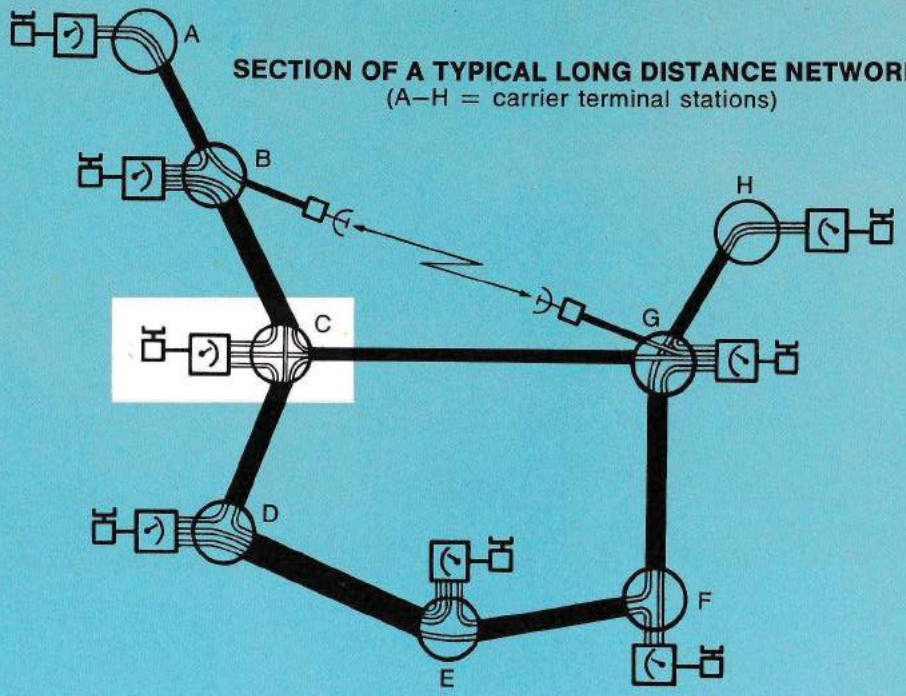
LM ERICSSON CARRIER TELEPHONE EQUIPMENT IN

M4

CONSTRUCTION PRACTICE

System planning guide



SECTION OF A TYPICAL LONG DISTANCE NETWORK
(A–H = carrier terminal stations)

INTRODUCTION

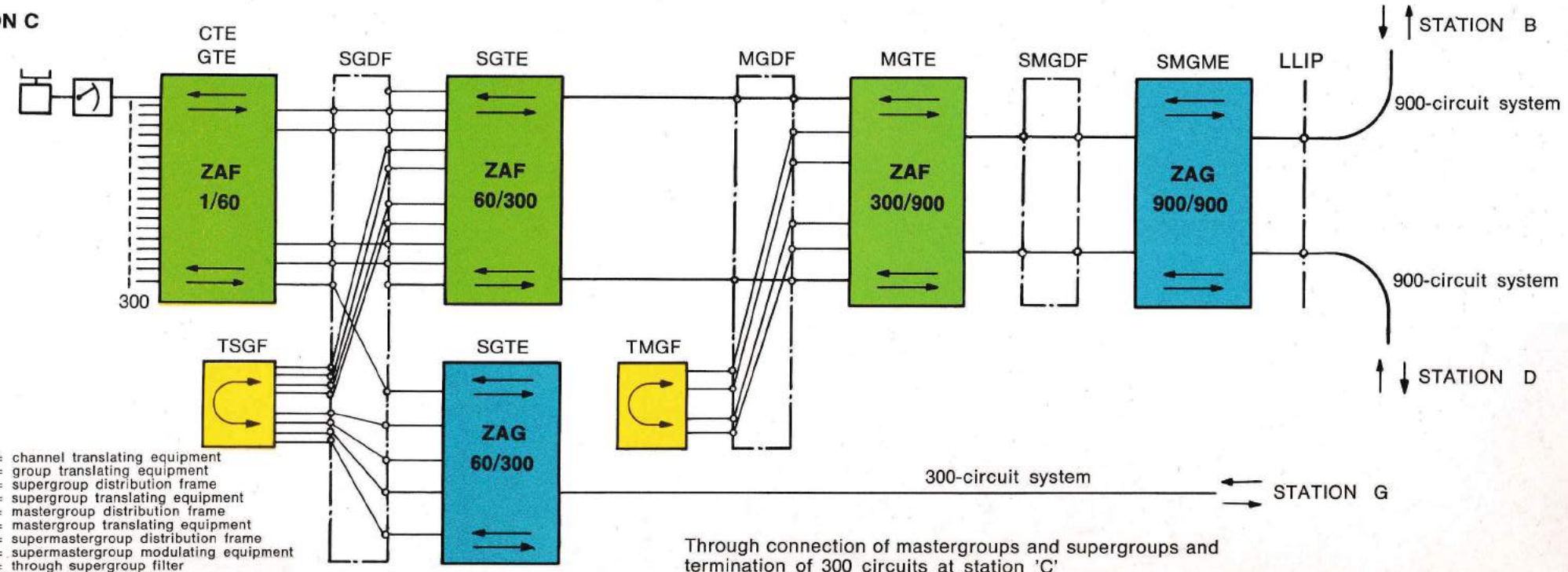
The rapid growth of modern carrier telephone traffic and the ever-increasing complexity of carrier stations and long-distance networks have led to new methods for system and station planning. These together with a drastic standardization of transmission equipment achieved in L M Ericsson's new construction practice, M4, give optimum flexibility in planning and installation.

Instead of arranging each carrier terminal as a separate entity within a main terminal station, it has proved more rational and economical to divide the total terminal multiplexing equipment into a number of homogeneous subsystems each performing a specific function and which can be shared by all the carrier systems converging at the station.

Each subsystem consists of a number of mechanical building blocks, prewired shelves or shelf stacks, which are mounted in standardized bay frames. A station is built up by installing as many shelves or shelf stacks as required to meet the total traffic demands. It can be subsequently built out to keep pace with any conceivable increase in traffic volume.

This flip-chart illustrates these new methods of system and station planning. Further details are given in a series of leaflets, separate subsystem descriptions and reprints of Ericsson Review articles.

STATION C



CTE = channel translating equipment
GTE = group translating equipment
SGDF = supergroup distribution frame
SGTE = supergroup translating equipment
MGDF = mastergroup distribution frame
MGTE = mastergroup translating equipment
SMGDF = supermastergroup distribution frame
SMGME = supermastergroup modulating equipment
TSGF = through supergroup filter
TMGF = through mastergroup filter
LLIP = line link interconnection point

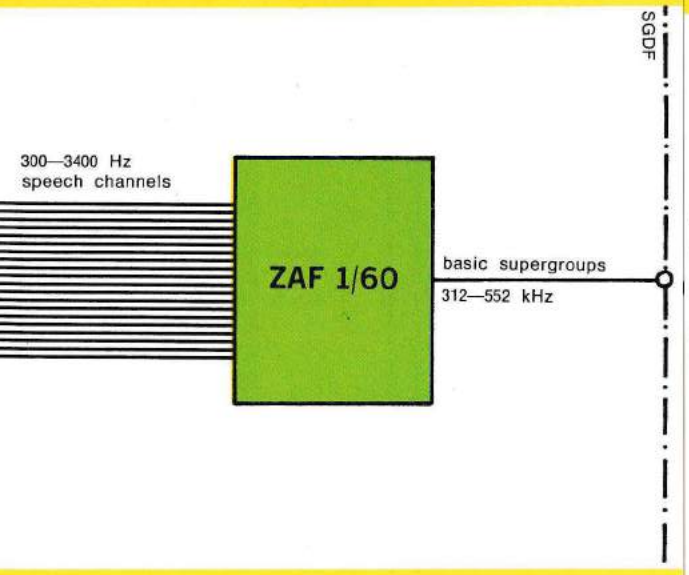
Through connection of mastergroups and supergroups and termination of 300 circuits at station 'C'

TSGF = through supergroup filter
TMGF = through mastergroup filter
LLIP = line link interconnection point

termination of 300 circuits at station 'C'

ZAF 1/60

MULTIPLEX SUBSYSTEM
assembles speech channels into 60—108 kHz basic groups, which in turn are assembled into 312—552 kHz basic supergroups, and vice versa



ZFF 11501

channel and group translating shelf stack (capacity: 60 ccts /1 SG)

ZFF 10305

channel and group carrier supply for max. 300 speech circuits

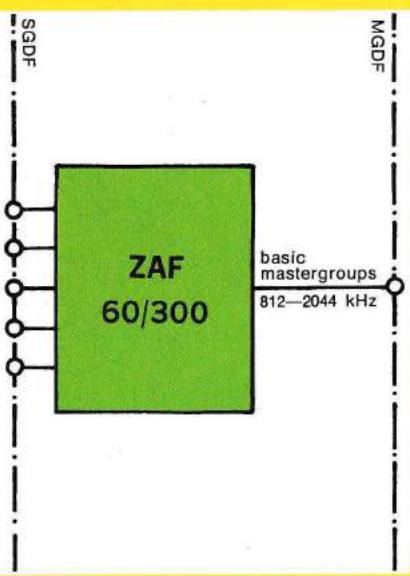
ZFF 10303

pilot receiving shelf 84.08 kHz (optional) 1 per transl. bay

Four ZFF 11501 + one ZFF 10305 can be housed in one bay frame = 240 channels/bay.

ZAF 60/300

MULTIPLEX SUBSYSTEM
assembles basic supergroups into 812—2044 kHz basic mastergroups and vice versa



ZFF 10601

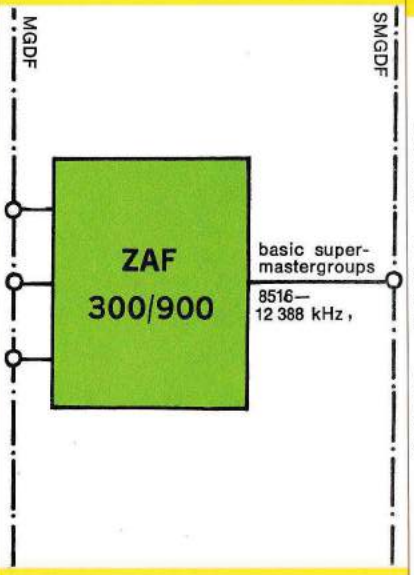
SG translating shelf stack (capacity: 5 SG's/1 MG)

ZFF 10303

pilot receiving shelf 411.92 kHz (optional) 1 per transl. bay

ZAF 300/900

MULTIPLEX SUBSYSTEM
assembles basic mastergroups into 8516—12 388 kHz basic supermastergroups and vice versa



ZFF 10902

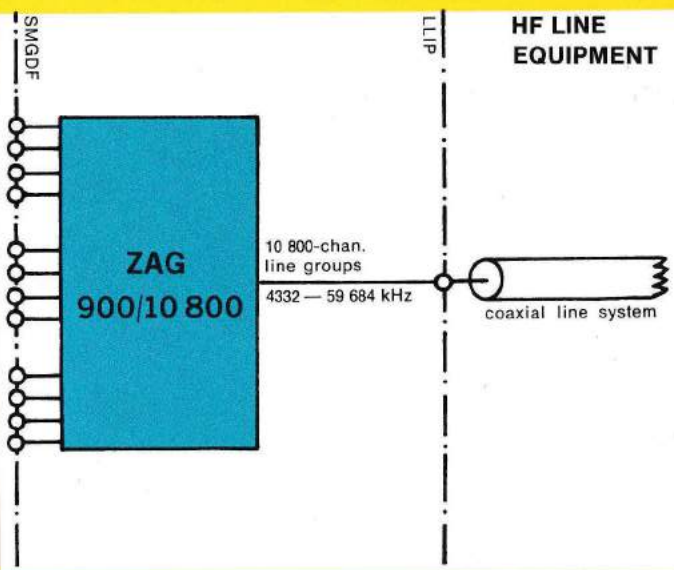
MG translating shelf stack (capacity: 3 MG's/ 1 SMG)

ZFF 10304

pilot receiving shelf 1552 kHz (optional) 1 per transl. bay

ZAG 900/10 800

MULTIPLEX SUBSYSTEM
assembles basic supermastergroups into 4332—59 684 kHz 10 800-channel line groups and vice versa



ZFG 11201

SMG translating shelf stack (SMG 2—5)

ZFG 11202

SMG translating shelf stack (SMG 6—9)

ZFG 11503

SMG translating shelf stack (SMG 10—13)

ZFG 10308

4-SMG combining/ separating shelf

ZFF 10304

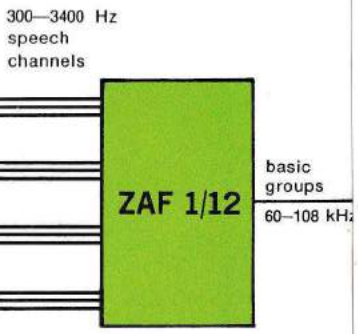
pilot receiving shelf 1552 kHz (1 per translating bay)

The above equipment can be housed in one bay frame.
Capacity: 12 SMG's/one 10 800-chan. LG

termination of 300 circuits at station 'C'

ZAF 1/12

MULTIPLEX SUBSYSTEM
assembles speech channels into 60–108 kHz basic groups and vice versa



ZFF 10301 — channel translating shelf (capacity: 12 sp. ccts/1 basic G) For small-capacity systems

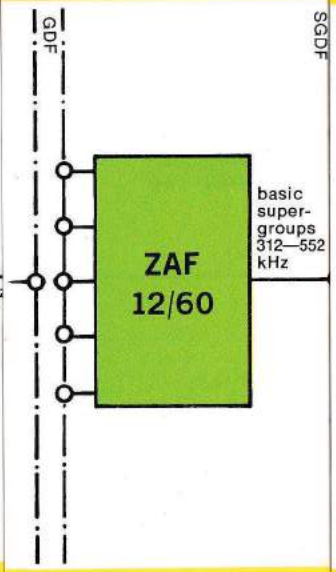
or: ZFF 11501 (excl. GTE) — channel translating equipment. (60 ccts/ 5 basic G's) For small-capacity systems where conversion into ZAF 1/60 is contemplated.

ZFF 10317 — frequency generating shelf (with 12 kHz master osc.) 1 per translating bay

or: ZFF 10305 — carrier generating shelf (without master osc.) 1 per translating bay

ZAF 12/60

MULTIPLEX SUBSYSTEM
assembles basic groups into 312–552 kHz basic supergroups and vice versa

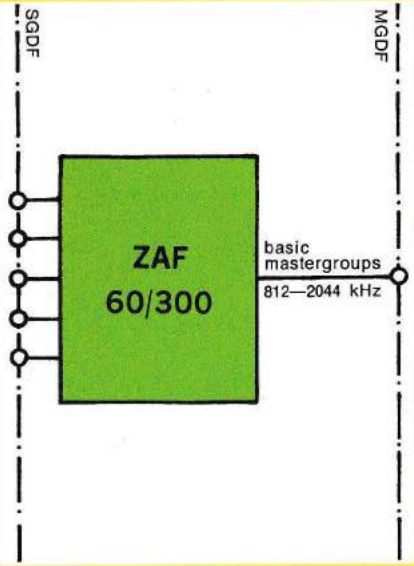


ZFF 10306 — group translating shelf (incl group carrier gen.) Capacity 5 G's/1 SG

ZFF 10303 — pilot receiving shelf 84.08 kHz (optional) 1 per transl. bay

ZAF 60/300

MULTIPLEX SUBSYSTEM
assembles basic supergroups into 812–2044 kHz basic mastergroups and vice versa

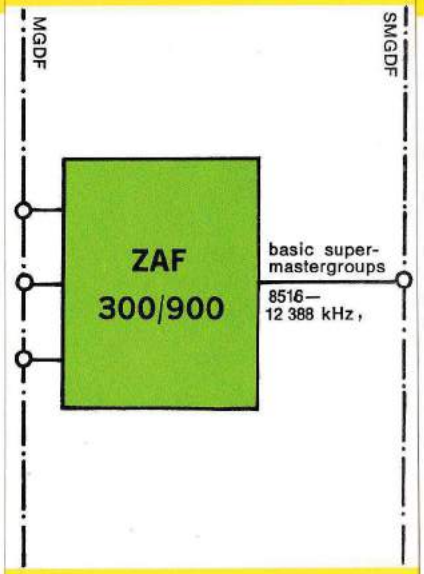


ZFF 10601 — SG translating shelf stack (capacity: 5 SG's/1 MG)

ZFF 10303 — pilot receiving shelf 411.92 kHz (optional) 1 per transl. bay

ZAF 300/900

MULTIPLEX SUBSYSTEM
assembles basic mastergroups into 8516–12 388 kHz basic supermastergroups and vice versa

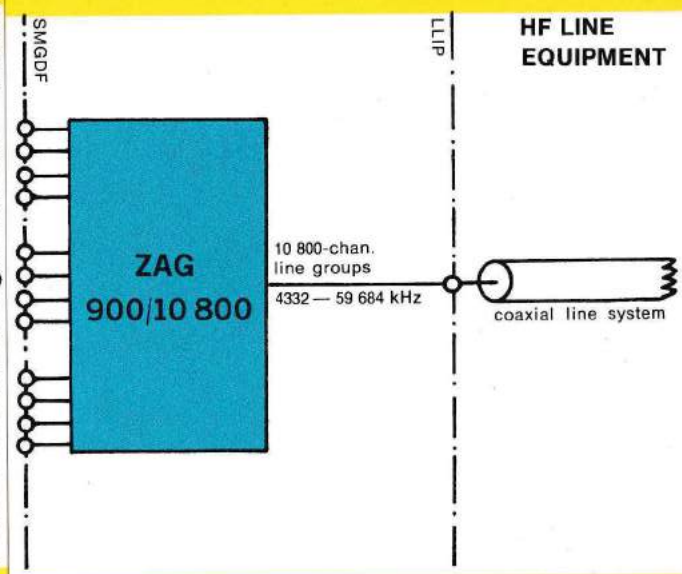


ZFF 10902 — MG translating shelf stack (capacity: 3 MG's/ 1 SMG)

ZFF 10304 — pilot receiving shelf 1552 kHz (optional) 1 per transl. bay

ZAG 900/10 800

MULTIPLEX SUBSYSTEM
assembles basic supermastergroups into 4332–59 684 kHz 10 800-channel line groups and vice versa



ZFG 11201 — SMG translating shelf stack (SMG 2—5)

ZFG 11202 — SMG translating shelf stack (SMG 6—9)

ZFG 11503 — SMG translating shelf stack (SMG 10—13)

ZFG 10308 — 4-SMG combining/ separating shelf

ZFF 10304 — pilot receiving shelf 1552 kHz (1 per translating bay)

The above equipment can be housed in one bay frame.
Capacity: 12 SMG's/one 10 800-chan. LG

TSGF = through supergroup filter
TMGF = through mastergroup filter
LLIP = line link interconnection point

termination of 300 circuits at station 'C'

ZAF 1/60

MULTIPLEX SUBSYSTEM

assembles speech channels into 60—108 kHz basic groups, which in turn are assembled into 312—552 kHz basic supergroups, and vice versa

ZAF 60/300

MULTIPLEX SUBSYSTEM

assembles basic supergroups into 812—2044 kHz basic mastergroups and vice versa

ZAF 300/900

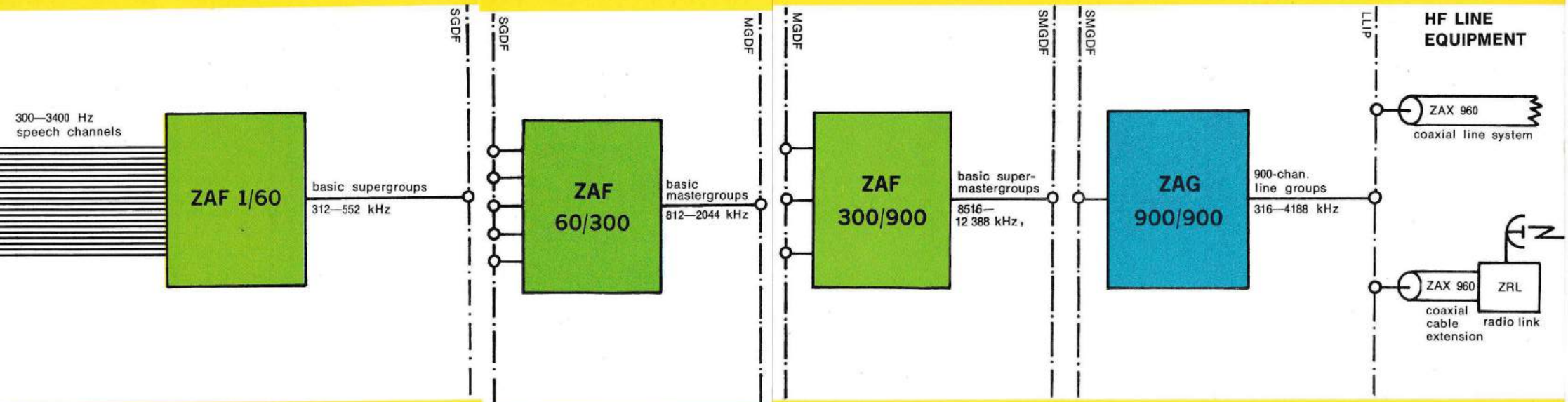
MULTIPLEX SUBSYSTEM

assembles basic mastergroups into 8516—12 388 kHz basic supermastergroups and vice versa

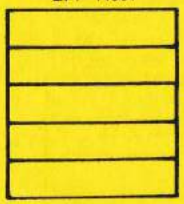
ZAG 900/900

MULTIPLEX SUBSYSTEM

converts basic supermastergroups into 316—4188 kHz 900-channel line groups and vice versa

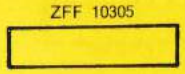


ZFF 11501



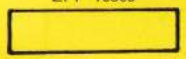
channel and group translating shelf stack (capacity: 60 ccts /1 SG)

ZFF 10305



channel and group carrier supply for max. 300 speech circuits

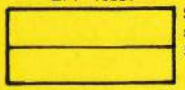
ZFF 10303



pilot receiving shelf 84.08 kHz (optional) 1 per transl. bay

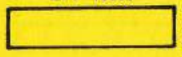
Four ZFF 11501 + one ZFF 10305 can be housed in one bay frame = 240 channels/bay.

ZFF 10601



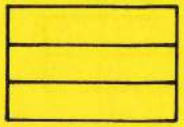
SG translating shelf stack (capacity: 5 SG's/1 MG)

ZFF 10303



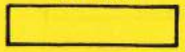
pilot receiving shelf 411.92 kHz (optional) 1 per transl. bay

ZFF 10902



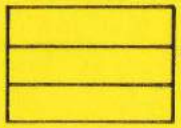
MG translating shelf stack (capacity: 3 MG's/ 1 SMG)

ZFF 10304



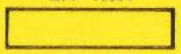
pilot receiving shelf 1552 kHz (optional) 1 per transl. bay

ZFG 10901



SMG modulating shelf stack (capacity: 1 SMG/one 900-chan. LG)

ZFF 10304



pilot receiving shelf 1552 kHz (optional) 1 per translating bay

TSGF = through supergroup filter
TMGF = through mastergroup filter
LLIP = line link interconnection point

termina

ZAF 1/60

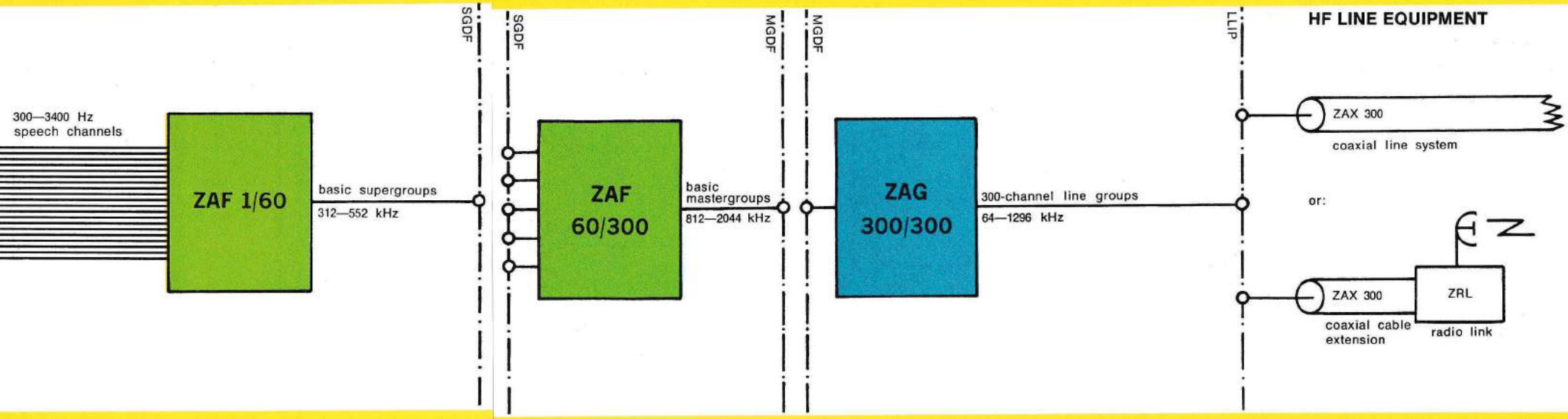
MULTIPLEX SUBSYSTEM
assembles speech channels into 60—108 kHz basic groups, which in turn are assembled into 312—552 kHz basic supergroups, and vice versa

ZAF 60/300

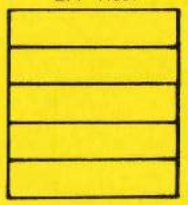
MULTIPLEX SUBSYSTEM
assembles basic supergroups into 812—2044 kHz basic mastergroups and vice versa

ZAG 300/300

MULTIPLEX SUBSYSTEM
converts basic mastergroups into 64—1296 kHz 300-channel line groups and vice versa

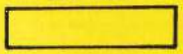


ZFF 11501



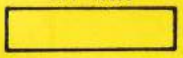
channel and group translating shelf stack (capacity: 60 ccts /1 SG)

ZFF 10305



channel and group carrier supply for max. 300 speech circuits

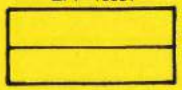
ZFF 10303



pilot receiving shelf 84.08 kHz (optional) 1 per transl. bay

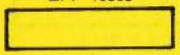
Four ZFF 11501 + one ZFF 10305 can be housed in one bay frame = 240 channels/bay.

ZFF 10601



SG translating shelf stack (capacity: 5 SG's/1 MG)

ZFF 10303

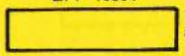


pilot receiving shelf 411.92 kHz (optional) 1 per transl. bay

ZFG 10602

MG modulating shelf stack (capacity: 1 MG/one 300-chan. LG)

ZFF 10304



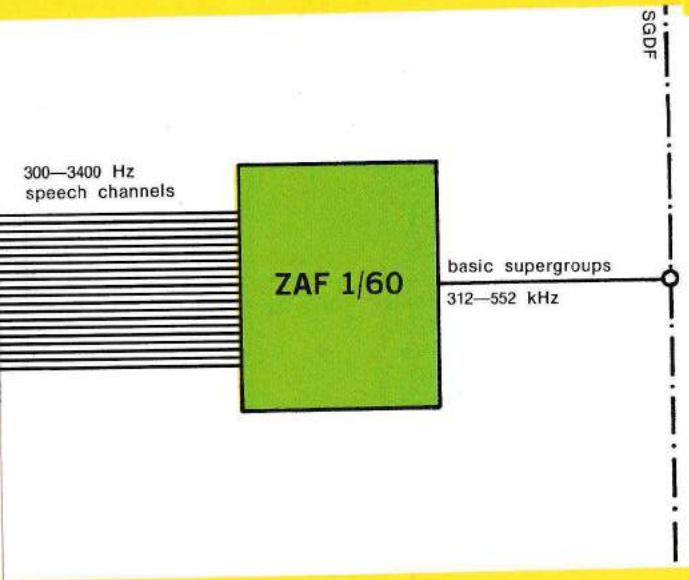
pilot receiving shelf 1552 kHz (optional) 1 per transl. bay

TSGF = through supergroup filter
TMGF = through mastergroup filter
LLIP = line link interconnection point

ZAF 1/60

MULTIPLEX SUBSYSTEM

assembles speech channels into 60—108 kHz basic groups, which in turn are assembled into 312—552 kHz basic supergroups, and vice versa



ZFF 11501

channel and group translating shelf stack (capacity: 60 ccts /1 SG)

ZFF 10305

channel and group carrier supply for max. 300 speech circuits

ZFF 10303

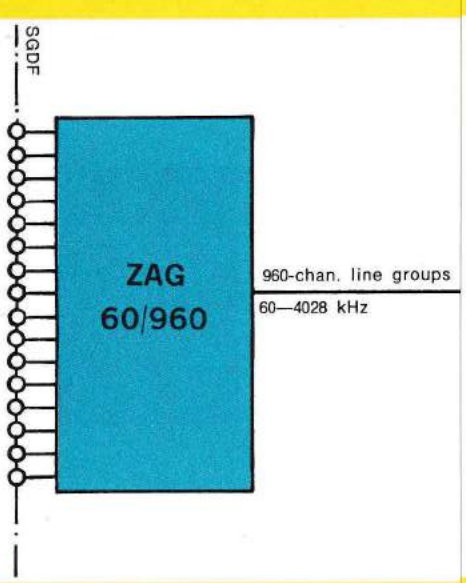
pilot receiving shelf 84.08 kHz (optional) 1 per transl. bay

Four ZFF 11501 + one ZFF 10305 can be housed in one bay frame = 240 channels/bay.

ZAG 60/960

MULTIPLEX SUBSYSTEM

assembles basic supergroups into 60—4028 kHz 960-channel line groups and vice versa



ZFG 11501

SG translating shelf stack (capacity: 16 SG's/one 960-chan. LG)

ZFF 10303

pilot receiving shelf 411.92 kHz (optional) 1 per transl. bay

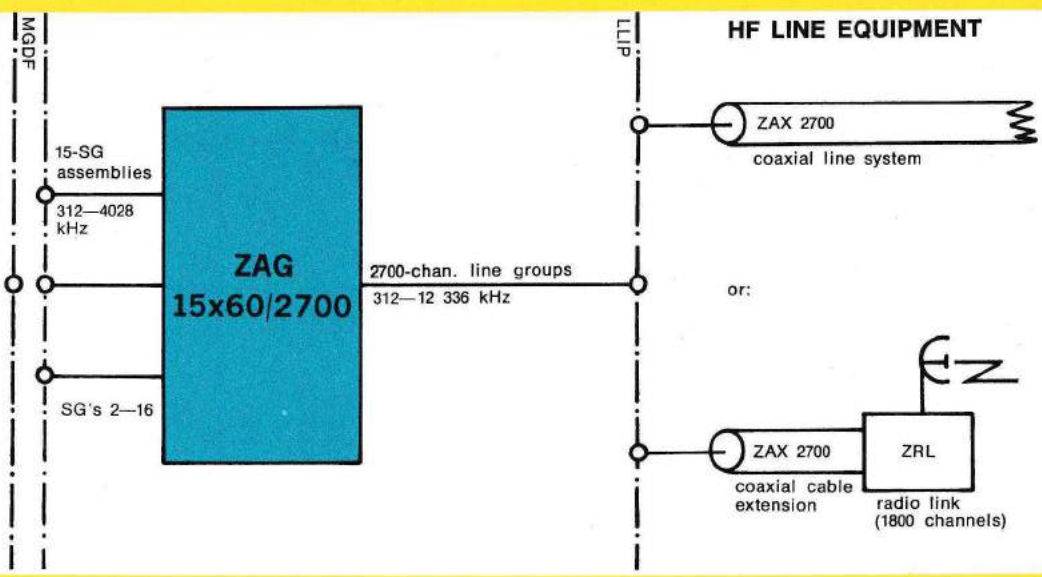
ZFF 10304

pilot receiving shelf 1552 kHz (optional) 1 per transl. bay.

ZAG 15x60/2700

MULTIPLEX SUBSYSTEM

assembles basic 15-supergroup assemblies into 312—12 336 kHz 2700-channel line groups and vice versa. (See also ZAG 900/2700 for alternative arrangement on a MG basis).



ZFG 11203

15-SG translating shelf stack (capacity: three 15-SG assemblies/ one 2700-chan. LG)

ZFF 10304

pilot receiving shelf 1552 kHz (optional) 1 per transl bay

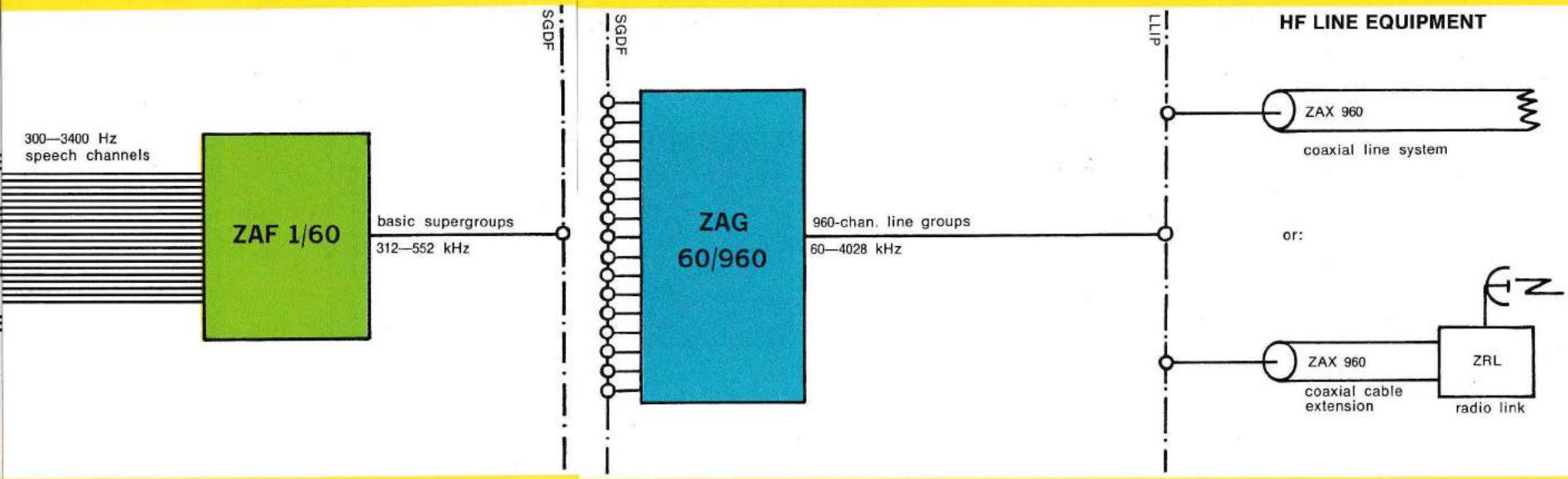
TSGF = through supergroup filter
TMGF = through mastergroup filter
LLIP = line link interconnection point

ZAF 1/60

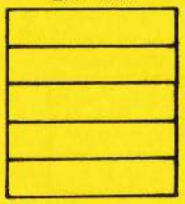
MULTIPLEX SUBSYSTEM
assembles speech channels into 60—108 kHz basic groups, which in turn are assembled into 312—552 kHz basic supergroups, and vice versa

ZAG 60/960

MULTIPLEX SUBSYSTEM
assembles basic supergroups into 60—4028 kHz 960-channel line groups and vice versa

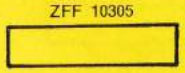


ZFF 11501



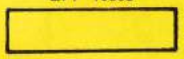
channel and group translating shelf stack (capacity: 60 ccts /1 SG)

ZFF 10305



channel and group carrier supply for max. 300 speech circuits

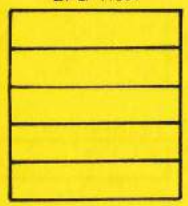
ZFF 10303



pilot receiving shelf 84.08 kHz (optional) 1 per transl. bay

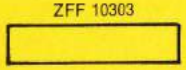
Four ZFF 11501 + one ZFF 10305 can be housed in one bay frame = 240 channels/bay.

ZFG 11501



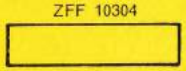
SG translating shelf stack (capacity: 16 SG's/one 960-chan. LG)

ZFF 10303



pilot receiving shelf 411.92 kHz (optional) 1 per transl. bay

ZFF 10304



pilot receiving shelf 1552 kHz (optional) 1 per transl. bay.

ZAF 1/12

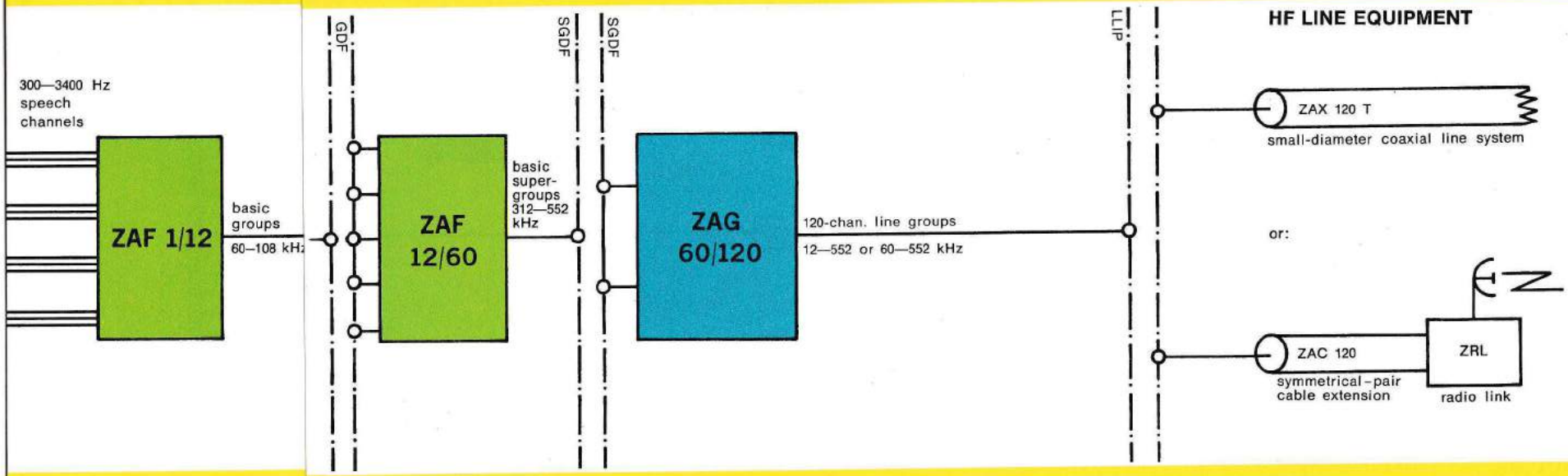
MULTIPLEX SUBSYSTEM
assembles speech channels into 60–108 kHz basic groups and vice versa

ZAF 12/60

MULTIPLEX SUBSYSTEM
assembles basic groups into 312–552 kHz basic supergroups and vice versa

ZAG 60/120

MULTIPLEX SUBSYSTEM
assembles basic supergroups into 12–552 or 60–552 kHz 120-channel line groups and vice versa



ZFF 10301 — channel translating shelf (capacity: 12 sp. ccts/1 basic G) For small-capacity systems

or: ZFF 11501 (excl. GTE) — channel translating equipment. (60 ccts/5 basic G's) For small-capacity systems where conversion into ZAF 1/60 is contemplated.

ZFF 10317 — frequency generating shelf (with 12 kHz master osc.) 1 per translating bay

or: ZFF 10305 — carrier generating shelf (without master osc.) 1 per translating bay

ZFF 10306 — group translating shelf (incl. group carrier gen.) Capacity: 5 G's/1 SG

ZFF 10303 — pilot receiving shelf 84.08 kHz (optional) 1 per transl. bay

ZFG 10303 — SG translating shelf (capacity: 2 SG's/one 120-chan. LG)

ZFF 10311 — frequency generating shelf

ZFF 10303 — pilot receiving shelf (optional) 1 per transl. bay

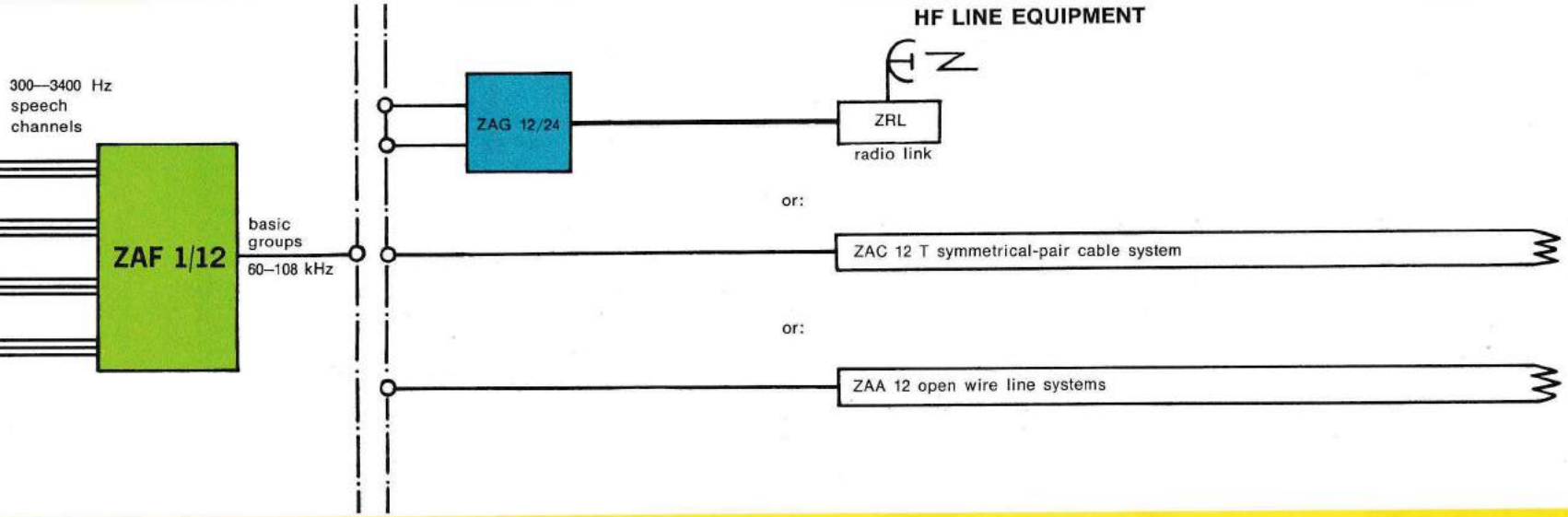
A complete 120-circuit terminal can be housed in a single bay frame.

ZAF 1/12

MULTIPLEX SUBSYSTEM
assembles speech channels into 60–108 kHz basic groups and vice versa

ZAG 12/24

MULTIPLEX SUBSYSTEM
assembles basic groups into 60–108 or 12–108 kHz 24-channel line groups and vice versa.



ZFF 10301 — channel translating shelf (capacity: 12 sp. ccts/1 basic G) For small-capacity systems

or: ZFF 11501 (excl. GTE) — channel translating equipment. (60 ccts/ 5 basic G's) For small-capacity systems where conversion into ZAF 1/60 is contemplated.

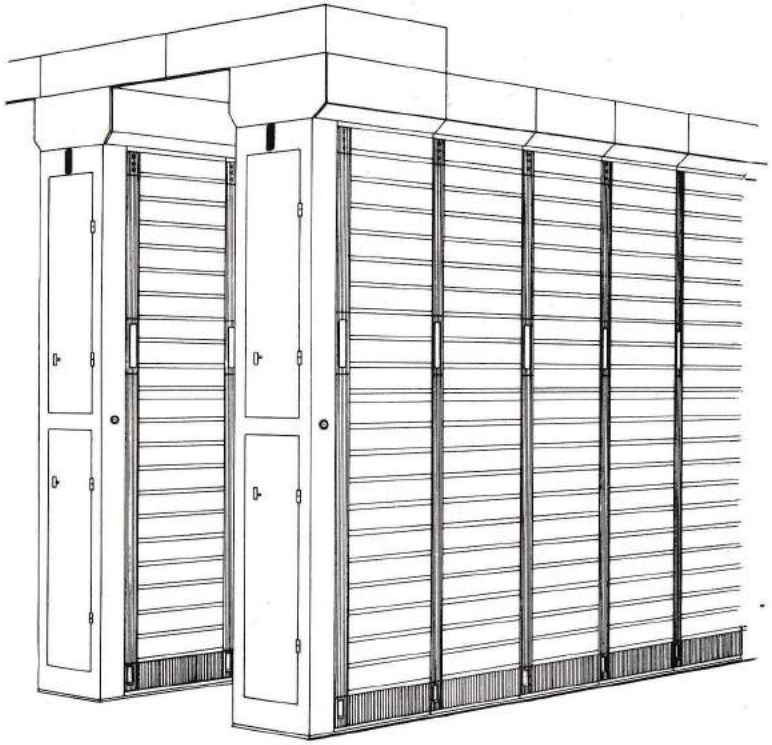
ZFF 10317 — frequency generating shelf (with 12 kHz master osc.) 1 per translating bay

or: ZFF 10305 — carrier generating shelf (without master osc.) 1 per translating bay

ZFG 10306 — group translating shelf for ZAG 12/24

group translating and terminal repeater shelf stack for ZAC 12 and ZAA 12L

group translating and terminal repeater shelf stack for ZAA 12



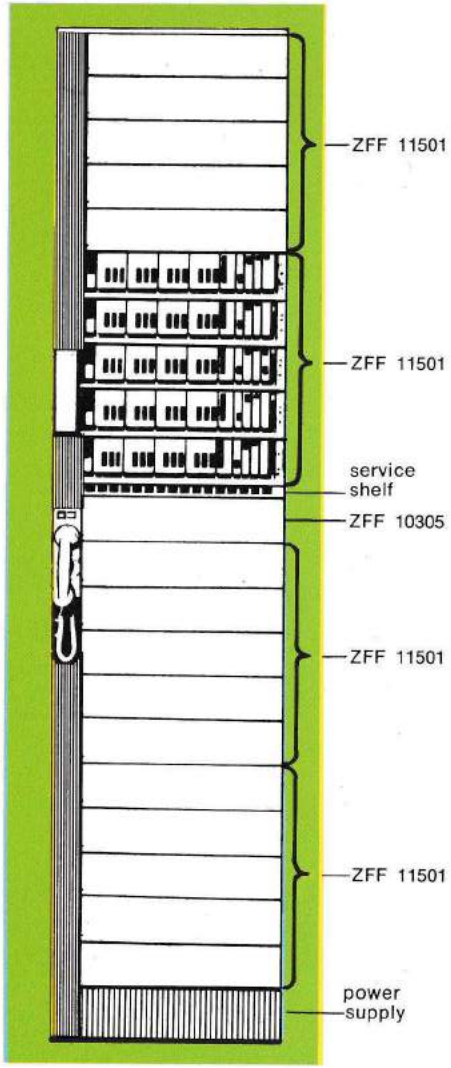
THE M4 BAY FRAME

In the M4 construction practice the conventional all-welded bay has been replaced by bay frames mounted in a suite framework.

The bay frames consist of two uprights, and top and bottom members. The left-hand upright accommodates the station cabling while the right-hand upright is supplied prewired with the internal bay cabling.

The shelves and shelf stacks are mounted in the bay frame and connected to the bay and station cabling by means of plug and jack.

An M4 bay frame can accommodate a maximum of 21 shelves + 1 service shelf + 1 power supply shelf alt. 19 shelves + 1 service shelf + 2 power supplies.



Section of a ZAF 1/60 multiplex subsystem comprising an M4 bay with four ZFF 11501 channel and group translating shelf stacks, one ZFF 10305 carrier generating shelf, service shelf and power supply = 240 speech channels translated into four 312–552 kHz basic supergroups.

FREQUENCY GENERATION

The frequency supplies for medium- and large-capacity carrier terminals consist of two sections:

- a centralized basic and pilot frequency supply common to the whole station, and
- decentralized, local carrier supplies incorporated in the various modulation stages of the station

Three main common frequency supply arrangements are available:

- ZAF 03, using a 12 kHz master oscillator, for 300-cct carrier systems
- ZAF 01, using a 124 kHz master oscillator, for 300-, 900/960- and 2700-cct systems (two versions)
- ZAF 04, using a 2500 kHz master oscillator, for 2700- and 10 800-cct systems

In small-capacity carrier terminals providing up to 120 circuits, the frequency generating equipment is built into the individual carrier system, so as to make it self-contained.

DISTRIBUTION AND THROUGH CONNECTION

According to the capacity of the station, the distribution equipment can be accommodated in shelves or bays.

A **distribution shelf** permits ten direct two-way connections to be made between a higher translation stage and a lower one. Alternatively, through connection filters can be connected as required.

A **distribution bay** permits up to 200 frequency blocks to be connected on each side of the bay, cross connections being made by means of patch cords or U-links.

A **through filter shelf** provides facility for the through connection of one basic G, SG, MG or SMG in each direction of transmission.

FS REKLAM/ALLKOPIA

LM ERICSSON TELEPHONE COMPANY
LONG DISTANCE DIVISION
S-126 11 STOCKHOLM 32 · SWEDEN