

**INSTRUCTIONS FOR
INSTALLATION AND OPERATION
OF THE
MEISSNER SIGNAL SHIFTER MODEL EX**

I. INTRODUCTION

A. The MEISSNER SIGNAL SHIFTER is a variable frequency exciter, with output over the entire ranges of the 10, 11, 15, 20, 40 and 80 meter amateur bands, designed for placement within easy reach of the operator.

The SIGNAL SHIFTER uses a 6V6GT/G tube in a highly stable electron-coupled oscillator circuit. The oscillator frequency is doubled in the tuned plate circuit of the oscillator and again in the plate circuit of the 807 doubler-amplifier. The high order of stability of the SIGNAL SHIFTER is achieved by the use of a high-C circuit, high quality components, including zero temperature-coefficient capacitors, efficient turret mounted inductors, and a stand-by circuit which maintains steady plate currents in the tubes during either operating or stand-by conditions. In addition, stability and reliability are insured by operating the tubes well within their ratings, and by voltage regulation of the oscillator tube plate and screen voltages.

The SIGNAL SHIFTER becomes an excellent crystal controlled exciter when a suitable crystal is plugged into the crystal socket and the >ECO-XTAL= switch is thrown to AXTAL=. Thus, the SIGNAL SHIFTER can be used for >net= operation or band-edge operation without additional equipment.

The power output on all bands is sufficient: 1. To drive a low or medium powered amplifier, using triodes. 2. To drive a medium or high powered amplifier using beam tubes, or 3. To allow its use as a low powered transmitter. The power output on all bands is in excess of six watts, except for the 10 meter band, which is slightly lower.

B. The SIGNAL SHIFTER is designed for operation from a MEISSNER Model PX power supply. The Model P operates on 110 - 120 V., 50-60 cycle supply. A 25 cycle model may be had on special order.

C. The SIGNAL SHIFTER is furnished in either a gray or a black wrinkle metal cabinet, 13-13/16" long by 12-1/4" wide by 8-3/4" high.

A conversion kit is available to change the cabinet model to a standard rack panel model, 8-3/4" by 19". This may also be obtained in either gray or black wrinkle finish.

Another conversion kit is available to allow the Model PX power supply to be removed from the SIGNAL SHIFTER cabinet and be placed remotely in a cabinet of its own, approximately 12" by 3-7/8" by 6-3/4". This conversion, to provide the utmost in stability, may be made with either the table or rack panel version of the SIGNAL SHIFTER.

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D. Selection of the desired amateur band is accomplished by rotating the coil turret with the band switch knob on the front panel.

Output frequency on any band is continuously variable by means of the precision vernier dial calibrated 0 to 500. The calibration sheets at the back of this book give **approximate** dial settings for frequencies in each band. Rapid rotation of the dial is possible with the handle provided.

Two jacks on the front panel allow a telegraph key with ordinary phone plug to be used for either oscillator keying or amplifier keying.

A knob on the front panel allows the operator to select any of the four following operating conditions:

1. OFF
2. AUTOMATIC
3. STAND-BY
4. ON

>AUTOMATIC= allows control of the SIGNAL SHIFTER by the stand-by switch in the higher-powered amplifier. This is accomplished automatically by the built-in stand-by relay.

A tuning eye indicates grid current on the 807 and serves as a visual check on keying, crystal operation, and general oscillator operation.

A. Space Limitation

The SIGNAL SHIFTER should be installed to allow free circulation of air. Nothing should be placed on or too close to the top of the cabinet.

B. For Use as an Exciter to Higher Powered Amplifier Stage(s).

In using the SIGNAL SHIFTER as an exciter, it is necessary to match the 300 ohm output impedance of the SIGNAL SHIFTER to obtain maximum output. A few of the coupling circuits which may be employed are shown in Figures 1 to 4.

NOTE: In using Fig. 3, it is necessary to terminate the transmission line properly to avoid undesirable reflections. (R= may be 300 ohms or more and about 10 watts).

The transmission line should have a characteristic impedance of about 300 ohms for efficient transfer of power over any appreciable distance, although concentric cable, the standard transmission cables, or twisted pair will be satisfactory for the usual line lengths.

Do not ground either side of the transmission line at the SIGNAL SHIFTER end. If it is desired to ground the transmission system, one side of the line at the link coil may be grounded, or the center of the link coil itself grounded as shown in Fig. 5

II. INSTALLATION

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The number of turns in the link is very important in the proper impedance matching of the SIGNAL SHIFTER to the driven stage. The actual number of turns to give the maximum excitation should be determined by experimental cut and try. DO NOT DISTURB THE COILS IN THE SIGNAL SHIFTER! Vary only the number of turns and degree of coupling at the driven stage. The best way to determine when the most excitation is obtained is by means of a milli-ammeter in the grid circuit of the driven stage. The number of link turns should be varied until the desired grid current is obtained. A loop of wire with a pilot bulb in series and held in the field of the grid coil of the driven stage is also a good indicator, as well as a neon bulb held near the grid coil, grid lead or stator plates of the grid tuning condenser.

After the link adjustments have been made, the cathode current (plate plus screen current) of the 807 tube in the SIGNAL SHIFTER should be measured. A 0-100 MA. meter, fitted with a phone plug and plugged into the jack marked >AMP=, will read the 807 cathode current. The normal cathode current of the 807, with load, is about 72 MA. For >PHONE= work, this current should not exceed 80 MA. For CW operation, slightly higher current is permissible. In every case, use the least coupling which provides the required excitation, even if the 807 cathode current is, say, only 60 MA.

The >AUTOMATIC= terminals at the rear of the SIGNAL SHIFTER chassis and the AAUTO= position of the front panel switch are provided to allow control of the SIGNAL SHIFTER from the stand-by switch on the succeeding amplifier stage(s). The >AUTO= terminals may be connected directly across the primary of the H.V. power transformer of the higher powered amplifier, as shown in Fig. 6.

Turning the on-standby switch of the higher powered stage to stand-by will automatically switch the SIGNAL SHIFTER from an >ON= position to a >STAND-BY= position, by action of the built-in relay.

C. For Use as a Low Powered Transmitter.

The SIGNAL SHIFTER may be employed as a low powered transmitter without the use of additional amplifiers. With a good antenna, very satisfactory results may be obtained. Several methods of feeding antennas may be employed. A few are shown in drawings 1 to 13.

With the exception of Fig. 10, the same procedure of loading and link adjustment should be followed as described under AB≅ above. In Fig. 10, no adjustments should necessary. If more or less loading is desired, the arrangement of Fig. 7 may be used.

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A check should be made before actual operation is begun, to be sure that harmonics are not being radiated, although the coupling methods shown tend to discriminate against harmonics. In the event that harmonics are radiated, one of the methods of harmonic suppression described in the handbooks should be used.

III. OPERATION

A. General

After making the proper >AUTO= and >OUTPUT= connections, the line cord should be plugged in. The SIGNAL SHIFTER may now be warmed up by turning the four position switch to >STAND-BY=. A warm-up period of at least 15 minutes is required to insure stability.

In the >STAND-BY= position, the contacts of the >AUTO= relay allow normal plate currents to flow in the 6V6GT/G oscillator tube, but prevent oscillations (regardless of the position of the telegraph key) by shorting the cathode tap to the cold end of the oscillator grid coil. This same condition may be obtained with the switch in the >AUTO= position, and the switch of the higher-powered amplifier thrown to >STAND-BY=. A warmed-up condition is thereby maintained during >STAND-BY= periods.

The band on which SIGNAL SHIFTER output is desired is selected by rotating the band switch. Bands, with a 2% frequency overlap at each end,

are:

80 Mtrs.	20 Mtrs.
40 Mtrs.	15 Mtrs.
10 & 11 Mtrs.	

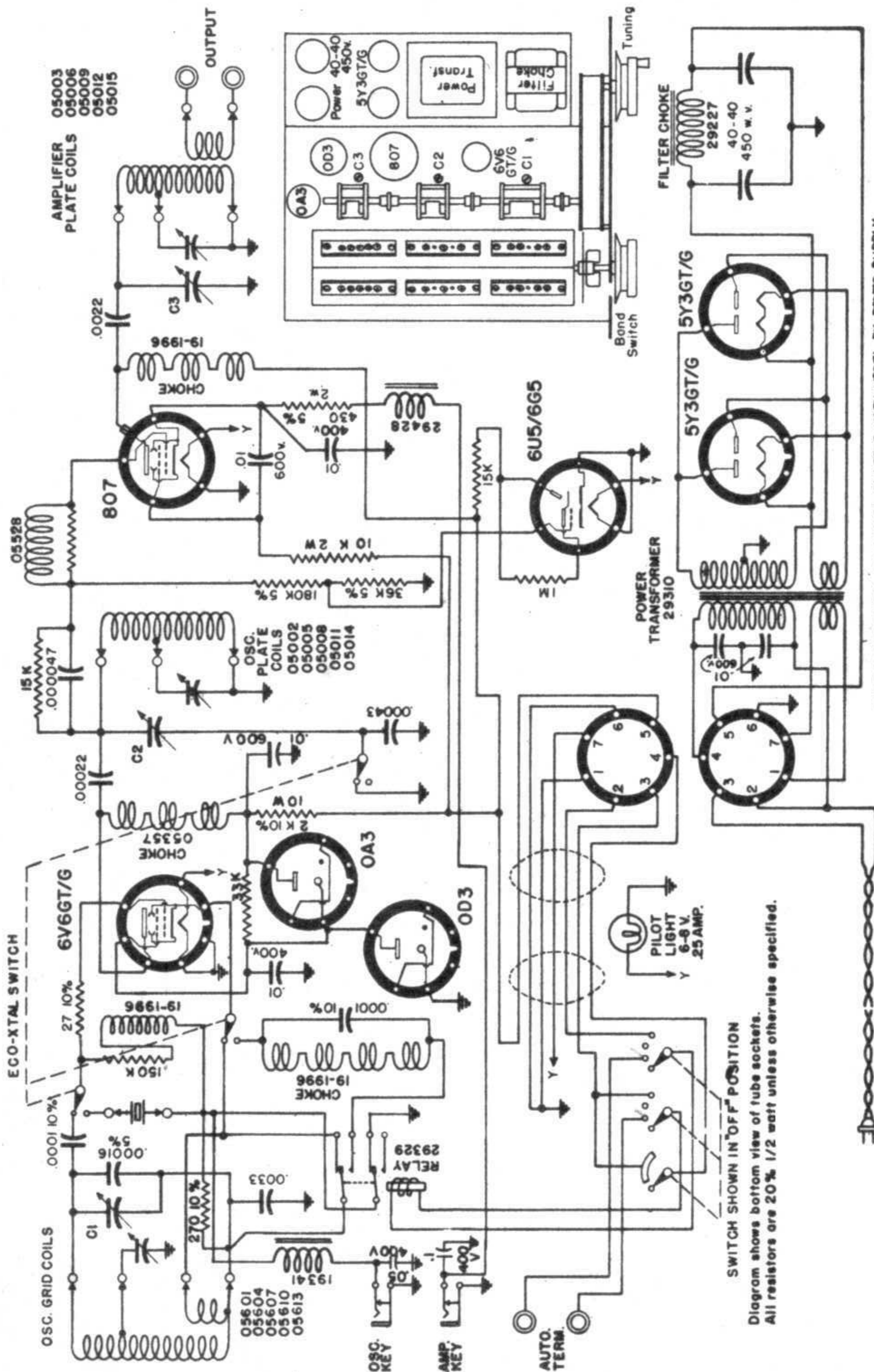
Any additional band, such as 75 Mtr. Phone band spread, may be ordered separately and installed by the operator.

B. E.C.O.

Approximate dial settings for any frequency may be obtained from the calibration charts incorporated in this instruction book. It is highly advisable to calibrate your SIGNAL SHIFTER, since the printed calibration charts are approximate only.

Calibration of the SIGNAL SHIFTER, after allowing a sufficient warm-up period, may be carried out using the standard frequency checking procedure as described in the radio technical handbooks. A heterodyne frequency meter of known accuracy or a precision type frequency standard, such as the Meissner Crystal Controlled Signal Calibrator, should be used. As many calibration points may be determined as desired, and the appropriate dial settings marked on the blank calibration charts provided. The calibration procedure may be repeated on as many bands as desired.

When the calibration has been completed, the SIGNAL SHIFTER may be set for output in any part of the band. Extreme care must be used in approaching the band edges. A substantial margin of safety should be allowed.



SWITCH SHOWN IN "OFF" POSITION
 Diagram shows bottom view of tube sockets.
 All resistors are 20% 1/2 watt unless otherwise specified.

FIG. 15 CIRCUIT OF MODEL EX SIGNAL SHIFTER WITH MODEL PX POWER SUPPLY

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Assuming that the SIGNAL SHIFTER has warmed up and is tuned to the desired frequency, the 4 - position switch should be placed in the >ON= position. The procedure outlined under INSTALLATION #B should be followed to adjust the link to the driven stage to give the proper excitation and 807 cathode current. Once the link turns and position have been determined, no changes should be necessary unless the driven stage is changed in some way.

The driven stage may now be put into operation in the normal way. The 4-position switch should be turned to >AUTO=, in which position manipulation of the >ON-STAND-BY= switch in the higher-powered stage will automatically switch the SIGNAL SHIFTER to >ON= or to A STAND-BY=.

For CW., keying may be done in either the A OSC= or the >AMP= position, Oscillator keying is recommended for break-in operation, as amplifier keying allows the oscillator to run when the key is up. The second harmonic of the oscillator plate circuit may be strong enough to interfere with reception of a signal near the frequency of the SIGNAL SHIFTER.

If the driven amplifier stage has no >STAND-BY= switch, the 4-position switch on the SIGNAL SHIFTER should be placed in the >ON= position during transmission periods and in the >STAND-BY= position during >STAND-BY=. This should be done with oscillator keying to minimize drift, even though it is possible to operate without moving the switch from >ON=.

For phone operation, the key

may either be left out of the key jacks or plugged in with the shorting bar on the key closed.

C. Crystal Control

If crystal controlled operation is desired, the >ECO-XTAL= switch should be thrown to >XTAL=. In this position, the 6V6GT/G becomes a very efficient grid-plate crystal oscillator which has extremely low crystal current. The crystal socket accommodates either a holder with 2 inch pin spacing or a holder with 3/4 inch pin spacing, the two most common types. The crystal used must have a frequency one-half that desired in the output, since the 807 doubles frequency. For example, for output on 3,600 Kc. In band A, a crystal ground for 1,800 Kc. Must be used. The crystal will usually operate best when the tuning dial is set for the output frequency with E.C.O. However, it may be found necessary to rock the tuning dial slightly to one side or the other to obtain best keying characteristics with some crystals. It is usually possible to shift from E.C.O. to >XTAL=, with output on the same frequency, without moving the tuning dial.

The tuning eye may be used to check crystal operation. Sluggish keying and weak output will be readily visible. Ordinarily, the eye will close instantaneously on keying, and will close more completely on >XTAL= than on >E.C.O.= In purchasing crystals, buy only those made by some reliable manufacturer.

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In using the SIGNAL SHIFTER as an exciter or as a transmitter, it will usually be possible to shift frequency over a moderate range without retuning of the amplifiers or antenna. This depends upon the characteristics of the amplifier(s) and antenna used, however, and will vary from one installation to another. It should be possible to obtain a useful frequency variation without retuning the amplifier(s) or antenna. Steps taken toward this end will repay the operator in convenience and operating pleasure. In shifting frequencies, the >STAND-BY= switch in the driven stage should be left at >STAND-BY= and the SIGNAL SHIFTER placed >ON=. This gives a signal in the receiver without placing the carrier on the air to cause unnecessary interference.

The SIGNAL SHIFTER is designed to increase the operating efficiency and pleasure of the amateur. It must be used correctly to realize the many advantages which variable frequency control give. The operator may select interference free channels to operate on, may shift frequency to escape interference, and may shift frequency to call a station on a different frequency. The good operator never varies his frequency with his carrier on the air. Swishing across the band is one of the worst offences of the variable frequency oscillator operator. The good operator will not zero-beat his SIGNAL SHIFTER to the frequency of the station being called. He will call on a frequency nearby, so that his carrier will not interfere with the called station in case the called station comes back to someone else.

IV. SERVICE NOTES

The MEISSNER SIGNAL SHIFTER is equipped with a glass 6V6GT/G tube. If it is ever necessary to replace the oscillator tube, a glass 6V6GT/G tube should be used. The calibration should be re-checked whenever the tubes are changed and occasionally even when tubes are not replaced.

In case it is necessary to re-align the SIGNAL SHIFTER, as it may be when a new set of tubes is installed, or when the output becomes low, the following adjustments must be made:

Step 1-

- a. With band switch on the 80 meter band, E.C.O.-XTAL switch on >E.C.O.=, tuning >0', and key closed, turn the SIGNAL SHIFTER to >STAND-BY= and allow it to warm up 30 minutes. The driven stages should not have plate voltage applied.
- b. After the SIGNAL SHIFTER has warmed up, turn the 4-position switch to >ON=, and with a good heterodyne frequency meter or crystal controlled frequency standard, carefully adjust the trimmer condenser C1, Fig. 14, with a screw driver, until a zero beat note is heard in the receiver at 1020 Kc., 2040 Kc., 3060 Kc., or 4080 Kc. Be sure you are listening to the correct signal!!

This aligns the oscillator grid circuit.

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Step 2-

Turn the band switch to the 10 meter band and, without touching the tuning dial, adjust trimmer C2 with a screw driver to obtain the maximum closing of the tuning eye. This aligns the oscillator plate circuit.

Step 3-

Turn the tuning dial to 110, band switch again to the 10 meter band and adjust trimmer C3 with a screw driver to obtain maximum output as indicated by the grid current or by a neon bulb, etc., in the driven stage, which has its 10 meter grid coil inserted. If the SIGNAL SHIFTER is being used as a transmitter, a neon bulb at the antenna tuning circuit can be used to indicate alignment of the 807 plate circuit. If possible, a dummy antenna should be used to prevent interference to other stations.

When this alignment procedure is completed, the SIGNAL SHIFTER will be aligned on all bands. It will probably be necessary to recalibrate the SIGNAL SHIFTER, since the process of alignment usually changes the calibration.

COILS:

The following table indicates the catalog number and frequency range of each coil strip.

Note: The calibration charts in the back of this book were made with the 80-40-20-15 and 10-11 meter bands in the turret in the positions A,B,C,D, and E respectively, and with one special band occupying position F. For other arrangements of coil strips in the turret, the actual calibration may differ slightly from the published calibration.

CATALOG

NO.	BAND	FREQUENCY RANGE
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18-3574	80 Mtr.	3430 to 4080 Kc.
18-3573	40 Mtr.	6860 to 7448 Kc.
18-3572	20 Mtr.	13,720 to 14,700 Kc.
18-3571	15 Mtr.	20,600 to 21,940 Kc.
18-3570	10-11Mtr	26,600 to 30,300 Kc.

SPECIAL COILS AVAILABLE

18-3575	160 Mtr.	1715 to 1836 Kc. (Disaster)
18-3576	75 Mtr.	3773 to 4080 Kc. (Phone)
18-3577	20 Mtr.	 (Phone)
18-3578	6 Mtr.	24.50 to 27.54 Mc. (Output of SIGNAL SHIFTER Is on 12 Mtrs.)

Write in your requests to Meissner Mfg. Division, Maguire Industries, Incorporated, for information and prices on special coil sets.

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STANDARD WARRANTY

This SIGNAL SHIFTER was carefully tested, inspected, and packed in an approved shipping container and left our factory in perfect condition. Should any damage occur while in transit, file claim with carrier at once.

We warrant this instrument to be free from defect in material and workmanship and to give satisfactory performance under normal use. Our obligation under this warranty is limited to making good at our factory any part or parts thereof (except tubes) which shall, within 90 days from date of purchase, be returned to our factory, carefully packed and transportation charge prepaid.

This warranty does not apply, if, in our judgement, this set has been misused, abused, tampered with, or connected otherwise than in accordance with instructions. Should this instrument become inoperative within the warranty period, it should be returned to the factory.

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CALIBRATION SHEETS

<u>80 MTR. BAND</u>		<u>40 MTR. BAND</u>		<u>20 MTR. BAND</u>		<u>15 MTR. BAND</u>	
<u>FREQ.KC.</u>	<u>DIAL</u>	<u>FREQ.KC.</u>	<u>DIAL</u>	<u>FREQ.KC.</u>	<u>DIAL</u>	<u>FREQ.KC.</u>	<u>DIAL</u>
3430	500	6860	500	13720	500	20600	500
3450	474	6900	457	13800	451	20900	386
3500	428	7000	375	13900	403	21000	352
3520	411	7025	355	14000	356	21040	338
3550	385	7050	335	14020	346	21080	325
3600	345	7075	316	14050	332	21120	311
3650	306	7100	296	14100	308	21160	297
3700	269	7125	277	14150	285	21200	283
3750	232	7150	257	14170	275	21240	269
3800	197	7175	237	14200	260	21260	262
3850	164	7200	216	14250	235	21280	254
3870	152	7225	196	14300	212	21320	240
3900	133	7250	176	14350	189	21360	236
3950	101	7260	168	14380	176	21400	212
3980	083	7275	156	14400	167	21440	198
4000	073	7300	137	14500	122	21500	177
4050	041	7400	062	14650	050	21600	142
4080	000	7448	000	14700	000	21940	000

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CALIBRATION SHEETS**

10-11 MTR. BAND		160 MTR. BAND		75 MTR. PHONE BAND		6 MTR.BAND (12 MTR. OUTPUT)	
<u>FREQ.KC.</u>	<u>DIAL</u>	<u>FREQ.KC.</u>	<u>DIAL</u>	<u>FREQ.KC.</u>	<u>DIAL</u>	<u>FREQ.KC.</u>	<u>DIAL</u>
26600	500	1715	500	3773	500	24500	500
26800	461	1720	470	3800	449	25000	408
27000	433	1745	369	3850	369	25200	375
27185	407	1750	349	3860	354	25300	359
27200	405	1755	330	3870	339	25400	343
27300	391	1760	310	3880	325	25500	327
27400	377	1765	291	3890	310	25600	312
27455	370	1770	272	3900	296	25700	296
28000	298	1775	252	3910	282	25800	280
28300	260	1780	233	3920	267	25900	265
28500	234	1785	214	3930	253	26000	249
28700	209	1790	195	3940	239	26100	234
28900	185	1795	177	3950	223	26200	218
29100	162	1800	159	3960	208	26300	203
29300	138	1805	140	3970	193	26400	187
29500	115	1830	050	3980	177	26500	173
29700	093	1836	000	3990	161	26600	158
29900	069			4000	145	26700	144
30300	000			4050	071	26800	130
				4080	000	27000	101
						27540	000

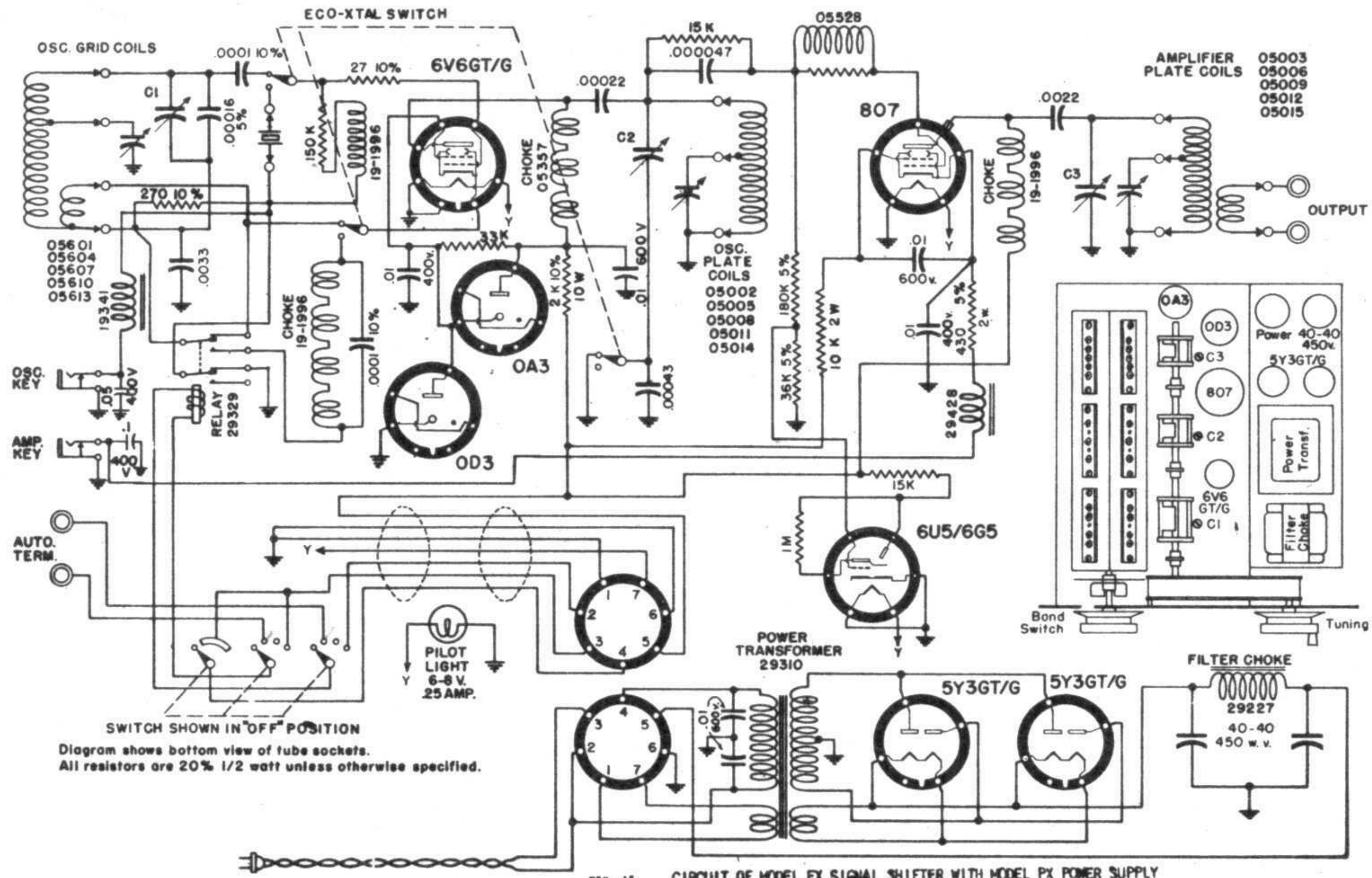


FIG. 15 CIRCUIT OF MODEL EX SIGNAL SHIFTER WITH MODEL PX POWER SUPPLY

