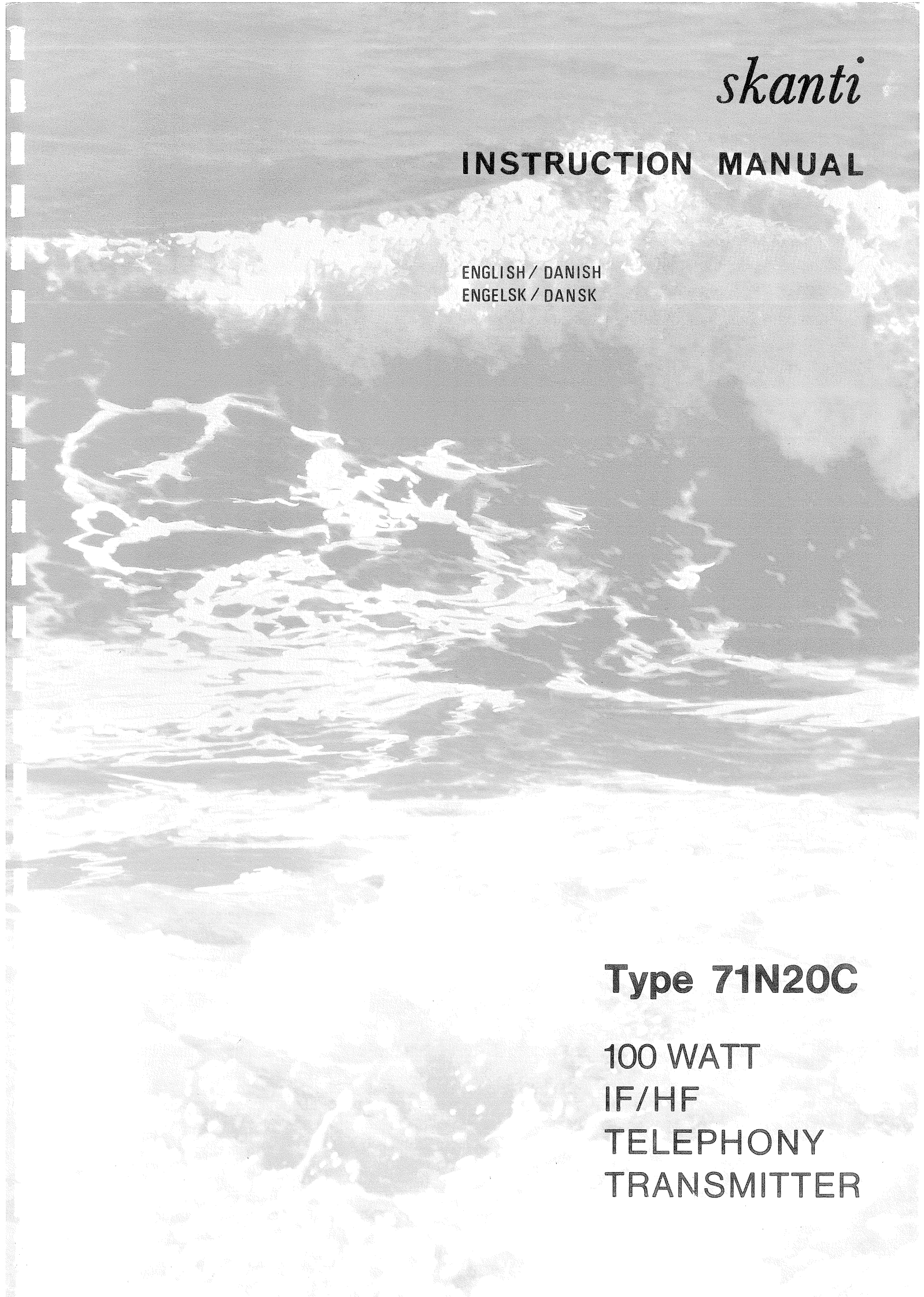


skanti

INSTRUCTION MANUAL

ENGLISH / DANISH
ENGELSK / DANSK

Type 71N20C

100 WATT
IF/HF
TELEPHONY
TRANSMITTER

skanti

INSTRUCTION MANUAL 71N20C

INSTRUKTIONSBOG 71N20C

The 71N20C transmitter is NO. 4 in a series of almost identical transmitters. As shown in this tabel only number of frequencies and frequency range deviate from the original 71C13:

71N20C senderen er nr. 4 i en serie af næsten identiske sendere. Som vist i denne tabel afviger kun frekvensantal og frekvensområde fra den oprindelige 71C13:

Type	Frequencies	Range
71C13	16	1,6- 3,8 MHz
71N20	16	1,6-12 MHz
71N20B	24	1,6-12 MHz
71N20C	24	1,6-16 MHz

SKANDINAVISK TELEINDUSTRI SKANTI A/S
ADDRESS: 34 KIRKE VAERLOESEVEJ, DK 3500 VAERLOESE, DENMARK · PHONE: (01) 48 25 44
CABLES: SKANTIRADIO, COPENHAGEN · TELEX: 6600 FOTEX DK, ATT. SKANTIRADIO COPENHAGEN

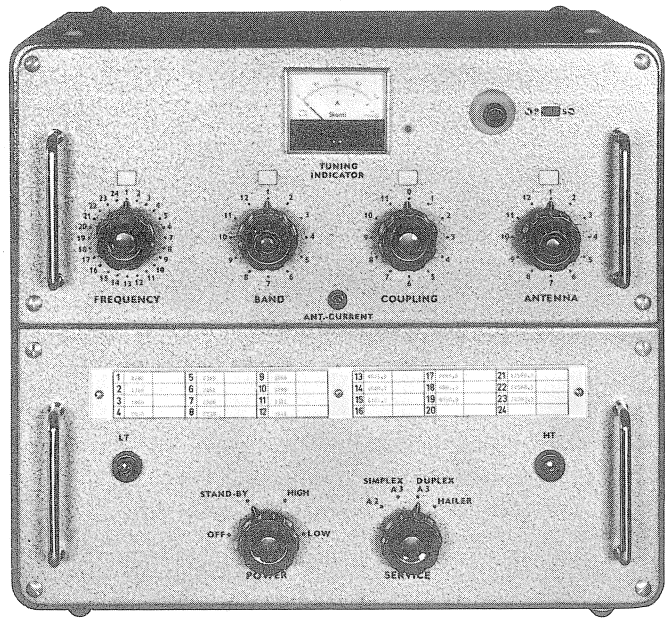
Gorm Helt-Hansen

Table of Contents (Indholdsfortegnelse)

Data Sheet 7IN20C - at the front of the manual (forrest i bogen)

skanti

Marine Radio Equipment **Data Sheet 71N20C**



Type 71N20C

100 WATT IF/HF TELEPHONY TRANSMITTER

APPLICATION

Working in the Coastal Telephony (IF) Band and the Maritime Short Wave (HF) Bands, the 71N20C is intended for Ship-to-Shore and Ship-to-Ship radio communication. The 71N20C also has provision for use as amplifier for a loud hailer. The design is based on the DISA 71C13 transmitter.

TECHNICAL DATA

Frequency Ranges

1600 - 1720 kHz in 1 band
1800 - 4180 kHz in 8 bands
8195 - 8280 kHz in 1 band
12330-12421 kHz in 1 band
16460-16560 kHz in 1 band

Fixed Frequencies

Up to 24 crystal-controlled frequencies which can be placed anywhere within the frequency ranges. Frequency stability is better than 0,005%.

Crystals

Fundamental working in the range 1,6 to 8,3 MHz. Half frequency working in the 12 and 16 MHz bands. Overall frequency tolerance: 0,003% (-20° to +70°C). Load capacitance: 30 pF. Holder according to American Military specifications, Type HC6U (pins: 1,3 mm, 0.051", spacing 12,35 mm, 0.486").

Antenna

1,6 - 12 MHz: Capacitance greater than 130 pF, resistance approx. 5 - 2000 ohms. This applies generally for antennas of lengths exceeding approx. 12 meters (40ft.).

1,6 - 16 MHz: Electrical length of antenna must be equal to or a little less than any odd number of a quarter of wavelength at 16 MHz. Thus corresponding to a physical length of approx. 13, 21, 30, 39 or 47 meters.

Output Power of Transmitter

90 - 100 watts of carrier power into antenna circuit at all frequencies in the range. Output may be reduced in one step to 1/10 or 1/4 power (according to regulations).

Output Power to Loud Hailer

Max. 50 watts. 15 watts of audio power into 15-ohm loudspeaker.

Types of Emission and Operation

Loud Hailing.
A3 (AM Telephony). Simplex or duplex.
A2 (MCW Telegraphy) is optional for frequencies in the Coastal Telephony Band (max. keying speed 30 Baud).

Modulation

Plate-and-screen modulation, average modulation depth 90%, over-modulation precluded through use of speech clipper providing approx. 10 dB volume compression for normal speech. Transmitted audio signal is essentially within 300 - 3000 c/s, frequencies above 3500 c/s attenuated 20 dB, above 5000 c/s approx. 40 dB. Noise and hum modulation: Suppression better than 40 dB below full modulation level.
Distortion: max. 5% at 100% modulation with 1500-cycle note. The distortion introduced by clipping is greater for frequencies below 1000 c/s. However, the distortion products do not impair speech quality nor do they fall outside the frequency channel.

Harmonic and Spurious Emissions

Suppression better than 40 dB below full carrier power.

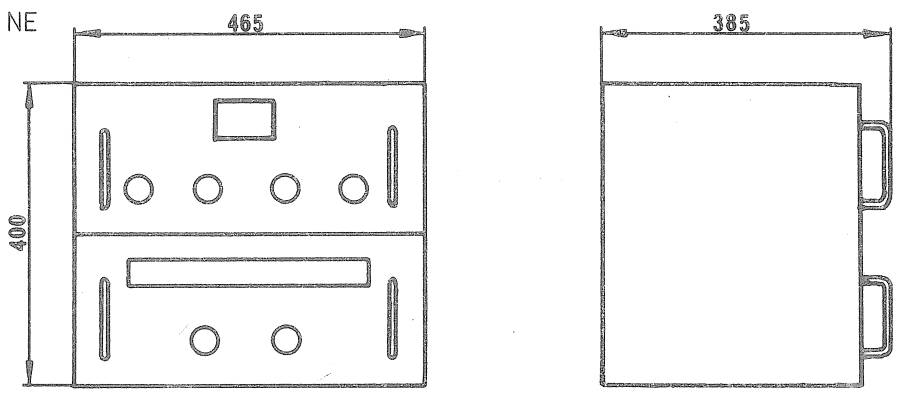
Tube Complement

RF oscillator:	1 x PCF 80 or 9A8
RF driver, PA and modulator:	6 x 6159
Clipper:	2 x 1S121 or OA202
Audio amplifier:	1 x ECC81 or 12AT7
Audio oscillator:	1 x ECC82 or 12AU7
Voltage regulators:	2 x OB2
Rectifiers:	2 x OA85

Dimensions and Weight

Width:	465 mm (18 3/8")
Height (excl. of shock absorbers):	400 mm (15 3/4")
Depth (incl. of knobs):	385 mm (15 3/16")
Overall Depth (installed, incl. of ventilation space behind cabinet):	420 mm (16 1/2")
Weight:	29 kg (54 lbs.)

DIMENSIONAL OUTLINE



Dimensions in mm

Power Supplies and Power Consumption

Supply Voltage	Heater Voltage	High Voltage	Total Consump.
24 volt DC	Battery	Transistor Converter R23	450 watts
	24 V DC, 3,0 amp.	550 V DC, 0,6 amp. max.	
110/220 volt DC	Rotary Converter EOK22 (S-192)		700 watts
	25 V DC, 3,0 amp.	550 V DC, 0,6 amp. max.	
3x220/380/440 volt	Power Pack F30		500 watts
	25 V DC, 3,0 amp.	550 V DC, 0,6 amp. max.	
110/220 volt AC	Power Pack available on special order		550 watts

SKANDINAVISK TELEINDUSTRI SKANTI A/S
ADDRESS: 34 KIRKE VAERLOESEVEJ, DK 3500 VAERLOESE, DENMARK · PHONE: (01) 48 25 44
CABLES: SKANTIRADIO, COPENHAGEN · TELEX: 6600 FOTEX DK, ATT. SKANTIRADIO COPENHAGEN

1. Introduction.

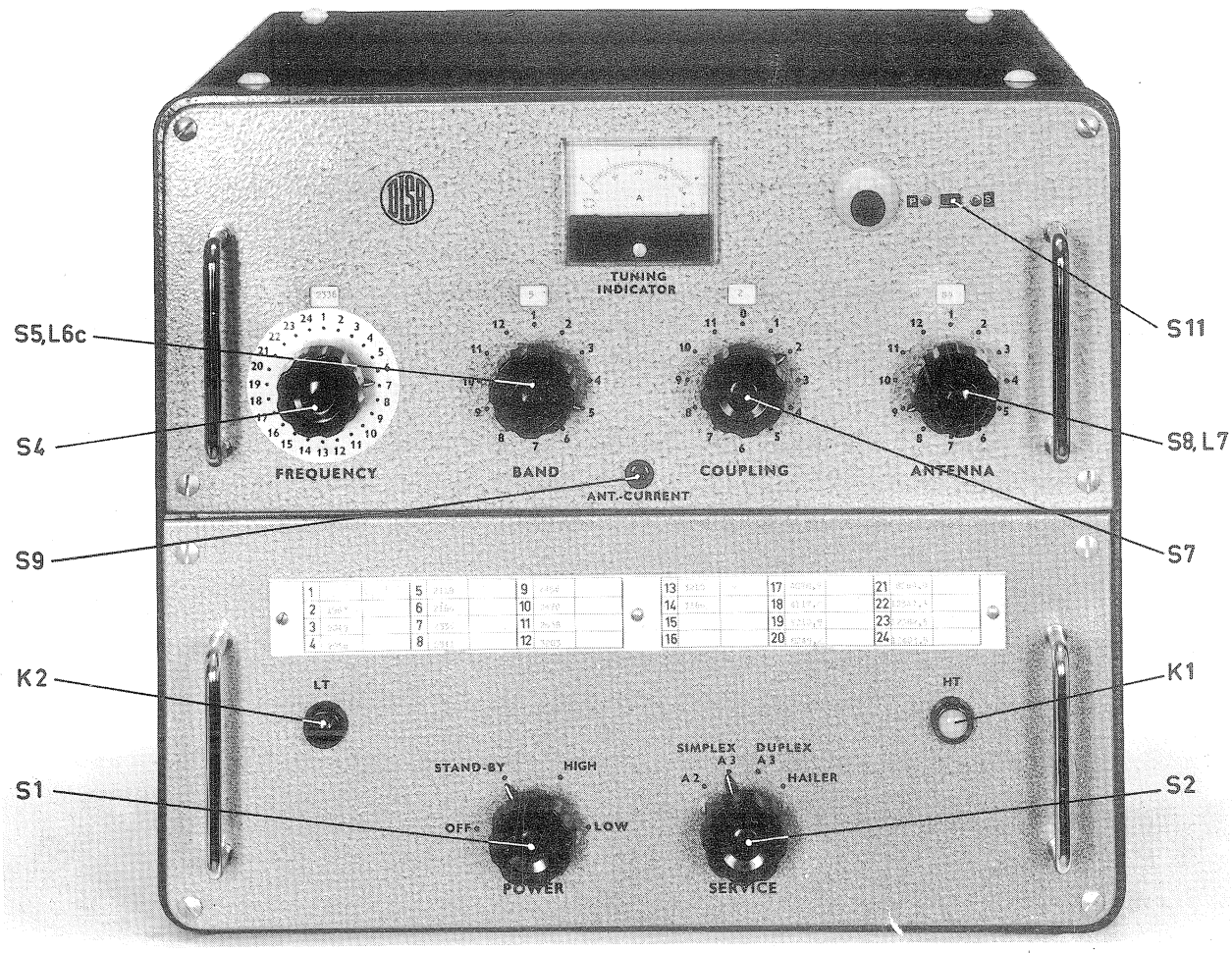
The 71N20C Telephony Transmitter is a 100-watt transmitter for ship-to-shore and ship-to-ship telephony communication. It has provision for modulated telegraphy for use in ships having telegraphists and may also be employed as a loud hailer amplifier.

The transmitter is crystal controlled on a maximum of 24 transmitting frequencies, which can be placed anywhere within the frequency range.

The transmitter delivers between 90 and 100 watts of carrier power to the antenna circuit which can be tuned to transfer power at maximum efficiency to antennas of length in excess of 12 meters.

The transmitter has automatic modulation control, which increases the effective average modulation percentage to 90 and prevents overmodulation. This means high get-through power and long range.

Best results will be obtained only if the installation has been carried out carefully, keeping strictly to the directions given by the factory. It is likewise important that the storage battery used for powering the transmitter should have adequate capacity and be kept in good condition at all times.



2. Technical Description.

2.1. For technical data see Data Sheet 7IN20C in the front of this manual.

2.2. Construction:

2.2.1. The chassis units are of heavy aluminum sheet and are located drawer-fashion in a steel cabinet. The drawers are provided with powerful guide rails on each side which slide on U-shaped rails in the cabinet. This system makes it possible to do service work on the transmitter with the drawers pulled almost all the way out. The U-shaped rails have no stops so as to make it possible to remove the drawers entirely from the cabinet. The drawers moreover have sturdy side walls to permit their being placed on a table with any desired side facing upwards.

2.2.2. The transmitter is connected to the rest of the installation and to the handset by means of a 24-contact terminal strip located on the inner side of the rear wall of the cabinet.

2.2.3. The antenna may be connected to the terminal on the front panel or to a knife contact through the rear wall of the cabinet. Where an antenna relay is used, the antenna may only be connected to the knife contact on the rear wall of the cabinet.

2.2.4. On the inner side of the rear wall of the cabinet is a plate on which the antenna relay may be conveniently mounted.

2.2.5. The ground wire is connected to a ground bolt located outside on the rear wall of the cabinet.

2.3. Circuit Details, RF Section.

2.3.1. See Drawing C-0038.

The RF oscillator, V II a, is crystal controlled and has sockets for 24 crystals. Crystals are selected by means of switch S4 (FREQUENCY). The oscillator is succeeded by a cathode follower, V II b, which is untuned.

2.3.2. The cathode follower output is fed to the driver tube V I2, whose plate inductances are L4, LII (8Mhz), LI2 (I2 MHz), and LI3 (I6 MHz). LI4 is a peaking coil for I6 MHz. S5 (BAND) selects circuit capacitances C46-53.

2.3.3. The driver output is fed to PA tubes VI3, VI4 and VI5, which operate Class C, self biased. The PA plate tank is a pi-section composed of capacitors C66-C67, fixed tapped coils L6a and L6b, aligment coil L6c, and capacitors C68, C83, C69, and C70. Coils and capacitors may be combined by means of switch S6, which is ganged to S5 (BAND). The alignment coil is adjusted by means of the small control located in the BAND switch knob.

2.3.4. The pi-section output capacitance, C70 has taps, selectable with switch S7 (COUPLING). By means of these taps the PA stage can be matched to resistive loads between 5 and 200 ohms.

2.3.5. The antenna tuner is used for matching and tuning the antenna so that the PA stage will work into a resistive load within the impedance range of 5-200 ohm. The antenna tuner consists of a number of tuning capacitors switched in by S8, and a variometer L7, the two coil-halves of which are either in parallel or in series by means of relay RYII which is energized with low voltage via switch SII marked "S" for series and "P" for parallel connections of L7a and L7b. The antenna variometer is adjusted by means of the small control located in the ANTENNA switch knob.

2.3.6. In order to avoid the presence of high voltage on the antenna in the event of short-circuits in the transmitter, a coil, LIO, has been added in such a manner that there will be a DC path between the antenna circuit and ground in such a situation.

2.3.7. The RF section incorporates a safety switch, SIO, which deenergizes the power pack starting relay so that the high voltage will be removed from the transmitter when the drawer is pulled out.

2.3.8. The built-in moving coil meter is normally inserted in the common PA-tube cathode lead, where it reads the total plate and screen current, thus serving as tuning indicator. By means of a push-button switch, the meter may be switched to read relative antenna current, measuring the rectified output from antenna current transformer TR5, which is wound on a ferrite core.

2.4. Circuit Details, Modulator Section:

2.4.1. See Drawing C-0034.

Audio signal is applied to microphone transformer TRI via switch S2 (SERVICE) - from the microphone: in the positions A3 SIMPLEX, A3 DUPLEX, and HAILER; from the audio tone generator: in the A2 position.

2.4.2. Microphone DC current comes from the -LT terminal, flows through resistors R2 and R3 and is filtered by capacitor C3. From there, it flows through the primary of the microphone transformer, TRI, and the microphone, from where it returns to +LT through the handset key. Capacitor CI passes the signal voltage while C2 acts as a bypass for RF.

2.4.3. The signal voltage is stepped up in transformer TRI and fed to the clipper circuit, which consists of two crystal diodes, VI and V2. When no signal is present, DC currents of equal value will flow through the diodes, the value of the total current being determined by resistor R4 and the value of the voltage delivered by regulator tubes V7 and V8. Therefore, equal positive voltages will be present at the diode cathodes.

2.4.4. When a signal is superimposed on the cathode voltage of V1, the current through that diode will increase or decrease (during the negative or the positive half-cycle, respectively), but since, as already mentioned, the sum of the currents through V1 and V2 is constant, the current through V2 must also vary, but opposite to the variations in V1. Consequently, the voltage at the cathode of V2 will follow the signal voltage but only within the limits determined by whether V2 draws no current or full current. Therefore, the voltage can only vary between zero and twice the value of the no-signal voltage.

2.4.5. The no-signal clipper voltage has been chosen so that approx. 10 db limiting will occur on peak values of normal voice output from the microphone. This results in dynamic compression, the greatest amplitudes being clipped most.

2.4.6. The amplitude and dynamic-regulated signal is amplified by tube V4a and fed through the filter L1-L2, which cuts off at approx. 3000 c/s. The filter removes distortion products introduced by the clipping process, whereupon the signal undergoes further amplification in V4b.

The output of V4b is fed to driver transformer TR2, which supplies drive to modulator tubes V5 and V6, which operate Class AB1 push-pull. The modulator tube cathodes are connected to -LT. When the key is pressed, +LT is connected to -HT. The modulator tube plates are connected to +HT; consequently, the modulator tube plates will receive 550 + 24 = 574 volts. The modulator tube screens receive voltage from two voltage regulator tubes, V7 and V8, which are in series.

2.4.7. 50 volts of negative grid bias must be applied to the modulator tubes to ensure proper performance. This bias is obtained from a secondary winding on the audio tone generator transformer, TR3, and is rectified by tube V3b. The bias is adjusted to the correct value by means of potentiometer P1 and is filtered by capacitor C15.

2.4.8. The modulator transformer, TR4, has three secondary windings: one to modulate the PA plates, one to modulate the PA screens, and a loudspeaker winding for hailer service. From this last-mentioned winding, a portion of the audio signal is fed through resistor R16 to the split cathode resistor of V4b. This arrangement provides inverse voltage feedback, which reduces the inherent distortion and plate circuit impedance of the modulator.

2.4.9. The audio tone generator for A2 consists of tube V3a and tramsformer TR3. The oscillator is tuned by capacitor C5 to produce a tone of approx. 1000 c/s. Inverse current feedback, produced by cathode resistor R10, is used with the oscillator. The audio signal is taken out from a low-impedance winding and fed to the microphone transformer primary via switch S2 (SERVICE) in the A2 position.

2.4.10. When the transmitter is in the key-down condition, -HT and +LT are connected together, as mentioned above. In the key-up condition, a 2 k ohm resistor, R34, is inserted between -HT and +LT. The cathodes of the tubes in the RF section are connected to +LT, and the grids in

the RF section are connected to -HT. The no-signal current through modulator tubes V5 and V6 produces a negative voltage across resistor R34, which serves as bias to block the tubes in the RF section. Resistor R34 is shorted when keying relay ReA is operated; this relay is energized via the contacts in the handset handle or, for A2 operation, by a telegraph key. When the key is up, resistor R32 is connected to +LT by means of keying relay ReA. R32 forms, together with resistor R87 in the RF section, a voltage divider which reduces the PA screen voltage during key-up intervals. When the tubes in the RF section are blocked, a pair of contacts on the keying relay short-circuits the signal in the speech amplifier.

2.4.11. Switch S1-6 is the HIGH-LOW switch. In the LOW position, the resistor R32 is connected permanently to +LT so that a voltage divider is formed, consisting of resistor R87 in the RF section and resistor R32. This voltage divider reduces the voltage applied to the screen grids of the PA tubes in the RF section. At the same time, switch contacts S1-4, S1-5 reduce the modulating power applied to the screen grids.

2.4.12. The modulator is provided with a safety switch identical with that employed in the RF section. The modulator safety switch is designated S3. It de-energizes the power pack starting relay if the modulator drawer is pulled out.

2.5. Circuit Details, Power Pack:

2.5.1. Storage battery operation (See drawing C-0046):

The transmitter receives filament power via switch S1-2, which is closed in positions STAND-BY, HIGH, and LOW. The transistor-converter starting relay receives power from +LT via safety switch S10 in the RF section and safety switch S3 in the modulator section, switch S1-3 as well as S2-3 or contacts of relay ReA.

2.5.2. For operation from 110 or 220 volts DC mains (see Drawing C-0047) the transmitter is powered from a motor generator which delivers both 550 volts DC and 25 volts DC. In this case, the motor-generator starting relay, R1, is connected to transmitter terminals 13 and 14, which are short-circuited by contacts S1-2. When the POWER switch leaves the OFF position, the motor-generator starts up, supplying low voltage for the transmitter. The motor-generator high-voltage relay, R2, is connected to transmitter terminal 11, and the motor-generator will therefore deliver high voltage only while the handset key is pressed, with the SERVICE switch in the A3 SIMPLEX or the HAILER position. If the SERVICE switch is in the A3 DUPLEX or the A2 position, the motor-generator will deliver power continuously.

2.5.3. For operation from 220/380/440 volt three-phase AC mains (see Drawing C-0047), the transmitter is powered from a mains-operated power pack. The low-voltage from this power pack is present as soon as the supply voltage is on. The high voltage relay RY1+2, is connected to transmitter terminal No. 11. The power pack will therefore deliver high voltage only while the handset key is depressed, with the SERVICE switch

in the A3 SIMPLEX or the HAILER position. If the SERVICE switch is in the A3 DUPLEX position, the power pack will deliver high voltage continuously.

3. Installation.

3.1. Possible Types of Installation.

These depend on the type of power supply available and are shown in the following diagrams (to be found at the back of this manual):

Telephony installation for storage battery operation:
Drawing No. C-0046.

Telephony installation for DC mains operation:
Drawing No. C-0047

Telephony installation for three-phase AC mains:
Drawing No. C-0047.

3.2. Location and Mounting.

Dimension sketches for these types of mounting are available:

Table-top mounting of transmitter and one or two receivers and, if desired, charging switchboard or rectifier: Drawing No. 7IC365.

Bulkhead mounting of transmitter and one or two receivers and, if desired, charging switchboard or rectifier: Drawing No. 7IC366.

3.3. Disassembling the Transmitter.

Release the four snap fasteners, located in the corners of each drawer, by turning them 90 degrees counterclockwise, using a large screwdriver. Pull out the lower drawer (the modulator drawer) and unplug the multiwire connectors located on the left-hand rear edge of the chassis. Both drawers may now be pulled all the way out and removed from the steel cabinet.

3.4. Connecting the Transmitter to the Permanent Installation.

Strip all cable ends behind the transmitter (except the antenna cable) of their outer covering and bring the free leads in through the aperture below the lower edge of the rear wall of the cabinet, taking care that the leads form a loop sufficiently large to take up any possible play between the transmitter and the bulkhead. Connect the leads to the terminals, checking the terminal numbers against the designations in the installation diagram (see 3.1. above).

3.5. Connecting the Handset.

Bring the Handset, which is terminated with a five-pin terminal strip, in below the rear wall of the cabinet and connect it to the large terminal strip at the terminals numbered 1-5.

3.6. RF Ground.

3.6.1. The transmitter ground bolt is located on the right-hand rear edge of the steel cabinet. It should be connected to the hull or, in wooden vessels, to an outside ground plate, which should be not less than 1 sq. m in size and located below the water line. For these connections, which should be as short as possible, broad copper strips or some similar heavy conductor having low RF resistance should be used.

3.6.2. Do not connect the transmitter ground bolt to the receiver ground bolt. The two units should be individually grounded, and when transmitter and receiver are bolted together as one unit, isolation parts must be used.

3.6.3. The RF ground connection involves no grounding af battery leads or mains leads, so there will be no flow of DC current from the battery through the ground wire.

3.7. Grounding the Battery.

If battery shall be grounded never connect the battery to ground at the transmitter. Wherever possible, the battery ground wire should go directly from the battery to ground. It makes no difference whether the plus or the minus terminal is grounded. The installation should be protected by fuses in the non-grounded conductor. Where the installation employs charging during operation through a dropping resistor from a balanced ship's mains, the battery must not be grounded at all, and the installation must be protected by fuses in both battery leads.

3.8. Transmitting Antenna.

3.8.1. Provided the transmitter shall operate in the frequency range 1,6 - 12 MHz only: Antenna capacitance should be greater than 130 pF and antenna resistance 5-2000 ohm. These figures are met by a single ended wire antenna having an effective length of not less than 12 meters.

If transmitter shall operate in the 16 MHz band also the matching to the antenna is more critical and great care in the installation must be taken. The electrical length of the antenna should be equal to or a little less than any odd number of a quarter of a wave length at 16 MHz. Thus corresponding to a total physical length of approx. 13, 21, 30, 39, or 47 meters, inclusive of lead-down wire and coaxial cable to transmitter. As mentioned in 3.9.3. the length of the coaxial cable should not exceed approx. 0,5 meter.

3.8.2. The antenna should be suspended in the clear, well away from objects that may have a varying influence on it (such as derricks etc.). Insulators should be high-grade types with low leakage even when wet.

3.9. Connecting the Antenna to the Transmitter.

3.9.1. The antenna should be terminated to a lead-in insulator in the roof or in the sidewall of the wheelhouse. If the distance between the insulator and the transmitter is more than 0,5 meter, then a piece of coppertube must be inserted between the lead-in insulator and a coaxial cable. The coppertube should be mounted on stand-off isolators. From the end of the coppertube connect a coaxial cable (see 3.9.3.) to the connecting plate located on the inside of the rear wall of the steel cabinet. This connecting plate has threaded holes to permit mounting an antenna relay if desired. The cable should be clamped to the bulkhead and brought in through the hole in the cabinet rear wall, forming a curve so as to prevent any water that may be running down the cable from getting into the transmitter. The cable end should be carefully stripped of insulation, leaving a large clearance (good insulation) between the shield and the bared inner conductor. The cable is grounded simply by leaving 1 cm of the shield braid bare at the point where the cable is to be held by the clamp. The cable inner conductor is soldered to the knife contact that connects the antenna down-lead to the transmitter drawer when this is pushed into place. If an antenna relay is to be used with the installation, the inner conductor should be soldered to the relay (see 3.10.).

3.9.2. In installations without built-in antenna relay the connection between the lead-in insulator and the transmitter may consist of a flexible insulated wire direct to the antenna terminal on the front panel of the transmitter.

3.9.3. When connecting the antenna to the transmitter, care should be taken to keep the inside connection to the antenna feed-through insulator as short as possible. If a coaxial cable is used, its length should not exceed approx. 0,5 meter as the cable may otherwise make it impossible to match the transmitter to a random length of antenna at the high frequencies at which the 7IN20C Transmitter can operate.

3.10. Receiving Antenna - Installing an Antenna Relay.

3.10.1. A separate receiving antenna, where used, should be suspended for minimum coupling to the transmitting antenna, in order to ensure satisfactory DUPLEX operation.

3.10.2. Where DUPLEX operation is not required, and where the transmitting antenna is to be utilized as receiving antenna while the transmitter is not in operation, it is necessary to install an antenna relay as shown in Drawing 7IR289.

When the key is pressed, the antenna relay operates, connecting the antenna to the transmitter. When the key is released, the antenna relay is de-energized, thus switching the antenna to the receiver.

3.10.3. Where it is desired to employ the transmitting antenna for extending a short receiving antenna for SIMPLEX operation it is likewise necessary to install an antenna relay as shown in Drawing 7IR289.

In SIMPLEX operation, the antenna relay operates as described in 3.10.2. In DUPLEX operation, the relay is kept constantly operated regardless of whether the key is pressed or not.

3.10.4. If, because of the direction-finding equipment on board, it is desired to insulate the transmitting antenna from the transmitter, the antenna relay should be wired as shown in Drawing 7IR289.

When the POWER switch is in the OFF or the STAND-BY position the relay coil is not energized, and the direction-finding equipment is powered via the relay contacts; the transmitting antenna is disconnected from the transmitter. When the POWER switch is in the HIGH or the LOW position, the relay is operated, and the direction-finding power supply is disconnected; the transmitting antenna is connected to the transmitter.

3.11. Installing a Hailer.

3.11.1. The outside loudspeaker should be placed for minimum acoustic feedback to the spot where the microphone is to be located.

3.11.2. The voltage delivered by the 7IN20C to the loudspeaker is 15 volts, and is virtually independent of the loudspeaker impedance. The amount of power that will be handled by the loudspeaker is therefore determined by the loudspeaker impedance. The impedance may be calculated from the formula $R = \frac{225}{P}$, where R is the loudspeaker impedance and P is the desired loudspeaker power. The maximum audio power obtainable from the 7IN20C is approx. 25 watts.

3.12. Installing a Charging Switchboard.

3.12.1. In ships with DC or AC mains the telephony equipment may be installed in conjunction with a charging switchboard for automatic charging of the 24-volt battery. See the charging switchboard instructions manual for data and wiring details.

3.12.2. The dimensions of the charging switchboard match those of the transmitter and the receiver so as to permit locating it conveniently under one of these two units.

4. Operating Instructions.

4.1. Operating Controls (Fig. 1 on page 1)

Fig. 1 shows a front view of the transmitter. It consists of two chassis units, mounted drawer-fashion in a steel cabinet. The upper drawer, the TRANSMITTER DRAWER, carries the high-frequency oscillator and amplifier as well as operating controls for frequency selection and tuning. The lower drawer, the MODULATOR DRAWER, houses the audio amplifier as well as starter switch and function selector.

S1: POWER has these positions:
OFF: No power is applied.
STAND-BY: Tube filaments receive power; LT lamp glows.
HIGH: Transmitter delivers full power; HT lamp glows too.
LOW: Transmitter delivers reduced power, HT lamp glows too.

S2: SERVICE has these positions:
A2: Tone telegraphy (MCW).
A3 SIMPLEX.
A3 DUPLEX.
HAILER: Modulator is used as amplifier for a hailer loudspeaker.

S4: FREQUENCY: frequency selector.

S5: BAND: coarse adjustment of RF circuits of transmitter.

S7: COUPLING: matches transmitter to antenna.

S8: ANTENNA: coarse adjustment of antenna circuit.

Switch S11, located above the window for the ANTENNA switch, S8, has two positions marked "S" and "P". This switch is used in conjunction with S8 for coarse tuning of the antenna circuit. "S" designates series connection of the two coils of the variometer (maximum inductance) while "P" designates parallel connection (minimum inductance).

L6c: fine adjustment of RF circuits of transmitter.

L7: fine adjustment af antenna circuit.

S9: ANT-CURRENT: When this button is depressed, the TUNING INDICATOR meter reads relative antenna current. When the button is not depressed, the meter serves as tuning inducator, reading power amplifier cathode current.

K1: HT, neon lamp which glows when high voltage is applied to the transmitter.

K2: LT, pilot lamp which glows when low voltage is applied to the transmitter.

4.2. Starting Up.

4.2.1. Set POWER switch to STAND-BY. Red LT lamp glows.

4.2.2. Find, from the frequency table on the modulator drawer front panel, the frequency number of the desired transmitting frequency.

4.2.3. Set FREQUENCY switch to frequency number found as per 4.2.2. This will cause the transmitting frequency to appear in the window above the FREQUENCY switch, and figures will appear in the other window to indicate the proper settings for the associated controls.

4.2.4. Set BAND and ANTENNA switches as indicated in the windows in question. Set switch S11 to "S" or "P", corresponding to the letter displayed behind the window above the ANTENNA switch, S8.

4.2.5. Set COUPLING switch to 0.

4.2.6. Set SERVICE switch to A3 SIMPLEX.

4.2.7. Turn POWER switch from STAND-BY to LOW.

4.2.8. Press Handset key. The HT lamp will glow, and the TUNING INDICATOR will show a reading. Turn the small control L6c, located in the BAND switch knob, until the meter needle shows a dip (minimum reading, which should be 50 - 100 mA). Then turn POWER switch to HIGH.

4.2.9. Set COUPLING switch as indicated in window above it.

4.2.10. Press Handset key and turn the small control L7, located in the ANTENNA switch knob, for maximum meter reading (approx. 320 mA).

4.2.11. Set SERVICE switch to desired mode of operation.

a) A2, tone-modulated telegraphy (MCW). The transmitter is keyed with the handset key or, if desired, with an external telegraph key.

b) A3 SIMPLEX. To transmit, press handset key. This causes the station receiver to be disabled, and places the transmitter into operation. To listen, release handset key. This causes the transmitter to be disabled, and places the station receiver into operation.

c) A3 DUPLEX. Never use this position of the SERVICE switch when station receiver is tuned to the transmitter frequency. The transmitter is on continuously, and the receiver is not disabled. The receiver loudspeaker is disabled so as to avoid acoustic feedback (howling) between microphone and loudspeaker. To speak, press handset key.

d) HAILER. With the SERVICE switch in this position, the modulator operates as amplifier for use with an outside hailer loudspeaker. To speak, press handset key. The power delivered to the loudspeaker is the same in both positions of the POWER switch. Be sure to hold the handset in such a position that acoustic feedback (howling) is avoided.

4.2.12. The transmitter is now ready for operation. The POWER switch may be set to LOW if the operator wishes to use reduced power; this will be found desirable for very-short-range communication.

4.3. Switching to Another Frequency may be done only with the POWER switch in the STAND-BY position. The tuning procedure must be carried out in the same sequence as that described under 4.2.

4.4. Remote Control.

Where the transmitter is installed in connection with a remote control equipment, the transmitter must be set to the desired transmitting frequency and mode of operation before being switched to remote controlled operation.

5. Alignment to a New Frequency.

It is assumed that a crystal for the frequency in question is available, with data as specified in the data sheet.

5.1. Switch off the transmitter (turn POWER switch OFF).

5.2. Set FREQUENCY switch to the number you wish to use for the new frequency and write the frequency in the window above the switch. Also write the frequency on the modulator drawer front panel.

5.3. Release the four snap fasteners that secure the transmitter drawer to the cabinet. To do this, turn them 90 degrees in the counterclockwise direction, using a large screwdriver. Pull the drawer outwards.

5.4. Locate, in the front left-hand corner of the chassis, the crystal socket corresponding to the frequency number and insert the new crystal. Push the drawer back into position and tighten the snap fasteners.

5.5. Find, from the frequency table at the back of the manual, the number of the frequency band in which the desired frequency is located. Set the BAND switch to that number and write the number in the window above the switch.

5.6. Start up the transmitter by setting the POWER switch to STAND-BY.

5.7. Set COUPLING switch to 0, and the SERVICE switch to A3 SIMPLEX.

5.8. Set POWER switch to LOW, press the handset key and turn the small L6c control, located in the BAND switch knob, until the meter shows minimum reading (50 - 100 mA). Then turn POWER switch to HIGH.

5.9. Adjusting the COUPLING and ANTENNA controls.

Set SERVICE switch to A3 DUPLEX so as to have both hands free for the adjustments described in the following.

Set COUPLING switch to a conveniently low stage, for instance 2. Now the idea is to find a setting of the ANTENNA switch (begin with low stages) at which tuning (pronounced rise in meter reading) is obtained by turning the small control L7, located in the ANTENNA switch knob. If no tuning results, increase the setting of the COUPLING switch stepwise until tuning obtains. Thereafter set the COUPLING switch so that

a maximum reading of approx. 320 mA is obtained; readjust the fine adjustment control, L7, at each change in the setting of the COUPLING switch so as to make sure that the meter reads still the actual maximum current.

Check to see that the switch settings found in this manner are those providing the maximum possible antenna current (this is read on the meter by pressing the ANTENNA CURRENT button) - in other words: both higher and lower coupling stages should give lower antenna current. If tuning is obtained in several positions of the ANTENNA switch, the one resulting in the highest antenna current should be preferred (normally the lowest-numbered position).

5.10. IMPORTANT. At 16 MHz it is necessary to match the antenna length by using an outside HF-ampmeter. The antenna length is satisfactorily, if correct load of transmitter is obtained at approx. step 7 of the COUPLING switch and the antenna current is not less than 1 amp. at nominal supply voltage.

When making the COUPLING and ANTENNA adjustments it will be necessary to check, at each setting of the ANTENNA switch, if maximum antenna current is obtained with switch S11 at "S" or at "P". The resulting combination of the two ANTENNA switches, S8, and S11, for maximum antenna current should be noted in the window above the antenna switch so that "S" or "P" will be written in front of the number of the setting of S8. Also write setting for S7 in the proper window and the transmitter has now been aligned to the new frequency.

6. Maintenance and Simple Service.

6.1. The condition of the battery should be checked at frequent intervals. The battery must always be fully charged and should be topped up frequently with distilled water (liquid should rise 5 - 10 mm above the plates). The transmitter and the receiver consume approx. 20 amperes at full load, at which rate a battery in poor condition is rapidly exhausted.

6.2. When tuning the transmitter it is advisable to check if a satisfactory "dip" (minimum) in TUNING INDICATOR reading is obtained while following the procedure described under 4.2.8. The needle should dip from approx. half-scale reading to 50- 100 mA with the POWER switch in the LOW position. This check should be made at frequent intervals.

6.3. Antenna tuning should be checked frequently by making sure that the TUNING INDICATOR shows the proper reading (approx. 320 mA). At the same time press the ANTENNA CURRENT button to see that the antenna current is as high as possible. See 5.9.

If it is found that proper tuning (that is, maximum antenna current) requires other settings of the COUPLING and ANTENNA switches than those designated by the numbers in the windows, the following checks should be made:

a) Have any changes in the antenna and/or ground installations been made since the transmitter was installed?

b) Have any changes been made in the ship's rigging, or in the location of derricks etc.?

c) Are there any leaks on the antenna or the shielded cable, possibly due to dirt and moisture on the antenna insulators?

d) Is the transmitter supply voltage correct?

If the fault is traced to any of the above causes it will have to be remedied, or the matching between transmitter and antenna must be altered by finding other settings of the COUPLING and ANTENNA switches that will result in satisfactory matching; in so doing, the notations in the windows above the said switches should be altered accordingly.

If the fault cannot be traced to any of the above causes it will be necessary to look for it in the transmitter itself. Try to replace the tubes (see 6.11.). If this does not help, a technician should be called in.

6.4. Modulation is checked by whistling into the microphone while keeping the ANTENNA CURRENT button depressed. The meter reading (the antenna current) should increase as you whistle.

6.5. Faults that can be Corrected by the User.

Below follows a description of faults that can be corrected through replacement of fuses and (if necessary) tubes.

6.6. No TUNING INDICATOR reading when key is depressed, but lamps LT and HT glow: replace fuse F4 (see 6.11.) Start up transmitter again. If the fuse burns out immediately or after a short time, do not replace it a second time until the fault has been located. The fault may be in one or more of the transmitting tubes (V13, V14, and V15), so try to replace these with new tubes (see 6.11.). If this does not help a technician should be called in. If the fault occurs only at one frequency it may be due to a defective crystal (see 6.9.).

6.7. The transmitter refuses to modulate when you speak into the microphone with the handset key depressed, but lamps LT and HT glow, and the transmitter is otherwise operating normally: replace fuse F3 (see 6.11.), and start up the transmitter. If the fuse burns out immediately or soon afterwards, do not replace it until fault has been located. The fault may be in one or both modulator tubes (V5 and V6), so try to replace these with new tubes (see 6.11.). If this does not help, a technician should be called in.

6.8. If lamps LT and HT do not glow when you try to start up the transmitter, fuses F1 and F2 (one or both) may have burned out. Replace these (see 6.11.). Also check if supply voltage is present. If these checks do not reveal the nature of the fault, a technician should be called in.

If only one of the lamps refuses to glow and the transmitter is otherwise operating normally, the bulb in question has burned out and should be replaced as soon as possible.

6.9. If no dip is obtained in the TUNING INDICATOR reading when tuning the transmitter to the desired frequency with the BAND switch set to the number shown in the window above it, it is possible that the crystal for the frequency in question is defective. To check for this fault, change over to another frequency and tune up the transmitter in the usual manner. If the transmitter operates normally on the other frequency, the first-mentioned crystal should be replaced. If the transmitter cannot be tuned to either of the two frequencies, a technician should be called in.

6.10. Disassembling the Transmitter.

The transmitter, as described in 4.2., consists of two drawers housed in a steel cabinet. Each drawer has four snap fasteners, one in each corner. The drawers slide on rails and can be drawn halfway out after the snap fasteners have been loosened. The snap fasteners are loosened with a broad screwdriver, turning them in the counter-clockwise direction.

The modulator drawer and the transmitter drawer are both provided with safety switches which break the current for the power pack starter relay when a drawer is pulled out, thus removing all dangerous voltages from the transmitter (or modulator, respectively). The safety switch, of the toggle type, may be closed manually after the drawer has been pulled out. However, this should be done only by a technician and with very great care since dangerously high voltages are now present in the transmitter. If it is found necessary to close the safety switch with a drawer pulled out, care should be taken to open it after use as otherwise the drawer cannot be pushed back into position in the cabinet.

Both the transmitter and the modulator drawer can be removed entirely from the cabinet by pulling the modulator drawer halfway out and removing the two multiwire connectors from the rear left-hand corner of the modulator. The modulator drawer may now be removed and, thereafter, the transmitter drawer. When reassembling the equipment care should be taken that neither of the two cables get jammed.

6.11. Replacing Fuses and Tubes.

The transmitter is provided with four fuses, F1, F2, F3, and F4. These are located in the modulator drawer, in the foremost portion of the chassis, and become accessible when the drawer is pulled halfway out. A set of spare fuses are placed on the left-hand side wall of the modulator drawer. Never use fuses of higher current rating than specified as this may result in extensive damage to the equipment!

Tubes in the modulator drawer may be replaced when the drawer has been pulled only halfway out, if sufficient care is shown. For replacement of tubes in the transmitter drawer this should be removed entirely from the cabinet as described under 6.10.

1. Indledning.

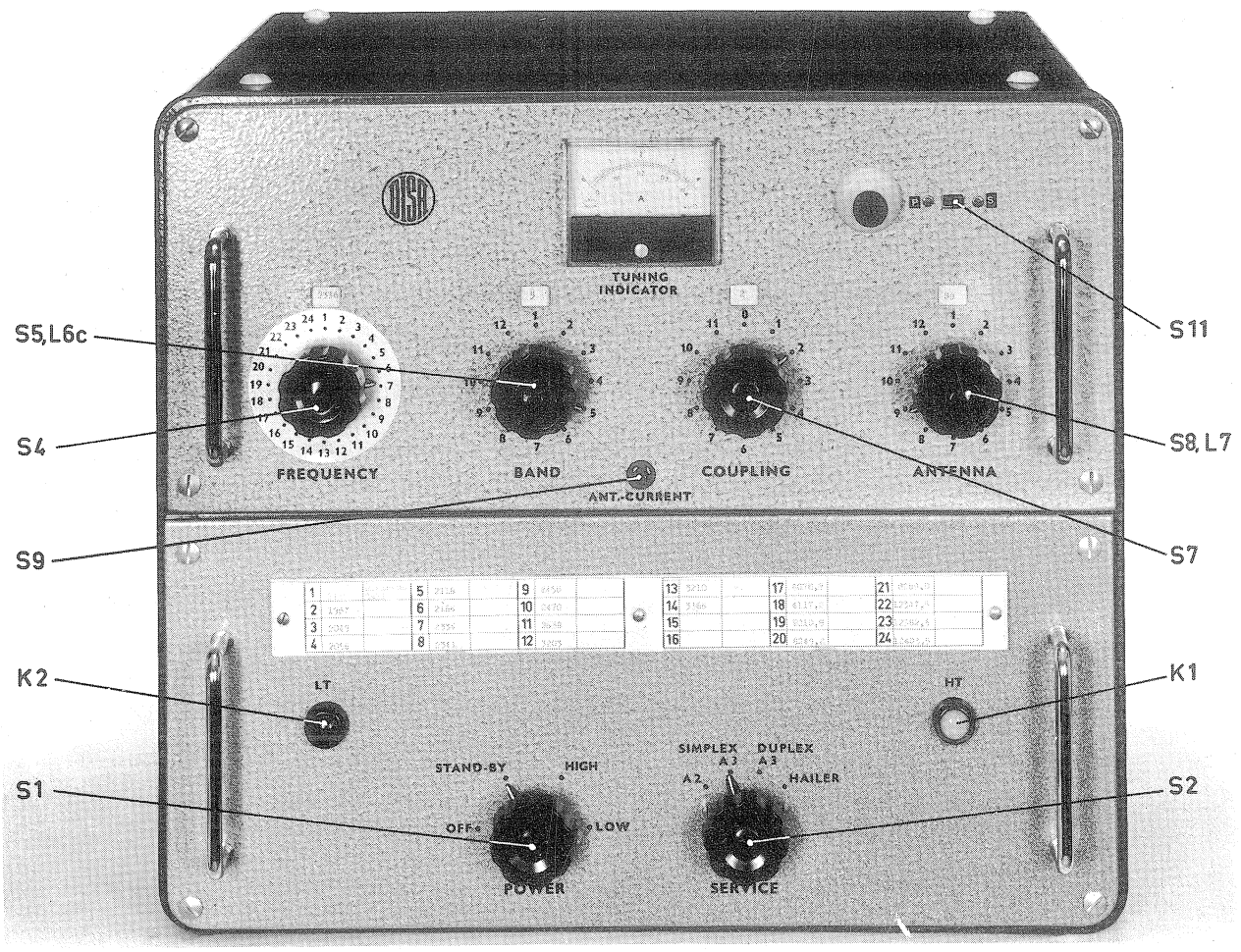
DISA telefonisender 71N20C er en 100 watt sender til brug ved telefonikorrespondance mellem skibe og kyststationer og mellem skibe indbyrdes. Med henblik på skibe, der har telegrafist, er senderen tillige indrettet for moduleret telegrafi. Senderen kan endvidere benyttes som forstærker for en prajehøjttaler.

Senderen er krystalstyret på indtil 24 sendefrekvenser, der kan vælges frit inden for frekvensområdet.

Senderen afgiver 90 - 100 watt bærebølgeeffekt til antennekredsen, der med størst mulig virkningsgrad kan afstemmes til antennelængder over 12 m lange.

Senderen har en automatisk modulationskontrol, der forøger den effektive gennemsnitlige modulationsgrad til 0,9 og samtidig hindrer overmodulation. Herved får senderen stor gennemslagskraft og rækkevidde.

Det er en betingelse for at opnå det fulde udbytte af senderen, at installationen er udført med omhu og i nøje overensstemmelse med fabrikkens forskrifter. Ligeledes er det vigtigt, at det anvendte akkumulatorbatteri er tilstrækkeligt stort til at klare strømforbruget, og at det til stadighed er godt vedligeholdt.



2. Teknisk beskrivelse.

2.1. For tekniske data henvises til Data Sheet 7IN20C foran i bogen.

2.2. Mekanisk opbygning:

2.2.1. Chassiserne er fremstillet af svær aluminiumsplade og anbragt som skuffer i et stålkabinet. Skufferne er på siderne forsynet med kraftige bæreskinner af stål, der glider i U-formede skinner i kabinettet og derved tillader, at der ved service arbejdes med skufferne næsten helt udtrukket. Da der ikke findes stop på glideskinnerne, kan skufferne trækkes helt ud af kabinettet. Skufferne er endvidere forsynet med kraftige sideplader, der tillader, at de kan anbringes på et bord med en vilkårlig side opad.

2.2.2. Senderens tilslutning til den øvrige installation samt til mikrotelefonen sker på en 24-polet klemliste anbragt på den indvendige side af kabinettets bagplade.

2.2.3. Antennen kan tilsluttes klemskruen på forpladen eller til en knivkontakt gennem kabinettets bagplade. Når der anvendes antennerelæ, kan antennen kun tilsluttes knivkontakten på senderens bagplade.

2.2.4. På den indvendige side af kabinettets bagplade er anbragt en plade, hvorpå antennerelæet kan anbringes på en bekvem måde.

2.2.5. Jordledning tilsluttes senderen på en jordbolt anbragt udvendig på kabinettets bagside.

2.3. Diagrambeskrivelse af HF-del:

2.3.1. Se tegning C-0038.

HF-oscillatoren V 11a er krystalstyret og har fatninger for 24 krystaller. Krystallerne udvælges med omskifteren S4 (FREQUENCY). Oscillatoren efterfølges af en katodefølger V 11b, der er uafstemt.

2.3.2. Fra katodefølgeren kobles signalet til driverrøret V12, som er forsynet med anodespolerne L4, L11 (8 MHz), L12 (12 MHz) og L13 (16 MHz). L14 er en peaking spole for 16 MHz. Med BAND omskifter S5 udvælges kredskapaciteterne C46 - 53.

2.3.3. Fra driveren kobles signalet til PA-rørene V13, V14 og V15, der arbejder i klasse C med automatisk gitterforspænding. PA-rørene afstemmes i anoden, med et π - led bestående af kondensatorerne C66 - C67, faste spoler med udtag L6a og L6b, samt trimmespolen L6c og endelig kondensatorerne C68, C83, C69 og C70. Spoler og kondensatorer kan kombineres ved hjælp af omskifteren S6, der er koblet mekanisk sammen med S5 (BAND). Trimmespolen indstilles med den lille knap i BAND omskifteren.

2.3.4. π - leddets udgangskapacitet C70 er forsynet med udtag, der kan vælges med omskifteren S7 (COUPLING). Med disse udtag kan PA-trinnet tilpasses

til ohmske belastninger mellem 5 og 200 ohm.

2.3.5. Antenneafstemningen har til opgave at tilpasse og afstemme antennen, så PA-trinnet bliver belastet med en ohmsk modstand inden for området 5 - 200 ohm. Antenneafstemningsenheden består af et antal afstemningskondensatorer, der udvælges ved hjælp af ANTENNA omskifteren S8, samt et variometer L7, hvis 2 spolehalvdele indkobles enten i parallel eller i serie ved hjælp af relæ RYII. Dette relæ styres med en LT-spænding via omskifter SII, hvis 2 stillinger er er mærket "P" og "S" for henholdsvis parallel- og serieforbindelse af L7a og L7b. Antennevariometret indstilles med den lille knap i ANTENNA omskifteren.

2.3.6. For at undgå højspænding på antennen, hvis der opstår kortslutning i senderen, er der anbragt en spole LIO således, at der opnås jævnspændingsmæssig jordforbindelse af antennekredsen i en sådan situation.

2.3.7. I HF-delen er monteret en sikkerhedsafbryder SIO, der afbryder strømmen til strømforsyningens startrelæ, således at højspændingen forsvinder, hvis senderskuffen trækkes ud.

2.3.8. Det indbyggede drejespoleinstrument er normalt indkoblet i den fælles katodeledning til PA-rørene, hvor det måler den samlede anode og skærmgitterstrøm og således tjener som afstemningsindikator. Ved hjælp af en tryknøgle omlægges instrumentet til angivelse af relativ antennestrøm, idet det måler det ensrettede output fra antennestrømstransformeren TR5, der er viklet på en ferrit-ringkerne.

2.4. Diagrambeskrivelse af modulator-del:

2.4.1. Se tegning C-0034.

Mikrofontransformeren TRI får tilført LF-signalet over omskifter S2 (SERVICE) fra mikrofonen i stillingerne A3 SIMPLEX og DUPLEX samt HAILER eller i stilling A2 fra toneoscillatoren.

2.4.2. Mikrofonjævnstrømmen kommer fra -LT, passerer modstandene R2 og R3 og filtreres af kondensatoren C3. Går herfra gennem mikrofontransformeren TRI og mikrofonen, hvorefter den returnerer gennem mikrofonens tangent til +LT. Kondensatoren CI overfører signalspændingen, mens C2 afkobler for højfrekvens.

2.4.3. I TRI optransformeres signalet og tilføres klipperkredsløbet, der består af to krystaldioder VI og V2. Uden signal deler de to dioder ligeligt en jævnstrøm, hvis størrelse er bestemt af modstanden R4 samt størrelsen af spændingen fra stabiliseringsrørene V7 og V8. Spændingen på diodernes katoder vil derfor have samme positive værdi.

2.4.4. Når et signal overlejrer V1's katodespænding, vil strømmen gennem denne diode øges eller mindskes (i henholdsvis den negative eller den positive halvperiode), men da summen af strømmene i V1 og V2 som før nævnt er konstant, vil det betyde, at strømmen gennem V2 også må variere, men i modsat retning af hvad den gør i V1. Spændingen på V2's katode vil altså følge signalspændingen, men kun inden for de grænser, der er bestemt af, om V2 trækker ingen eller den fulde strøm. Spændingen kan derfor kun variere mellem nul og den dobbelte værdi af den indstillede hvilespænding.

2.4.5. Klipperens hvilespænding er fastlagt således, at en begrænsning på ca. 10dB finder sted for spidsværdier af normale talespændinger fra mikrofonen. Der sker altså en dynamikkompression, idet de største amplituder klippes mest.

2.4.6. Det amplitude- og dynamikregulerede signal forstærkes af røret V4a og passerer filteret L1-L2, der har afskæringsfrekvens ved ca. 3000 Hz. Generende forvrængningsprodukter, der er opstået ved klipningen, fjernes af filtret, og signalet forstærkes yderligere i V4b.

Signalet tilføres drivertransformeren TR2, der leverer styrespænding til modulationsrørene V5 og V6, som arbejder i push-pull klasse AB1. Modulationsrørenes katoder er forbundet til -LT. Når senderen er nøglet, er +LT forbundet til -HT. Modulationsrørenes anoder er forbundet til +HT, anodespændingen til modulationsrørene bliver derfor 550 + 24 = 574 volt. Modulationsrørenes skærmgitre får spænding fra to serieforbundne stabiliseringsrør V7 og V8.

2.4.7. For at arbejde korrekt skal modulationsrørene have en negativ gitterforspænding på 50 V. Spændingen fås fra en sekundær vikling på toneoscillatortransformeren TR3 og ensrettes af røret V3b. Størrelsen indstilles med potentiometret P1, og den filtreres af kondensatoren C15.

2.4.8. Modulationstransformeren TR4 har tre sekundærviklinger, en der modulerer PA-rørenes anoder, en der modulerer PA-rørenes skærmgitre, samt en højttalervikling, hvortil der kan tilsluttes en prajehøjttaler. Fra denne vikling føres en del af LF-signalet gennem modstanden R16 til en opdelt katodemodstand på V4b. Herved opnås en spændingsmodkobling, der nedsætter modulatorens forvrængning og indre modstand.

2.4.9. Toneoscillatoren for A2 består af røret V3a og transformeren TR3. Oscillatoren er afstemt med kondensatoren C5 og svinger på ca. 1000 Hz. Oscillatorrøret er strømmodkoblet med katodemodstanden R10. LF-svinget tages fra en lavimpedanset vikling og føres over omskifteren S2 (SERVICE) i stilling A2 til mikrofontransformeren.

2.4.10. Når senderen er nøglet, er som omtalt -HT og +LT forbundet sammen. Når senderen ikke er nøglet, er der mellem -HT og +LT indskudt en modstand R34 på 2 kohm. Katoderne på rørene i HF-delen er forbundet til +LT, og gitrene i HF-delen er forbundet til -HT. Hvilestrømmen i modulationsrørene V5 og V6 frembringer en negativ spænding over modstanden R34, der blokerer rørene i HF-delen. Modstanden R34 kortsluttes ved nøgling

af nøglerelæet ReA, der aktiveres af kontakten i mikrotelefonens håndtag eller ved A2 af en tilsluttet telegrafnøgle. Modstanden R32 forbindes ved hjælp af nøglerelæet ReA til +LT, når senderen ikke er nøglet. Denne modstand danner sammen med modstanden R87 i HF-delen en spændingsdeler, der nedsætter skærmgitterspændingen til PA-rørene i nøglepauserne. Samtidig med blokering af rørene i HF-delen bliver signalet i modulatorens forforstærker kortsluttet af et kontaktsæt på nøglerelæet.

2.4.11. Effektreduktion (HIGH-LOW) sker ved hjælp af omskifteren SI-6. I stilling LOW forbindes modstanden permanent til +LT, herved fremkommer en spændingsdeler bestående af modstanden R87 i HF-delen og modstanden R32. Denne spændingsdeler nedsætter skærmgitterspændingen på PA-rørene i HF-delen. Samtidig nedsættes skærmgittersvinget med omskifteren SI-4, SI-5.

2.4.12. Modulatoren er ligesom HF-delen forsynet med sikkerhedsafbryder. Denne er her benævnt S3, den afbryder strømmen til strømforsyningens startrelæ, hvis modulatorskuffen åbnes.

2.5. Diagrambeskrivelse af strømforsyning:

2.5.1. Senderen drevet fra akkumulatorbatteri: Se tegning C-0046.

Senderen får glødespænding over afbryderen SI-2, der er sluttet i stillingerne STAND-BY, HIGH og LOW.

Omformerens startrelæ får spænding fra +LT over sikkerhedsafbryderen SI0 i HF-delen og sikkerhedsafbryderen S3 i modulatordelen, afbryderen SI-3, samt afbryder S2-3 eller relækontakter på ReA.

2.5.2. Ved 110 eller 220 V jævnstrømsnet (se tegning C-0047) drives senderen fra en omformer, der leverer både 550 V jævnspænding og 25 V jævnspænding. Omformerens startrelæ RI er i dette tilfælde forbundet til senderens klemmer 13 og 14, der kortsluttes af kontakten SI-2. Når omskifteren POWER forlader stilling OFF, starter omformeren og leverer lavspænding til senderen. Omformerens højspændingsrelæ R2 er forbundet til senderens klemme 11, og omformeren afgiver således højspænding, hver gang mikrotelefonens tangent trykkes, når omskifteren SERVICE står i stilling A3-SIMPLEX og HAILER. Står omskifteren SERVICE i stilling A3-DUPLEX eller A2 afgiver omformeren spænding hele tiden.

2.5.3. Ved 220/380/440 Volt trefaset vekselstrømsnet (se tegning C-0047) drives senderen fra en netensretter. Lavspænding i denne fremkommer så snart forsyningsspændingen er til stede. Ensretterens højspændingsrelæ RYI + 2 er forbundet til senderens klemme 11. Ensretteren afgiver således højspænding, hver gang mikrotelefonens tangent trykkes, når omskifteren SERVICE står i stilling A3-SIMPLEX og HAILER. Står omskifteren SERVICE i stilling A3-DUPLEX eller A2, afgiver ensretteren højspænding hele tiden.

3. Installation.

3.1. Installationsmuligheder.

De forskellige strømforsyningsmuligheder fremgår af følgende diagrammer (findes bagest i bogen):

Telefonianlæg for akkumulatordrift tegning nr. C-0046.

Telefonianlæg for jævnstrømsnet tegning nr. C-0047.

Telefonianlæg for 3-faset vekselstrømsnet tegning nr. C-0047.

3.2. Anbringelse og fastspænding af telefonianlæg.

Målskitser for følgende opspændingsmuligheder forefindes:
Senderen og en eller to modtagere samt eventuel ladetavle eller ensretter anbragt på bord tegning nr. 7IC365.

Senderen og en eller to modtagere samt eventuel ladetavle eller ensretter anbragt på konsol tegning nr. 7IC366.

3.3. Adskillelse af senderen:

De 4 snaplåse i hjørnerne af hver skuffe frigøres ved at dreje dem en kvart omgang til venstre med en stor skruetrækker. Den nederste skuffe, modulatorskuffen, trækkes så langt frem, at man kan aftage multistikkene, der er anbragt på chassisets venstre bagkant. Begge skuffer kan nu trækkes helt ud og fjernes fra stålkabinettet.

3.4. Forbindelse til den faste installation.

Alle kablerne, bortset fra antennekablet, afisoleres bag senderen, og derved frigjorte ledninger føres i en så stor sløjfe ind gennem åbningen forneden i kabinettets bagklædning, at eventuelle bevægelser mellem anlægget og skot indbyrdes kan optages af sløjfen. Ledningerne forbindes til klemmenumrene svarende til angivelserne på installationsdiagrammet (se ovenfor pkt. 3.1.).

3.5. Tilslutning af mikrotelefon.

Mikrotelefonen, der er afsluttet med en 5-benet klemliste, føres under bagklædningen og tilsluttes den store klemliste ved numrene 1-5.

3.6. HF-jordforbindelse.

3.6.1. Senderens jordbolt er anbragt på stålkabinettets højre bagkant. Den forbindes til skibsskroget eller i træskibe til en udvendig jordplade på mindst 1 m^2 anbragt under vandlinien. Forbindelserne bør være så korte som muligt og udføres i bredt kobberbånd eller en lignende svær leder med lille højfrekvensmodstand.

3.6.2. Senderens jordbolt må ikke forbindes til modtagerens. De to apparater skal have hver sin jordledning, ligesom isolerende sammenspændingsdele må anvendes, når sender og modtager sammenkobles til én enhed.

3.6.3. HF-jordforbindelsen forårsager ingen stel-forbindelse af akkumulator- eller netledninger, og batteriet vil derfor ikke sende jævnstrøm gennem jordledningen.

3.7. Jordforbindelse af batteri.

Hvis batteriet skal jordes, må en sådan forbindelse aldrig foretages i senderen, den skal helst ske direkte ved batteriet. Forbindelsen kan foretages til enten plus- eller minuspoler. Anlægget sikres med sikringer i den ikke fordforbundne leder. I de tilfælde, hvor installationen udføres med ladning under drift over faldmodstand fra et balanceret skibsnet, må batteriet slet ikke jordforbindes, og anlægget skal sikres med sikringer i såvel plus- som minusledningen.

3.8. Sendeantenne.

3.8.1. Forudsat at senderen kun skal virke i frekvensområdet 1,6 - 12 MHz:

Antennekapacitet bør være større end 130 pF og antennemodstand ca. 5 - 2000 ohm. Disse data opfyldes af en normal enkelttrådsantenne, hvis længde er 12 meter eller derover.

Hvis senderen også skal virke i 16 MHz båndet er antennens tilpasning mere kritisk og installationen må udføres meget omhyggeligt. Den elektriske antennelængde må være lig med eller lidt mindre end et ulige antal kvarte bølgelængder af 16 MHz. Dette svarer til følgende omtrentlige fysiske totallængder: 13, 21, 30, 39, eller 47 meter, inklusiv nedføring og coaxialkabel til sender. Som omtalt under 3.9.3. bør længden af coaxialkablet ikke overstige 1/2 meter.

3.8.2. Antennen ophænges frit og med stor afstand til dele, hvis indflydelse på antennen kan være varierende (f.eks. lossebomme og lignende). Isolatorerne bør være af bedste type med lille afledning selv i våd tilstand.

3.9. Antennens tilslutning til senderen.

3.9.1. Antennen afsluttes i en gennemføringsisolator i styrehusets tag eller sidevæg. Hvis afstanden mellem isolatoren og senderen er mere end 0,5 meter, må der indsættes et stykke kobberrør mellem isolatoren og coaxialkablet. Kobberrøret monteres på stand-off isolatorer. Fra kobberrøret forbindes et coaxialkabel (se 3.9.3.) til den tilslutningsplade, der er anbragt indvendigt på stålkabinettets bagplade. På denne tilslutningsplade findes der gevindhuller til fastspænding af et evt. antennerelæ. Kablet fastspændes til skottet med bøjler og føres i en bue ind gennem hullet i kabinettets bagplade. Buen på kablet skal hindre vand, der løber ned ad kablet i at trænge ind i

senderen. Kablet afisoleres omhyggeligt med stor afstand (god isolation) mellem skærm og den frie inderleder. Stelforbindelse af kablet opnås ved at lade 1 cm af skærmstrømpen være blottet, der hvor fastspændingsbøjlen skal sidde. Kablets inderleder loddes til knivkontakten, der giver forbindelse til senderskuffen, når denne skubbes på plads. Hvis anlægget skal udføres med antennerelæ loddes inderlederen til dette. (se pkt. 3.10.).

3.9.2. I installationer uden indbygget antennerelæ kan forbindelsen fra gennemføringsisolatoren til senderen udføres med en fleksibel, isoleret tråd direkte til antenneterminalen på senderens forplade.

3.9.3. Antennens tilslutning til senderen bør ske med så kort en indvendig forbindelse til antennegennemføringen som muligt. Sker tilslutningen med et coaxialkabel bør længden af dette kabel ikke overstige ca. 1/2 meter for at kablet ikke skal umuliggøre senderens tilpasning til en vilkårlig antennelængde ved de høje frekvenser, som sender 7IN20C kan arbejde på.

3.10. Modtageantenne samt indbygning af antennerelæ.

3.10.1. Hvor separat modtageantenne anvendes, bør denne af hensyn til DUPLEX-drift ophænges, så minimum kobling til sendeantennen opnås.

3.10.2. Hvor DUPLEX-drift ikke er krævet, og hvor sendeantennen ønskes udnyttet som modtageantenne, når senderen ikke arbejder, må et antennerelæ indbygges som vist på tegning 7IR289.

Når nøglen trykkes, trækker antennerelæet og antennen kobles til senderen. Når nøglen slippes, falder antennerelæet fra og antennen kobles til modtageren.

3.10.3. Hvor en kort modtageantenne ønskes forlænget med sendeantennen ved SIMPLEX-drift, skal der også indbygges et antennerelæ som vist på tegning nr. 7IR289.

Ved SIMPLEX-drift er funktionen den samme som nævnt under pkt. 3.10.2. Ved DUPLEX-drift er relæet konstant trukket uanset om nøglen er trykket eller ej.

3.10.4. Hvis sendeantennen ønskes isoleret fra senderen af hensyn til pejleren skal antennerelæet kobles som vist på tegning 7IR289.

Når omskifteren POWER står i OFF eller STAND-BY, er der ingen spænding på relæspolen, og pejleren får strømforsyning over relækontakten, sendeantennen er koblet fra senderen. Når omskifteren POWER står i HIGH eller LOW er relæet trukket og pejlerens strømforsyning er afbrudt, sendeantennen er koblet til senderen.

3.11. Installation med hailer.

3.11.1. Den udvendige højttaler anbringes således, at der bliver mindst mulig akustisk tilbagekobling til det sted, hvor mikrofonen ønskes anbragt.

3.11.2. Den fra senderen til højttaleren afgivne spænding er 15 V og næsten uafhængig af højttalerens impedans. Effekten, der afsættes i højttaleren, er derfor bestemt af højttalerens impedans. Impedansen kan beregnes af $R = \frac{225}{P}$, her er R højttalerens impedans og P den ønskede effekt i højttaleren. Den maximalt aftagelige effekt er ca. 25 Watt.

3.12. Installation med ladetavle.

3.12.1. I skibe, der har jævn- eller vekselstrømsnet, kan telefonianlægget installeres med en ladetavle for automatisk ladning af 24 V batteriet. Vedrørende ladetavlens data og forbindelsesmåde henvises til instruktionsbogen for denne.

3.12.2. Ladetavlens dimensioner er således afpasset i forhold til sender og modtager, at den kan anbringes under ét af disse apparater på en bekvem måde.

4. Betjeningsforskrift.

4.1. Betjeningshåndtagenes funktioner (fig. 1 på side 1).

På fig. 1 ses senderen forfra. Den består af 2 chassiser, der sidder som skuffer i stålkabinettet. Den øverste skuffe "SENDER-SKUFFEN" indeholder højfrekvensoscillator og forstærker samt betjeningshåndtagene for frekvensvalg og afstemning. I den nederste skuffe "MODULATOR-SKUFFEN" er lavfrekvensforstærkeren anbragt samt betjeningshåndtag for start og indstilling af driftsart.

S1: POWER har følgende funktioner.

"OFF", senderen afbrudt.
"STAND-BY", rørene får glødespænding, LT lampe lyser.
"HIGH", senderen indstillet for fuld effekt, HT lampe lyser også.
"LOW", senderen indstillet for reduceret effekt, HT lampe lyser også.

S2: SERVICE har følgende funktioner.

"A2", tonetelegrafi (MCW).
"A3 SIMPLEX", skiftetale.
"A3 DUPLEX", modtale.
"HAILER", modulator anvendes som forstærker for en prajehøjttaler.

S4: FREQUENCY, frekvensomskifter.

S5: BAND, grovindstilling af senderens HF-kredse.

S7: COUPLING, tilpasning mellem sender og antenne.

S8: ANTENNA, grovafstemning af antennekreds.

Omskifter S11, der er anbragt over ruden for omskifter S8, ANTENNA, er forsynet med to stillinger mærket "S" og "P". Omskifteren anvendes sammen med S8 til grovafstemning af antennekredsen. "S" angiver serie-forbindelse af variometerets to spoler (maximal selvinduktion), mens "P" angiver parallel-forbindelse (minimum selvinduktion).

L6c: finindstilling af senderens HF-kredse.

L7: finafstemning af antennekreds.

S9: ANT-CURRENT, ved tryk på denne knap viser instrumentet TUNING INDICATOR relativ antenne-strøm. Når der ikke trykkes på knappen bruges instrumentet som afstemningsindikator og viser senderrørenes katodestrøm.

K1: HT, neonlampe, der lyser, når der er højspænding på senderen.

K2: LT, glødelampe, der lyser, når der er lavspænding på senderen.

4.2. Start af senderen.

4.2.1. Omskifteren POWER stilles på STAND-BY. Den røde lampe LT lyser.

4.2.2. Find frekvensnummeret svarende til den ønskede sendefrekvens i frekvenstabellen på modulatorskuffens forplade.

4.2.3. Indstil omskifteren FREQUENCY til det fundne frekvensnummer. Herved vises sendefrekvensen i ruden over denne omskifter. Samtidig fremkommer tal i de andre ruder, der viser, hvad de tilhørende omskiftere skal stå på.

4.2.4. Indstil omskifterne BAND og ANTENNA som angivet i de pågældende ruder.

Omskifter S11 indstilles "S" eller "P" svarende til angivelsen i ruden over S8, ANTENNA.

4.2.5. Indstil onskifteren COUPLING på 0.

4.2.6. Indstil omskifteren SERVICE til A3 SIMPLEX.

4.2.7. Indstil omskifteren POWER fra STAND-BY til LOW.

4.2.8. Tryk på mikrotelefonens tangent. HT lampe lyser, og måleinstrumentet TUNING INDICATOR slår ud. Drej på den lille knap L6c i BAND omskifteren, indtil instrumentet viser dyk, minimum udslag (50 - 100 mA). Stil derefter POWER omskifteren på HIGH.

4.2.9. Indstil omskifteren COUPLING som angivet i ruden over denne.

4.2.10. Tryk på mikrofonens tangent og drej på den lille knap L7 i ANTENNA omskifteren til måleinstrumentet viser maximum udslag (ca. 320mA).

4.2.11. Omskifteren SERVICE indstilles til den ønskede driftsart.

a) A2, tonemoduleret telegrafi M.C.W. Senderen nøgles med mikrotelefonens tangent eller evt. udvendig tilsluttet telegrafnøgle.

b) A3 SIMPLEX, skiftetale. Når der sendes, trykkes mikrotelefonens tangent. Herved blokeres stationens modtager, og senderen nøgles. Når der lyttes, slippes mikrotelefonens tangent. Herved blokeres senderen, og blokeringen af stationens modtager ophæves.

c) A3 DUPLEX, modtale. Denne indstilling må aldrig benyttes, når stationens modtager er indstillet til senderens frekvens. Senderen er hele tiden nøglet, og modtageren er ikke blokeret. Modtagerens højttaler er afbrudt for at undgå akustisk tilbagekobling (hyl) mellem mikrofon og højttaler. Når der tales, trykkes mikrotelefonens tangent.

d) HAILER. I denne omskifterstilling kan modulatoren anvendes som forstærker for en udvendig prajehøjttaler. Når der tales, trykkes mikrotelefonens tangent. Der afgives samme effekt til prajehøjttaleren, uanset om POWER omskifteren står i HIGH eller LOW. Mikrotelefonen må holdes sådan, at akustisk tilbagekobling (hyl) undgås.

4.2.12. Senderen er nu klar til drift. Omskifteren POWER kan stilles i LOW, hvis man ønsker at arbejde med reduceret effekt, dette kan have betydning ved korrespondance mellem to stationer, der ligger tæt ved hinanden.

4.3. Omskiftning til anden frekvens, må kun ske, når omskifteren POWER står i stilling STAND-BY. Afstemningsproceduren skal foretages i samme rækkefølge som beskrevet under pkt. 4.2.

4.4. Benyttelse af fjernbetjening.

Hvor senderen er installeret i forbindelse med fjernbetjeningsudstyr, sker omstillingen til fjernbetjening, efter at senderen er indstillet til ønsket sendefrekvens og driftsart.

5. Indtrimning til en ny frekvens.

Det forudsættes, at man har et krystal til den nye frekvens, og med øvrige data som specificeret i Data Sheet 7IN20C foran i bogen.

5.1. Afbryd anlægget (POWER omskifteren på "OFF").

5.2. Indstil omskifteren FREQUENCY på det nummer, hvor den nye frekvens ønskes placeret, og noter frekvensen i ruden over omskifteren. Samtidig noteres frekvensen på modulatorskuffens forplade.

5.3. Frigør de 4 snaplåse, der holder senderskuffen i kabinettet, ved at dreje dem en kvart omgang til venstre ved hjælp af en stor skruetrækker. Træk skuffen frem.

5.4. Opsøg foran til venstre på chassiset krystalfatningen svarende til frekvensnummeret og indsæt det nye krystal. Skub skuffen på plads og spænd snaplåsene.

5.5. Find af frekvenstabellen bagest i bogen hvilket frekvensbånd den ønskede frekvens ligger i. Indstil båndomskifteren BAND på det fundne båndnummer og noter det i ruden over omskifteren.

5.6. Start senderen ved at stille omskifteren POWER og STAND-BY.

5.7. Indstil omskifteren COUPLING på 0, og omskifteren SERVICE på A3 SIMPLEX.

5.8. Indstil omskifteren POWER på LOW, tryk på mikrotelefonens tangent og drej den lille knap L6c i BAND omskifteren indtil instrumentet viser minimum udslag (50 - 100 mA). Indstil derefter POWER omskifteren på HIGH.

5.9. Indtrimning af COUPLING og ANTENNA.

Indstil omskifteren SERVICE på A3 DUPLEX for at have begge hænder fri til de følgende indstillinger.

Stil omskifteren COUPLING på et passende lavt trin f.eks. 2. Der skal nu findes en sådan indstilling af omskifteren ANTENNA (begynd med lave trin), at man ved drejning af den lille knap L7 i denne kan opnå afstemning, dvs. at instrumentet viser et tydeligt maximumsudslag; gå om fornødent op med COUPLING efterhånden. Når afstemning er fundet skal COUPLING indstilles således, at maximumudslaget bliver ca. 320 mA; efterindstil finafstemningen L7 ved hver ændring af COUPLING, så der stadig aflæses det virkelige maximumudslag.

Det kontrolleres, at den fundne indstilling af omskifterne giver størst mulig antennestrøm (denne aflæses på instrumentet under indtrykning af knappen ANTENNA CURRENT), altså at både højere og lavere koblingstrin giver mindre antennestrøm. Hvis der opnås afstemning i flere stillinger af antenne-omskifteren, foretrækkes den, der giver mest antennestrøm (normalt den med laveste nummer).

5.10. VIGTIGT. Ved 16 MHz er det nødvendigt at tilpasse antennelængden ved hjælp af et udvendigt HF-amperemeter. Antennelængden er tilfredsstillende, hvis korrekt belastning af senderen opnås i ca. trin 7 af COUPLING omskifter og antennestrømmen er mindst 1 amp. ved nominel forsyningsspænding.

Ved indtrimning af COUPLING og ANTENNA vil det være nødvendigt for hvert trin af omskifter ANTENNA at undersøge, om størst antennestrøm opnås med omskifter S11 stående i "S" eller "P".

Den fundne kombination af de to ANTENNA-omskiftere (S8 og S11) for maximal antennestrøm opnoteres i ruden over ANTENNA, således at "S" eller "P" skrives foran stillingsnummeret for S8. Noter også de fundne stillinger for S7 i den tilhørende rude og indtrimningen til den nye frekvens er dermed fuldført.

6. Vedligeholdelse og simpel service.

6.1. Batteriets tilstand bør hyppigt kontrolleres. Det er nødvendigt, at batteriet altid er fuldt opladet, og der bør jævnligt efterfyldes med destilleret vand (væsken skal stå 5 - 10 mm over pladerne). Senderen og modtageren bruger ved fuld belastning ca. 20 amp., og dette forbrug vil hurtigt tømme et dårligt vedligeholdt akkumulatorbatteri.

6.2. Ved afstemning af senderen undersøges det jævnligt, om der opnås tilfredsstillende "dyk" (minimum) på TUNING INDICATOR ved fremgangsmåden beskrevet under pkt. 4.2.8. Viseren skal dykke fra ca. halvt udslag til 50 - 100 mA, når POWER omskifteren står i LOW.

6.3. Antenneafstemningen kontrollerer man ved jævnligt at undersøge om instrumentet TUNING INDICATOR viser den rigtige strøm (ca. 320 mA). Samtidig kontrolleres ved indtrykning af knappen ANTENNA CURRENT, at antennestrømmen er størst mulig. Se 5.9.

Finder man, at der skal benyttes andre indstillinger af COUPLING og ANTENNA omskifterne, end numrene i ruderne angiver, for at opnå korrekt afstemning (dvs. størst mulig antennestrøm), må flg. under undersøges:

a) Er der, siden installationen blev foretaget, sket ændringer i antenne- eller jordforbindelser?

b) Er der foretaget ændringer i skibets rigning, eller i placeringen af lossebomme eller lign.?

c) Er der afledning på antennen eller skærmkablet, eventuelt forårsaget af snavs og fugt på antenne-isolatorerne?

d) Er senderens fødespænding korrekt?

Findes årsagen et af de nævnte steder, må fejlen søges afhjulpet, evt. må senderens tilpasning til antennen ændres, ved at finde de nye indstillinger af omskifterne COUPLING og ANTENNA samt ændre påskriften i ruderne over disse.

Findes årsagen ikke på et af de nævnte steder, må fejlen søges i senderen. Eventuelt må rørene skiftes ud (se pkt. 6.11.), hjælper dette ikke, bør tekniker tilkaldes.

6.4. Kontrol af modulationen foretages ved at fløjte i mikrofonen samtidig med at knappen ANTENNA CURRENT indtrykkes. Instrumentudslaget (antennestrømmen) skal blive større, når der fløjtes.

6.5. Fejl, der kan afhjælpes af brugeren.

I det følgende beskrives fejl, der kan rettes ved udskiftning af sikringer og evt. rør.

6.6. Intet udslag på instrumentet TUNING INDICATOR når senderen nøgles, men lamperne LT og HT lyser: Sikring F4 udskiftes (se pkt. 6.11), senderen startes pånyt. Smelter sikringen straks eller efter kort tids forløb, må den ikke udskiftes igen, før fejlen er fundet. Fejlen kan skyldes, at et eller flere af senderrørene V13 - V14 - V15 er defekte, og der forsøges udskiftning (se pkt. 6.11.). Hjælper dette ikke, bør der tilkaldes teknikerassistance. Forekommer fejlen kun på én bestemt frekvens, kan fejlen skyldes krystallet. Se pkt. 6.9.

6.7. Senderen vil ikke modulere, når der tales i mikrofonen ved nøglet sender, men lamperne LT og HT lyser, og senderen fungerer ellers normalt: Sikring F3 udskiftes (pkt. 6.11.), senderen startes pånyt. Smelter sikringen straks eller efter kort tids forløb, må den ikke udskiftes før fejlen er fundet. Fejlen kan skyldes, at det ene eller begge modulatorrør V5 - V6 er defekte, og der forsøges udskiftning (se pkt. 6.11.). Hjælper dette ikke, bør der tilkaldes teknikerassistance.

6.8. Hvis lamperne LT og HT ikke lyser, når man forsøger at starte senderen, kan det skyldes, at den ene eller begge sikringer F1 - F2 er smeltet. Sikringerne udskiftes (se pkt. 6.11.). Endvidere bør det undersøges om forsyningsspændingen er tilstede. Hjælper dette ikke, bør der tilkaldes teknikerassistance. Er det kun en af lamperne, der ikke vil lyse, men senderen ellers fungerer normalt, er vedkommende pære brændt ud og bør snarest udskiftes.

6.9. Hvis der ved afstemning af senderen til den ønskede frekvens ikke kan opnås dyk på TUNING INDICATOR, når omskifteren BAND står på det nummer, der vises i ruden over denne, kan det skyldes, at krystallet til den pågældende frekvens er defekt. Dette undersøges ved, at skifte over til en anden frekvens, og afstemme senderen på normal måde. Virker senderen normalt på den nye frekvens, må det førstnævnte krystal udskiftes. Kan senderen ikke afstemmes til nogen af frekvenserne, bør der tilkaldes teknikerassistance.

6.10. Adskillelse af anlægget.

Senderen består som nævnt i pkt. 4.2. af 2 skuffer i et stålkabinet. Hver skuffe har 4 snaplåse, der er placeret med én i hvert hjørne. Skufferne, der er anbragt på glideskinner, kan trækkes halvt ud efter at snaplåsene er løsnet. Snaplåsene løsnes med en bred skruetrækker ved at dreje mod uret.

Modulatorskuffe og senderskuffe er begge forsynet med sikkerhedsafbryder, der afbryder strømmen til strømforsyningens startrelæ. Herved undgår man, at der er højspænding på senderen, når denne åbnes. Sikkerhedskontakten er en vippekontakt, der kan sluttes manuelt når skuffen er ude. Dette bør dog kun foretages af en tekniker og under største agtpågivenhed, da der nu er mulighed for livsfarlig højspænding på senderen. Har sikkerhedskontakten været sluttet, medens skuffen var trukket ud af kabinettet, må man huske at afbryde den igen, ellers kan skuffen ikke skubbes på plads i kabinettet.

Senderskuffe og modulatorskuffe kan begge fjernes helt fra kabinettet, ved at trække modulatorskuffen halvt ud og fjerne de to multistik fra modulatorens bagerste venstre hjørne. Modulatorskuffen kan nu fjernes og derefter senderskuffen. Når anlægget påny samles, må det påses, at ingen af forbindelseskablerne kommer i klemme.

6.11. Udskiftning af sikringer og rør.

Senderen er forsynet med 4 sikringer, F1 - F2 - F3 - F4. Disse er anbragt i modulatorskuffen på chassisets forreste del og bliver tilgængelige, når skuffen trækkes halvt ud. På modulatorskuffens venstre sideplade er anbragt et sæt reservesikringer. Brug aldrig sikringer påstemplet en større strømstyrke end specificeret, da dette kan medføre omfattende ødelæggelser i anlægget!

Udskiftning af rør i modulatorskuffen kan med forsigtighed foretages, når denne er trukket halvt ud. Ved udskiftning af rør i senderskuffen skal denne tages helt ud, som beskrevet under pkt. 6.10.

PARTS LIST

for

7IN2oC TRANSMITTER

(Modulator Section 7IMo6)

Diagram Coo34

ABBREVIATIONS

A	ampere
Car.	carbon
Cer.	ceramic
El.	electrolytic
F	farad
H	henry
k	kilohm or 10^3
lin.	linear
log.	logaritmic
M	megohm or 10^6
MF	metalized film (for capacitors) or metal film (for resistors)
u	microfarad or 10^{-6} F
m	milli or 10^{-3}
MP	metalized paper
n	nanofarad or 10^{-9} F (1on=o.o1uF)
N75o	Temp. coeff. $-75o \times 10^{-6}/^oC$
NPO	Temp. coefficient 0
NTC	neg. temp. coefficient
Ω	Ohm
p	picofarad or 10^{-12} F (1op=1ouuF)
poly	polystyrene
V	working volts dc
Vac.	working volts ac
var.	variable
VDR	voltage-dependent resistor
W	watt
ww	wire wound

R e s i s t o r s

RI	22o Ohm	I W	ww 5%
R2	22o Ohm	I W	ww 5%
R3	47 k	o,5 W	Car. 5%
R4	2,2 M	o,5 W	Car. 5%
R5	I k	o,25 W	Car. 5%
R6	I5o k	o,5 W	Car. 5%
R7	47 k	o,5 W	Car. 5%
R8	I k	o,25 W	Car. 5%
R9	33o Ohm	o,5 W	Car. 5%
RIo	4,7 k	o,5 W	Car. 5%
RII	39 k	o,5 W	Car. 5%
RI2	39 k	o,5 W	Car. 5%
RI3	4,7 k	o,5 W	Car. 5%
RI4	Ioo Ohm	o,5 W	Car. 5%
RI5	82o Ohm	o,5 W	Car. 5%

R16	33o Ohm	o,5 W	Car. 5%
R17	39o k	o,5 W	Car. 5%
R18	1 k	o,25 W	Car. 5%
R19	22o k	1 W	Car. 5%
R2o	22o k	1 W	Car. 5%
R21	1o k	1 W	Car. 5%
R22	1o k	1 W	Car. 5%
R23	22 k	1 W	Car. 5%
R24	22 k	1 W	Car. 5%
R25	1oo Ohm	o,5 W	Car. 5%
R26	1o k	o,5 W	Car. 5%
R27	1o Ohm	o,5 W	Car. 5%
R28	1o Ohm	o,5 W	Car. 5%
R29	1o k	o,5 W	Car. 5%
R3o	1oo Ohm	o,5 W	Car. 5%
R31	1o k	27 W	ww 5%
R32	1.7 + 2.2 k	27 W	ww 5%
R33	1oo k	o,5 W	Car. 5%
R34	2,2 k	9 W	ww 5%
R35	3 Ohm	3 W	ww 5%
R36	12o Ohm	3 W	ww 5%
R37	1,5 M	o,5 W	Car. 5%
R38	15o Ohm	3 W	ww 5%
R39	1o Ohm	o,5 W	Car. 5%
R4o	1o Ohm	o,5 W	Car. 5%

C a p a c i t o r s

C1	1o u	-1o/+5o%	25 V	El.
C2	33 n	+/- 2o%	15o V	MP
C3	64 u	-1o/+5o%	64 V	El.
C4	o.1 u	-1o/+2o%	1ooo V	Oil.
C5	2o n	+/- 2o%	1ooo V	Oil.
C6	2o n	+/- 2o%	1ooo V	Oil.
C7	2,2 n	+/- 2o%	4oo V	MP
C8	1o n	+/- 2o%	4oo V	MP
C9	1o n	+/- 2,5%	125 V	Poly
C1o	1o n	+/- 2,5%	125 V	Poly
C11	2o n	+/- 2,5%	125 V	Poly
C12	1 n	+/- 2o%	4oo V	MP
C13	4 n	+/- 2o%	6oo V	MP
C14	o.1 u	-1o/+2o%	1ooo V	Oil.
C15	1 u	+/- 5%	25o V	MP
C16	2 u	+/- 1o%	5oo V	MP
C17	5 n	+/- 2,5%	125 V	Poly
C18	o.5 u	+/- 1o%	63o V	MP
C19	1o u	+/- 1o%	16o V	MP
C2o	2 u	+/- 1o%	85o V	MP

C21	o.1 u	-1o/+2o%	1ooo V	Oil	
C22	47 n	+/- 2o%	4oo V	MP	
C23	4 u	+/- 1o%	85o V	MP	
C24	o.2 u	+/- 2o%	25o V	MP Two 0.1u in parallel	

Inductor

L1-2	o.53 Hy + o.32 Hy	AF-filter	9o73A1961

Potentiometers

P1	25 k	+/- 5%	o,25 W	Car.	lin.
P2	5oo k	+/- 5%	o,25 W	Car.	lin.

Transformers

TR1	Microphone
TR2	Driver
TR3	Tone Oscillator
TR4	Modulation

Tubes and Diodes

V1	1S121-1S923	Silicon
V2	1S121-1S923	Silicon
V3	ECC82 or 12AU7	
V4	ECC81 or 12AT7	
V5	QE05/40H or 6159	
V6	QE05/40H or 6159	
V7	OB2	
V8	OB2	

Fuses

F1-2	6,3 Amp.	slow-acting Size, 6.3 dia. x 32 mm
F3-4	o,63 Amp.	slow-acting Size, 6.3 dia. x 32 mm

Lamps

K1	22o V neon		Indicator
K2	12 V	2 W	Pilot

Switches

S1	4 x 1 sect., 4 pos.	Power
S2	1 x 3 sect., 4 pos.	Service
S3	Single Pole	Safety

Relay

ReA	Keying

PARTS LIST

for

7IN20C TRANSMITTER

(RF Section 7IC23)

Diagram C-0038

R e s i s t o r s

R61	47 ohm	0,25W	Car. 5%	
R62	47 k	0,5 W	Car. 5%	
R63	47 ohm	0,5 W	Car. 5%	
R64	50 ohm	9 W	ww 5%	(two 100 ohm in parallel)
R65	150 k	0,5 W	Car. 5%	
R66	22 k	10 W	ww 5%	
R67	220 k	0,5 W	Car. 5%	
R68	16,5k	16 W	ww 5%	(two 33 k in parallel)
R69	120 k	0,5 W	Car. 5%	
R70	470 k	0,5 W	Car. 5%	
R71	1 k	0,25W	Car. 5%	
R72	47 ohm	0,5 W	Car. 5%	
R73	10 k	3 W	ww 5%	
R74	100 k	0,5 W	Car. 5%	
R75	47 ohm	0,5 W	Car. 5%	
R76	47 k	0,5 W	Car. 5%	
R77	47 k	0,5 W	Car. 5%	
R78	47 ohm	1 W	Car. 5%	
R79	220 ohm	1 W	Car.10%	
R80	3,3 k	1 W	Car.10%	
R81	3,9 k	1 W	Car.10%	
R82	1,5 k	10 W	ww 5%	
R83	10 ohm	1 W	Car.10%	
R84	10 ohm	1 W	Car.10%	
R85	10 ohm	1 W	Car.10%	
R87	16,5k	16 W	ww 5%	(two 33 k in parallel)
R88	2,2 k	1 W	Car. 5%	
R89	2,2 k	1 W	Car. 5%	
R90	2,2 k	1 W	Car. 5%	
R91	0,251 ohm	3 W	ww 1%	(shunt for M1)
R92	27 k	0,25W	Car. 5%	
R93	47 ohm	0,5 W	Car. 5%	
R94	47 ohm	0,5 W	Car. 5%	
R95	47 ohm	0,5 W	Car. 5%	

Capacitors

C31	100 p	+/- 5%	400 V	Cer.	NP0
C32	0,1 u	+/- 10%	350 V	MP	
C33	0,1 u	+/- 10%	350 V	MP	
C34	5 n	+/- 20%	400 V	Cer.	
C35	1 n	+/- 20%	750 V	Mica.	
C36	10 p	+/- 5%	400 V	Cer.	NP0
C37	220 p	+/- 5%	400 V	Cer.	N750
C38	5 n	+/- 20%	400 V	Cer.	
C39	220 p	+/- 5%	400 V	Cer.	NP0
C40	10 n	+/- 20%	400 V	MP	
C41	5 n	+/- 20%	400 V	Cer.	
C42	5 n	+/- 20%	400 V	Cer.	
C43	0,1 u	-10/+20%	1000V	Oil	
C44	5 n	+/- 20%	1500V	Mica	
C45	0,1 u	+/- 10%	400 V	MP	
C46	37 p	+/- 2pF	32 VA	Cer.	NP0
C46	81 p	+/- 2pF	59 VA	Cer.	NP0
C46	199 pF	+/- 2pF	110VA	Cer.	NP0
C47	37 p	+/- 2pF	32 VA	Cer.	NP0
C47	199 p	+/- 2pF	110VA	Cer.	NP0
C48	199 p	+/- 2pF	110VA	Cer.	NP0
C49	166 p	+/- 2pF	96 VA	Cer.	NP0
C50	134 p	+/- 3pF	82 VA	Cer.	NP0
C51	106 p	+/- 2pF	70 VA	Cer.	NP0
C52	68 p	+/- 5%	400 V	Cer.	NP0
C53	33 p	+/- 5%	400 V	Cer.	NP0
C56	100 p	+/- 5%	400 V	Cer.	NP0
C58	0,1 u	+/- 10%	350 V	MP	
C59	0,1 u	+/- 10%	350 V	MP	
C60	0,1 u	+/- 10%	350 V	MP	
C61	1 n	+/- 20%	750 V	Mica	
C62	1 n	+/- 20%	750 V	Mica	
C63	1 n	+/- 20%	750 V	Mica	
C64	5 n	+/- 20%	1500V	Mica	
C65	1 n	+/- 20%	1500V	Mica	
C66	100 p	+/- 10%	3000V	Cer.	
C67	500 p	+/- 20%	3000V	Cer.	
C68-69	580 + 750 p	+/- 10%	Mica coupling		E-0037
C70-83	280 + 750 p	+/- 10%			
C77	0,1 u	+/- 10%	350 V	MP	
C79	1 n	+/- 20%	500 V	Mica	
C80	1 n	+/- 20%	500 V	Mica	
C81	1 n	+/- 20%	500 V	Mica	
C82	250 p	+/- 5%	3000V	Cer.	
C84	16 p	+/- 20%	3000V	Cer.	
C85	100 p	+/- 10%	3000V	Cer.	
C86	250 p	+/- 10%	3000V	Cer.	
C87	500 p	+/- 20%	3000V	Cer.	

C88	5 n	+/- 20%	400 V	Cer.	
C89	1 n	+/- 20%	500 V	Mica	
C90	3 n	+/- 20%	500 V	Mica	
C91	1 n	+/- 20%	500 V	Mica	
C92	3 n	+/- 20%	500 V	Mica	
C93	1 n	+/- 20%	500 V	Mica	
C94	3 n	+/- 20%	500 V	Mica	
C95	300 P	+/- 5%	400 V	Cer.	NPO
C96	1 n	+/- 20%	500 V	Mica	

Inductors

L3	2,5 mH	RF-choke	
L4	26 uH	Driver Tank Coil	c-0009
L5	120 uH	RF-choke	E-0047
L6a	23 uH	PA Tank Coil	71E1731
L6b	4 uH	PA Tank Coil	C-0044
L6c	1,3-4,4 uH	Alignment Coil	71C170
L7	3-60uH	Variometer	71C02
L8	17 uH	Coil for antenna tuning	71C2251
L10	200 uH	RF-choke	71E1801
L11	7 uH	Driver Tank Coil (8Mc/s)	71C4741
L12	4 uH	Driver Tank Coil (12 Mc/s)	71C4751
L13	2 uH	Driver Tank Coil (16 Mc/s)	C-0045
L14	10 uH	Peaking Coil (16 Mc/s)	C-0042

Potentiometer

P3	100 k	+/- 5%	0,25W	Car. lin.	

Indicator Unit

Antenna Current indicator Unit	71E163

Tubes and Diodes

V11	PCF80	Oscillator
V12	6159	Transmitting
V13	6159	Transmitting
V14	6159	Transmitting
V15	6159	Transmitting
V16	OA85	Germanium 2 pcs.

Switches

S4	4 sect.,24 pos.	Frequency			C-0007
S5-6	3 sect.,12 pos.	Band			C-0041
S7	1 sect.,12 pos.	Coupling			71C3153
S8	2 sect.,12 pos.	Antenna			71C3591
S9	1 sect., 2 pos.	Micro-Switch	110 V	3 A	
S10	Single Pole	Safety	250 V	4 A	
S11	Two Pole				

Meter

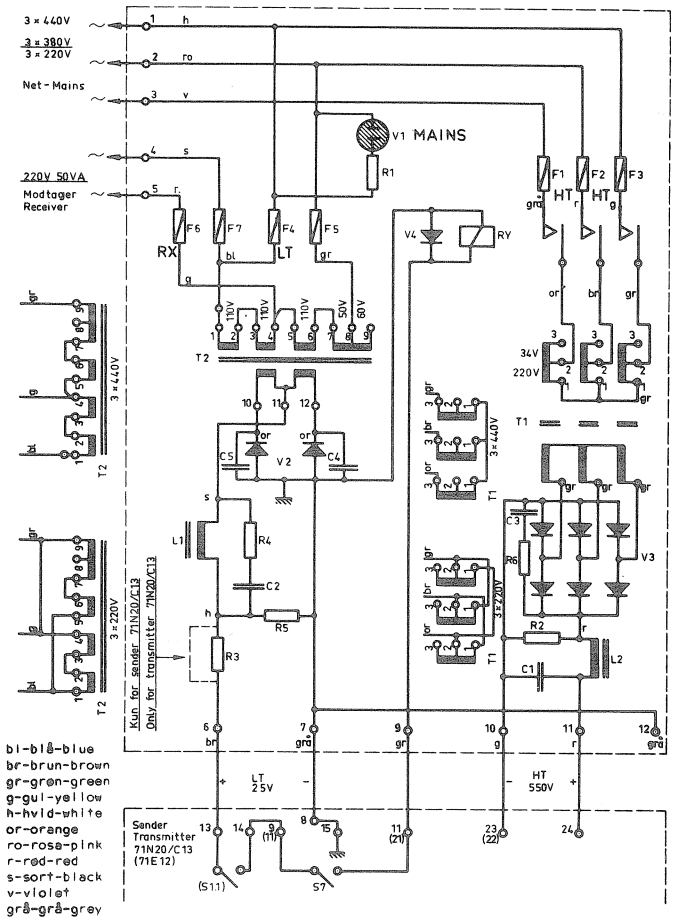
M1	1 mA 100 Ohm	2%	Ammeter 0-400

RELAY

RY11	antenna

STRØMFORSYNINGSENHED F30

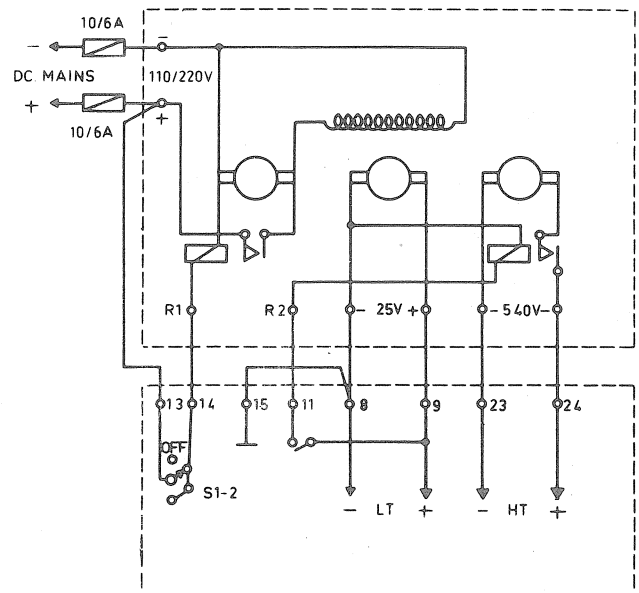
POWER PACK F30



TRANSMITTER 71N20C with three phase
POWER PACK F30
SENDER 71N20C med STRØMFORSYNINGS-
ENHED F30 for trefaset vekselstrømsnet

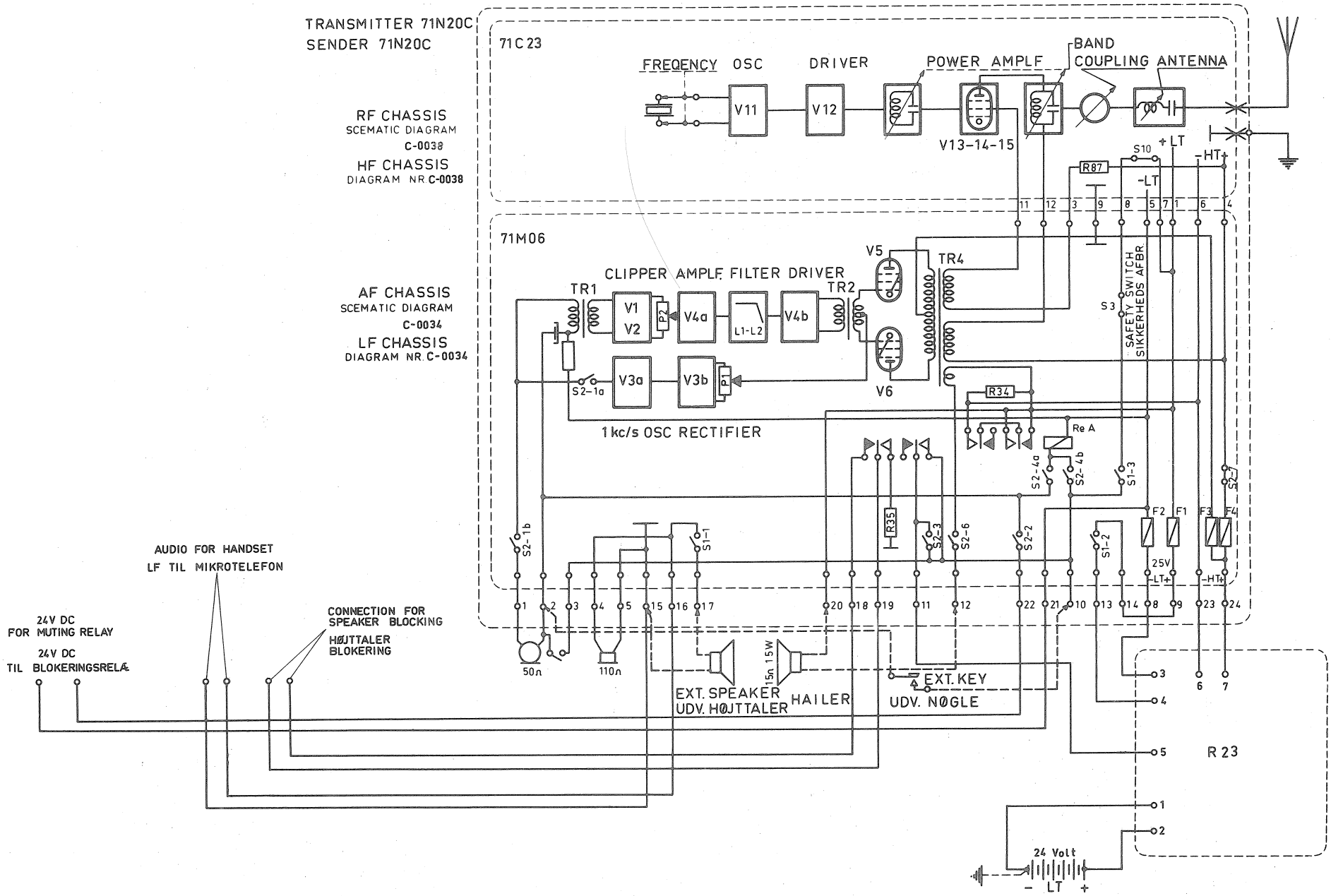
OMFORMER

CONVERTER



TRANSMITTER 71N20C with Converter for
110/220V DC Mains.
SENDER 71N20C med OMFORMER for 110/220V
jævnspændingsnet.

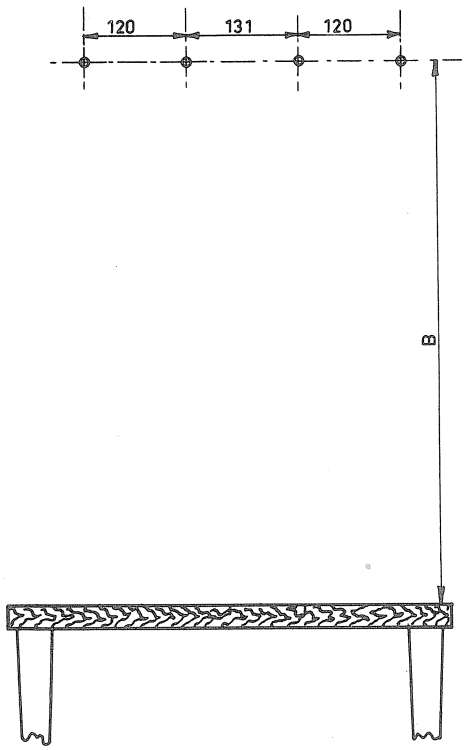
skanti	Installationsdiagram AC trefaset net Installationsdiagram DC omformer	- JD C - 0047 - 2 7 - 3 - 69

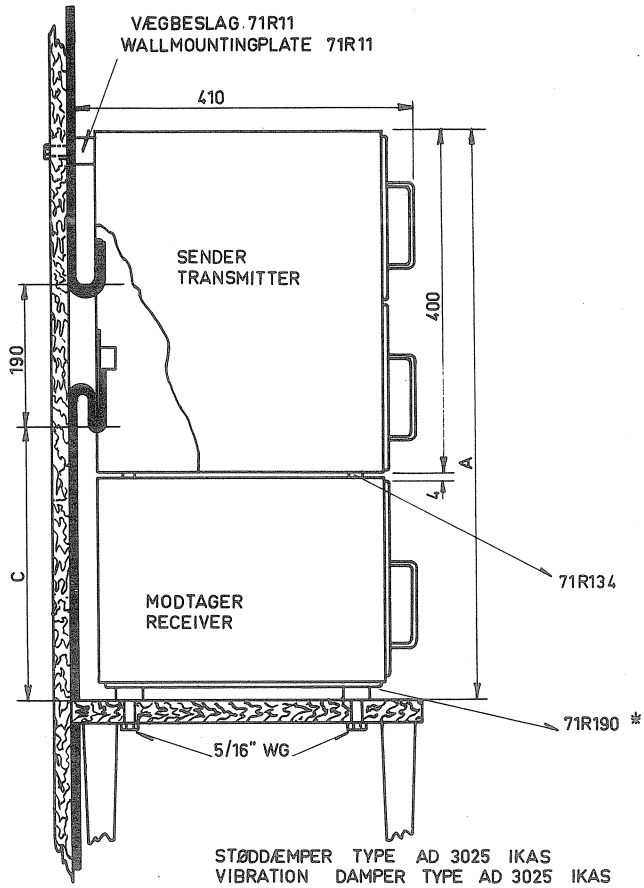


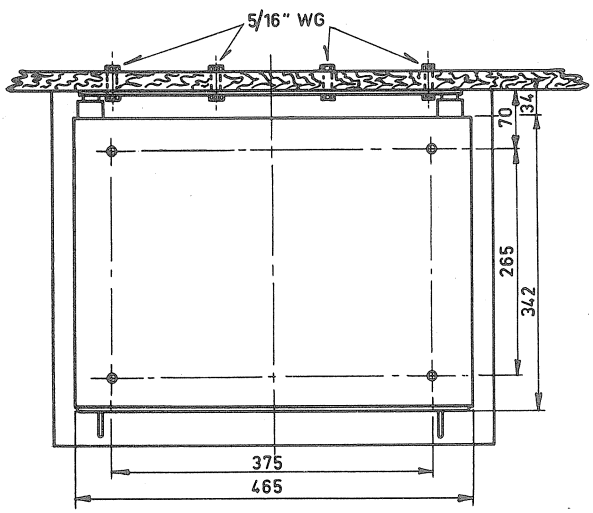
INSTALLATIONS DIAGRAM FOR 71N20C
FORSYNET FRA AKKUMULATORBATTERI
TEGNING NR. C-0046-1

PRINCIPAL WIRING DIAGRAM FOR 71N20C
SUPPLIED FROM LOW VOLTAGE BATTERY
DRAWING NO. C-0046-1 7.3.69. JD

TELEFONISENDER 71N20C MONTERET PÅ BORD MED VÆGBESLAG 71R11
TELEPHONYTRANSMITTER 71N20C MOUNTED ON TABLE WITH WALLMOUNTINGPLATE 71R11







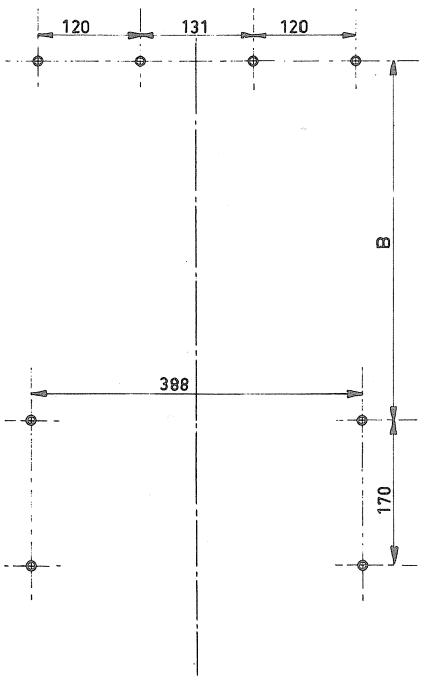
KOMBINATION COMBINATION	DIMENSION "	VÆGT WEIGHT
SENDER TRANSMITTER	1 "	29kg "
SENDER + 1 MODTAGER TRANSMITTER + 1 RECEIVER	2 "	50kg "
SENDER + 2 MODTAGERE TRANSMITTER + 2 RECEIVERS	3 "	71kg "
SENDER + 1 MODTAGER + AC LADETAVLE TRANSMITTER + 1 RECEIVER + AC CHARGING BOARD	3 "	65kg "
SENDER + 1 MODTAGER + DC LADETAVLE TRANSMITTER + 1 RECEIVER + DC CHARGING BOARD	3 "	58kg "
SENDER + 1 MODTAGER + NETDEL TRANSMITTER + 1 RECEIVER + 1 POWER PACK	3 "	86kg "

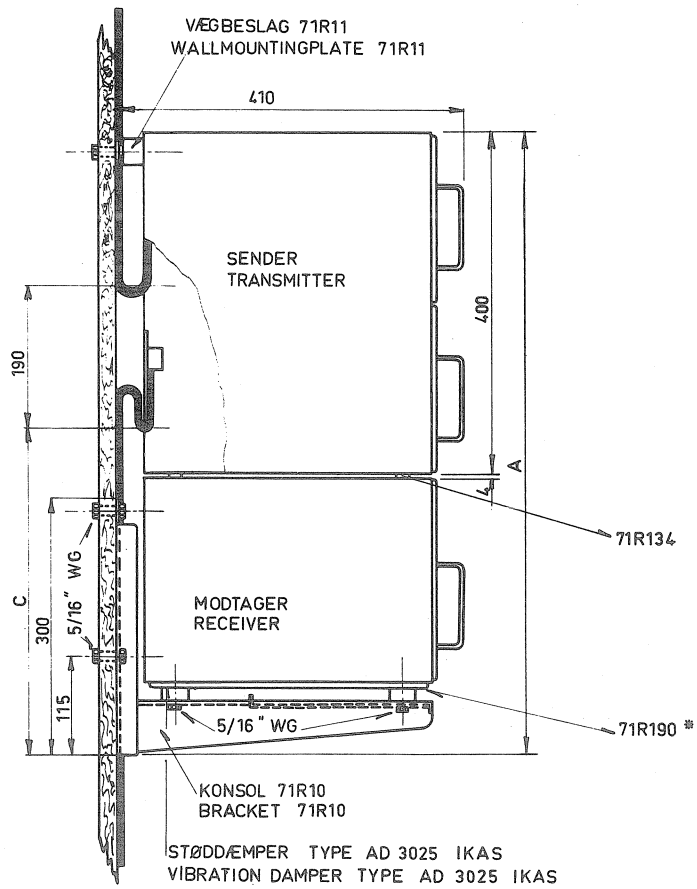
	1	2	3
A	424	668	912
B	401	645	889
C	69	313	557

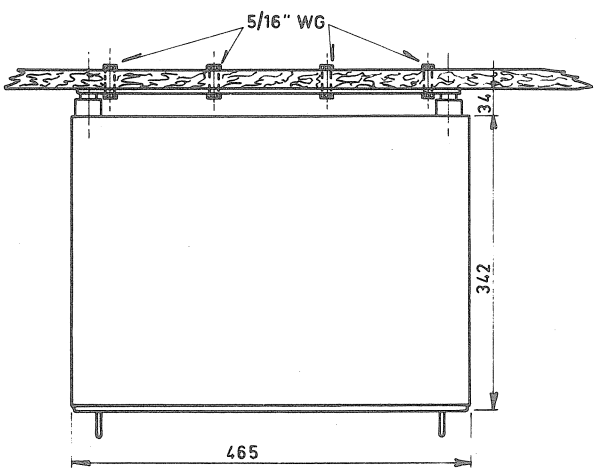
* NÅR RADIOANLÆGGET BESTÅR AF MERE END TO SAMMENSPÆNDTE KABINETTER, SKAL DER ANVENDES ET SÆT FORSTÆRKNINGSPLADER TYPE 71R190 MELLEM DET NEDERSTE KABINET OG SVINGNINGSDÆMPERNE.

* WHEN THE RADIO EQUIPMENT CONTAINS MORE THAN TWO CASES BOLTED TOGETHER THERE MUST BE USED A PAIR OF REINFORCING PLATES TYPE 71R190 BETWEEN THE LOWEST CASE AND THE VIBRATIONS DAMPERS.

TELEFONISENDER **71N20C** MONTERET PÅ SKOT VED HJÆLP AF KONSOL 71R10 OG VÆGBESLAG 71R11
TELEPHONY TRANSMITTER **71N20C** MOUNTED ON BULKHEAD BY MEANS OF BRACKET 71R10 AND WALL-MOUNTINGPLATE 71R11







KOMBINATION COMBINATION	DIMENSION "	VÆGT WEIGHT
SENDER TRANSMITTER	1 "	29kg "
SENDER+1 MODTAGER TRANSMITTER+1RECEIVER	2 "	50kg "
SENDER+2 MODTAGERE TRANSMITTER+2 RECEIVERS	3 "	71kg "
SENDER+1 MODTAGER+AC LADETAVLE TRANSMITTER+1RECEIVER+AC CHARGING BOARD	3 "	65kg "
SENDER+1 MODTAGER+DC LADETAVLE TRANSMITTER+1RECEIVER+DC CHARGING BOARD	3 "	58kg "

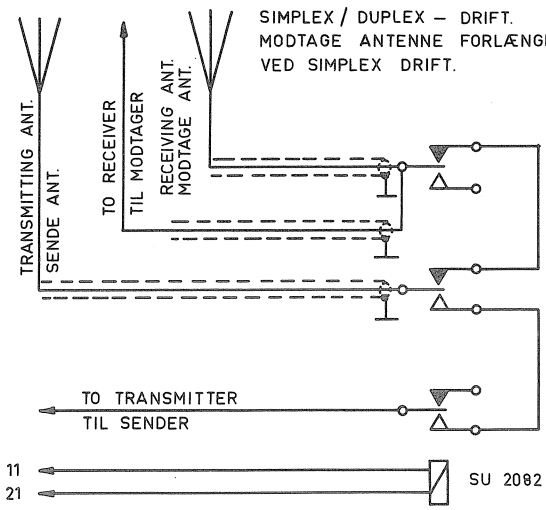
	1	2	3
A	484	728	972
B	176	420	664
C	129	373	617

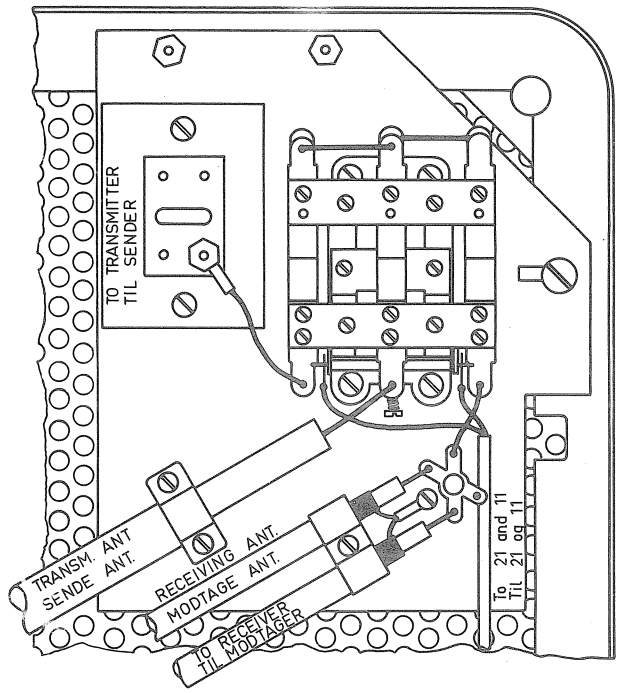
* NÅR RADIOANLÆGGET BESTÅR AF MERE END TO SAMMENSPÆNDTE KABINETTER, SKAL DER ANVENDES ET SÆT FORSTÆRKNINGSPLADER TYPE 71R190 MELLEM DET NEDERSTE KABINET OG SVINGNINGSDÆMPERNE

* WHEN THE RADIO EQUIPMENTS CONTAINS MORE THAN TWO CASES BOLTED TOGETHER THERE MUST BE USED A PAIR OF REINFORCING PLATES TYPE 71R190 BETWEEN THE LOWEST CASE AND THE VIBRATION DAMPERS.

SIMPLEX / DUPLEX – SERVICE.
THE RECEIVING ANTENNA EXTENDED
IN SIMPLEX – SERVICE.

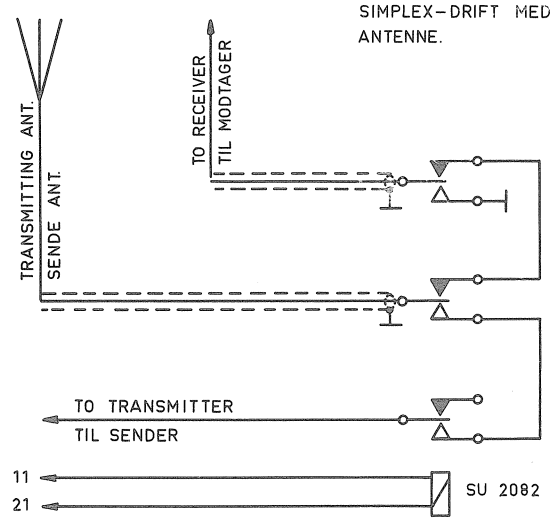
SIMPLEX / DUPLEX – DRIFT.
MODTAGE ANTENNE FORLÆNGET
VED SIMPLEX DRIFT.

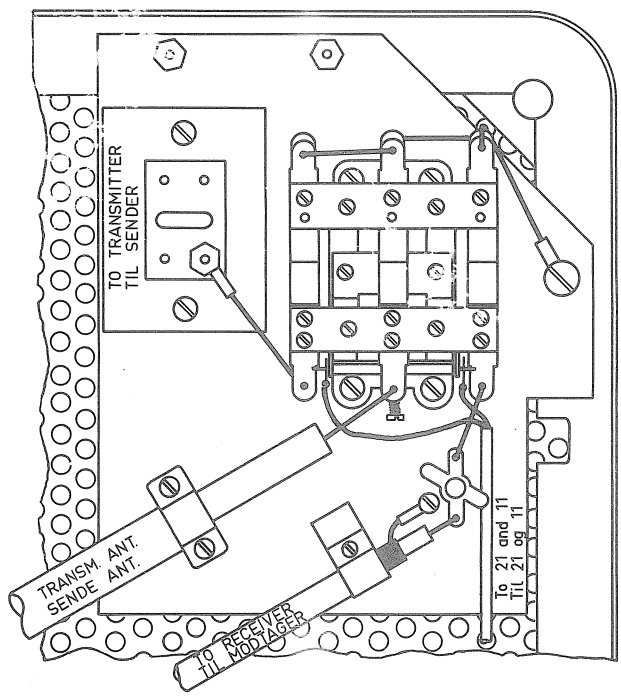




SIMPLEX – SERVICE WITH
A SINGLE ANTENNA.

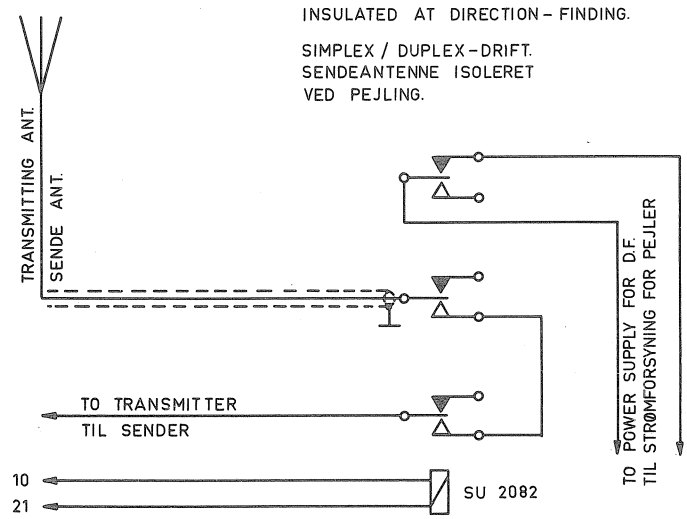
SIMPLEX – DRIFT MED ENKELT
ANTENNE.

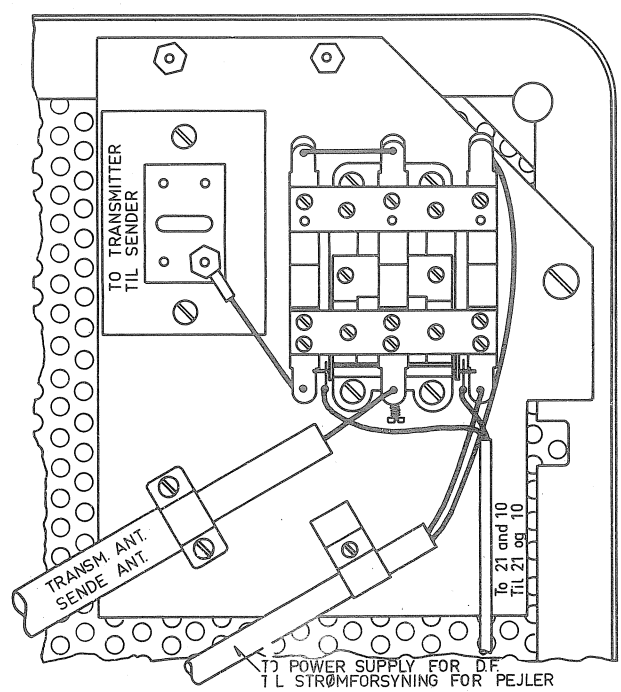


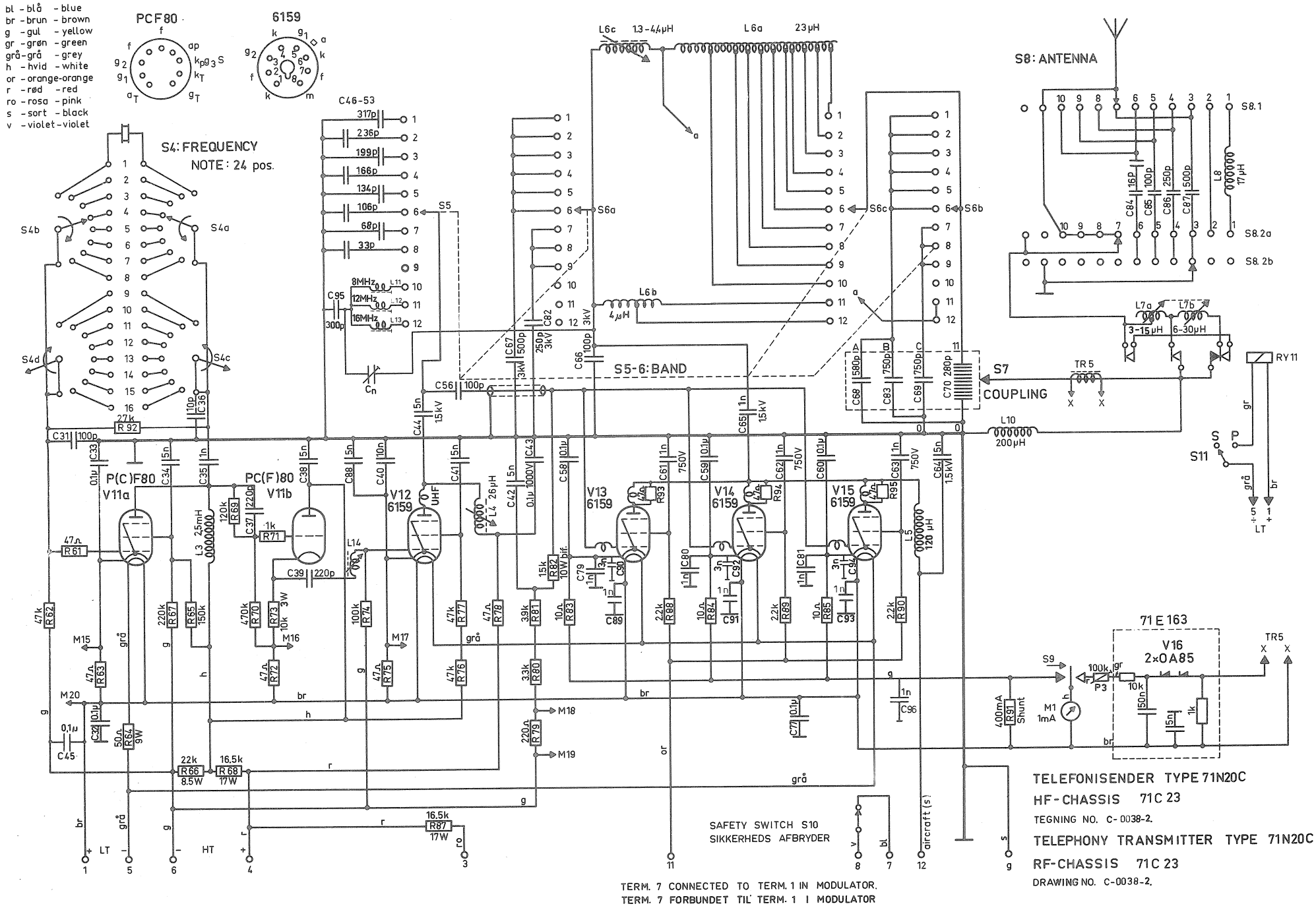


SIMPLEX / DUPLEX – SERVICE.
TRANSMITTING ANTENNA
INSULATED AT DIRECTION – FINDING.

SIMPLEX / DUPLEX – DRIFT.
SENDEANTENNE ISOLERET
VED PEJLING.






bl - blå - blue
br - brun - brown
g - gul - yellow
gr - grøn - green
grå - grå - grey
h - hvid - white
or - orange - orange
r - rød - red
ro - rosa - pink
s - sort - black
v - violet - violet
PCF80
6159
S4: FREQUENCY
NOTE: 24 pos.
S4a
S4b
S4c
S4d
S5
S5-6: BAND
S6a
S6b
S6c
S7
COUPLING
S8: ANTENNA
S8.1
S8.2a
S8.2b
S9
S10
SAFETY SWITCH S10
SIKKERHEDS AFBRYDER
S11
L6c 1.3-44µH
L6a 23µH
L6b 4µH
L7a 3-15µH
L7b 6-30µH
L8 17µH
L10 200µH
C46-53
317p
236p
199p
166p
134p
106p
68p
33p
8MHz
12MHz
16MHz
C95 300p
C66 100p
C67 500p 3kV
C82 250p 3kV
C56 100p
C44 5n 15kV
C65 1n 15kV
C68 580p
C83 750p
C69 750p
C70 280p
TR5
RY11
P(C)F80
V11a
PC(F)80
V11b
V12 6159
UHF
L4 26µH
V13 6159
V14 6159
V15 6159
L3 2.5mH
L5 120µH
L14
C39 220p
C42 5n
C43 0.1µ 1000V
C58 0.1µ
C59 0.1µ
C60 0.1µ
C61 1n 750V
C62 1n 750V
C63 1n 750V
C64 5n 1.5kV
C79 1n
C80 1n
C81 1n
C87 500p
C84 16p
C85 100p
C86 250p
R82 15k 10W pif.
R93
R94
R95
R61 47Ω
R62 47k
R63 47Ω
R64 50Ω 9W
R65 150k
R66 22k 8.5W
R67 220k
R68 16.5k 17W
R69 120k
R70 470k
R71 1k
R72 47Ω
R73 10k 3W
R74 100k
R75 47Ω
R76 47k
R77 47k
R78 47Ω
R79 220Ω
R80 33k
R81 3.9k
R83 10n
R84 10n
R85 10n
R87 16.5k 17W
R88 2.2k
R89 2.2k
R90 2.2k
R91 400mA Shunt
R92 27k
C31 100p
C32 0.1µ
C33 0.1µ
C34 5n
C35 1n
C36 10p
C38 5n
C40 10n
C41 5n
C88 5n
C89 1n
C90 3n
C91 1n
C92 3n
C93 1n
C94 3n
C96 1n
C97 0.1µ
C45 0.1µ
71 E 163
V16 2×OA85
M1 1mA
P3 100k
M15
M16
M17
M18
M19
M20
LT
HT
aircraft (s)
TELEFONISENDER TYPE 71N20C
HF-CHASSIS 71C 23
TEGNING NO. C-0038-2.
TELEPHONY TRANSMITTER TYPE 71N20C
RF-CHASSIS 71C 23
DRAWING NO. C-0038-2.
TERM. 7 CONNECTED TO TERM. 1 IN MODULATOR.
TERM. 7 FORBUNDET TIL TERM. 1 I MODULATOR

SERVICE S2-	1a	1b	2	3	4a	4b	6	7
A2	●		●	●	●			●
A3S		●	●		●			●
A3D		●				●		●
HAILER		●			●		●	
WAFER	1	1	2	2	3	4		

Switch functions. Omskifter funktioner.

POWER S1-	1	2	3	4	5	6
OFF	●			●		
ST BY	●	●		●		
HIGH		●	●	●		
LOW		●	●		●	●
WAFER	1	2	3	4	5	

● Switch closed. Kontakt lukket.

6159 ECC81/82 OB2

bl - blå - blue
br - brun - brown
g - gul - yellow
gr - grøn - green
grå - grå - grey
h - hvid - white
or - orange - orange
r - rød - red
ro - rosa - pink
s - sort - black
v - violet - violet

TIL SENDER
TO TRANSMITTER

PSb

COIL

Bottom view of ReA
ReA set fra bunden

Plug

Socket

PSc er kun på bestilling placeret på forpladen

PSc is only situated on the frontplate when ordered

71C273

V1 1S121 V2 1S121

V4a 1/2ECC81 V4b 1/2ECC81

V5 6159 V6 6159

V7 OB2 V8 OB2

V3a 1/2ECC82 V3b 1/2ECC82

TR1 TR2 TR3 TR4

ReA

K1 K2

S1-1 S1-2 S1-3 S1-4 S1-5 S1-6 S2-1a S2-1b S2-2 S2-3 S2-4a S2-4b S2-6 S2-7 S3 "safety switch"

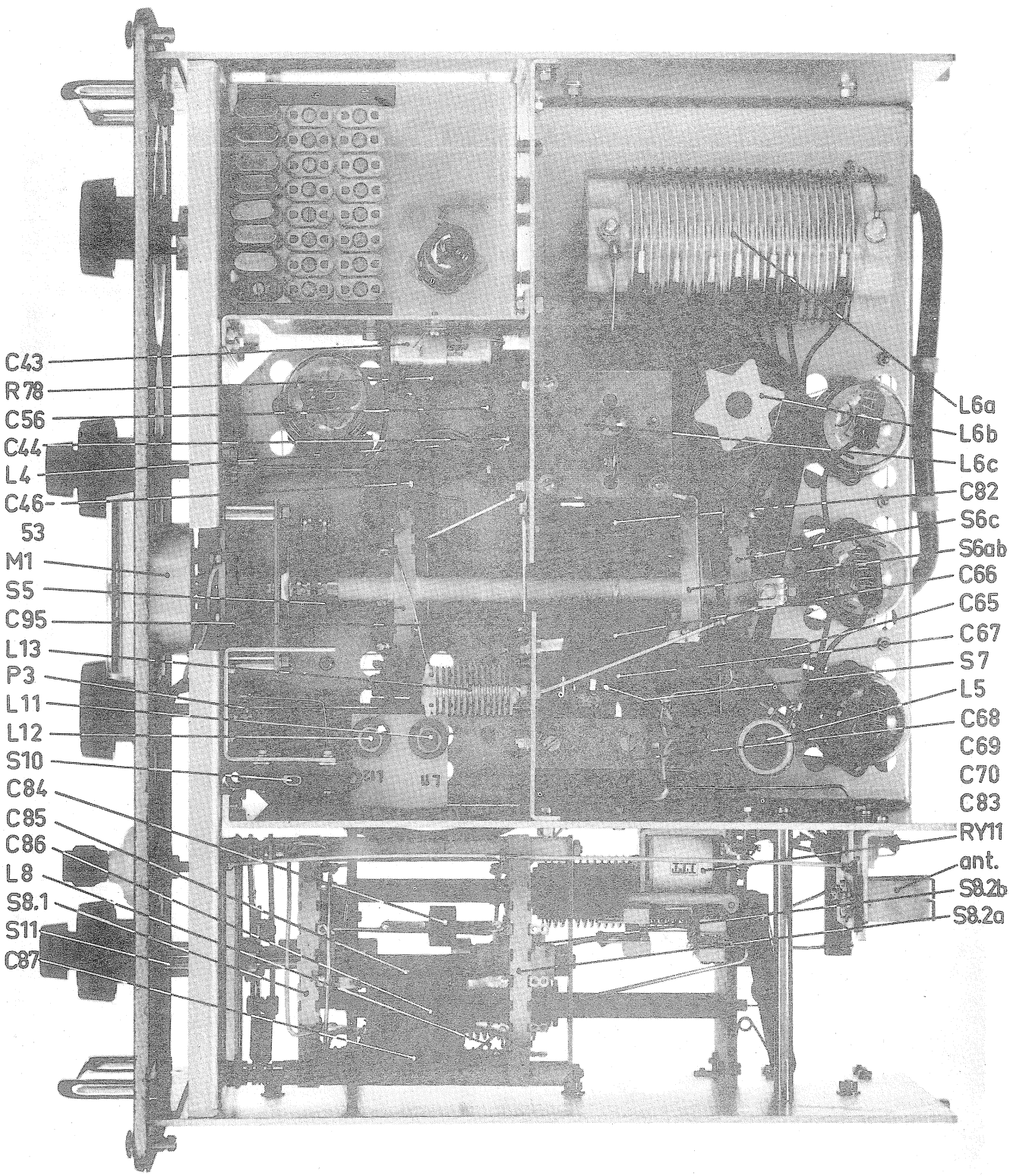
F1 F2 F3 F4

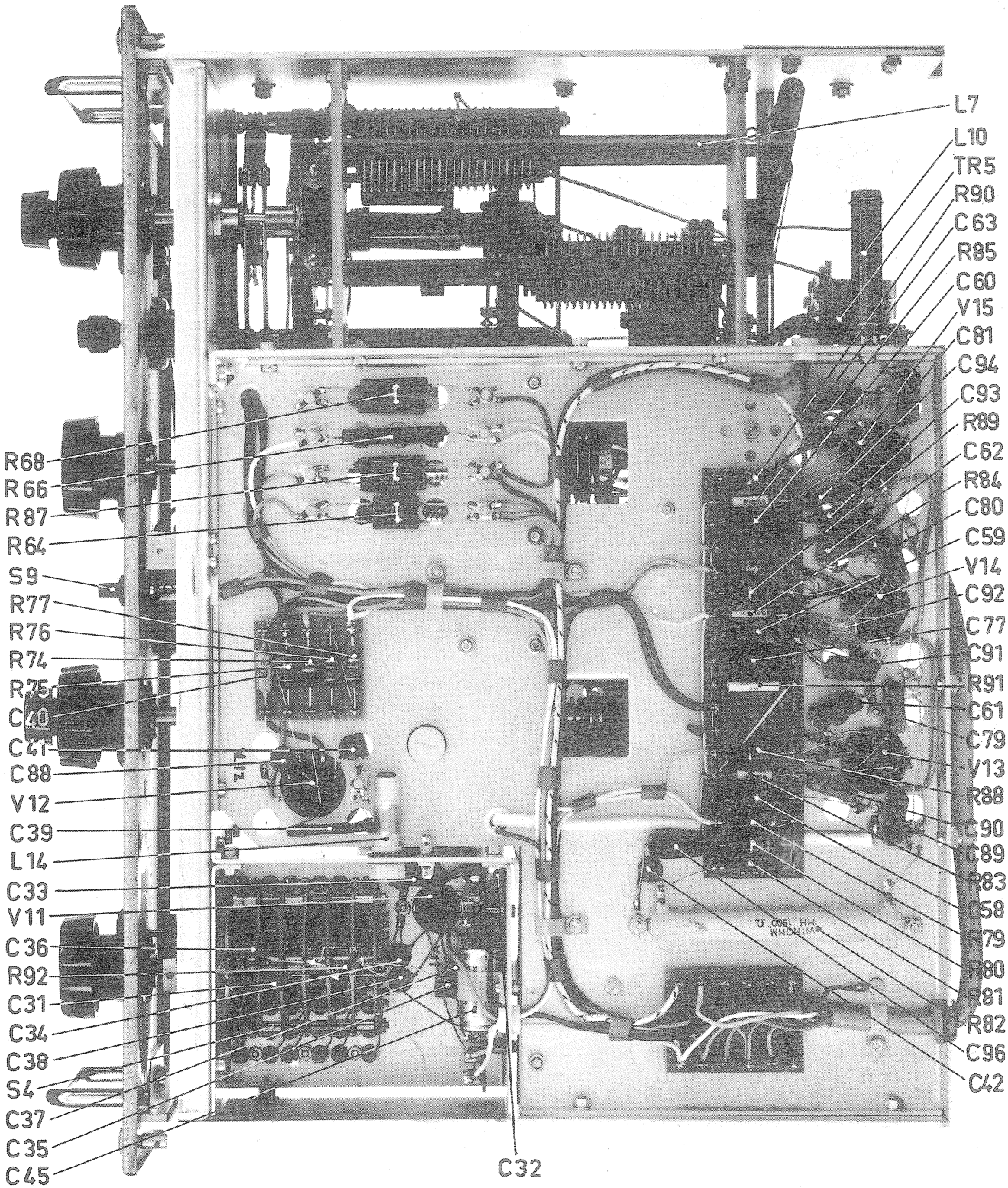
PSa

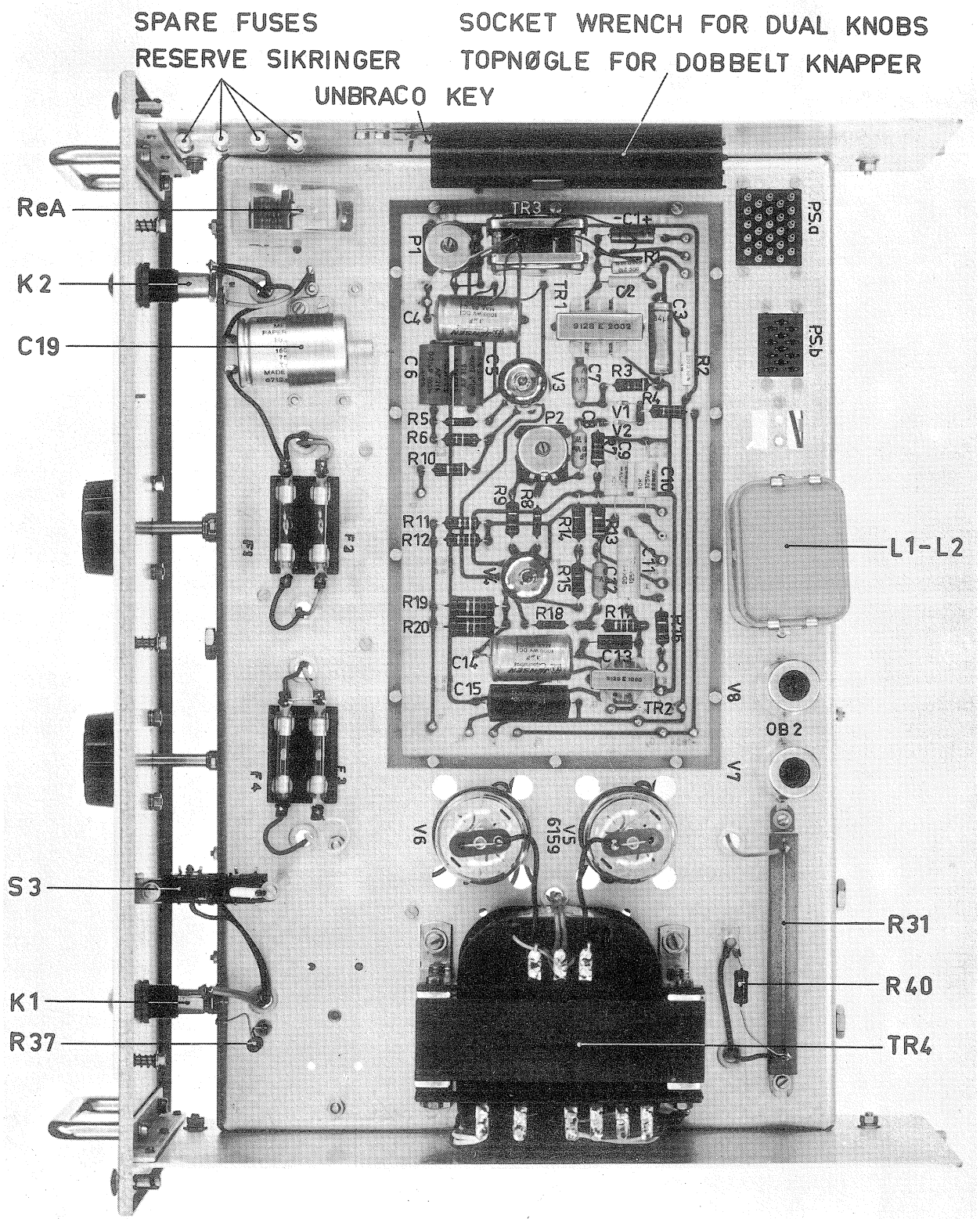
+180V +24V -24V

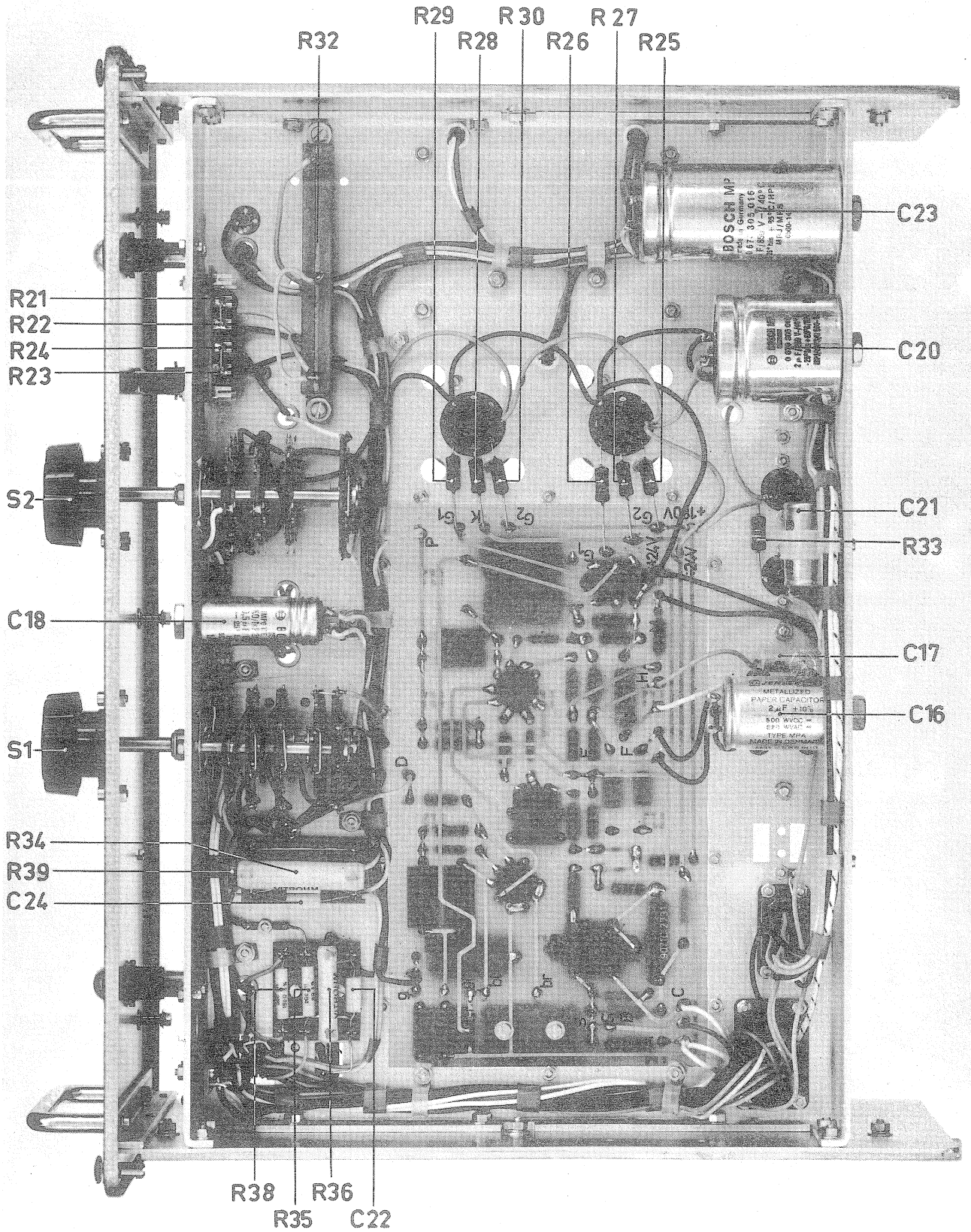
TELEFONISENDER TYPE 71N20C
LF-CHASSIS 71M06
TEGNING NO. C-0034-2

TELEPHONY TRANSMITTER TYPE 71N20C
AF-CHASSIS 71M06
DRAWING NO C-0034-2


C43
R78
C56
C44
L4
C46
53
M1
S5
C95
L13
P3
L11
L12
S10
C84
C85
C86
L8
S8.1
S11
C87
L6a
L6b
L6c
C82
S6c
S6ab
C66
C65
C67
S7
L5
C68
C69
C70
C83
RY11
ant.
S8.2b
S8.2a


L7
L10
TR5
R90
C63
R85
C60
V15
C81
C94
C93
R89
C62
R84
C80
C59
V14
C92
C77
C91
R91
C61
C79
V13
R88
C90
C89
R83
C58
R79
R80
R81
R82
C96
C42
R68
R66
R87
R64
S9
R77
R76
R74
R75
C40
C41
C88
V12
C39
L14
C33
V11
C36
R92
C31
C34
C38
S4
C37
C35
C45
C32
L12
VITROHM
HH 1390 Ω


SPARE FUSES
RESERVE SIKRINGER
SOCKET WRENCH FOR DUAL KNOBS
TOPNØGLE FOR DOBBELT KNAPPER
UNBRACO KEY
ReA
K2
C19
S3
K1
R37
L1-L2
R31
R40
TR4
OB2
P1
P2
TR1
TR2
TR3
V1
V2
V3
V4
V5
6159
V6
V7
V8
PS.a
PS.b
F1
F2
F3
F4
C1
C2
C3
C4
C5
C6
C7
C8
C9
C10
C11
C12
C13
C14
C15
R1
R2
R3
R4
R5
R6
R7
R8
R9
R10
R11
R12
R13
R14
R15
R16
R18
R19
R20

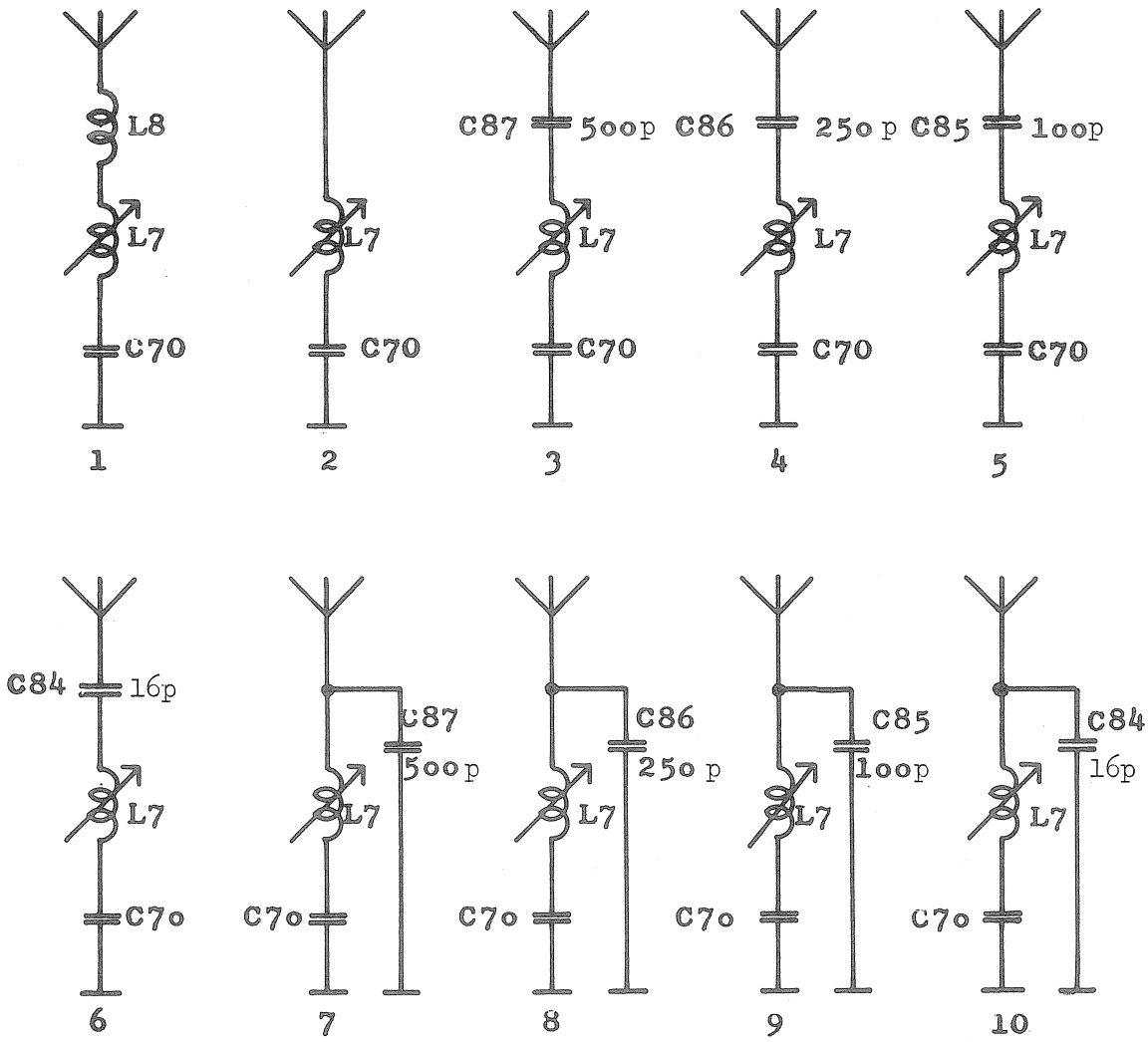

R29
R30
R27
R32
R28
R26
R25
C23
R21
R22
R24
R23
C20
S2
C21
R33
C18
C17
C16
S1
R34
R39
C24
R38
R36
R35
C22

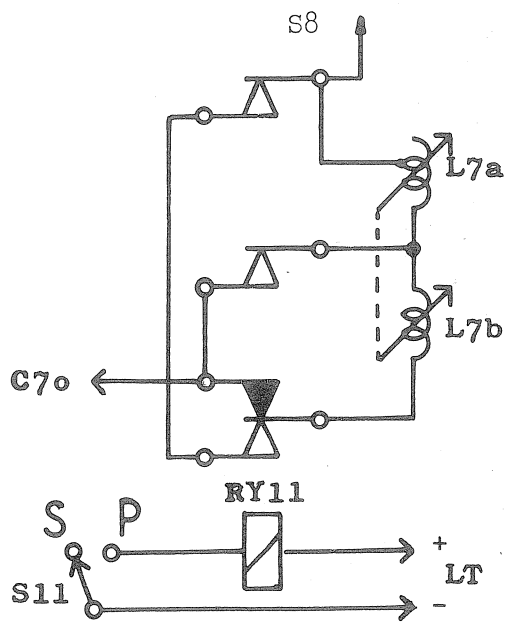
SENDER 71N20C SENDER

HF-del 71C23 RF-unit

antenneomskifter S8 antenna switch

pos. 1-10





C-0048-1

NORMAL TEST METER READINGS

Conditions for measurements: Set SERVICE switch S2 to A2, POWER switch S1 to HIGH and FREQUENCY switch S4 to 2182 kc/s. Key transmitter. Primary voltage is normal. 20 kΩ/volt test meter is used.

Transmitter section, type 71C23

Tube	V11a	V11b	V12	V13	V14	V15
V_a	175V	180V	550V	550V	550V	550V
V_k	M15 0.15V	M16 0.5V	M17 2.3V	1.1V	1.1V	1.1V
V_{g2}	60V		100V	135V	135V	135V
Voltage measured in relation to point M20 (terminal no. 1).						

PA grid current between points M18-M19 = 10 - 13 mA.

Modulator section, type 71M06

Tube	V1	V2	V3a	V3b	V4a	V4b	V5	V6
V_a			280V	-95V	230V	135V	550V	550V
V_k	1.1V	1.1V	26V	-23V	2.3V	1.8V	1V×	1V×
V_{g2}							210V×	210V×
V_{g1}							-50V	-50V
Voltage measured in relation to point "+24V", (× to point "-24V").								

Abbrevations

V_a = plate voltage
V_k = cathode voltage
V_{g2} = screen-grid voltage
V_{g1} = control-grid voltage

71N2oC Telephony Transmitter

Division of the Frequency Range into Bands

Band (S6)	Frequency, kc/s	
Pos. No.	Minimum	Maximum
1	16oo	172o
2	18oo	19oo
3	19oo	2o2o
4	2o2o	215o
5	215o	2325
6	2325	251o
7	251o	29oo
8	29oo	34oo
9	34oo	418o
1o	8195	828o
11	1233o	12421
12	1646o	1656o