



M. Flom Associates, Inc. - Global Compliance Center

3356 North San Marcos Place, Suite 107, Chandler, Arizona 85224-1571

www.goodnet.com/~mflom, (602) 926-3100, FAX: 926-3598

C E R T I F I C A T I O N

of

RECEIVER MODEL: FT-90R

FCC ID: K66FT-90R

to

FEDERAL COMMUNICATIONS COMMISSION

Part 15(B)
(New)

DATE OF REPORT: March 8, 1999

ON THE BEHALF OF THE APPLICANT:

Yaesu Musen Co., Ltd.

AT THE REQUEST OF:

P.O. Phone Call March 5, 1999

Yaesu U.S.A.
17210 Edwards Rd.
Cerritos, CA 90703

Attention of:

Mikio Maruya, Executive Vice President
(800) 255-9237; FAX: (800) 477-9237
(562) 404-2700, x280; FAX: -1210

SUPERVISED BY:

A handwritten signature in black ink that reads 'Morton Flom, P. Eng.' The signature is written in a cursive, flowing style.


Morton Flom, P. Eng.

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Required information per ISO/IEC Guide 25-1990, paragraph 13.2:

- a) TEST REPORT
- b) Laboratory: M. Flom Associates, Inc.
(FCC: 31040/SIT) 3356 N. San Marcos Place, Suite 107
(Canada: IC 2044) Chandler, AZ 85224
- c) Report Number: d9930053
- d) Client: Yaesu U.S.A.
17210 Edwards Rd.
Cerritos, CA 90703
- e) Identification: FT-90R
FCC ID: K66FT-90R
Description: Amateur Receiver
- f) EUT Condition: Not required unless specified in individual tests.
- g) Report Date: March 8, 1999
EUT Received: February 2, 1999
- h, j, k): As indicated in individual tests.
- i) Sampling method: No sampling procedure used.
- l) Uncertainty: In accordance with MFA internal quality manual.
- m) Supervised by: 
Morton Flom, P. Eng.
- n) Results: The results presented in this report relate only to the item tested.
- o) Reproduction: This report must not be reproduced, except in full, without written permission from this laboratory.

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GENERAL INFORMATION

Part 2.948:

(a) (b) DESCRIPTION OF MEASUREMENT FACILITIES:
FILE: 31040/SIT

A description of the measurement facilities was filed with the Commission and was found to be in compliance with the requirements of Section 2.948, by letter dated March 3, 1997. All pertinent changes will be reported to the Commission by up-date prior to March 2000.

(b) (4) SUPPORTING STRUCTURES:

SKETCH - ATTACHED EXHIBITS

(b) (5) (6) TEST INSTRUMENTATION:

LIST - SEE EXHIBITS

2.925: IDENTIFICATION OF AN AUTHORIZED DEVICE:

DRAWING - SEE EXHIBITS

LOCATION OF LABEL - SEE PHOTOS

NAME AND ADDRESS OF APPLICANT:

Yaesu Musen Co., Ltd.
20-2, Shimomaruko 1-chome
Ota-ku
Tokyo, Japan 146

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2.911:
2.1033(b) (6)

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TECHNICAL REPORT

MANUFACTURER:

Applicant

TRADE NAME:

YAESU

FCC ID:

K66FT-90R

MODEL NO:

FT-90R

PHOTOGRAPHS:

SEE LIST OF EXHIBITS

15.31:

MEASUREMENT STANDARD & PROCEDURE:

- IEEE STANDARD 187 WAS USED AS A GUIDE.
- FCC MEASUREMENT PROCEDURE MP-1
- FCC RULE PART 15(B) (NEW)
- FCC RULE 15.63 TRANSITION

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EXPOSITORY STATEMENT

1. NUMBER OF BANDS = 3
2. NUMBER OF CHANNELS = N/A
3. TUNING RANGE, MHz = 100 to 230
300 to 530
810 to 999.75
4. OSCILLATOR RANGE, MHz = 145 to 275
255 to 485
765 to 954
5. I.F., MHz = 0.455, 45.05
6. BLOCK DIAGRAM = ATTACHED
7. For cellular receiver only, the radio transceiver meets the requirements of FCC Bulletin OET 53 ("Cellular System Mobile Stations-Land-System Compatibility Specification."). See attached affidavit.

15.203: ANTENNA REQUIREMENT:

- The antenna is permanently attached to the EUT
- The antenna uses a unique coupling
- The EUT must be professionally installed
- The antenna requirement does not apply

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NAME OF TEST: Receiver Spurious Emissions (Radiated)

SPECIFICATION:

15.109:	Radiated Interference Limits
15.209:	Radiated Emission Limits; General Requirements
15.33:	Frequency Range of Radiated Measurements
80.217:	Suppression of Interference Aboard Ships

GUIDE: See measurement procedure below

TEST CONDITIONS: Standard Temperature & Humidity

TEST EQUIPMENT: As per attached page

SEARCH ANTENNAS:

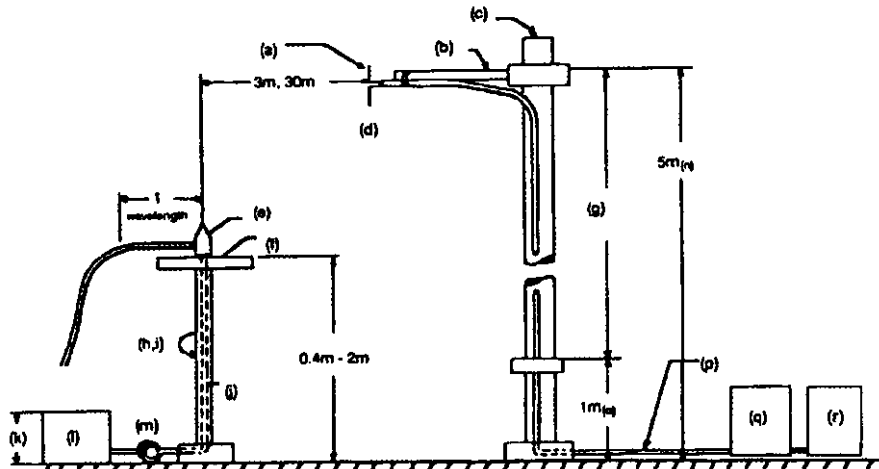
100 Hz -	50 MHz:	Emco 3301B Active Rod
10 kHz -	32 MHz:	Singer 94593-1 Loop
25 MHz -	300 MHz:	Emco 3109 Biconical
200 MHz -	1 GHz:	Apral 2001 Log Periodic
1 GHz -	18 GHz:	Emco 3115 Horn
10 GHz -	40 GHz:	Emco 3116 Horn with HP11970A Mixer

MEASUREMENT PROCEDURE

- At first, bench tests were performed to locate the spurious emissions at the antenna terminals.
- In the field, tests were conducted over the range shown, The test sample was set up on a wooden turntable above ground, and at a distance of three meters from the antenna connected tot he Spectrum Analyzer.
- In order to obtain the maximum response at each frequency, the turntable was rotated, and the search antenna was raised and lowered. The EUT was also adjusted for maximum response. Tests were conducted in Horizontal & Vertical polarization modes.
- The field strength was calculated from:

$$E \mu\text{V/m @ 3 m} = \text{Log}_{10}^{-1} \left(\frac{\text{dB}\mu\text{V} + \text{A.F.} + \text{C.L.}}{20} \right)$$
- MEASUREMENT RESULTS: Attached for "Worst Case" conditions.

RADIATED TEST SETUP



NOTES:

- (a) Search Antenna - Rotatable on boom
- (b) Non-metallic boom
- (c) Non-metallic mast
- (d) Adjustable horizontally
- (e) Equipment Under Test
- (f) Turntable
- (g) Boom adjustable in height.
- (h) External control cables routed horizontally at least one wavelength.
- (i) Rotatable
- (j) Cables routed through hollow turntable center
- (k) 30 cm or less
- (l) External power source
- (m) 10 cm diameter coil of excess cable
- (n) 25 cm (V), 1 m-7 m (V, H)
- (o) 25 cm from bottom end of 'V', 1m normally
- (p) Calibrated Cable at least 10m in length
- (q) Amplifier (optional)
- (r) Spectrum Analyzer

Asset	Description	s/n	Cycle	Last Cal
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PER ANSI C63.4-1992, 10.1.4

TRANSDUCER

___	i00065	EMCO 3109B 100Hz-50MHz	2336	12 mo.	
___	i00033	Singer 94593-1 10kHz-32MHz	0219	12 mo.	
x	i00088	EMCO 3109-B 25MHz-300MHz	2336	12 mo.	Oct-98
x	i00089	Apral 2001 200MHz-1GHz	001500	12 mo.	Oct-98
x	i00103	EMCO 3115 1GHz-18GHz	9208-3925	12 mo.	Oct-98
___	i00085	EMCO 3116 10GHz-40GHz	2076	12 mo.	

AMPLIFIER

___	i00028	HP 8449A	2749A00121	12 mo.	Mar-98
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SPECTRUM ANALYZER

___	i00029	HP 8563E	3213A00104	12 mo.	Aug-98
x	i00033	HP 85462A	3625A00357	12 mo.	Dec-98
___	i00048	HP 8566B	2511AD1467	6 mo.	Dec-98

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NAME OF TEST: Receiver Spurious Emissions (Radiated)

MEASUREMENT DETAILS

SITE REFERENCE = 31040/SIT
 SPECTRUM SEARCHED = 0 to 10 x F_R
 WORST CASE = V
 LIMITS = 15.109(a) (Attached)
 RESTRICTED BAND MEASUREMENTS = 15.205 (Attached)
 ALL OTHER EMISSIONS = 20 dB OR MORE BELOW LIMIT

TESTS WERE CONDUCTED WITH:

- a. All controls and switches operated.
- b. Half-wave dipole antenna or manufacturer/applicant supplied antenna.

SAMPLE CALCULATION:

EMISSION FREQUENCY, MHz = 145.071000
 LEVEL = $\text{Log}_{10}^{-1} \left(\frac{13.52 + 14.43}{20} \right)$
 LEVEL, $\mu\text{V}/\text{m}$ @ 3m = 24.97

MEASUREMENT RESULTS = ATTACHED

NOTE: WORST CASE OF SCAN AND NON-SCAN MODES REPORTED.

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NAME OF TEST: Receiver Spurious Emissions (Radiated)
 g9920032: 1999-Feb-05 Fri 09:22:00
 STATE: 0:General

All other emissions in the required measurement range were more than 20 dB below the required limits.

FREQUENCY TUNED, MHz	FREQUENCY EMISSION, MHz	LEVEL, @ m dBuV		C.F., dB	μ V/m @ m	
100.02000	145.071000	13.52	3	14.43	24.97	3
229.98000	184.931000	10.67	3	15.69	20.8	3
145.02000	190.071000	10.91	3	16.08	22.36	3
100.02000	290.144000	10.15	3	26.59	68.71	3
300.02000	345.073000	19.41	3	20.45	98.4	3
229.98000	369.866000	13.21	3	21.83	56.49	3
145.02000	380.132000	12.12	3	22.38	53.09	3
440.02000	394.980000	11.03	3	23.14	51.11	3
529.98000	484.923000	14.05	3	23.29	73.62	3
300.02000	690.152000	13.2	3	28.09	116.01	3
810.02500	764.968000	10.68	3	29.07	97.16	3
440.02000	789.942000	9.45	3	29.37	87.3	3
529.98000	969.863000	8.38	3	36.27	170.8	3
999.97500	1045.025000	8.56	3	31.8	104.23	3
810.02500	1529.953000	4.09	3	36.95	112.72	3
999.97500	2090.056000	-2.16	3	41.8	95.94	3

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THE APPLICANT HAS BEEN CAUTIONED AS TO THE FOLLOWING:

15.21 INFORMATION TO USER.

The users manual or instruction manual for an intentional radiator shall caution the user that changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

15.27(a) SPECIAL ACCESSORIES.

Equipment marketed to a consumer must be capable of complying with the necessary regulations in the configuration in which the equipment is marketed. Where special accessories, such as shielded cables and/or special connectors are required to enable an unintentional or intentional radiator to comply with the emission limits in this part, the equipment must be marketed with, i.e. shipped and sold with, those special accessories. However, in lieu of shipping or packaging the special accessories with the unintentional or intentional radiator, the responsible party may employ other methods of ensuring that the special accessories are provided to the consumer, without additional charge.

Information detailing any alternative method used to supply the special accessories for a grant of equipment authorization or retained in the verification records, as appropriate. The party responsible for the equipment, as detailed in § 2.909 of this chapter, shall ensure that these special accessories are provided with the equipment. The instruction manual for such devices shall include appropriate instructions on the first page of text concerned with the installation of the device that these special accessories must be used with the device. It is the responsibility of the user to use the needed special accessories supplied with the equipment.

LIMITS: Rule 15.209(a): TRANSMITTER

FREQUENCY, MHz	FIELD STRENGTH, $\mu\text{V}/\text{m}$	DISTANCE, m
0.009 - 0.490	$2400/F(\text{kHz})$	300
0.490 - 1.705	$24000/F(\text{kHz})$	30
1.705 - 30.0	30	30
30 - 88	100	3
88 - 216	150	3
216 - 960	200	3
Above 960	500	3

LIMITS: RULE 15.109(a): RECEIVER RADIATED EMISSION LIMITS

FREQUENCY, MHz	FIELD STRENGTH, $\mu\text{V}/\text{m}$	DISTANCE, m
30 - 88	100	3
88 - 216	150	3
216 - 960	200	3
Above 960	500	3

LIMITS: RULE 15.111: RECEIVER CONDUCTED EMISSION LIMITS

The power at the antenna terminal at any frequency within the range of measurements shall not exceed 2.0 nanowatts.

STATEMENT OF COMPLIANCE

THIS IS TO CERTIFY:

THAT, ON THE BASIS OF THE MEASUREMENTS MADE, THE
EQUIPMENT TESTED IS CAPABLE OF COMPLYING WITH THE
REQUIREMENTS OF

FCC RULE PART 15, SUBPART B x

FCC RULE PART 15, SUBPART C

USING ANSI C63.4-1992 IN EFFECT AS OF THIS DATE, UNDER
NORMAL OPERATION, WITH THE USUAL MAINTENANCE.

THAT THE DATA CONTAINED HEREIN IS A SUMMARY (WORST CASE)
OF THAT OBTAINED ON SEVERAL RANDOMLY-SELECTED PRODUCTION
SAMPLES.

THAT THE EQUIPMENT MEETS OR EXCEEDS THE REQUIREMENTS OF
PART 15.

STATEMENT OF QUALIFICATIONS

EDUCATION:

1. B. ENG. in ENGINEERING PHYSICS, 1949, McGill University, Montreal, Canada.
2. Post Graduate Studies, McGill University & Sir George Williams University, Montreal.

PROFESSIONAL AFFILIATIONS:

1. ARIZONA SOCIETY OF PROFESSIONAL ENGINEERS (NSPE), #026 031 821.
2. ORDER OF ENGINEERS (QUEBEC) 1949. #45 34.
3. ASSOCIATION OF PROFESSIONAL ENGINEERS, GEOPHYSICISTS & GEOLOGISTS OF ALBERIA #5916.
4. REGISTERED ENGINEERING CONSULTANT - GOVERNMENT OF CANADA, DEPARTMENT OF COMMUNICATIONS. Radio Equipment approvals.
5. IEEE, Lifetime member no. 041/204 (Member since 1947).

EXPERIENCE:

1. Research/Development/Senior Project Engineer. R.C.A. LIMITED (4 years).
2. Owner/Chief Engineer of Electronics. Design/Manufacturing & Cable TV Companies (10 years)
3. CONSULTING ENGINEER (over 25 years).



MORTON FLOM, P. Eng.