

SUMMARY OF DATA

PURPOSE

To provide an automatically tuned 100 W HF transmitter receiver for Emergency use, and for operational use in Integrated Communication System Stage 2.

BRIEF DESCRIPTION

In the Synthesizer, which is common to the receiver and the transmitter drive, regenerative divider circuits and triple-mix multipliers convert a 1 MHz standard into the frequency set on the decade controls.

In the Modulator Tuning Unit, the modulator generates SSB signals from a keyed tone or speech input to produce a modulated 100 kHz sub-carrier. The Synthesizer translates this into a low-level RF signal bearing the required intelligence at the selected frequency. The RF tuning unit, tuning automatically to the same frequency, amplifies and filters this signal to produce the drive output. Front panel switches determine the AF input and the class of transmission.

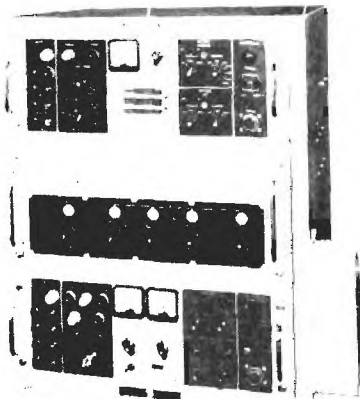
In the 100 W Self-tuning Amplifier, wide-band pre-amplification of the drive output produces about 1 W PEP for the Amplifier Radio Frequency, where power amplifier valve provides 100 W, via a 50 ohms feeder, to the Antenna Matching Unit which couples it to a whip antenna. The grid and anode circuits of the fan-cooled power amplifier tune automatically to the frequency set on the Synthesizer while the RF output is switched by a relay so that the anode is tuned into a 50 ohms dummy load. Then the Antenna Matching Unit is connected and a servo controlled matching network, using phase and amplitude detectors, transforms the antenna impedance into 50 ohms. Automatic level control is provided by an attenuator, in the Modulator Tuning Unit, operated by binary dividers and controlled by a level detector at the grid of the power amplifier.

In the Receiver, automatically tuned RF circuits precede the first frequency change which produces an IF of 4 MHz, or 1 MHz, for frequencies above or below 8 MHz. For frequencies above 8 MHz, the 4 MHz IF is subjected to a second frequency change to produce an IF of 1 MHz. For all frequencies the 1 MHz IF is again mixed to produce a final IF of 100 kHz. To avoid spurious response problems the normal Synthesizer output is inhibited and its component frequencies are mixed in a Frequency Offset Unit to provide the local oscillation for each frequency change.

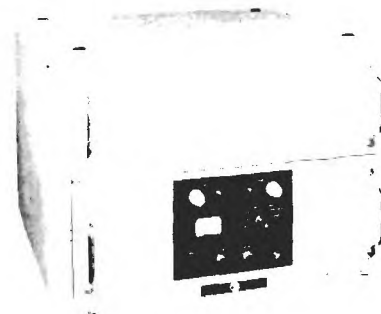
The final IF at 100 kHz is supplied to two receiver channels, one for usb, dsb and the other for 1sb reception. Sideband AGC is employed. Demodulation is effected by an envelope detector for dsb reception and by balanced modulators for ssb reception. The amplified audio output from each channel can be switched to a built-in loudspeaker or monitored by headphones at one of three Receiver outputs, one local and two remote. The class of reception is selected by front panel switches.

RF tuning circuits are selected and tuned by rotary solenoids and servo motors positioned by the Synthesizer decade controls. Antenna matching circuits are servo tuned by phase and impedance magnitude detectors.

NOTE The Modulator Tuning Unit and the Synthesizer are also used in Transmitter Drive Outfit TDC; the Receiver and the Synthesizer are used in Receiver Outfit CJM.



DRIVE UNIT RECEIVER



100 W SELF-TUNING AMPLIFIER

CLASS OF TRANSMISSION

Modulation: AM
 Types of Transmission:
 CW (1 kHz tone keyed in usb)
 MCW (1 kHz tone keyed in usb and carrier)
 Telephony
 Supplementary Characteristics:
 SSB (or ISB) Suppressed Carrier
 SSB (or ISB) Pilot Carrier
 Compatible DSB (Carrier and USB only transmitted)

CLASS OF RECEPTION

Modulation: AM
 Types of Reception: CW
 MCW
 Telephony
 FST
 Data
 Supplementary Characteristics:
 DSB
 SSB (USB and ISB)
 ISB

FREQUENCY RANGE

HF 1.5 to 24 MHz as simplex transmitter receiver
 HF 1.06 to 27.999 MHz) Receiver only
 MF 240 to 525 kHz)

PHYSICAL DATA

Major Assemblies

Cabinet, Drive Unit Receiver
 5820-99-519-7467

Receiver, Radio Frequency
 5820-99-519-7019

Synthesizer, Electrical Frequency
 5820-99-519-7000

Modulator Tuning Unit
 5820-99-619-6983

Switch, Aerial Selector
 5820-99-916-4652

Cabinet, Radio Frequency Amplifier
 5820-99-519-7004

Amplifier Radio Frequency
 5820-99-519-7014

Control Power Supply
 5820-99-519-7015

Antenna Matching Unit
 5820-99-519-7033

Height	Width	Depth	Weight
66.5 cm (26.24 in.)	56 cm (22 in.)	59.1 cm (23.25 in.)	60 Kg (130 lb)
17.8 cm (7 in.)	50.2 cm (19.75 in.)	57.6 cm (22.65 in.)	30.2 Kg (67 lb)
23.8 cm (9.375 in.)	50.2 cm (19.75 in.)	57.6 cm (22.6 in.)	27.2 Kg (60 lb)
17.8 cm (7 in.)	50.2 cm (19.75 in.)	57.6 cm (22.6 in.)	26.3 Kg (58 lb)
23.5 cm (9.25 in.)	11.4 cm (4.5 in.)	12 cm (4.75 in.)	2.4 Kg (5 lb)
39.0 cm (15.375 in.)	56 cm (22 in.)	58.5 cm (23 in.)	40 Kg (88 lb)
17.8 cm (7 in.)	50.2 cm (19.75 in.)	57.6 cm (22.625 in.)	16 Kg (35 lb)
17.8 cm (7 in.)	50.2 cm (19.75 in.)	57.6 cm (22.625 in.)	27.2 Kg (60 lb)
73.7 cm (29 in.)	43.2 cm (17 in.)	44.5 cm (17.5 in.)	54 Kg (120 lb)

ELECTRICAL CHARACTERISTICS

- 1 MHz standard frequency input : 0.5 V to 1 V into 75 ohms or more than 1 kohm.
 Self-tuning time : Less than 25 seconds.
 Transmission
 Audio inputs : At two remote inputs 1 mV ± 1 dB into 600 ohms at 1 kHz, at local input -50 dBm for peak sideband output on either sideband.
 RF Drive : Approximately 75 mV into 75 ohms.
 RF Power Output : 70 to 120 W PEP, set by automatic level control to 100 W.
 Intermodulation Products : Third order intermodulation products better than -36 dB relative to PEP measured at the 50 ohms output of the power amplifier, when two test tones separated by not less than 200 Hz are applied simultaneously.
 Antenna Matching : Preset adjustments are required for the Aerial Outfit fitted, AWN or AWH(M).
 Keying : Maximum speed in CW telegraphy is 30 bauds. On activation the antenna changeover relay is held in so that for subsequent continuous keying the transmitter output follows the keying input with a delay of 6 to 8 ms at the start and 2 to 4 ms at the end of each mark. The antenna relay hold-on time is about 25 ms.
 Reception
 AGC Characteristics : On ssb the AF output level is held constant within 3 dB for an increase in input level from 2 μV to 1 V equivalent antenna EMF. On dsb the AF output level is held constant within 3 dB, for any constant percentage modulation, on carrier levels for 2 μV to 0.5 V equivalent antenna EMF.
 Audio Output : 2 V ± 2 dB into 200 ohms from each sideband.
 0.15 mW into 600 ohms at sideband monitor jacks.
 Up to 1 mV into 600 ohms at headset jack and socket, via volume control.
 Up to 1 W at loudspeaker, via volume control.

POWER REQUIREMENTS

100 to 130 V or 200 to 260 V, 50 to 60 Hz single-phase ac, 580 W IN USE, 260 W READY, 680 W during TUNE. 115 V or 230 V ac or dc for anti-condensation heaters, 50 W each for 100 W Self-tuning Amplifier and Antenna Matching Unit, 70 W for Drive Unit receiver. Also 300 W for a conditioning heater in the AMU.

HANDBOOKS

BR 4144(3 & 4)	Handbook for Type 641 Transmit Receive Equipment
BR 4144(6)	Handbook for Acceptance Trials.
BR 4145 Vol 1 & Vol 2	Handbook for Modulator Tuning Unit 5820-99-519-6983.
BR 4146	Handbook for Synthesizer, Electrical Frequency 5820-99-519-7000.
BR 4147 Vol 1 & Vol 2	Handbook for Receiver, Radio Frequency 5820-99-519-7019.
BR 4148 Vol 1 & Vol 2	Handbook for 100 W Self-tuning Amplifier and Antenna Matching Unit

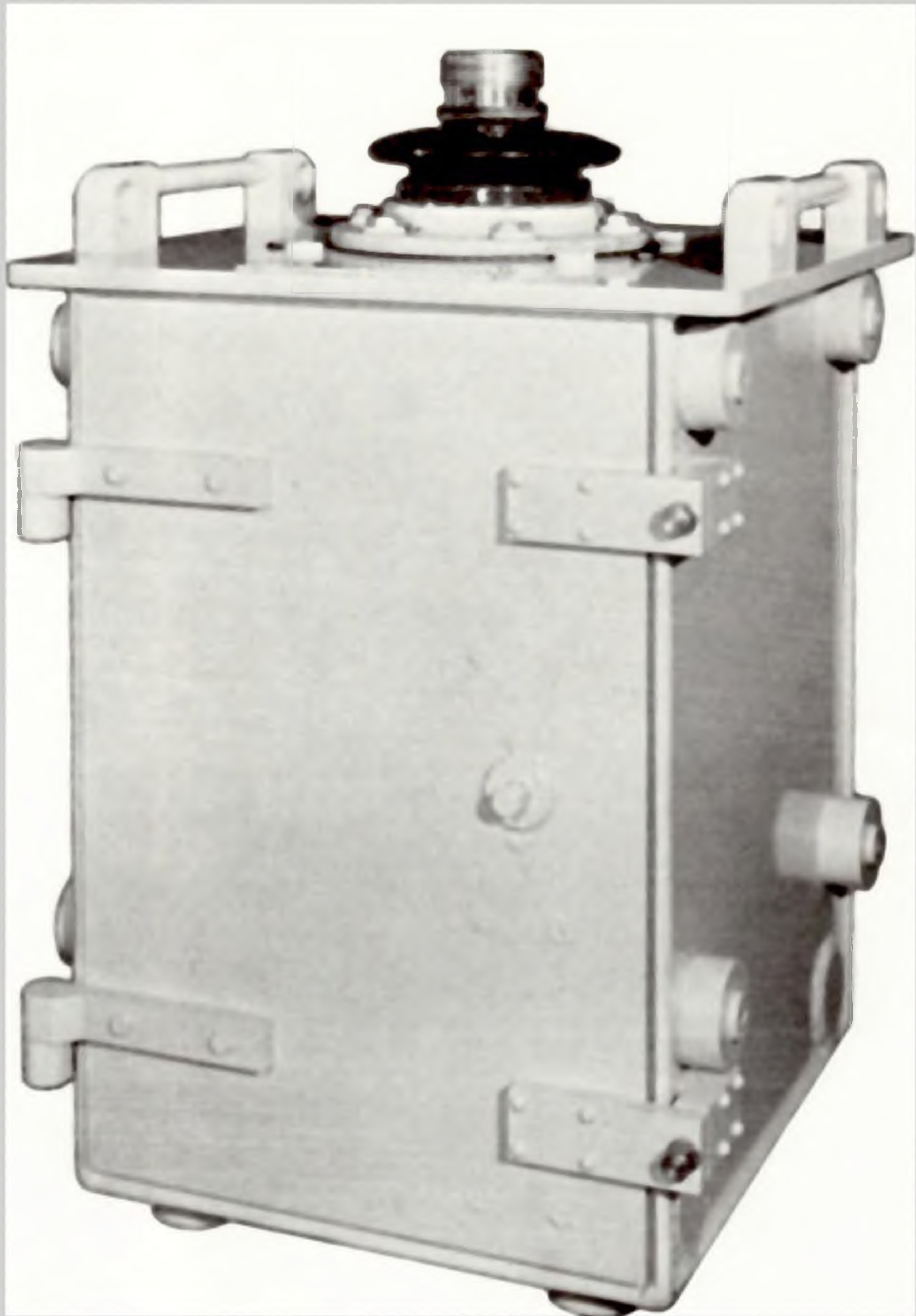
ESTABLISHMENT LIST

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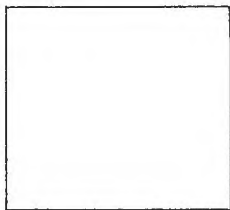
INSTALLATION SPECIFICATION

B 1087

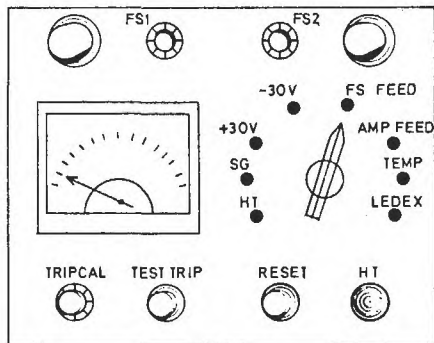








AMPLIFIER RF



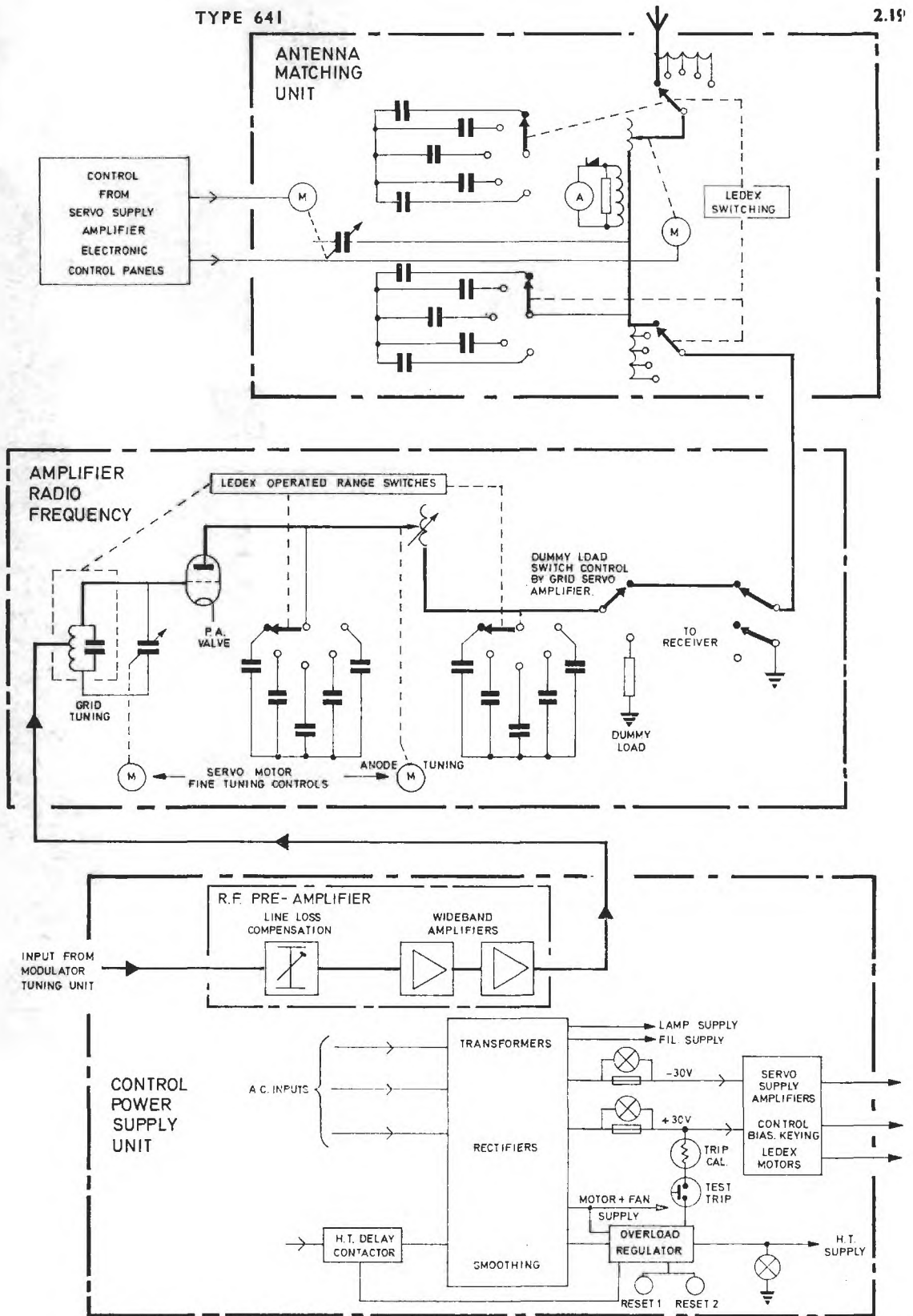
CONTROL POWER--SUPPLY

MAINS SUPPLY

AF LINEAR AMPLIFIER N1050

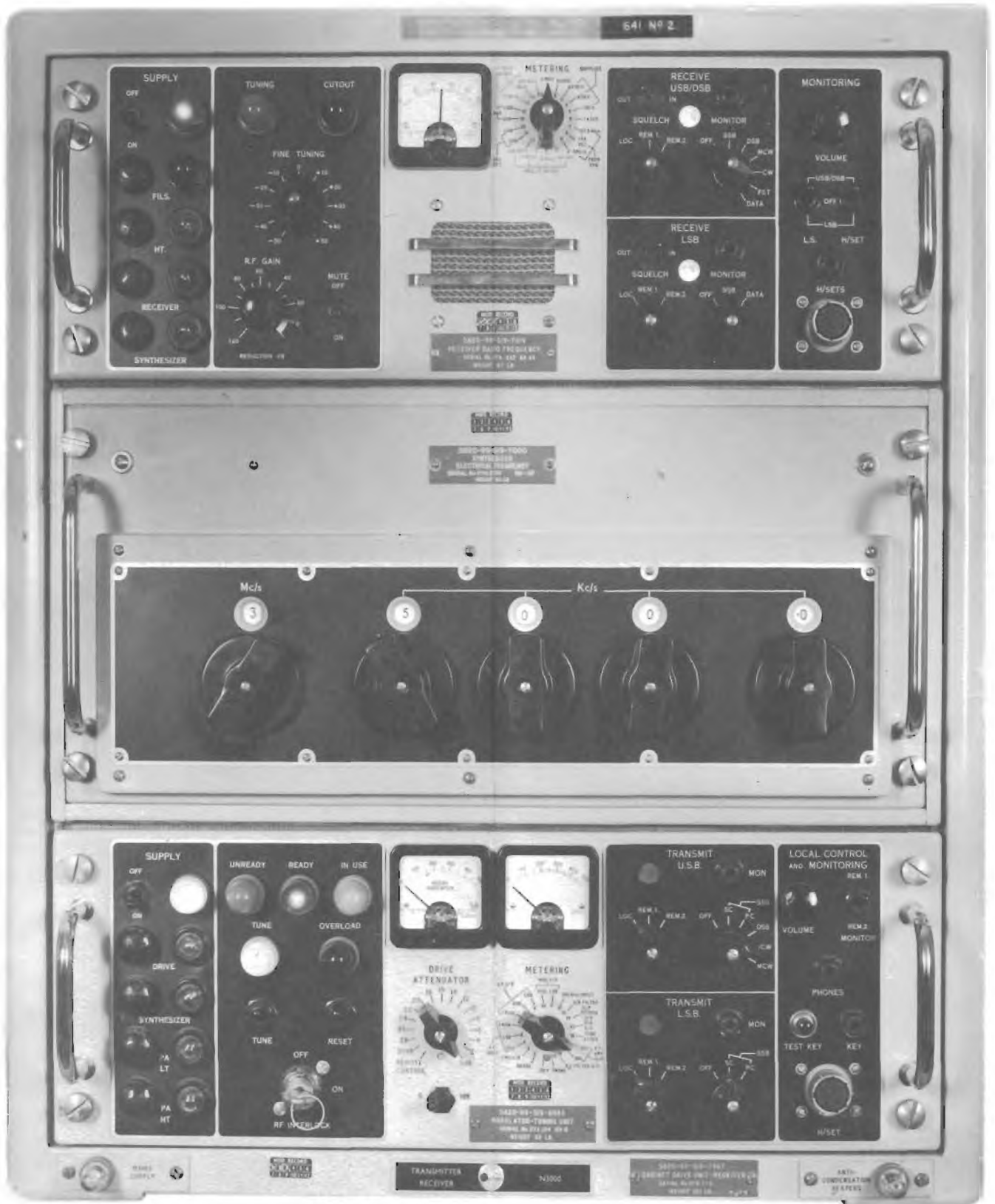
CABINET RF AMP

ANTICONDENSATION HEATERS



2-19-19

CHANGE NO. 4
(Reverse blank)



TRANSMITTER / RECEIVER OUTFIT TYPE 641 — FIG. 4.6