



M.460

MAINTENANCE :

INTERNATIONAL TRANSMISSION SYSTEMS (ANALOGUE)

BRINGING INTERNATIONAL GROUP, SUPERGROUP, ETC., LINKS INTO SERVICE

ITU-T Recommendation M.460

(Extract from the *Blue Book*)

NOTES

1 ITU-T Recommendation M.460 was published in Fascicle IV.1 of the *Blue Book*. This file is an extract from the *Blue Book*. While the presentation and layout of the text might be slightly different from the *Blue Book* version, the contents of the file are identical to the *Blue Book* version and copyright conditions remain unchanged (see below).

2 In this Recommendation, the expression “Administration” is used for conciseness to indicate both a telecommunication administration and a recognized operating agency.

© ITU 1988, 1993

All rights reserved. No part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from the ITU.

Recommendation M.460

BRINGING INTERNATIONAL GROUP, SUPERGROUP, ETC., LINKS INTO SERVICE

1 Preliminary exchange of information

The technical services concerned nominate the control and sub-control stations for the link to be brought into operation in accordance with Recommendations M.80 and M.90.

The technical services should indicate the routing to be followed and the method given in Recommendation M.570 may be applied. In the case of group or supergroup links, they will mutually agree on the pilot or pilots to be used.

Note – When group, supergroup, etc. links are used to provide the terrestrial links to a time division multiple access (TDMA) satellite system, the pilots are not transmitted over the satellite section. An alternative method of supervision for the individual circuits is described in Recommendation Q.33 [1].

In determining the routing of group links, in order to avoid interference between the pilots on two supergroup links, the technical services will try to arrange that position No. 3 is not occupied by the same group link on two supergroup links. (Where this is impossible, the supergroup pilot should be blocked at the through-group connection point.)

Information necessary for the control station, which will be entered on a *routing form* [see specimens in Appendix I (supergroup routing form) and Appendix III (A or B) (group routing form) of this Recommendation] is indicated below:

- routing of the link,
- names of control and sub-control stations,
- through-connection points,
- points where regulators are fitted.

The overall routing form for the entire link is drawn up by the control station on the basis of information furnished by its technical service and by each sub-control station for the sections for which the latter is responsible.

When the group link is assigned its designation (according to Recommendation M.140, §§ 5 and 6), the Administration with control station responsibility will assemble the necessary technical and operational information. This is entered into the list of *Related information* (as defined in Recommendation M.140, § 7) which consists of the items shown in Annex A.

2 Frequencies and levels of group, supergroup, etc., pilots

2.1 Details of the recommended frequency and level of pilots are given in Table 1/M.460.

The specifications of terminal equipments provide that for every group or supergroup two pilots can be simultaneously transmitted. However, the normal case is that only one is being transmitted.

Note – Special considerations apply to the use of group and supergroup pilots if circuits are to be provided using Signalling System R2. Group and supergroup pilots placed at 140 Hz from a virtual carrier frequency are incompatible with signalling at 3825 Hz. Hence, the pilot at 84.140 kHz should not be applied to groups in which channel 6 is to be operated with this out-of-band signalling. Similarly, the pilot on 411.860 kHz should not be applied to supergroups in which channel 1 of the group in the group 3 position is to be operated with signalling at 3825 Hz.

TABLE 1/M.460

Group, supergroup and mastergroup pilots for	Frequency (kHz)		Power level ^{a)}
	8 ch. and 12 ch.	16 ch.	dBm0
Basic group (60-108 kHz)	84.080 84.140 104.080	84 ^{b)}	–20 –25 –20
Basic supergroup	411.860 411.920 547.920	444 ^{c)}	–25 –20 –20
Basic mastergroup	1 552		–20
Basic supermastergroup	11 096		–20
Basic 15 supergroup assemble	1 552		–20

a) To avoid errors in interpreting measurement results, the results of measurements on pilots will be stated in terms of the departure from the nominal pilot level in dBm at that particular point.

b) A pilot of 84 kHz is normally used. A different frequency can be used by agreement between Administrations.

c) A pilot of 444 kHz with a power level of –20 dBm0 is used.

2.2 Level tolerances for transmitted pilots

2.2.1 At the point where a pilot is injected, its level should be so adjusted that its measured value is within ± 0.1 dB of its nominal value. The measuring equipment used for making this measurement must give an accuracy of at least ± 0.1 dB.

2.2.2 The change in output level of the pilot generator with time (which is a factor included in equipment specifications) must not exceed ± 0.3 dB.

2.2.3 The total maximum variation resulting from §§ 2.2.1 and 2.2.2 above will be ± 0.5 dB. It is advisable to have a device to give an alarm when the variation at the generator output exceeds these limits, the zero of the warning device being aligned as accurately as possible with the lining-up level of the transmitted pilot.

2.3 Frequency tolerances for transmitted pilots

The permissible frequency tolerances for transmitted pilots are as follows:

- 84 kHz and 444 kHz (if used as reference pilots for 16-channel systems) ± 1 Hz
- 84.080 kHz and 411.920 kHz pilots ± 1 Hz
- 84.140 kHz and 411.860 kHz pilots ± 3 Hz
- 104.080 kHz and 547.920 kHz pilots ± 1 Hz
- 1552-kHz pilot ± 2 Hz
- 11 096-kHz pilot ± 10 Hz

3 Frequencies and levels of test signals

Reference measurements for a link and its component sections are made at some or all of the following frequencies:

- supermastergroup link:
8516, 9008, 11 096, 11 648, 12 388 kHz;
- 15 supergroup assembly link:
312, 556, 808, 1056, 1304, 1552, 2048, 2544, 3040, 3536, 4028 kHz;
- mastergroup link:
814, 1056, 1304, 1550, 1800, 2042 kHz;
- supergroup link (4-kHz channels):
313, 317, 333, 381, 412, 429, 477, 525, 545, 549 kHz;
- supergroup link (3-kHz channels or 3+4-kHz channels):
312.1, 313, 317, 333, 381, 412, 429, 477, 525, 545, 549, 551.9 kHz;
- group link (4-kHz channels):
61, 63, 71, 79, 84, 87, 95, 103, 107 kHz¹⁾;
- group link (3-kHz channels):
60.1, 60.6, 61, 63, 71, 79, 84, 87, 95, 103, 107, 107.3, 107.9 kHz¹⁾.

Administrations may also make measurements at other frequencies as considered necessary. In the case of group and supergroup links of simple constitution, three measuring frequencies (midband and at the two edges) may suffice.

The overall loss will be measured by means of a test frequency being equal or very close to the reference pilot frequency.

The level of the test signal to be used for the measurements will be –10 dBm0.

4 Reference measurements for a link

The measurements described in § 7.2 below for lining-up also constitute reference measurements. These data should be recorded at every group, supergroup, etc. sub-control station and in the through-connection stations adjacent to frontiers and, on request, forwarded to the control station which then can draw up a *line-up record*.

5 Some features of a multiple destination unidirectional transmission link as might be provided by a communication-satellite system

This section refers to Figure 1/M.460, which is drawn in terms of a supergroup. An analogous arrangement can occur for groups or, in principle, for higher-order assemblies. There is no loss of generality in describing the arrangement of a supergroup.

¹⁾ If the group-measuring frequencies are generated by applying 1020 Hz to the input of channel modulating equipment, special precautions will have to be taken at the receiving end to prevent carrier leak from affecting the readings of the measuring equipment. In these circumstances, the measuring device must be of the selective kind. For further information about the choice of the test signal frequency, refer to Recommendation O.6 [2].

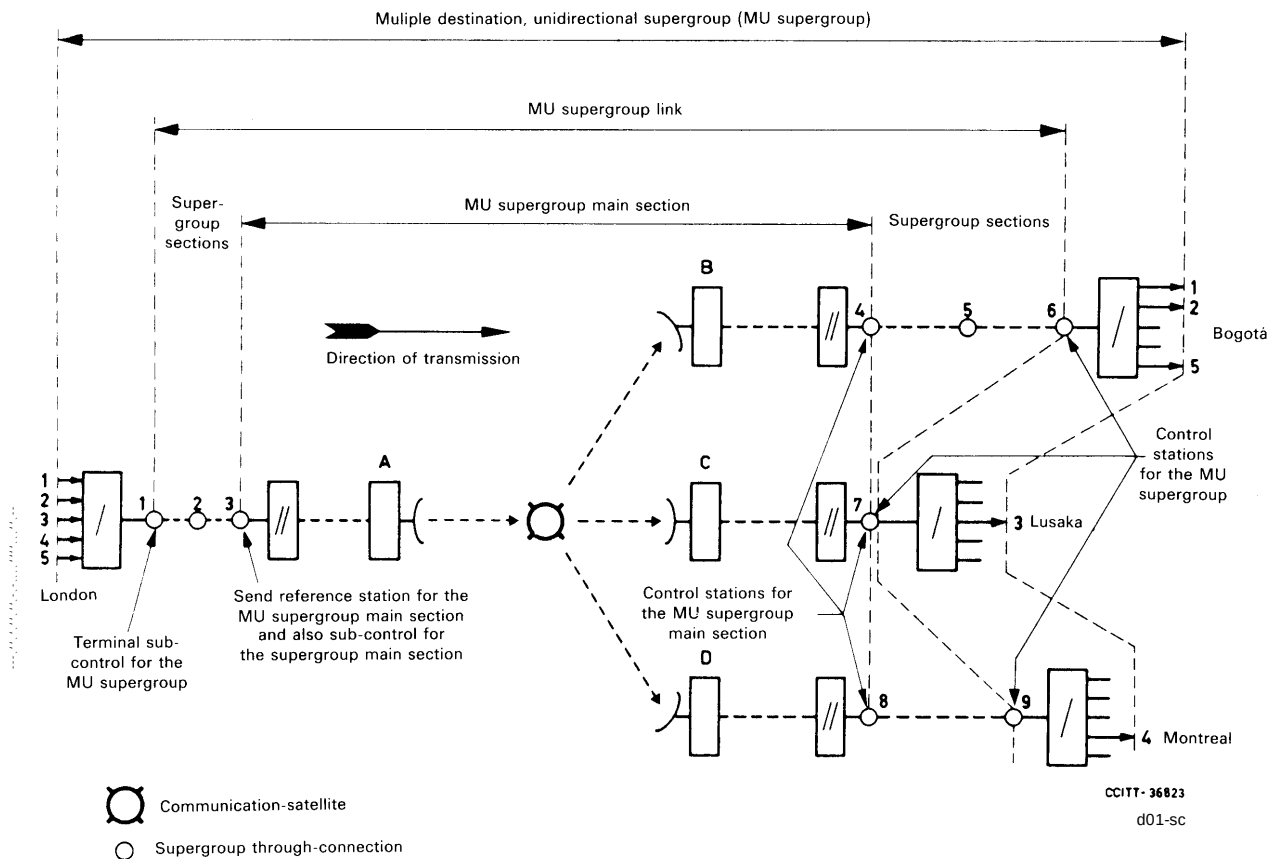


FIGURE 1/M.460

Arrangements for a multiple-destination, unidirectional supergroup (MU supergroup)

5.1 In the example the supergroup is assembled in London and portions of it appear in three other places. Hence the designatory letter M standing for **MULTIPLE DESTINATION**.

5.2 In the return directions of transmission for any or all of the groups in this supergroup, the transmission path may be quite different and will not necessarily bear any relationship to the direction illustrated. Hence the designatory letter U standing for **UNIDIRECTIONAL**.

5.3 The supergroup may be set up initially with only some of the destinations, for example, Montreal may be connected some time, say a year or so, after Bogota and Lusaka.

Furthermore, a destination may alter the amount of bandwidth it exploits, e.g. Bogota may initially derive Groups 1 and 2, Group 5 being derived some time later.

5.4 The portions of the supergroup defined by the stations 1-2-3, 4-5-6, and 8-9 are supergroup sections which are to be treated in the way described in the following paragraphs of this Recommendation.

5.5 The routings connecting stations 3, 4, 7 and 8 to their corresponding earth stations A, B, C and D can be markedly dissimilar. For example, the routing to control station 4 from earth station B need not resemble in any way the analogous routing from earth station D to control station 8. Control station 4 may be at the earth station, that is, the *distance* between B and 4 is zero whereas the *distance* between D and 8 may be several hundreds of miles perhaps and may be routed over a variety of coaxial line or radio-relay systems.

5.6 The portion 1-2-3 is referred to as a *common path*. Operations on the common path can affect all destinations whereas operations on the other paths (4-5-6 and 8-9) can affect only one destination.

5.7 Station 3 is likely to have a community of interest with each of stations 4, 7 and 8. This is not necessarily so likely among 4, 7 and 8 themselves.