VOLUME I S

UNCLASSIFIED

TECHNICAL MANUAL

for

GENERAL PURPOSE TRANSMITTER

MODEL GPT-10K

SYNTHESIZED

THE TECHNICAL MATERIEL CORPORATION

MAMARONECK, N.Y. OTTAWA, CANADA

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IN-345

ISSUE DATE: 20 Oct. 1965

NOTICE

THE TECHNICAL MATERIEL CORPORATION
COMMUNICATIONS ENGINEERS
700 FENIMORE ROAD MAMARONECK, N. Y.

Warranty

The Technical Materiel Corporation, hereinafter referred to as TMC, warrants the equipment (except electron tubes,* fuses, lamps, batteries and articles made of glass or other fragile or other expendable materials) purchased hereunder to be free from defect in materials and workmanship under normal use and service, when used for the purposes for which the same is designed, for a period of one year from the date of delivery F.O.B. factory. TMC further warrants that the equipment will perform in a manner equal to or better than published technical specifications as amended by any additions or corrections thereto accompanying the formal equipment offer.

TMC will replace or repair any such defective items, F.O.B. factory, which may fail within the stated warranty period, PROVIDED:

1. That any claim of defect under this warranty is made within sixty (60) days after discovery thereof and that inspection by TMC, if required, indicates the validity of such claim to TMC's satisfaction.
2. That the defect is not the result of damage incurred in shipment from or to the factory.
3. That the equipment has not been altered in any way either as to design or use whether by replacement parts not supplied or approved by TMC, or otherwise.
4. That any equipment or accessories furnished but not manufactured by TMC, or not of TMC design shall be subject only to such adjustments as TMC may obtain from the supplier thereof.

Electron tubes*furnished by TMC, but manufactured by others, bear only the warranty given by such other manufacturers. Electron tube warranty claims should be made directly to the manufacturer of such tubes.

TMC's obligation under this warranty is limited to the repair or replacement of defective parts with the exceptions noted above.

At TMC's option any defective part or equipment which fails within the warranty period shall be returned to TMC's factory for inspection, properly packed with shipping charges prepaid. No parts or equipment shall be returned to TMC, unless a return authorization is issued by TMC.

No warranties, express or implied, other than those specifically set forth herein shall be applicable to any equipment manufactured or furnished by TMC and the foregoing warranty shall constitute the Buyers sole right and remedy. In no event does TMC assume any liability for consequential damages, or for loss, damage or expense directly or indirectly arising from the use of TMC Products, or any inability to use them either separately or in combination with other equipment or materials or from any other cause.

*Electron tubes also include semi-conductor devices.

PROCEDURE FOR RETURN OF MATERIAL OR EQUIPMENT

Should it be necessary to return equipment or material for repair or replacement, whether within warranty or otherwise, a return authorization must be obtained from TMC prior to shipment. The request for return authorization should include the following information:

1. Model Number of Equipment.
2. Serial Number of Equipment.
3. TMC Part Number.
4. Nature of defect or cause of failure.
5. The contract or purchase order under which equipment was delivered.

PROCEDURE FOR ORDERING REPLACEMENT PARTS

When ordering replacement parts, the following information must be included in the order as applicable:

1. Quantity Required.
2. TMC Part Number.
3. Equipment in which used by TMC or Military Model Number.
4. Brief Description of the Item.
5. The *Crystal Frequency* if the order includes crystals.

PROCEDURE IN THE EVENT OF DAMAGE INCURRED IN SHIPMENT

TMC's Warranty specifically excludes damage incurred in shipment to or from the factory. In the event equipment is received in damaged condition, the carrier should be notified immediately. Claims for such damage should be filed with the carrier involved and not with TMC.

All correspondence pertaining to Warranty Claims, return, repair, or replacement and all material or equipment returned for repair or replacement, within Warranty or otherwise, should be addressed as follows:

THE TECHNICAL MATERIEL CORPORATION
Engineering Services Department
700 Fenimore Road
Mamaroneck, New York

RECORD OF CORRECTIONS MADE

Change No.	Date of Change	Date Entered	Entered By

CHANGE NO. 2 GPT-10K

INSTRUCTION BOOK CHANGE NOTICE

Date 12/29/64

Manual affected: Operating Instructions for Transmitting Set, Radio Model GPT-10K Synthesized IN -317

Page 3-6. Paragraph 3-6.

Change step (m) to read:

(m) Adjust PA TUNE control (115) until a dip is obtained on PA PLATE CURRENT meter (103). The indication on the PA PLATE RF meter (104) should simultaneously maximize at this tuning point.

SHOULD ADDITIONAL COPIES OF THIS CHANGE NOTICE BE REQUIRED, PLEASE CONTACT:

THE TECHNICAL MATERIEL CORP., 700 Fenimore Road, Mamaroneck, N w Y rk

Attn.: Director of Eng. Services.

FOREWORD

This instruction manual contains an overall description of the Synthesized GPT-10K Transmitter. For detailed maintenance and operating information, refer to the following TMC publications:

ITEM	PUBLICATION
Maintenance of Synthesized Exciter	Technical Manual for Synthesized Sideband Generator, SBG-1 or SBG-2
Maintenance of GPT-10K Transmitter, less the Exciter	Maintenance Manual for GPT-10K Transmitter (Volume II)
Operating Procedures for Synthesized GPT-10K Transmitter	Operating Instructions for Transmitting Set, Radio, Model GPT-10K Synthesized

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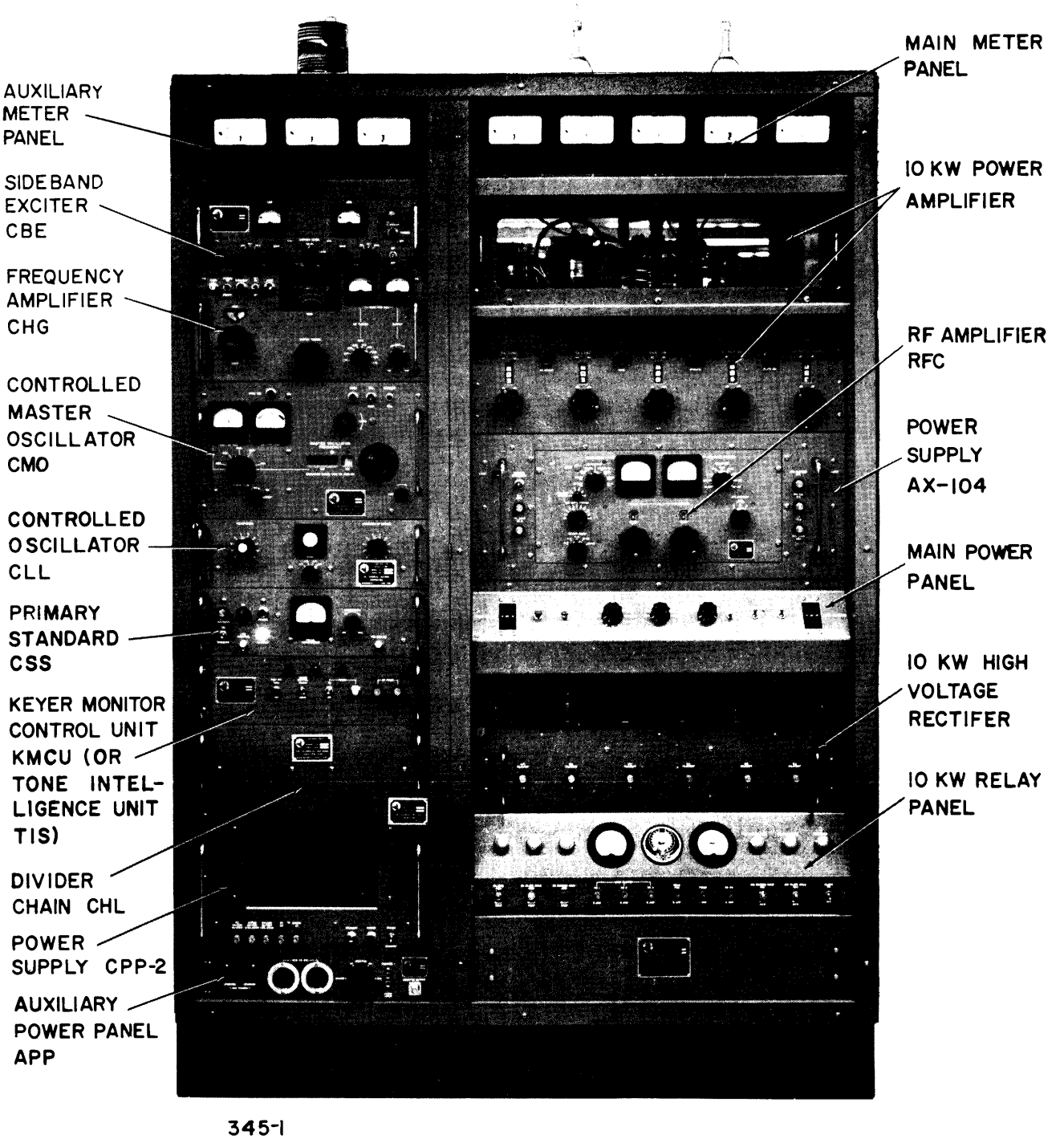

Figure 1 GPT-10K Transmitter, Overall View

654.29-5

1. PURPOSE OF EQUIPMENT.

The GPT-10K Transmitter (figure 1) is a conservatively rated general purpose transmitter that delivers 10,000 watts PEP (peak envelope power), or 5,000 watts average power, throughout the 2- to 28-mc range. The operating modes of the transmitter are:

1. SSB (single sideband) with suppressed or any degree of carrier.

2. DSB (double sideband) with suppressed or any degree of carrier. This mode includes AM (amplitude modulation) and AME (AM equivalent).

3. ISB (independent sideband) (separate intelligence on each sideband) with suppressed or any degree of carrier.

4. FSK (frequency-shift telegraphy).

5. FAX (facsimile).

6. CW (keyed carrier telegraphy).

2. TECHNICAL CHARACTERISTICS.

Frequency Range:	2-28 mc (bandswitched).
Output Power:	10,000 watts PEP, 5,000 watts average. 3rd order distortion products down at least 35 db from either tone of a standard 2-tone test at full PEP.
Operating Modes:	SSB, ISB, DSB, FSK, FAX, CW, and AM.
Frequency Stability:	1 part in 10^8 (using CSS-1) or 10^9 (using CSS-2), at any 100-cycle increment from 2- to 28-mc.
R-F Bandpass:	20 kc throughout the tuning range, between 3-db voltage points.
Carrier Insertion:	-55 db to full output.

2. TECHNICAL CHARACTERISTICS (CONT)

Harmonic Suppression:	Second harmonic at least 50 db down from PEP; third harmonic at least 65 db down from PEP.
Environment:	Between 0°C (32°F) and 50°C (122°F) for humidity as high as 90%.
Output Impedance:	50 or 70 ohms unbalanced; 600 ohms balanced. Pi-L network will match load with VSWR of 2:1 maximum.
Audio Inputs:	Two independent 600-ohm channels, balanced or unblalnced; -20 dbm for full r-f output.
Audio response per sideband:	CBE-1; flat within ±1.5 db, 250 to 7500 cps.
	CBE-2; flat within ±1.5 db, 250 to 3300 cps.
Power Consumption:	220 volts 3-phase, 60 cps, 50 amps per leg.

3. EQUIPMENT SUPPLIED.

Table 1 lists the major components of the synthesized transmitter; corresponding common nomenclature is also indicated.

TABLE 1. EQUIPMENT SUPPLIED

TMC DESIGNATION	COMMON NAME
Auxiliary Frame Assembly AX-575	Auxiliary Frame
Auxiliary Meter Panel AX-107	Auxiliary meter panel
Sideband Generator, Model SBG-1B or SBG-2B	Sideband Generator SBG
Sideband Exciter, Model CBE-1 or CBE-2 (See Note 1)	Sideband Exciter CBE

TABLE 1. EQUIPMENT SUPPLIED (CONT)

TMC DESIGNATION	COMMON NAME
Frequency Amplifier, Model CHG-2B	Frequency Amplifier CHG.
Controlled Master Oscillator, Model CMO-1	Controlled Master Oscillator CMO
Primary Standard, Model CSS-1C; or Primary Standard, Model CSS-2C	Primary Standard CSS
Divider Chain, Model CHL-1	Divider Chain CHL
Controlled Oscillator, Model CLL-1	Controlled Oscillator CLL
Power Supply, Model CPP-5	Power Supply CPP-5
Power Supply, Model CPP-2	Power Supply CPP-2
Tone Intelligence Unit, Model TIS-3A (See Note 2)	Tone Intelligence Unit TIS
Keyer-Monitor Control Unit, Model KMCU-1 (See Note 3)	Keyer Monitor Control Unit KMCU
Auxiliary Power Panel, Model APP-10	Auxiliary power panel
Standing Wave Control Unit, Model SWCU-1	Standing Wave Control Unit SWCU
Main Frame Assembly AX-557	Main frame
Main Meter Panel AM-122	Main meter panel
Power Amplifier Section AX-509	10-kw PA
Rf Amplifier Drawer AX-104	Power Supply AX-104
Rf Amplfier RFC-1	1-kw IPA or RFC
Main Power Panel AX-504	Main power panel
High Voltage Rectifier AX-103	10-kw high voltage Rectifier
Relay Panel AR-161	10-kw relay panel
Main Power Supply AX-138	10 kw main power supply

TABLE 1. EQUIPMENT SUPPLIED (CONT)

NOTES:

1. CBE-1 is part of Sideband Generator SBG-1.

   CBE-2 is part of Sideband Generator SBG-2.

2. Optional equipment; TIS may be housed in a remote location.

3. Optional equipment.

4. DESCRIPTION OF EQUIPMENT.

a. GENERAL. As shown in figure 1, the transmitter consists of an auxiliary frame and a main frame that are bolted togetner and to a common base assembly. The two frames house all the components of the transmitter and are equipped with protective doors. Primary power connections are made through the base assembly. Two antenna bowl assemblies, used for balanced output operation, are provided at the top of the main frame. For unbalanced output operation, a connector must be mounted in the opening located in the side of the main frame.

b. AUXILIARY FRAME. The auxiliary frame houses the exciter components of the transmitter. The frame is divided into a front and rear section by a partition which supports miscellaneous controls, connectors, and terminal boards. Power Supply CPP-5 is mounted at the upper rear of the auxiliary frame. All other major exciter units are mounted at the front of the auxiliary frame. Except for Sideband Exciter CBE, the major exciter units are slide-mounted and can be partially withdrawn from the cabinet and tilted to expose the top or bottom surface of each chassis.

Thus, adjustments and maintenance procedures may be conveniently performed with full power applied. An AUXILIARY FRAME MAIN POWER circuit breaker, located on the rear of the inner partition, controls the application of primary power to the auxiliary frame. When it is turned on, a-c power is applied to an autotransformer bolted to the rear base of the auxiliary frame. The transformer delivers 115 volts ac to a strip positioned vertically within the auxiliary frame; the a-c power cords of the exciter units are plugged into this strip. A fan at the upper front portion of the auxiliary frame provides forced-air cooling of the exciter components. A red lamp on the roof of the auxiliary frame lights when high voltage is applied to the transmitter.

(1) Auxiliary Meter Panel. The auxiliary meter panel, mounted at the top of the auxiliary frame, contains three meters. These monitor the power-amplifier screen grid voltage, grid bias voltage, and plate voltage.

(2) Sideband Exciter CBE. The sideband exciter accepts two channels of intelligence and frequency translates these audio inputs into lower and upper sidebands at a nominal frequency of 250 kc. The CBE-1 and CBE-2 are physically identical units which differ only in audio bandpass. The CBE-1 provides a wide bandpass of $\pm$7.5 kc; the CBE-2 narrow bandpass is $\pm$2.3 kc. To simplify presentation, all subsequent references in this manual are made to the CBE and are applicable to both, unless otherwise specified.

Controls on the front panel of the CBE permit independent

control of upper-and lower-sideband power levels. The relative power in each sideband is monitored by front-panel meters. Either audio input may be switched to either sideband, and carrier level is adjustable from off to full on.

(3) Frequency Amplifier CHG. The CHG receives sideband signals and other precise frequencies generated in the sideband generator system, and provides the final 1-watt exciter output in the frequency range of 1.75 to 33.75 mc, precisely synchronized at any 100-cycle increment. Full frequency coverage is obtained through a front-panel bandswitch and tuning controls. R-f level is controlled by a level control. Front-panel meters facilitate tuning and r-f output indication. Supplementary controls permit standby or full-power application for continuous oven operation and an indication of synchronization of the CHG frequency-control circuits is included.

(4) Controlled Master Oscillator CMO. The CMO receives frequency-locked signals from the low-frequency loop of the sideband generator system, and generates controlled frequencies in the range of 2 to 4 mc, precisely synchronized at any 100-cycle increment. A finely calibrated frequency counter and control sets the master-oscillator output frequency. A tuning control and meter facilitates frequency tuning; power output level is controlled by a front-panel potentiometer. Supplementary front-panel controls permit crystal calibration of the master-oscillator frequency prior to frequency lock-on. A SYNC IND lamp and an ADJ FOR ZERO meter indicate frequency synchronization of the sideband generator low-frequency loop.

The frequency tuning controls are equipped with knob-controlled locks to safeguard critical settings.

(5) Controlled Oscillator CLL. The CLL receives precise frequency inputs from the sideband generator system low-frequency loop and generates frequencies in the range of 510.0 to 519.9 kc, precisely synchronized at any 100-cycle increment. Two 10-position rotary switches on the front panel permit the selection of any 100-cycle step in this range. A front-panel SYNC oscilloscope and 3-position switch permit rapid monitoring, on a go-no-go basis, of the three synthesizer loops thus facilitating trouble localization.

(6) Primary Standard CSS. The CSS provides the 1-mc reference signal to which the exciter circuits are slaved. The CSS-1C provides the signal at a frequency stability of 1 part in 10^8 per day; the CSS-2C provides increased stability of 1 part in 10^9 per day.

Controls on the CSS permit standby or full operation of the unit. The standby feature permits the self-contained oven to remain on during transmitter off-time. A front-panel meter, a sensitivity control, and a coaxial input connector permit check and calibration of any external 1-mc signal against that of the CSS.

(7) Tone Intelligence Unit TIS. The TIS is a multi-purpose audio-shift keyer that is specifically designed to be used in conjunction with a synthesized exciter. Its purpose is to generate a keyed or frequency-shifted audio tone output, so that the carrier frequency generated by the exciter will not have to be keyed or shifted directly. In this way, the high

degree of carrier-frequency stability is maintained. Key line, FAX, and two audio-line inputs to the transmitter are connected to two terminal boards at the lower rear portion of the auxiliary frame. These are wired to the input of the TIS through the internal cabling of the frame; the TIS audio outputs are cabled to Sideband Exciter CBE.

The TIS circuits contribute much flexibility in choice of sideband selection and control. When desired, either or both audio-line inputs to the transmitter may be applied directly to either or both audio-channel inputs of the CBE for ultimate insertion into the sidebands. For FAX operation, FAX d-c voltage is converted into a linear-shifted audio signal about one of four selected center frequencies, then applied to the CBE. For FSK or CW operation, voltage or current keying at different levels may be selected by a front panel KEY MODE switch. Total frequency shift for FSK operation is controlled by a calibrated direct-reading counter-type control. A front panel TEST switch permits the keying circuits to simulate a mark or space condition for monitoring and test purposes. Audio output level of the TIS is displayed on a front-panel meter and controlled by an associated potentiometer. The TIS provides a precise 1000-cycle tone for CW keying. Oven-controlled crystal oscillators in the unit may be energized separately during standby operation to insure frequency stability.

(8) Divider Chain CHL. The CHL divides the 1-mc standard signal into lower frequencies for use in the sideband generator

system low-frequency loops. This unit has no operating controls.

(9) Power Supply CPP-2. The CPP-2 is the main power supply for the sideband generator low-frequency loop components. It supplies a-c and d-c power for the Divider Chain CHL, Controlled Oscillator CLL, and Controlled Master Oscillator CMO. A front-panel switch permits standby operation with a-c power applied to the ovens of the CMO and the CLL.

(10) Auxiliary Power Panel APP. The APP, rack-mounted at the bottom of the auxiliary frame, contains two a-c receptacles, a coaxial MONITOR switch, and a coaxial OUTPUT jack. The r-f outputs of the exciter circuits, the 1-kw IPA, and the 10-kw PA are wired to the switch. The selected r-f output may be conveniently monitored by means of a spectrum analyzer at the OUTPUT jack on the APP front panel.

(11) Power Supply CPP-5. The CPP-5, installed at the upper rear of the auxiliary frame, provides a-c and d-c power for Frequency Amplifier CHG. Operating controls for the CPP-5 are on the front panel of Frequency Amplifier CHG.

(12) Standing Wave Control Unit SWCU. The SWCU, rack-mounted at the rear of the auxiliary frame, contains an SWR overload relay, a d-c amplifier, and a power supply. During unbalanced output operation, this unit monitors SWR on the transmission line. When excessive SWR is detected, the overload relay automatically removes high voltage from the transmitter.

(13) Keyer-Monitoring Control Unit KMCU. The KMCU (optional equipment) monitors various phases of transmitter opera-

tion such as presence of plate voltage, r-f output, and input keying signals and provides signals for indication at a remote location for these conditions. The KMCU also sequentially keys Controlled Master Oscillator CMO, Frequency Amplifier CHG, and RF Amplifier RFC, and controls the TUNE/OPERATE condition of the 1-kw IPA and 10-kw PA stages of the transmitter.

c. MAIN FRAME. -The main frame houses a two-stage r-f voltage amplifier, and 1-kw IPA (Intermediate Power Amplifier) and 10-kw PA, a relay panel, and associated power supply and power circuits. The r-f components are distributed through the upper portion of the frame; heavy power supply components are bolted to the base channels of the frame.

(1) Main Meter Panel. The main meter panel, mounted at the top of the main frame, contains five meters. These monitor the 10-kw PA filament voltage, screen grid voltage, plate current, r-f plate voltage and r-f power output or unbalanced transmission line SWR.

(2) Power Amplifier Section AX-509. The 10-kw PA is mounted below the main meter panel. It contains the power-amplifier tube and its associated tuned circuits. A blower motor, which provides forced-air cooling of the power-amplifier tube, is mounted directly under the power-amplifier tube. The front panel of the power amplifier contains a plexiglass window, the power amplifier tuning and loading controls and their associated counter-type dials, and indicator lamps.

(3) RF Amplifier RFC and Power Supply AX-104. The r-f amplifier and power supply is mounted below the 10-kw PA. This

unit serves as the r-f voltage amplifier and 1-kw IPA between the exciter and the 10-kw PA. The inner section of the unit contains all r-f amplifier parts; the outer section houses the power supply components. The 1-kw IPA tube is air-cooled by a blower contained in the r-f section. The front panel of the inner r-f section contains tuning and loading controls for the 1-kw IPA, band-switches to cover the 2- to 28-mc r-f range, and a monitoring meter and associated meter switch. All major d-c and r-f voltages in the r-f amplifier may be conveniently monitored with this arrangement.

(4) Main Power Panel. The main power panel controls the application of plate, screen grid, and filament voltages to the 10-kw PA and monitors all interlock circuits contained in the main frame. Other front-panel controls include a reset pushbutton associated with the protective relays in the main frame and an automatic load and drive control switch and level adjustment.

(5) 10-kw High-Voltage Rectifier. The 10-kw high-voltage rectifier, mounted below the power panel, contains the high-voltage rectifier tubes and their corresponding filament transformers. Operating as the high-voltage rectifier deck associated with the main power supply, this unit generates 7500 volts d-c for the plate of the 10-kw PA tube. A plexiglass window on the front panel of the high-voltage rectifier permits observation of the rectifier tubes. Heavy insulated button connectors at the rear of the unit provide connection for the 3-phase input

voltage and the d-c output voltage.

(6) 10-kw Relay Panel. The 10-kw relay panel, mounted at the bottom of the main frame, contains nine relays that protect the transmitter circuits against overloads. The relays and their associated terminal boards are mounted under a front panel cover plate for quick accessibility. The upper portion of the relay panel contains filament and plate time meters, an automatic reset timer, and overload indicator lamps. All 1-kw IPA and PA overload adjustments are also brought out on the relay panel for ease of adjustment.

5. BLOCK DIAGRAM ANALYSIS. (See figure 2.)

The synthesized transmitter consists of a synthesized exciter, a 1-kw IPA (Intermediate Power Amplifier), a 10-kw PA, and associated power supply and power control circuits. The transmitter delivers 10,000 watts PEP (5000 watts average) throughout its 2- to 28-mc operating range. The exciter generates 1 watt (PEP) rf in the range of 1.75 to 33.75 mc, with the signal frequency-locked to an accuracy of 1 part in 10^8 when operating at any 100-cycle increment within this range. The 1-kw IPA and 10-kw PA stages are tuned to the 2- to 28-mc range, fixing the transmitter output frequencies to this range.

The exciter circuits provide a large variety of operating modes and types of sideband intelligence. The circuits can be set up for single sideband, double sideband, independent sideband, keyed carrier (CW), or AM equivalent (AME) transmission. Operating with proper terminal equipment, either or both sidebands may carry FSK, FAX, or audio line intelligence.

The heart of the exciter is the highly stable 1-mc signal generated in Primary Standard CSS. This signal is routed to Frequency Amplifier CHG where it is amplified and then routed to Divider Chain CHL.

Divider Chain CHL provides 500-kc, 10-kc, 1-kc, and 100-cps signals, stabilized to the 1-mc standard. Controlled Oscillator CLL accepts the four outputs of the CHL, and generates a signal in the 510-519.9-kc range. This signal is phase-locked to the four outputs of the CHL, and therefore has the same degree of stability as the standard 1-mc signal from Primary Standard CSS. The 510.0-519.9-kc signal from Controlled Oscillator CLL is used to stabilize a 2- to 4-mc VFO in Controlled Master Oscillator CMO.

Audio input signals are applied to Intelligence Unit TIS. For SSB, ISB, or AM operation, the audio signals are routed to Sideband Exciter CBE; for CW, FSK or FAX operation, an audio tone generated in the TIS is routed to the CBE.

The standard 1-mc signal from Primary Standard CSS is divided down to 250-kc in Frequency Amplifier CHG. This stable 250-kc signal is applied to Sideband Exciter CBE. The CBE, using the 250-kc sub-carrier and its audio inputs, generates an SSB, ISB or DSB signal. Carrier insertion is continuously adjustable for all of these modes. The 250-kc output of the CBE, which may be modulated or unmodulated, is routed to Frequency Amplifier CHG.

Frequency Amplifier CHG combines the 2- to 4-mc output of Controlled Master Oscillator CMO and the 250-kc output of Sideband Exciter CBE and heterodynes the resultant signal to any de-

sired frequency in the 1.75- to 33.75-mc range. The high-frequency heterodyning signal used in the CHG is phase-locked to the standard 1-mc signal from Primary Standard CSS; the exciter output, therefore, has the same frequency stability as the standard 1-mc signal. The output of the CHG, up to 1-watt PEP, is routed to RF Amplifier RFC; a sample of this exciter output is also routed to Auxiliary Power Panel APP for monitoring purposes. The linear stages of the RFC raise the level of the input signals as high as 1-kw PEP; this signal is applied to the 10-kw PA. A sample of IPA r-f is also routed to Auxiliary Power Panel APP in the auxiliary frame for monitoring purposes.

The 10-kw linear power amplifier, operating class AB1, raises the r-f level to 10-kw PEP. Either balanced (600 ohms) or unbalanced (50 to 70 ohms) r-f output may be used, depending on the antenna employed. A sample of 10-kw PA output is also routed to the APP for convenient monitoring. A portion of the high level r-f output is rectified and applied to an automatic load and drive control (ALDC) circuit. When this circuit is switched on, a control voltage is applied to the exciter whenever any preset r-f signal level is exceeded. This control circuit limits high drive peaks (which can be developed during multiple-signal transmission) and suppresses unwanted transmission products. When operating into an unbalanced antenna, an indication of SWR on the transmission line is applied to the Standing Wave Control

Unit SWCU in the auxiliary frame. When a preset level of SWR is exceeded, an SWR overload signal from the SWCU automatically removes high voltage from the transmitter by opening the interlock circuit.

The 10-kw high-voltage rectifier functions together with the main power panel and main power supply to produce the high d-c voltages required by the 1-kw IPA and 10-kw PA.

The 10-kw relay panel contains overload coils that open interlocks that remove high voltages to the 1-kw IPA and 10-kw PA stages when preset overload levels are exceeded. The protective circuits sample the IPA and PA plate and screen currents, bias-supply voltages, and the current in a voltage-regulating diode assembly in the main power supply. When any of these currents is excessive, or if a voltage is deficient, the associated protective relay operates and removes high voltage.

An interlock circuit is provided in the transmitter for personnel and equipment safety. When one of these interlocks opens, power is removed from the transmitter, the HV switch is turned off automatically, and a deadman solenoid shorts out high-voltage capacitors. Interlock circuits are provided for drawers in which potentials greater than 500 volts are present. Important cooling air ducts are also interlocked for equipment safety.

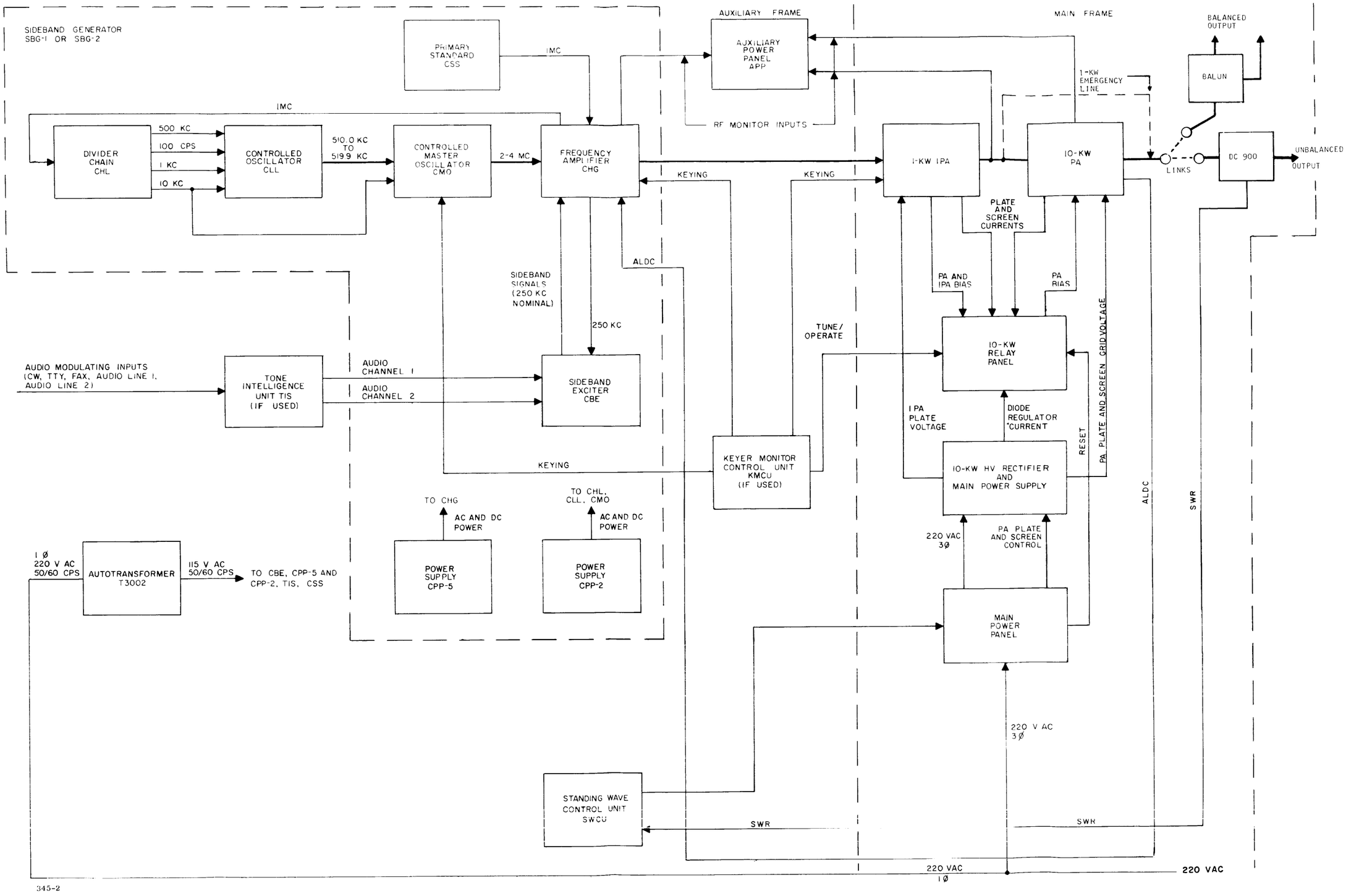

Figure 2. Synthesized GPT-10K Transmitter Block Diagram