



XVIIth PLENARY ASSEMBLY
DÜSSELDORF, 1990



INTERNATIONAL TELECOMMUNICATION UNION

REPORTS OF THE CCIR, 1990

(ALSO DECISIONS)

ANNEX TO VOLUME VII

STANDARD FREQUENCIES
AND TIME SIGNALS

CCIR INTERNATIONAL RADIO CONSULTATIVE COMMITTEE

Geneva, 1990

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INDEX OF TEXTS WHICH HAVE BEEN DELETED
AT THE END OF THE STUDY PERIOD 1986-1990

(In order to facilitate the retrieval of a given text, the page number of Volume VII of the XVIth Plenary Assembly, Dubrovnik 1986, is indicated.)

ANNEX TO VOLUME VII

Text	Title	Page No. Vol. VII Dubrovnik, 1986
Report 730-1 ⁽¹⁾	Glossary	1

⁽¹⁾ Now Recommendation 686.

ANNEX TO VOLUME VII
STANDARD FREQUENCIES AND TIME SIGNALS
(Study Group 7)

TABLE OF CONTENTS

	Page
Plan of Volumes I to XV, XVIIth Plenary Assembly of the CCIR (see Volume VII - Recommendations)	
Distribution of texts of the XVIIth Plenary Assembly of the CCIR in Volumes I to XV (see Volume VII - Recommendations)	
Table of contents	I
Numerical index of texts	III
Index of texts deleted	V

Section 7A - Glossary

There are no Reports in this Section.

Section 7B - Specifications for the standard-frequency and time-signal services

There are no Reports in this Section

Section 7C - Systems for dissemination and comparison

Report 267-7	Standard frequencies and time signals. <u>Characteristics of standard-frequency and time-signal emissions in allocated bands and characteristics of stations emitting with regular schedules with stabilized frequencies, outside of allocated bands</u>	3
Report 270-3	Optimum use of the frequency spectrum for high-precision time signals	31
Report 271-8	Stability and accuracy of standard frequency and time signals in VLF and LF bands as received	33
Report 363-7	Methods for the transfer and dissemination of time and standard frequencies	42
Report 518-8	Time/frequency dissemination and coordination via satellite	51
Report 576-3	Standard-frequency dissemination via stabilized broadcast station carriers	80

	Page
Report 577-3 Dissemination of time signals and time codes by addition of phase modulation on amplitude-modulated sound broadcasting transmitters	81
Report 578-3 Time codes	83
Report 731-2 Survey of users of standard-frequency and time-signal emissions	89
Report 732-3 Proposed reduction of mutual interference between standard-frequency and time-signal emissions in bands 6 and 7	100
Report 735-1 Importance of standard-frequency and time-signal emissions in band 5	105
Report 736-1 Frequency sharing between the time-signal service and the radiolocation service, the fixed-satellite service and the fixed and mobile services near 14, 21, 26 and 31 GHz	106
Report 896-1 Documentation of changes in transmitted time signals ...	113
Report 897-2 Methods for short range precision time transfers	114
Report 1016-1 Television methods for the transfer and dissemination of time and frequency	118
Report 1017 Characterization of signal delays in antennas	123
Report 1152 General sources of highly stable signals in the UHF-EHF bands using synchronized oscillators	125
 <u>Section 7D - Characterization of sources and time scales formation</u>	
Report 364-6 Performance of standard-frequency generators	129
Report 439-5 Relativistic effects in a terrestrial coordinate time system	150
Report 579-4 Time scale algorithm and associated averaging problems ..	155
Report 580-3 Characterization of frequency and phase noise	160
Report 738-3 Frequency generators in the far infra-red, infra-red and visible light regions of the spectrum	172
Report 898-2 Operational experience with reference clocks in time systems	179
 <u>Decisions</u>	
Decision 65 Handbook on the use of satellite time and frequency dissemination	189

NUMERICAL INDEX OF TEXTS

ANNEX TO VOLUME VII

	Page
SECTION 7A: Glossary	1
SECTION 7B: Specifications for the standard-frequency and time- signal services	1
SECTION 7C: Systems for dissemination and comparison	3
SECTION 7D: Characterization of sources and time scales formation	129

REPORTS	Section	Page	REPORTS	Section	Page
267-7	7C	3	731-2	7C	89
270-3	7C	31	732-3	7C	100
271-8	7C	33	735-1	7C	105
363-7	7C	42	736-1	7C	106
364-6	7D	129	738-3	7D	172
439-5	7D	150	896-1	7C	113
518-8	7C	51	897-2	7C	114
576-3	7C	80	898-2	7D	179
577-3	7C	81	1016-1	7C	118
578-3	7C	83	1017	7C	123
579-4	7D	155	1152	7C	125
580-3	7D	160			

Note - Decisions which already appear in numerical order in the table of contents, are not reproduced in this index.

SECTION 7A: GLOSSARY

There are no Reports in this Section.

SECTION 7B: SPECIFICATIONS FOR THE STANDARD-FREQUENCY AND TIME-SIGNAL SERVICES

There are no Reports in this Section.

SECTION 7C: SYSTEMS FOR DISSEMINATION AND COMPARISON

REPORT 267-7

STANDARD FREQUENCIES AND TIME SIGNALS

**Characteristics of standard-frequency and time-signal
emissions in allocated bands and characteristics of stations
emitting with regular schedules with stabilized frequencies,
outside of allocated bands**

(Question 1/7)

(1956-1959-1963-1966-1970-1974-1978-1982-1986-1990)

The characteristics of stations appearing in the following tables are valid as of 16 September, 1989. For information concerning changes which may have occurred since that date, reference may be made to the Annual Report of the time section of the Bureau international des poids et mesures (BIPM) or directly to the respective authority for each service as listed in Annex I.

TABLE I - Characteristics of standard-frequency and time-signal emissions in the allocated bands, valid as of 16 September 1989

Call sign	Station		Type of antenna(s)	Carrier power (kW)	Number of simultaneous transmissions	Period of operation		Standard frequencies used		Duration of emission		Uncertainty of frequency and time intervals (parts in 10 ¹²) ⁽¹⁾	Method of DUT1 indication
	Approximate location	Latitude Longitude				Days/ week	Hours/ day	Carrier (MHz)	Modulation (Hz)	Time signal (min)	Audio-modulation (min)		
ATA	New Delhi, India	28° 34' N 77° 19' E	Horizontal folded dipole	8 (PEP)	3	7	24 ⁽²⁾	5, 10, 15	1, 1000	continuous	4/15	± 10	
BPM ⁽³⁾	Pucheng, China	35° 00' N 109° 31' E	Omni-directional	10-20	2	7	24 ⁽⁴⁾	2.5, 5, 10, 15	1, 1000	20/30 (UTC) 4/30 (UT1)	nil	± 10	Direct emission of UT1 time signal
HLA	Taejeon Taedok Science Town, Republic of Korea	36° 23' N 127° 22' E	Vertical (conical monopole)	2	1	5 ⁽⁵⁾	7 ⁽⁶⁾	5	1	continuous	continuous	± 10	CCIR code by double pulse
IAM ⁽⁷⁾	Roma, Italy	41° 47' N 12° 27' E	Vertical $\lambda/4$	1	1	6	2	5	1	continuous	nil	± 10	CCIR code by double pulse
IBF ⁽⁷⁾	Torino, Italy	45° 02' N 07° 46' E	Vertical $\lambda/4$	5	1	7	2 1/4	5	1	continuous	nil	± 10	CCIR code by double pulse
JJY ⁽⁷⁾	Sanwa, Sashima, Ibaraki, Japan	36° 11' N 139° 51' E	(B)	2	5	7	24 ⁽⁹⁾	2.5, 5, 8, 10, 15	1 ⁽¹⁰⁾ 1000 ⁽¹¹⁾	continuous	30/60	± 10	CCIR code by lengthening
LOL ⁽⁷⁾	Buenos Aires, Argentina	34° 37' S 58° 21' W	Horizontal 3-wire folded dipole	2	3	7	5	5, 10, 15	1, 440, 1000	continuous	3/5	± 20	CCIR code by lengthening

TABLE I (continued)

Station			Type of antenna(s)	Carrier power (kW)	Number of simultaneous transmissions	Period of operation		Standard frequencies used		Duration of emission		Uncertainty of frequency and time intervals (parts in 10^{12}) ⁽¹⁾	Method of DUT1 indication
Call sign	Approximate location	Latitude Longitude				Days/ week	Hours/ day	Carrier (MHz)	Modulation (Hz)	Time signal (min)	Audio-modulation (min)		
OMA ⁽⁷⁾	Praha, Czechoslovak S.R.	50° 07' N 14° 35' E	T	1	1	7	24	2.5	1, 1000 ⁽¹²⁾	15/30	4/15	± 1000	
RCH ⁽⁷⁾	Tachkent, USSR	41° 19' N 69° 15' E	Horizontal dipole	1	2	7	21	2.5, 5, 10	1, 10	40/60	nil	± 50	CCIR code by double pulse, additional information dUT1 ⁽¹³⁾
RID ⁽⁷⁾	Irkutsk, USSR	52° 26' N 104° 02' E	Horizontal dipole	1 1 1	3	7	24	5.004 10.004 15.004	1, 10	40/60	nil	± 50	CCIR code by double pulse, additional information dUT1 ⁽¹³⁾
RIM ⁽⁷⁾	Tachkent, USSR	41° 19' N 69° 15' E	Horizontal dipole	1	1	7	20½	5, 10	1, 10	39/60	nil	± 50	CCIR code by double pulse, additional information dUT1
RTA ⁽⁷⁾	Novosibirsk, USSR	55° 04' N 82° 58' E	Horizontal dipole	5	1	7	20½	10, 15	1, 10	40/60	nil	± 50	CCIR code by double pulse, additional information dUT1 ⁽¹³⁾
RWM ⁽⁷⁾	Moskva, USSR	55° 48' N 38° 18' E	Horizontal dipole	5 5 8	3	7	24	4.996 9.996 14.996	1, 10	40/60	nil	± 50	CCIR code by double pulse, additional information dUT1 ⁽¹³⁾

TABLE I (continued)

Station			Type of antenna(s)	Carrier power (kW)	Number of simultaneous transmissions	Period of operation		Standard frequencies used		Duration of emission		Uncertainty of frequency and time intervals (parts in 10^{12}) ⁽¹⁾	Method of DUT1 indication
Call sign	Approximate location	Latitude Longitude				Days/week	Hours/day	Carrier (MHz)	Modulation (Hz)	Time signal (min)	Audio-modulation (min)		
WWV ⁽⁷⁾	Fort Collins, Colorado, USA	40° 41' N 105° 02' W	Vertical $\lambda/2$ dipoles	2.5-10	5	7	24	2.5, 5, 10, 15, 20 ⁽¹⁴⁾	1, 440, 500, 600	continuous ⁽¹⁵⁾	continuous ⁽¹⁶⁾	± 10	CCIR code by double pulse, additional information on UT1 corrections
WWVH ⁽⁷⁾	Kekaha, Kauai, Hawaii, USA	21° 59' N 159° 46' W	Vertical $\lambda/2$ dipole arrays	2.5-10	4	7	24	2.5, 5, 10, 15 ⁽¹⁴⁾	1, 440, 500, 600	continuous ⁽¹⁵⁾	continuous ⁽¹⁶⁾	± 10	CCIR code by double pulse, additional information on UT1 corrections
ZLFS	Lower Hutt, New Zealand	41° 14' S 174° 55' E		0.3	1	1	3	2.5	nil	nil	nil	± 100	

Notes to Table I:

The daily transmission schedule and hourly modulation schedule is given, where appropriate, in the form of Figs. 1 and 2 supplemented by the following notes:

- (1) This value applies at the transmitter; to realize the quoted uncertainty at the point of reception it could be necessary to observe the received phase time frequency over a sufficiently long period in order to eliminate noise and random effects.
- (2) 5 MHz: 1800-0900 h UTC; 10 MHz: 24 hours; 15 MHz: 0900-1800 h UTC.
- (3) Call sign in Morse and language.
- (4) 2.5 MHz: 0730-0100 h UTC; 15 MHz: 0100-0900 h UTC; 5 MHz and 10 MHz: continuous.
- (5) Monday to Friday (except national holidays in Korea).
- (6) 0100 to 0800 h — UTC. Pulses of 9 cycles of 1 800 Hz modulation. 59th and 29th second pulses omitted. Hour identified by 0.8 s — long 1 500 Hz tone. Beginning of each minute, identified by a 0.8 s long 1 800 Hz tone, voice announcement of hours and minutes each minute following 52nd second pulse. BCD time code given on 100 Hz sub-carrier.
- (7) These stations have indicated that they follow the UTC system as specified in Recommendation 460. Since 1 January 1972 the frequency offset has been eliminated and the time signals remain within about 0.8 s of UT1 by means of occasional 1 s steps as directed by the Bureau international de l'heure.
- (8) Vertical $\lambda/4$ for 2.5 MHz, horizontal $\lambda/2$ dipole for 5 and 8 MHz, and vertical $\lambda/2$ dipoles for 10 and 15 MHz.
- (9) Interrupted from 35 to 39 minutes of each hour.
- (10) Pulse consists of 8 cycles of 1600 Hz tone. First pulse of each minute preceded by 655 ms of 600 Hz tone.
- (11) 1000 Hz tone modulation between the minutes of 0-5, 10-15, 20-25, 30-35, 40-45, 50-55 except 40 ms before and after each second's pulse.
- (12) In the period from 1800-0600 h UTC, audio-frequency modulation is replaced by time signals.
- (13) The additional information about the value of the difference UT1 - UTC is transmitted by code dUT1. It provides more precisely the difference UT1 - UTC down to multiples of 0.02 s. The total value of the correction is DUT1 + dUT1. Possible values of dUT1 are transmitted by marking of p second pulses between the 21st and 24th seconds of the minute, so that $dUT1 = +0.02 s \times p$. Negative values of dUT1 are transmitted by marking of q second pulses between the 31st and 34th second of the minute, so that $dUT1 = -0.02 s \times q$.
- (14) As of Feb. 1, 1977 transmissions on 25 MHz from WWV and 20 MHz from WWVH were discontinued, but may be resumed at a later date.
- (15) In addition to other timing signals and time announcements, a modified IRIG-H time code is produced at a 1-pps rate and radiated continuously on a 100 Hz sub-carrier on all frequencies. A complete code frame is 1 minute. The 100 Hz sub-carrier is synchronous with the code pulses, so that 10 ms resolution is obtained. The code contains DUT1 values and UTC time-of-year information in minutes, hours and days of the year.
- (16) Except for voice announcement periods and the 5-minute semi-silent period each hour.

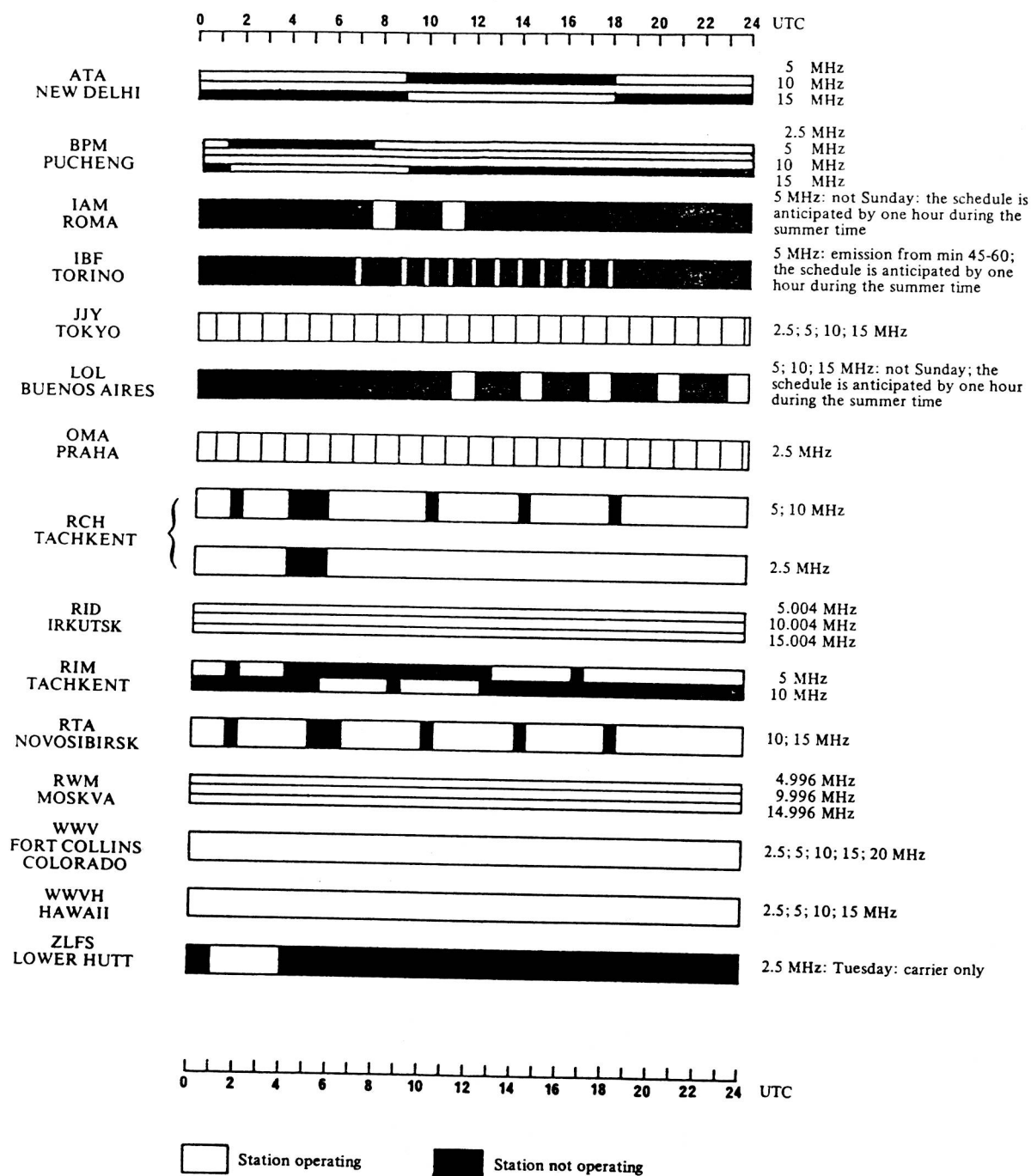
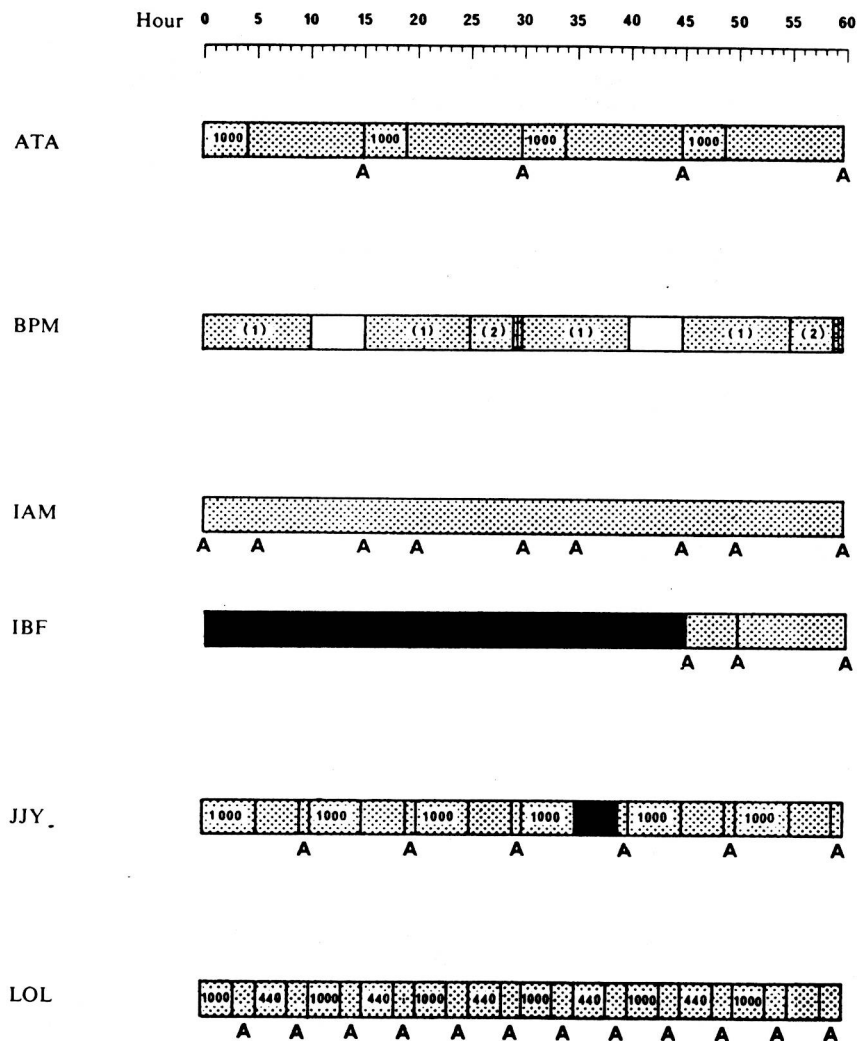


FIGURE 1 - Daily emission schedule



Min.

Form of second and minute signals :
Morse and voice announcements (A).

Pulse of 5 cycles of 1000 Hz tone, lengthened to 100 ms at the beginning of each minute. Call sign and time (UTC) in Morse.

(1) Pulse of 10 cycles of 1000 Hz tone (UTC time signal), the first pulse of every minute is a 300 ms pulse of 1000 Hz tone. In order to avoid mutual interference the second pulses of UTC of BPM precede UTC of BIH by 20 ms.

(2) 100 ms pulse of 1000 Hz tone UTI time signal, the first pulse of every minute is a 300 ms pulse of 1000 Hz tone.

Pulse of 5 cycles of 1000 Hz tone : minute pulse of 20 cycles of 1000 Hz tone. Call sign and time (UTC) in Morse and voice identification.

Pulse of 5 cycles of 1000 Hz tone repeated 7 times at minute. Call sign and time (UTC) in Morse, voice identification at the beginning and end of emission.

Pulse of 8 cycles of 1600 Hz tone : minute pulse is preceded by a 600 Hz tone of 655 ms duration. Call sign and time (JST) in Morse and voice. Radio propagation warnings in letter code : N (normal), U (unstable) or W (disturbed). DUT1 is indicated, by the number and position of the lengthened second's pulses of 45 ms duration, instead of the 5 ms duration of the normal second's pulse.

Pulse of 5 cycles of 1000 Hz tone, 59th pulse omitted. Call sign in Morse : identification and time (UTC - 3 h) in voice.

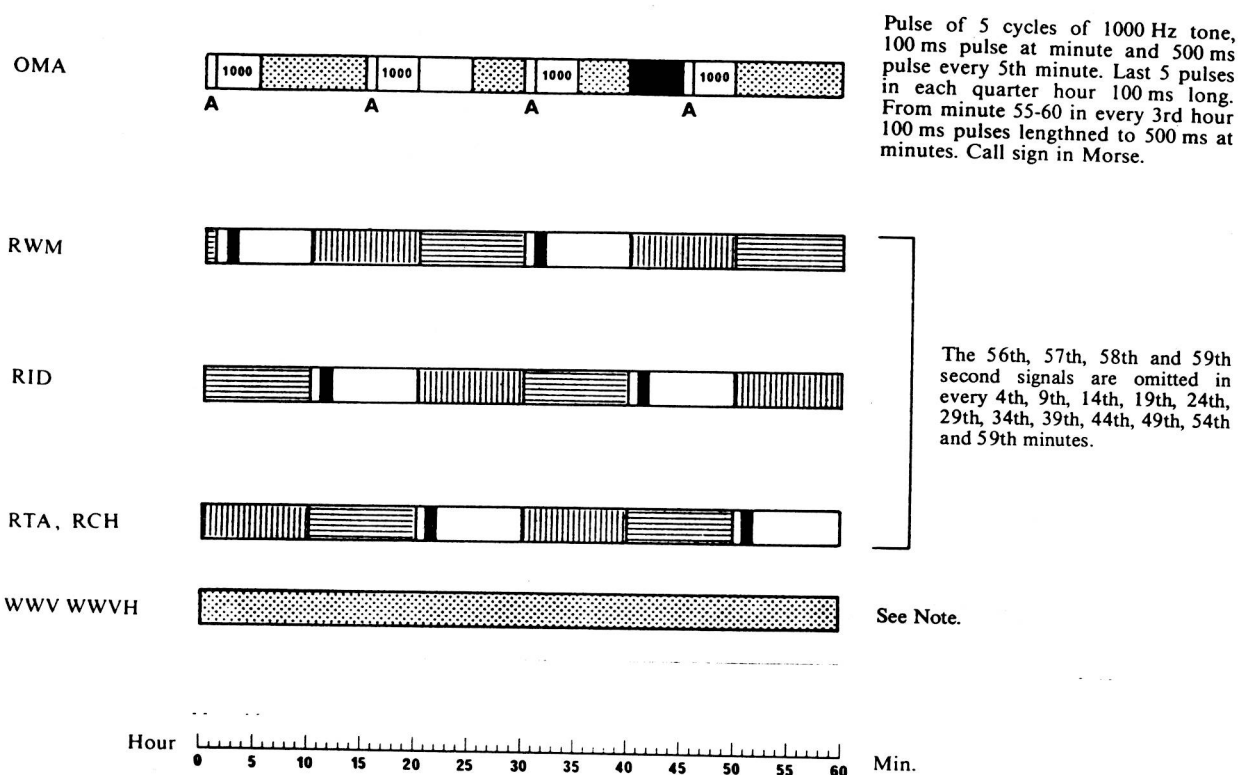


FIGURE 2 — Hourly modulation schedule

Note. — Pulse of 5 cycles of 1000 Hz (WWV) or 6 cycles of 1200 Hz (WWVH) tone, lengthened to 0.8 s at beginning of each minute. An 0.8 s pulse of 1500 Hz begins each hour at both stations. 29th and 59th pulses each minute are omitted. Voice time announcements preceding each minute. 45-second audio tones alternating between 500 and 600 Hz each minute, except when special announcements or station identification messages are given in voice. One 45-second segment of 440 Hz is included each hour at one minute (WWVH) or two minutes (WWV) past the hour. A modified IRIG-H time code, giving day, hour, minute and UT1 information, is broadcast continuously on a 100 Hz sub-carrier. DUT1 information is provided by the number and position of doubled second pulses each minute. All modulations interrupted for 40 ms around each second's pulse.

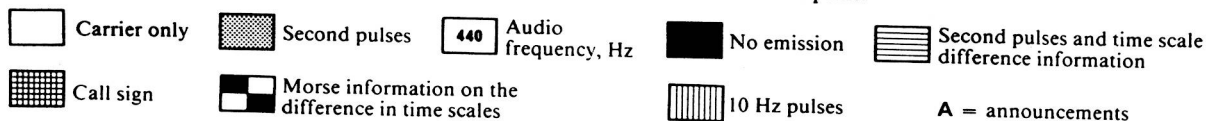


TABLE II - Characteristics of standard-frequency and time-signal emissions in additional bands, valid as of 16 September 1989

Call sign	Station		Type of antenna(s)	Carrier power (kW)	Number of simultaneous transmissions	Period of operation		Standard frequencies used		Duration of emission		Uncertainty of frequency and time intervals (parts in 10^{12}) ⁽¹⁾	Method of DUT1 indication
	Approximate location	Latitude Longitude				Days/week	Hours/day	Carrier (kHz)	Modulation (Hz)	Time signal (min)	Audio-modulation (min)		
	Allouis, France	47° 10' N 02° 12' E	Omni-directional	1000 to 2000	1	7	24	162	1 ⁽²⁾	continuous	A3E broadcast continuously	± 2	No DUT1 transmission
CHU ⁽³⁾	Ottawa, Canada	45° 18' N 75° 45' W	Omni-directional	3, 10, 3	3	7	24	3330, 7335, 14 670	1 ⁽⁴⁾	continuous	nil	± 5	CCIR code by split pulses
	Donebach, F.R. of Germany	49° 34' N 09° 11' E	Omni-directional	250	1	7	24	153	nil	nil	A3E broadcast continuously	± 2	
DCF77 ⁽⁵⁾	Mainflingen, F.R. of Germany	50° 01' N 09° 00' E	Omni-directional	20 ⁽⁶⁾	1	7	24	77.5	1	continuous ⁽⁸⁾	continuous ⁽⁷⁾	± 0.5	No DUT1 transmission
	Droitwich, United Kingdom	52° 16' N 02° 09' W	T	400	1	7	22	198 ⁽⁹⁾	nil	nil	A3E broadcast continuously	± 20	
	Westerglen, United Kingdom	55° 58' N 03° 50' W	T	50	1	7	22	198 ⁽⁹⁾	nil	nil	A3E broadcast continuously	± 20	
	Burghead, United Kingdom	57° 42' N 03° 28' W	T	50	1	7	22	198 ⁽⁹⁾	nil	nil	A3E broadcast continuously	± 20	
GBR ⁽³⁾ ₍₁₀₎	Rugby, United Kingdom	52° 22' N 01° 11' W	Omni-directional	750 60 ⁽⁷⁾	1	7	22 ⁽¹¹⁾	16.0	nil	nil	nil	± 10	
HBG ⁽¹²⁾	Prangins, Switzerland	46° 24' N 06° 15' E	Omni-directional	20	1	7	24	75	1 ⁽¹³⁾	continuous	nil	± 1	No DUT1 transmission