Input attenuation	1-89
1-115	MARKER IDENT and 0 db CAL SWEEP NORM controls	1-89
1-116	12.035 MHz oscillator	1-90
1-117	SWEEP-kHz/DIV. SINGLE SWEEP, and FAST NORM switches	1-91
1-118	VFO amplifier, 18.785 to 18.885 MHz to swept IF stage	1-92
1-119	VFO amplifier, 18.785 to 18.885 MHz to marker IF stage	1-93
1-120	Input signal amplifier, input stage	1-93
1-121	Input signal amplifier, bandpass filter stage	1-94
1-122	Input signal amplifier, output stage	1-94
1-123	Marker IF, 2.215 MHz oscillator stage	1-95

LIST OF ILLUSTRATIONS-Continued

<i>Number</i>	<i>Title</i>	<i>Page</i>
1-124	Marker IF, mixer stage	1-96
1-125	Marker IF, bandpass filter and output stage	1-96
1-126	Swift IF, input-amplifier stage	1-97
1-127	Swept IF, bandpass filter stage	1-97
1-128	Swept IF, output stage	1-98
1-129	1.215 MHz mixer	1-99
1-130	Swept divider input stage	1-99
1-131	Swept divider 10 kHz/division output amplifier	1-100
1-132	Swept divider 1 and .3 kHz/division divider and output amplifier.....	1-101
1-133	440 Hz input amplifier and filter	1-101
1-134	440 Hz bandpass filter output stage	1-102
1-135	Bandwidth selection relay	1-102
1-136	35 Hz input amplifier and bandpass filter	1-103
1-137	35 Hz bandpass filter output stage	1-103
1-138	VCXO output amplifier	1-104
1-139	VCXO	1-104
1-140	1.215 MHz amplifier, input stage	1-105
1-141	Second 1.215 MHz amplifier	1-105
1-142	Third 1.215 MHz amplifier.....	1-105
1-143	Fourth 1.215 MHz amplifier	1-106
1-144	1.215 MHz amplifier, output stage	1-106
1-145	High voltage power supply, input stage	1-106
1-146	High voltage power supply rectifiers and filters	1-107
1-147	Horizontal sweep generator, output stage	1-107
1-148	Horizontal sweep trigger circuit and VCXO sweep amplifier	1-108
1-149	Horizontal sweep generator output	1-109
1-150	Vertical amplifier and log converter, input stage	1-109
1-151	Log converter.....	1-110
1-152	Vertical output amplifier	1-111
1-153	Horizontal sweep amplifier	1-111
1-154	CRT circuitry	1-112
2-1	Tuning Unit TN-527/U, front panel view	2-7
2-2	Tuning Unit TN-527/U, rear panel view.....	2-8
2-3	Tuning Unit TN-527/U, top view.....	2-9
2-4	Tuning Unit TN-527/U, bottom view.....	2-10
2-5	Tuning Unit TN-527/U, operational troubleshooting test setup	2-11
2-6	Power supply A1, Tuning Unit TN-527/U.....	2-20
2-7	Power supply A1, schematic diagram, Tuning Unit TN-527/U	2-21
2-8	Power supply A2, Tuning Unit TN-527/U.....	2-22
2-9	Power supply A2, schematic diagram, Tuning Unit TN-527/U.....	2-23
2-10 (1)	Power supply A3, Tuning Unit TN-527/U (sheet 1 of 2)	2-24
2-10 (2)	Power supply A3, Tuning Unit TN-527/U (sheet 2 of 2)	2-24
2-11	Power supply A3, schematic diagram, Tuning Unit TN-527/U.....	2-26
2-12 (1)	Decade divider and spectrum generator A4, Tuning Unit TN-527/U (sheet 1 of 2)	2-27
2-12 (2)	Decade divider and spectrum generator A4, Tuning Unit TN-527/U (sheet 2 of 2)	2-28
2-13	Decade divider and spectrum generator A4, schematic diagram Tuning Unit TN-527/U	2-29
2-14 (1)	19.1 MHz oscillator A5, Tuning Unit TN-527/U (sheet 1 of 2)	2-30
2-14 (2)	19.1 MHz oscillator A5, Tuning Unit TN-527/U (sheet 2 of 2)	2-31
2-15 (1)	19.1 MHz oscillator A5, schematic diagram, Tuning Unit TN-527/U (sheet 1 of 2)	2-32
2-15 (2)	19.1 MHz oscillator A5, schematic diagram, Tuning Unit TN-527/U (sheet 2 of 2).....	2-33
2-16 (1)	19.0 MHz oscillator A6, Tuning Unit TN-527/U (sheet 1 of 2).....	2-34
2-16 (2)	19.0 MHz oscillator A6, Tuning Unit TN-527/U (sheet 2 of 2).....	2-35
2-17 (1)	19.0 MHz oscillator A6, schematic diagram, Tuning Unit TN-527/U (sheet 1 of 2)	2-36
2-17 (2)	19.0 MHz oscillator A6, schematic diagram, Tuning Unit TN-527/U (sheet 2 of 2)	2-37
2-18	Coarse tuning oscillator, Tuning Unit TN-527/U.....	2-38
2-19	Coarse tuning oscillator A7, schematic diagram, Tuning Unit TN-527/U.....	2-39
2-20 (1)	Coarse tuning amp, and output A8, Tuning Unit TN-527/U (sheet 1 of 2)	2-40
2-20 (2)	Coarse tuning amp, and output A8, Tuning Unit TN-527/U (sheet 2 of 2)	2-41
2-21	Coarse tuning amp, and output A8, schematic diagram, Tuning Unit TN-527/U	2-42
2-22	Mixer A9, Tuning Unit TN-527/U	2-43
2-23	Mixer A9, schematic diagram, Tuning Unit TN-527/U.....	2-44

<i>Number</i>	<i>Title</i>	<i>Page</i>
2-24	Amplifier-detector A10, Tuning Unit TN-527/U	2-45
2-25	Amplifier-detector A10, schematic diagram, Tuning Unit TN-527/U.....	2-46
2-26	Coarse lock sensor A11, Tuning Unit TN-527/U	2-47
2-27	Coarse lock sensor A11, schematic diagram Tuning Unit TN-527/U	2-48
2-28	Fine tuning oscillator A12, Tuning Unit TN-527/U.....	2-49
2-29	Fine tuning oscillator A12, schematic diagram, Tuning Unit TN-527/U	2-50
2-30	2nd amp. and phase discriminator A-13, Tuning Unit TN-527/U	2-51
2-31	2nd amp. and phase discriminator A13, schematic diagram, Tuning Unit TN-527/U.....	2-52
2-32	Fine lock sensor A14, Tuning Unit TN-527/U.....	2-53
2-33	Fine lock sensor A14, schematic diagram, Tuning Unit TN-527/U	2-54
2-34 (1)	2nd oscillator A15, Tuning Unit TN-527/U (sheet 1 of 2)	2-55
2-34 (2)	2nd oscillator A15, Tuning Unit TN-527/U (sheet 2 of 2)	2-56
2-35	2nd oscillator A15, schematic diagram, Tuning Unit TN-527 /U	2-57
2-36	Reference mixer A16, Tuning Unit TN-527/U	2-58
2-37	Reference mixer A16, schematic diagram, Tuning Unit TN-527/U	2-59
2-38	40-73 MHz centenary divider A20, Tuning Unit TN-527/U	2-60
2-39	40-73 MHz centenary divider A20, schematic diagram, Tuning Unit TN-527/U.....	2-61
2-40	Control logic # 2 A22, Tuning Unit TN-527/U.....	2-62
2-41	Control logic # 2 A22, schematic diagram, Tuning Unit TN-527/U	2-63
2-42	Control logic # 1 A23, Tuning Unit TN-527/U.....	2-64
2-43	Control logic # 1 A23, schematic diagram, Tuning Unit TN-527/U.....	2-65
2-44	Mode decade A24, Tuning Unit TN-527/U.....	2-66
2-45	Mode decade A24, schematic diagram, Tuning Unit TN-527/U	2-67
2-46	Decade divider A25, Tuning Unit TN-527/U (7 identical units)	2-68
2-47	Decade divider A25, schematic diagram, Tuning Unit TN-527/U (7 identical units)	2-69
2-48 (1)	Counter waveforms, Tuning Unit TN-527/U (sheet 1 of 3).....	2-76
2-48 (2)	Counter waveforms, Tuning Unit TN-527/U (sheet 2 of 3)	2-77
2-48 (3)	Counter waveforms, Tuning Unit TN-527/U (sheet 3 of 3)	2-78
2-49	Decade divider A4 output waveform, Tuning Unit TN-527/U.....	2-80
2-50	Spectrum generator A4 output waveform, Tuning Unit TN-527/U.....	2-80
2-51	Mixer A9 first stage waveform, Tuning Unit TN-527/U	2-80
2-52	Mixer A9 output waveform, Tuning Unit TN-527/U.....	2-80
2-53	Amplifier-detector A10 output waveform, Tuning Unit TN-527/U	2-81
2-54	Reference mixer A16 first stage waveform, Tuning Unit TN-527/U	2-81
2-55	Reference mixer A16 output waveform, Tuning Unit TN-527/U	2-81
2-56	2nd amplifier and phase discriminator A13 waveform, Tuning Unit TN-527/U	2-81
2-57	2nd amplifier and phase discriminator A13 output waveform, Tuning Unit TN-527/U.....	2-82
2-58	Audio-Radio Frequency Monitor TS-2968/U, front panel view	2-84
2-59	Audio-Radio Frequency Monitor TS-2968/U, rear panel view	2-85
2-60	Audio-Radio Frequency Monitor TS-2968/U, top view	2-86
2-61	Audio-Radio Frequency Monitor TS-2968/U, bottom view.....	2-87
2-62	Audio-Radio Frequency Monitor TS-2968/U, operational troubleshooting test setup	2-88
2-63	Gain reference oscillator and third modulator A1, Audio-Radio Frequency Monitor TS-2968/U.....	2-96
2-64 (1)	Gain reference oscillator and third modulator A1, schematic diagram, Audio-Radio Frequency Monitor TS-2968/U (sheet 1 of 2)	2-97
2-64 (2)	Gain reference oscillator and third modulator A11, schematic diagram, Audio-Radio Frequency Monitor TS-2968/U (sheet 2 of 2)	2-98
2-65	First modulator and IF A2, Audio-Radio Frequency Monitor TS-2968/U	2-99
2-66	First modulator and IF A2, schematic diagram, Audio-Radio Frequency Monitor TS-2968/U	2-100
2-67	Local oscillator amp. A3, Audio-Radio Frequency Monitor TS-2968/U	2-101
2-68	Local oscillator amp. A3, schematic diagram, Audio-Radio Frequency Monitor TS-2968/U.....	2-102
2-69	Second modulator and IF amp. A4, Audio-Radio Frequency Monitor TS-2968/U	2-103
2-70 (1)	Second modulator and IF output amp. A4, schematic diagram, Audio-Radio Frequency Monitor TS-2968/U (sheet 1 of 2)	2-104
2-70 (2)	Second modulator and IF output amp. A4, schematic diagram, Audio-Radio Frequency Monitor TS-2968/U (sheet 2 of 2)	2-105

<i>Number</i>	<i>Title</i>	<i>Page</i>
2-71	Second mixer and IF A5, Audio-Radio Frequency Monitor TS-2968/U	2-106
2-72	Second mixer and IF A5, schematic diagram, Audio-Radio Frequency Monitor TS-2968/U	2-107
2-73	Third mixer and IF A6, Audio-Radio Frequency Monitor TS-2968/U.....	2-108
2-74	Third mixer and IF A6, schematic diagram, Audio-Radio Frequency Monitor TS-2908/U.....	2-109
2-75	NB and WB followers A7, Audio-Radio Frequency Monitor TS-2968/U	2-110
2-76	NB and WB followers A7, schematic diagram, Audio-Radio Frequency Monitor TS-2968/U.....	2-111
2-77	Meter amplifier A8, Audio-Radio Frequency Monitor TS-2968/U.....	2-112
2-78	Meter amplifier A8, schematic diagram, Audio-Radio Frequency Monitor TS-2968/U.....	2-113
2-79	Meter circuit A9, Audio-Radio Frequency Monitor TS-2968/U.....	2-114
2-80	Meter circuit A9, schematic diagram, Audio-Radio Frequency Monitor TS-2968/U.....	2-115
2-81	Sideband oscillator A10, Audio-Radio Frequency Monitor TS-2968/U	2-116
2-82	Sideband oscillator A10, schematic diagram, Audio-Radio Frequency Monitor TS-2968/U.....	2-117
2-83 (1)	Audio amplifier A11, Audio-Radio Frequency Monitor TS-2968/U (sheet 1 of 2)	2-118
2-83 (2)	Audio amplifier A11, Audio-Radio Frequency Monitor TS-2968/U (Sheet 2 of 2).....	2-119
2-84 (1)	Audio amplifier A11, schematic diagram, Audio-Radio Frequency Monitor TS-2968/U (sheet 1 of 2).....	2-120
2-84 (2)	Audio amplifier A11, schematic diagram, Audio-Frequency Monitor TS-2968/U (sheet 2 of 2).....	2-121
2-85	-16V de power supply A 12, Audio-Radio Frequency Monitor TS-2968/U.....	2-122
2-86	-16V de power supply A 12, schematic diagram, Audio-Radio Frequency Monitor TS-2968/U.....	2-123
2-87	Impedance-matching pad A13, Audio-Radio Frequency Monitor TS-2968/U	2-124
2-88	Impedance-matching pad A13, schematic diagram, Audio-Radio Frequency Monitor TS-2968/U.....	2-124
2-89	Low-pass filter A14, Audio-Radio Frequency Monitor TS-2968/U	2-125
2-90	Low-pass filter A14, schematic diagram, Audio-Radio Frequency Monitor TS-2968/U.....	2-126
2-91	Meter compensation A15, Audio-Radio Frequency Monitor TS-2968/U.....	2-127
2-92	Meter compensation A 15, schematic, Audio-Radio Frequency Monitor TS-2968/U.....	2-128
2-93	Gain reference oscillator AI output waveform, Audio-Radio Frequency Monitor TS-2968/U.....	2-132
2-94	Spectrum Analyzer IP-1018/U, front panel view.....	2-134
2-95	Spectrum Analyzer IP-1018/U, rear panel view	2-135
2-96	Spectrum Analyzer IP-1018/U, top view.....	2-136
2-97	Spectrum Analyzer IP-1018/U, bottom view.....	2-137
2-98	Spectrum Analyzer IP-1018/U, operational troubleshooting test setup	2-138
2-99	Input attenuator A1, Spectrum Analyzer IP-1018/U.....	2-145
2-100	Input attenuator A1, schematic diagram, Spectrum Analyzer IP-1018/U	2-146
2-101	VFO amplifier A2, Spectrum Analyzer IP-1018/U.....	2-147
2-102	VFO amplifier A2, schematic diagram, Spectrum Analyzer IP- 018/U	2-148
2-103	Low voltage power supply A3, Spectrum Analyzer IP-1018/U	2-149
2-104	Low voltage power supply A3, schematic diagram, Spectrum Analyzer IP-1018/U	2-150
2-105	Signal IF A4, Spectrum Analyzer IP-1018/U.....	2-151
2-106	Signal IF A4, schematic diagram, Spectrum Analyzer IP-1018/U	2-152
2-107	Marker IF A5, Spectrum Analyzer IP-1018/U.....	2-153
2-108	Marker IF A5, schematic diagram, Spectrum Analyzer IP-1018/U	2-154
2-109	Swept IF A6, Spectrum Analyzer IP-1018/U.....	2-155
2-110	Swept IF A6, schematic diagram, Spectrum Analyzers IP- 1018/U	2-156
2-111	1.215 MHz A7, Spectrum Analyzer IP-1018/U.....	2-157
2-112	1.215 MHz A7, schematic diagram, Spectrum Analyzer IP-1018/U	2-158
2-113	Swept divider A8, Spectrum Analyzer IP-1018/U.....	2-159
2-114	Swept divider A8, schematic diagram, Spectrum Analyzer, IP- 1018/U	2-160
2-115	440 Hz BW IF A9, Spectrum Analyzer IP-1018/U	2-161
2-116	440 Hz BW IF A9, schematic diagram, Spectrum Analyzer IP-1018/ U.....	2-162

Number	Title	Page
2-117	35 Hz BW IF A10, Spectrum Analyzer IP-1018/U	2-163
2-118	35 Hz BW IF A10, schematic diagram, Spectrum Analyzer IP-1018/U	2-164
2-119	Voltage-controlled crystal oscillator (VCXO) A11, Spectrum Analyzer IP-1018/U.....	2-165
2-120	Voltage-controlled crystal oscillator (VCXO) A11, schematic diagram, Spectrum Analyzer IP-1018/U.....	2-166
2-121	1.215 MHz IF A12, Spectrum Analyzer IP-1018/U.....	2-167
2-122	1.215 MHz IF A 12, schematic diagram, Spectrum Analyzer IP-1018 /U	2-168
2-123	High-voltage power supply A13, Spectrum Analyzer IP-1018/U.....	2-169
2-124	High-voltage power supply A13, schematic diagram, Spectrum Analyzer IP-1018/U	2-170
2-125	Horizontal sweep generator A14, Spectrum Analyzer IP-1018/U	2-171
2-126	Horizontal sweep generator A14, schematic diagram, Spectrum Analyzer IP-1018/U	2-172
2-127	Vertical amplifier A15, Spectrum Analyzer IP-1018/U	2-173
2-128	Vertical amplifier A15, schematic diagram, Spectrum Analyzer IP-1018/U	2-174
2-129	Horizontal amplifier A16, Spectrum Analyzer IP-1018/U.....	2-175
2-130	Horizontal amplifier A16, schematic diagram, Spectrum Analyzer IP-1018/U	2-176
2-131	Swept output A14 waveform, Spectrum Analyzer IP-1018/U.....	2-182
2-132	Swept divider A8 Q2 input waveform, Spectrum Analyzer IP-1018/U	2-182
2-133	Swept divider A8 output waveform Spectrum Analyzer IP-1018 /U	2-182
2-134	Swept IF A6 1 kHz/DIV sweep waveform, Spectrum Analyzer IP-1018/U	2-182
2-135	Swept IF A6 10 kHz/DIV sweep waveform, Spectrum Analyzer IP-1018/U.....	2-183
2-136	Marker IF A5 input waveform, Spectrum Analyzer IP-1018/U	2-183
2-137	Marker IF A5 Q4 output waveform, Spectrum Analyzer IP-1018 /U	2-183
2-138	1.215 MHz IF A12 output waveform, Spectrum Analyzer IP-1018/U	2-183
2-139	Vertical amplifier A15 waveform, Spectrum Analyzer IP-1018/U.....	2-184
2-140	Probe Subassembly MX-8642/U, components location	2-188
2-141	Probe Subassembly MX-8642/U, schematic diagram	2-189
3-1	High voltage power supply A 13, wiring diagram, Spectrum Analyzer IP-1018/U	3-2
3-2	Power transformer T1, wiring diagram, Tuning Unit TN-527/U	3-3
3-3	Power transformer T2, wiring diagram, Tuning Unit TN-527/U	3-4
3-4	Power transformer T1, wiring diagram, Audio-Radio Frequency Monitor TS-2968/U.....	3-5
3-5	Power transformer T1, wiring diagram, Spectrum Analyzer IP-1018 /U	3-6
3-6 (1)	Coarse tuning drive assembly, exploded view (sheet 1 of 2)	3-8
3-6 (2)	Coarse tuning drive assembly, exploded view (sheet 2 of 2)	3-9
3-7 (1)	Fine tuning drive assembly, exploded view (sheet 1 of 2)	3-13
3-7 (2)	Fine tuning drive assembly, exploded view (sheet 2 of 2)	3-14
3-8	50- to 75-ohm matching pad, local fabrication details	3-18
3-9 (1)	Alignment waveforms, tuning unit (sheet 1 of 2)	3-21
3-9 (2)	Alignment waveforms, tuning unit (sheet 2 of 2)	3-22
3-10	2nd Mixer and IF Bandpass Characteristics, Monitor, Audio-Radio Frequency TS-2968/U.....	3-25
3-11	Swept divider A8, Q2 input waveform, Spectrum Analyzer IP-1018 /U	3-31
4-1	50- to 75-ohm matching pad, local fabrication details	4-1
4-2	Interconnection diagram. Test Set, Radio AN/USM-306(V)1	4-2
4-3	Test Set. Radio AN/USM-306(V)1, rear interior view.....	4-3
4-4	Typical frequency display indications, tuning unit	4-5
4-5	Frequency synthesizer test setup Tuning Unit TN-527/U.....	4-7
4-6	Fine tuning test setup, Tuning Unit TN-527/U.....	4-9
4-7	Coarse tuning test setup, Tuning Unit TN-527/U.....	4-11
4-8	Monitor Unit TS-2968/U, test setup	4-13
4-9	Spectrum Analyzer IP-1018/U, test setup	4-16
4-10	Probe Subassembly MX-8642/U, test setup	4-23
5-1	Transistor basing diagrams	5-1
5-2	SENSITIVITY 1 dB/STEP switch S1, wiring diagram, Audio-Radio Frequency Monitor TS-2968/U.....	5-3
5-3	SENSITIVITY 10 dB/STEP switch S4, wiring diagram, Audio-Radio Frequency Monitor TS-2968/U.....	5-5
5-4	SENSITIVITY switch S3, wiring diagram Audio-Radio Frequency Monitor TS-2968/U.....	5-6
5-5	Attenuator S1, wiring diagram, Spectrum Analyzer IP-1018/U	5-7
5-6	Attenuator test setup (A1), Spectrum Analyzer IP-1018/U	5-7
5-7	SWEEP kHz/DIV switch S4, wiring diagram, Spectrum Analyzer IP-1018/U	5-8
6-1	Color code marking for MIL STD resistors inductors, and capacitors (combined with fig. 6-2).....	

<i>Number</i>	<i>Title</i>	<i>Page</i>
6-2	Color code marking for MIL STD resistors, inductors, and capacitors (combined with fig. 6-1)	
6-3	Functional block diagram, Test Set, Radio AN/USM-306(V)1	
6-4	Frequency synthesizer, schematic diagram, Tuning Unit TN-527/U.....	
6-5	Coarse tuning oscillator, schematic diagram, Tuning Unit TN-527/U	
6-6	Fine tuning oscillator, schematic diagram, Tuning Unit TN-527/U	
6-7	Control logic A22, schematic diagram, Tuning Unit TN-527/U	
6-8	Control logic A22, schematic diagram, Tuning Unit TN-5 27/U	
6-9	Gate counter logic diagram, Tuning Unit TN-527/U.....	
6-10	Centenary divider, schematic diagram, Tuning Unit TN-527/U.....	
6-11	Decade divider, schematic diagram, Tuning Unit TN-527/U.....	
6-12	Mode decade, schematic diagram, Tuning Unit TN-527/U	
6-13	Decade logic diagram, Tuning Unit TN-527/U	
6-14	Power supply, schematic diagram, Tuning Unit TN-527/U.....	
6-15	Power distribution diagram, Tuning Unit TN-527/U.....	
6-16 (1)	Schematic diagram, Monitor Audio-Radio Frequency TS-2968/U (sheet 1 of 3)	
6-16 (2)	Schematic diagram, Monitor, Audio-Radio Frequency TS-2968/U (sheet 2 of 3)	
6-16 (3)	Schematic diagram, Monitor, Audio-Radio Frequency TS-2968/U (sheet 3 of 3)	
6-17 (1)	Schematic diagram, Analyzer, Spectrum IP-1018/U (sheet 1 of 2)	
6-17 (2)	Schematic diagram, Analyzer, Spectrum IP-1018/U (sheet 2 of 2)	

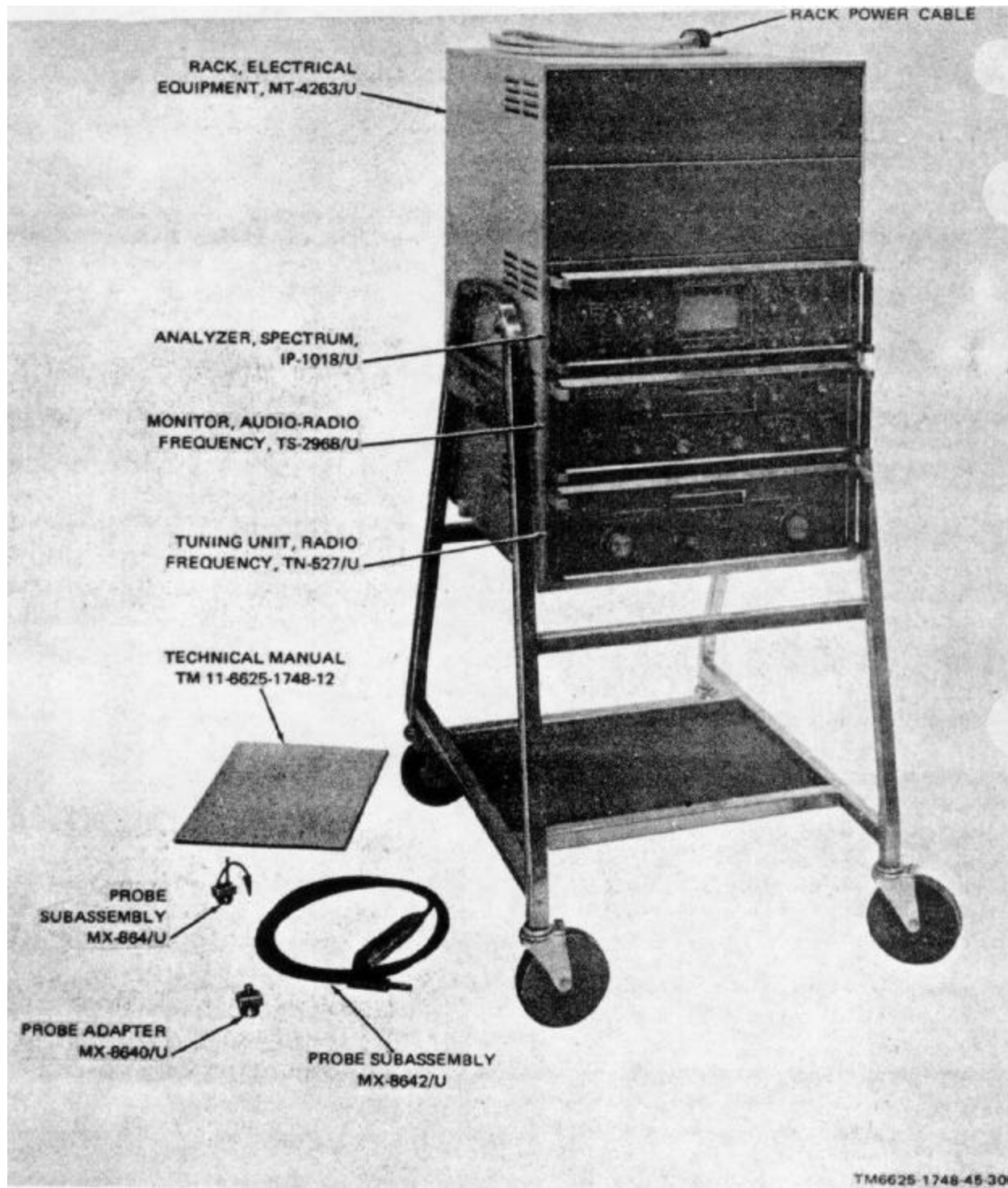


Figure 1-1. Test Set, Radio AN/USM-306(V)1.

CHAPTER 1

FUNCTIONING

Section I. GENERAL

1-1. Scope

a. This manual contains general support and depot maintenance instructions for Radio Set AN/USM-306(V)1. It includes instructions appropriate to general support and depot for troubleshooting, testing, aligning, and repairing the equipment. It also lists test equipment and ancillary items required for general support and depot maintenance. Functional analysis of the equipment is covered in this chapter.

b. The complete technical manual for this equipment includes TM 11-6625-1748-12.

c. The reporting of errors, omissions, and recommendations for improving this manual by the individual user is encouraged. Reports should be submitted on DA Form 2028 (Recommended Changes to Publications and Blank Forms) and forwarded direct to Commander, US Army Electronics Command, ATTN: AMSEL-MA-CE, Fort Monmouth, NJ 07703.

amplitude on the meter, while at the same time a 120 kHz, 12 kHz of 3.6 kHz segment of the frequency band under test is displayed on the spectrum analyzer unit. Typical spectrum analyzer displays are shown in figures 1-2, 1-3 and 1-4.

NOTE

**For applicable forms and records,
see paragraph 2, TM 11-6625-000-12.**

1-2. Indexes of Publications

a. *DA Pam 310-4.* Refer to DA Pam 310-4 to determine whether there are new editions, changes, or additional publications pertaining to this equipment.

b. *DA Pam 310-7.* Refer to DA Pam 310-7 to determine whether there are modification work orders (MWO's) pertaining to the equipment.

1-3. Purpose and Use

Radio Test Set AN/USM-306(V)1 is a combined frequency-selective audio-radio frequency decibels meter and spectrum analyzer. It is intended for use with frequency-division radio multiplex and cable carrier systems. Individual signals may be measured in

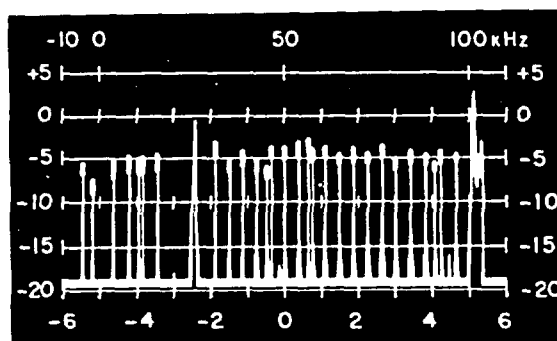


Figure 1-2. Typical 120-kHz display, spectrum analyzer.

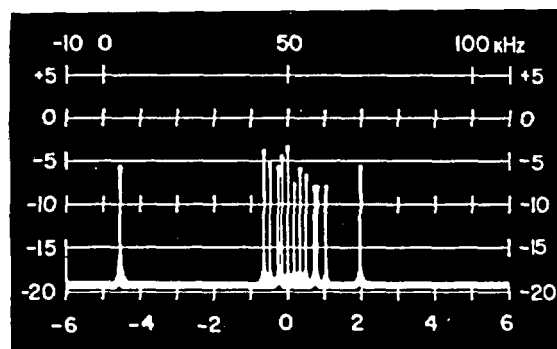


Figure 1-3. Typical 12-kHz display, spectrum analyzer.