COMPLETE INSTRUCTIONS FOR THE

Meissner

1942 DeLuxe "Signal Shifter"

Models: 9-1077, 9-1078, 9-1079, 9-1080

One complete set of (3) coils for operation on any specified band, is supplied with each "Signal Shifter". Coils for operation on the other amateur bands are available in sets of three according to the following table:

AMATEUR BANDSPREAD COILS

No. 18-2915	Complete set of coils for 160-meter band.
No. 18-2916	Complete set of coils for 80-meter band.
No. 18-2917	Complete set of coils for 40-meter band.
No. 18-2918	Complete set of coils for 20-meter band.
*No. 18-2919	Complete set of coils for 10-meter band.

*Coverage of these coils is 14 to 15 mc; designed to cover the 10-meter band, 28 to 30 mc., by doubling in the transmitter.

**SPECIAL COILS FOR AMATEUR PHONE BANDS

No. 18-2964	Complete set of coils for 20-meter phone band (14,150 to 14,250 kc.)
No. 18-2965	Complete set of coils for 40-meter phone band (7,250 to 7,300 kc.)
No. 18-2966	Complete set of coils for 75-meter phone band (3,900 to 4,000 kc.)
No. 18-2967	Complete set of coils for restricted 75-meter phone band (3,950 to 4,000 kc.)
No. 18-2968	Complete set of coils for 160-meter phone band (1,900 to 2,050 kc.)

**These coils are available on special order only. Frequency ranges indicated are subject to change without notice, to correspond with any new regulations introduced by the F. C. C.

***GENERAL COVERAGE COILS

For Commercial and Military service, Meissner offers "General Coverage Coils" for the Signal Shifter, available in the following frequency ranges:

No. 18-2951	Complete set of coils.	2,040	to	2,410 kc.
No. 18-2952	Complete set of coils.	2,395	to	2,835 kc.
No. 18-2953	Complete set of coils.	2,820	to	3,320 kc.
No. 18-2954	Complete set of coils.	3,190	to	3,760 kc.
No. 18-2916	Complete set of coils.	3,500	to	4,000 kc.
No. 18-2955	Complete set of coils.	3,975	to	4,690 kc.
No. 18-2956	Complete set of coils.	4,670	to	5,515 kc.
No. 18-2957	Complete set of coils.	5,480	to	6,470 kc.
No. 18-2958	Complete set of coils.	6,440	to	7,540 kc.
No. 18-2959	Complete set of coils.	7,510	to	8,870 kc.
No. 18-2960	Complete set of coils.	8,830	to	10,360 kc.
No. 18-2961	Complete set of coils.	10,300	to	12,100 kc.
No. 18-2962	Complete set of coils.	12,075	to	14,000 kc.
No. 18-2963	Complete set of coils.	13,940	to	16.500 kc.

***These coils are available on special order only.

GENERAL INFORMATION

The Meissner **Signal Shifter** is a variable-frequency exciter, permitting frequency control of a transmitter over the entire range of the amateur bands. Due to its inherent stability, flexibility, and ease and simplicity of operation, the Signal Shifter has rightfully earned its place on the amateur's operating table—beside his key or mike.

The Signal Shifter uses a 6F6 metal tube in a high-C electron coupled oscillator circuit, operating on one-quarter of the output frequency, except on the 160-meter band where it operates on one-half the output frequency. The oscillator frequency is doubled in the tuned plate circuit of the 6F6, which is capacitively coupled to the grid of the 6L6 metal tube. The 6L6 operates as a frequency doubler-amplifier except on the 160-meter band, in this case functioning as a neutralized buffer-amplifier. When operating on the 160-meter band, the 6L6 stage must be neutralized. On all other bands, neutralization is not required. (See paragraphs under heading, "Neutralization".)

The Meissner **Signal Shifter** has a self contained power supply for operation on **alternating current only.** It will not operate on 110 or 220-volt direct current.

The **Signal Shifter** is arranged for the addition of a crystal oscillator unit. This companion unit is known as the Meissner **Signal Spotter".** A receptacle is provided on the back edge of each **Signal Shifter** and by means of a short cable assembly, supplied with the **Signal Spotter,** the two units can be easily coupled together. No other connections are required. A two position switch, located on the **Signal Shifter** front panel directly below the main tuning control, enables the operator to select the type output desired; either crystal output from the **Signal Spotter** or ECO output from the **Signal Shifter.**

OUTPUT—BANDSPREAD—FREQUENCY RANGE

The **Signal Shifter** delivers a fundamental signal of approximately 7.5 watts on each of the commonly-used amateur bands, except 28 MC. For operation in this band, coils are supplied that cover 14 to 15 MC, permitting full dial-spread on the 28-MC band when the **Signal Shifter** is followed by a frequency-doubling stage.

The three coils used for each band are so designed that each amateur band is spread over approximately 90% of the dial scale, thus permitting accurate calibration and setting of frequencies.

STABILITY

An extremely high order of frequency-stability in the **Signal Shifter** is achieved by the use of the 6F6, a tube which has a minimum of thermal frequency-drift, in a high-C circuit, using sturdy, high-quality components, together with temperature-coefficient condensers, and a "Stand-by" circuit which holds steady the currents flowing in the tube under either operating or "stand-by" conditions.

ADJUSTMENT

In the event that it is found necessary to re-align the **Signal Shifter,** as when a new set of tubes is installed, it is suggested that the following procedure be used in making the preliminary test:

Turn the AC switch (left side of the panel) to OFF. Plug in the line cord to an AC outlet of suitable voltage and frequency.

A telegraph key or "bug", connected to an ordinary phone plug, is plugged into the key jack found on the back side of chassis. This jack is a 'closed circuit' type and for phone operation, the plug is removed which permits the **Signal Shifter** to operate and eliminates the necessity of an extra switch or 'strap' to close the keying circuit.

As shown in Figures 1 and 2, a five terminal strip is mounted on the back side of the chassis. This terminal strip enables the operator to select the desired method of keying the **Signal Shifter.** For oscillator keying, use short pieces of wire and connect terminal 1 with terminal 2 and terminal 3 with terminal 4. For amplifier keying, connect terminal 2 with terminal 3 and terminal 4 with terminal 5.

See that all tubes are correctly placed in their respective sockets as shown in Figure 1. Place one complete set of coils in their sockets. **NOTE: THE SIGNAL SHIFTER SHOULD NOT BE TURNED "ON" OR PERMITTED TO RUN WITHOUT COILS AS THE ABSENCE OF COILS PLACES A HEAVY LOAD ON THE FILTER CIRCUIT.**

Turn the "operating switch" (SW-1) to "Stand-By", turn the "selector switch" (below tuning control) to "ECO" and turn the power switch (SW-2) to the "On" position. This permits the tubes to warm up and places the entire unit in operating condition, but does not allow the oscillator to start.

NOTE: The two position "selector switch", located directly below the tuning control, is provided to permit the use of a crystal oscillator, the Meissner **"Signal Spotter".** When the companion **"Signal Spotter"** is used with the **Signal Shifter,** this switch enables the operator to instantly select the type output desired; either crystal controlled output or ECO output. When the **Signal Shifter** is not used with a **Signal Spotter,** the selector switch should always remain in the "ECO" position. After a warm-up of fifteen minutes, turn the "operating switch" (SW-1) to the "On" position and rotate the tuning knob to scale setting "90". Set an accurately calibrated receiver, monitor or frequency meter on the **HIGH FREQUENCY END OF THE BAND** corresponding to the set of coils in the Shifter. Adjust the "band-setting" condenser (C4 in Figure 1.) until the output signal of the **Signal Shifter,** heard in the station receiver, corresponds to the high frequency end of the band. If a super-heterodyne receiver is

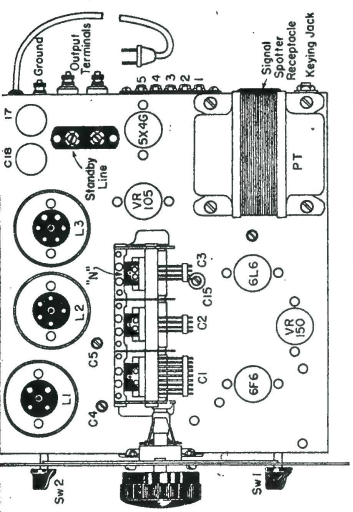


FIG. 1
SIGNAL SHIFTER
TOP VIEW

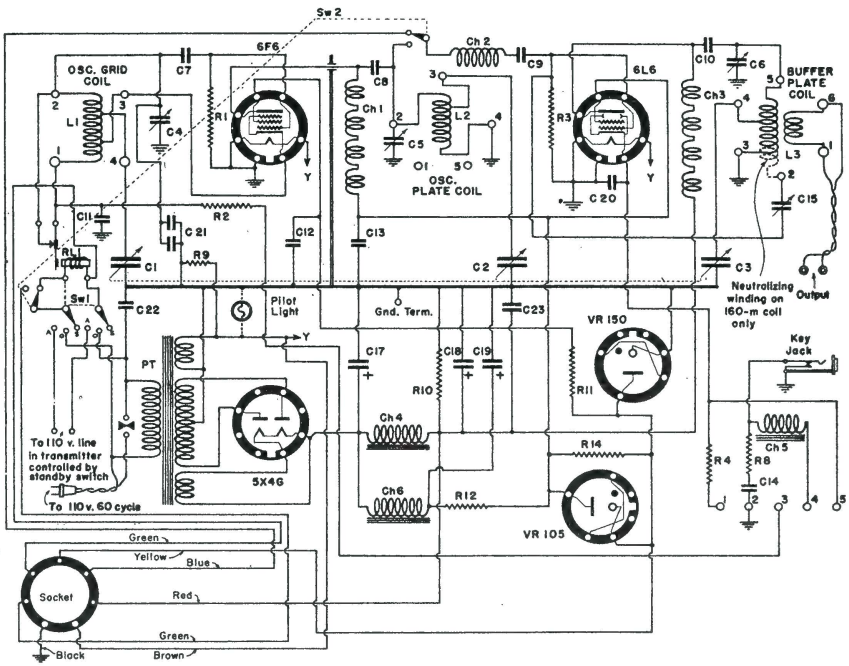


FIG. 2 SIGNAL SHIFTER—CIRCUIT DIAGRAM

used to locate the frequency of the Shifter, the receiver may give beat notes at several different points but there should be no question as to which is the CORRECT SIGNAL as it will be much stronger than the spurious signals caused by harmonic beats. Before the **Signal Shifter** is actually placed in service, a calibrated frequency standard should be used to actually determine band edges, dial calibration, etc. See paragraphs under the heading "Frequency Calibration".

Then with the KEY DOWN or with the key plug REMOVED from the jack (which automatically closes the keying circuit), adjust the trimming condensers (C-5 and C-6) to give maximum **Signal Shifter** output. The best indicator of **Signal Shifter** output is a grid milliammeter located in the grid circuit of the amplifier stage to which the **Signal Shifter** is connected. This meter will indicate the amount of grid driving power supplied by the **Signal Shifter** and trimming condensers (C-5 and C-6) should be adjusted to provide MAXIMUM READING on the grid milliammeter. If no amplifier is used with the **Signal Shifter** and the instrument is connected direct to antenna, a small neon bulb held against the antenna feeder or a flash-light bulb connected in series with one of the feeders, can be used to indicate **Signal Shifter** output. Trimming condensers should be adjusted to provide maximum glow.

It is customary practice to "peak" the **Signal Shifter** to provide MAXIMUM OUTPUT ON THE HIGHEST FREQUENCY BAND EMPLOYED AT THE STATION. Once the **Shifter** is peaked on the highest frequency band, no further adjustments should be made when lower frequency coils are used. It is ABSOLUTELY UNNECESSARY to re-align the **Signal Shifter** when changing from one band to another providing the unit has been aligned for maximum output on the highest frequency band employed at the station.

NEUTRALIZATION

When 160 meter coils are used in the **Signal Shifter**, the instrument MUST BE NEUTRALIZED. This is readily accomplished in the following manner: Turn the front panel switch to "Stand-By"; then carefully adjust the neutralizing condenser (C-15 on Fig 1), using a long screw driver inserted through the chassis hole indicated. Adjust for MINIMUM GLOW in a small neon bulb held against the top lug of main gang condenser, section C3. This lug is pointed out by an arrow in Figure 1 and is labelled point "N". A neon bulb is a good indicator for determining the condition of neutralization, since with the front panel switch in "Stand-By" position and the keying circuit CLOSED (Key Down), almost no glow should be visible when the 6L6 is neutralized. If a bright glow does occur, adjust the condenser (C-15) until the neon bulb goes out or becomes dim.

Neutralization is NOT required for operation on bands other than 160 meters and the neutralizing components are automatically switched out of the circuit on the other bands.

When tubes are replaced in the **Signal Shifter**, the instrument must be re-neutralized.

—FREQUENCY CALIBRATION—

The **Signal Shifter** is now ready to calibrate. Unlike previous models, the 1942 model **Signal Shifter** is provided with a direct reading scale which can be easily calibrated by the individual user. Provision is made for direct calibration of FIVE AMATEUR BANDS and the scale may be calibrated to indicate frequency, band edges, phone bands, marker points OR a combination of ALL, dependent upon the requirements of the individual user.

In order that the calibration will remain within desirable limits of accuracy, care must be taken to permit a substantial warm-up before calibration is started. **A warm-up period of 30 minutes is recommended.** Whenever coils are changed, the coil shields as well as the coils proper must be firmly seated to prevent mechanical shift of the oscillator frequency. Actual calibration can be made by any standard frequency-checking procedure as outlined in radio technical handbooks, using a heterodyne frequency meter of known accuracy or a precision type frequency standard such as the Meissner crystal controlled **Signal Calibrator.**

Assuming the **Signal Shifter** has been allowed to warm-up for 30 minutes, the actual process of dial calibration can begin. First, **remove** panel screws "A" and "B" and **loosen** panel screws "C" and "D". These screws are clearly shown in Figure 11. Now remove the transparent sheet of "plastacelle" which covers and protects the scale. Removal is accomplished by pulling the sheet upward and out from its position between the scale and front panel. When the transparent sheet is removed, replace panel screws "A" and "B" and tighten all four screws (A-B-C-D) firmly in place. In tightening these screws, make certain the dial scale is properly centered in normal position behind front panel cut-out.

Any one or all of the five popular amateur bands may be calibrated on the dial scale in their indicated respective positions. Since the calibration process is the same for all bands, the 20-meter band is used in the following paragraphs as a typical example of calibration procedure.

First, carefully tune the **station receiver** to the low frequency edge of the 20-meter band (14,000 kc.) It is highly

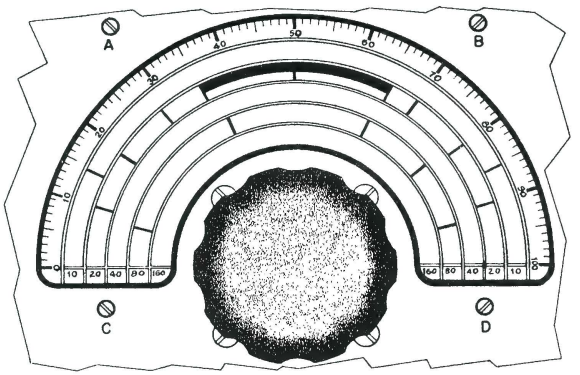


FIG. 11

advisable **not to depend upon the calibration of the receiver** itself but to insure the accuracy of the 14,000 kc point by using a good heterodyne frequency meter or crystal controlled frequency standard.

Second, tune the **Signal Shifter** to ZERO BEAT with the 14,000 kc setting of the receiver. If the adjustments made in both the receiver and **Signal Shifter** were carefully made, the Signal Shifter pointer indicates "14,000 KC" and this point may now be marked on the dial scale. Ordinary black fountain pen ink or pencil may be used to mark the scale. Extreme care should be used in marking the scale. If a line is drawn to mark a point, the line should follow the angle of the pointer line. See Figure 11. NOTE: if the scale is slightly "oily", it will not "take" ink readily. For this reason, the points where the marker lines are placed should be cleaned with ordinary "art gum", obtainable at any stationery store. Use care in cleaning with art gum and do not rub over the printed scale markings. **Clean only the clear spaces where personal marks are to be made.** If an error is made in marking, erase with an ordinary pencil eraser. **DO NOT RUB OVER THE PRINTED SCALE LINES.**

The procedure employed to locate the "14,000 KC" point on the **Signal Shifter** scale may be used to locate all other desired points over the 20-meter band. Namely, tune the station receiver to the desired frequency, making certain the receiver point is accurate, tune the Signal Shifter to zero beat with the receiver and mark the indicated point on the dial scale. Any number of points may be marked on the scale; Band edges, 100 KC points, 50 KC points, 10 KC points, phone band edges, etc. The points may be identified by appropriate figures or wording, **carefully** printed on the scale by the operator. A "messy" job will ruin the appearance of the attractive Signal Shifter dial scale and dial calibration should be made with care and preciseness. Many operators do a good calibration job by first making temporary markings with pencil and after all marks have been made in this manner, removing the scale from the panel and making **PERMANENT** markings in **INK**, while the scale is resting on a desk or table.

When the calibration process is completed and the ink has been permitted to dry, the scale and transparent covering may be re-mounted behind the panel. This process is simple enough and the only necessary precaution to follow is to see that the scale occupies **EXACTLY THE SAME POSITION** as it did while being calibrated!

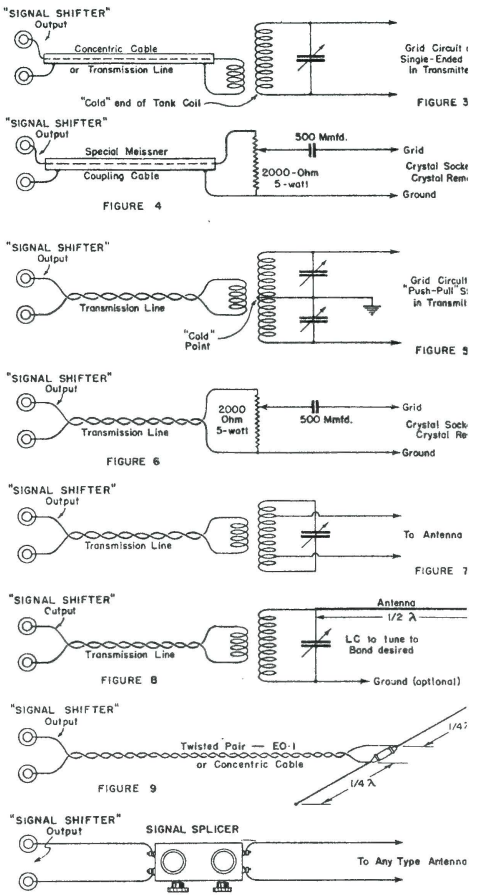
The high frequency end of each band is found between 80 and 95 on the **Signal Shifter** dial scale. If this point is found elsewhere, the band setting condensers should be readjusted in the manner described in the paragraphs headed "Adjustment".

Calibration should be re-checked at frequent intervals and must positively be checked whenever tubes are changed or replaced.

When operating on the extreme edges of the bands, do not rely entirely upon the calibrated dial scale. Band edge operation is risky at best and should be attempted only with a precision type crystal controlled oscillator. Use extreme care when approaching the band edges with the **Signal Shifter. Allowance of a small safety factor is advisable.**

COUPLING TO THE TRANSMITTER

After the **Signal Shifter** has been adjusted, aligned, and calibrated, it is then ready to be coupled to the transmitter. This may be done by any of the standard methods of coupling. In a medium- or low powered transmitter, the **Shifter** may be link-coupled to the grid coil of the output stage in the trans-



to the buffer stage of the transmitter or the grid
circuit of the tube previously used as a crystal os
If the transmitter has crystal control with grid of th
stage capacity coupled to the crystal plate tube, t
coupling can be conveniently made to the plate circ
the crystal tube removed and the plate circuit re-t
the output of the **Signal Shifter** is linked to a buffe
fier, care should be taken to prevent self-oscillation
buffer stage by means of neutralization or adequate
ing in the case of screen-grid tubes.

The output terminals of the **Signal Shifter** may be
to the transmitter through special Meissner concen
ble, E01 cable, or any other good low-temperature t
sion line, such as a pair of No. 14 rubber-covere
twisted loosely. Special Meissner coupling cable is
mended when highest possible **Signal Shifter** outpu
sired. Type E01 cable is highly recommended. The
loss in such transmission lines will determine the le
line which can be used satisfactorily. Due to the re
high output of the **Signal Shifter,** standard transmissi
can be used up to 25 feet without seriously reducing t
to the transmitter itself. Typical methods of coupl
shown in figures 3, 4, 5 and 6.

If possible, the degree of coupling between the Sign
ter and a tuned circuit in the transmitter should be
at the transmitter in order to obtain the maximum ou
each band with the minimum of coupling to the tran
It will not be necessary to change the link-coupling t
the output coil of the **Signal Shifter,** but better to v
coupling at the transmitter by means of a variable
link-circuit or by the "cut and try" method.

CONTROLLING THE SIGNAL SHIFTER

There are four controls on the front panel of the
Shifter, the AC "On-Off" switch . . . (left hand side
panel), the "Selector switch", . . . the "Operating
. . . (right hand side of the panel), and the main Tuni
A standby relay (RL) is incorporated in the Signal

to permit automatic standby of the oscillator when the amplifier is turned off in the transmitter. This means the operator can control the **Signal Shifter** merely by operating the "on and off" switch of his transmitter.

In the "Automatic" position of the switch, the relay is connected to the twin terminal-strip near the rectifier socket at the rear of the chassis. For automatic operation these terminals should be connected across any line in the transmitter where 110 volts AC is controlled by the transmitter "standby" switch. This is usually the line to the primary of the high-voltage power supply. Thus, the send-receive" switch simultaneously controls the transmitter and the "Signal Shifter."

In the "Automatic" position of the switch the relay contacts are open when the "final stage" is on, thus permitting the oscillator to function. In the "On" position, the relay is held down with the contacts open, by the 110 volts obtained from the power-line cord of the **Signal Shifter**. In this position of the switch, continuous operation of the oscillator is maintained regardless of whether or not the remainder of the transmitter is operating. This feature is very useful in calibrating the **Signal Shifter**, locating its position in the band and in furnishing a local signal for use as a frequency standard. The oscillator alone will furnish a weak signal in a receiver placed nearby.

In the "Standby" position, the relay contacts are closed, thus short-circuiting the oscillator in the **Signal Shifter**. Due to circuit balance, the current flowing in the 6F6 tube remains practically constant whether the tube is oscillating or not, thus preventing drift during the "Standby" period. The tube is thus kept at a constant temperature permitting instantaneous use of a desired frequency without warm-up or re-setting of the frequency control.

ADJUSTING TRANSMITTER TO SIGNAL SHIFTER

After coupling the exciter to a transmitter an adjustment should be made in the transmitter to provide efficient energy transfer from the **Signal Shifter**. While the basic idea of the **Shifter** is to provide single-dial, bandspread control of transmitter frequency, it is obvious that complete single-dial control (with all circuits in the transmitter and antenna network tracking) is impossible due to the wide variations in transmitter and antenna. It has been found that with the proper coupling from the **Signal Shifter** to the stage, which is being excited, it is possible to operate over a wide frequency range in a given band without readjustment of the grid circuit of the stage under excitation. The plate circuit naturally must be retuned in the transmitter to provide maximum efficiency. The use of "flat lines" in connecting the transmitter to the antenna will greatly eliminate tuning variations in the amplifier stage itself when operating over a wide frequency range.

The output of the **Signal Shifter** is practically constant over the entire frequency range of each band. The exact decrease in power at the edges of the band (when the transmitter is tuned up in the center of the band), is a function of the number of circuits following the **Shifter**, and the degree of coupling between circuits.

SIGNAL SHIFTER AS FREQUENCY STANDARD

In using the Meissner **Signal Shifter** as a frequency standard, care should be taken to accurately calibrate the various frequency bands. Extreme care should be taken in re-setting the dial to the calibrated point. The accuracy of the unit will be increased if care is taken to prevent mechanical vibration of the **Signal Shifter**, especially while being used as a frequency standard. Adequate warm-up should be provided for before attempting to use the unit as a frequency standard.

SIGNAL SHIFTER AS A TRANSMITTER

The **Signal Shifter** may be used as a low-powered or emergency transmitter by connecting the output terminals to a tuned circuit as shown in Figs. 7 and 8. Also, the output can be connected directly to a twisted pair feeder line, which in turn is connected to the center of a double antenna. The twisted pair can be of any normal length, without loss. This circuit is shown in Fig. 9. Another method, using the Meissner **Signal Splicer** as a coupling unit, enables the operator to employ ANY type antenna with the **Signal Shifter**. This arrangement is shown in Figure 10.

—IMPORTANT— READ CAREFULLY!

The **Signal Shifter must be neutralized** when operated with 160-meter coils. See paragraphs under heading "Neutralization".

The **Signal Shifter** must **not** be turned "on" when the coils are **out of their sockets.**

Use extreme care when operating near the band edges. Allow a **margin of safety.**

The **Signal Shifter** is designed to produce a T9-X signal. Failure to obtain a pure signal may usually be traced to a defective 6F6 oscillator tube. Replace the bad tube immediately.

The **Signal Shifter** incorporates a well designed key click filter. However, the presence of absence of "clicks" depends largely upon the manner in which the amplifier stages, **following the Signal Shifter**, are biased. See comprehensive article on this subject, page 17, April 1941 QST.

Adequate ventilation in **Signal Shifter** cabinet is important. It is best not to cut off ventilation on the sides and top of cabinet . . . especially the top.

If **Signal Shifter** output is normal on one band but far below normal on another band, it is logical to suspect the condition is caused by a partially defective coil or coils. The suspected coils should not be tampered with but returned to the factory for repair or replacement.

In case of trouble, **carefully re-read this entire instruction folder.** A faulty condition can often be caused by some point that has been overlooked in the preceeding sections.

The Service Department of the Meissner Company is at your disposal at all times. Your inquiries will receive prompt attention.

ETHICAL OPERATION OF AN ECO

With the Meissner **Signal Shifter** connected to a transmitter and the aligning, adjustment and calibration completed, the exciter is now ready to operate. It must be remembered that the operator of an ECO now becomes a part of his equipment. He can operate in a decent, sporting manner, turning off his carrier when placing his signal on the band, and by keeping a few kilocycles from the station called or he can "swish", park right on the weak DX station, or slide back and forth across the station already working the DX station, in the hope of attracting his attention.

Many paragraphs have been printed in the amateur technical journals pleading with the operators for sensible operation of ECO's. Nothing can be added except this—THE MEISSNER SIGNAL SHIFTER HAS BEEN SO DESIGNED AND SO CONSTRUCTED AS TO PERMIT TRANSMITTER OPERATION WITH AN ABSOLUTE MINIMUM OF INTERFERENCE AND ANNOYANCE TO OTHER OPERATORS, IN FULL ACCORD WITH THE BEST "HAM ETHICS" BUT IT NOW BECOMES THE DUTY OF EACH OPERATOR TO SEE TO IT THAT HIS OPERATION AT HIS STATION UTILIZES THESE FEATURES, AND THEREBY MEETS THE ETHICAL REQUIREMENTS!

"SIGNAL SHIFTER" REPLACEMENTS PARTS LIST

Circuit Designation	Meissner Part No.	Description	Each Net Price
C1, C2, C3	15176	3-Gang Special Tuning Condenser	$3.85
C4	15177	Oscillator Grid-Tank Condenser	1.40
C5	15240	Oscillator Plate-Tank Condenser	.85
C6	15260	Buffer Plate-Tank Condenser	.85
C7, C9,	14101	100-mmfd. Mica Condenser	.17
C8, C10	14100	500-mmfd. Mica Condenser	.22
C14	15142	0.1-mfd., 200-volt paper Condenser	.14
C12, C20	14110	.01-mfd., 400-volt Paper Condenser	.14
C13	18131	.01-mfd., 600-volt Paper Condenser	.17
C15	6765	Align-Aire Neutralizing Condenser	.20
C17	17193	15-mfd., 500-volt Electrolytic Cond.	1.00
C18, C19	17192	15-500, 10-450 Electrolytic Condenser	1.40
C11, C22	14181	.05-mfd., 400-volt Paper Condenser	.14
C23	16166	0.1-mfd., 600-volt Paper Condenser	.17
R1	15155	40,000-ohm, ½-watt Resistor	.17
R2	15184	400-ohm, 1-watt Resistor	.22
R3	15183	50,000-ohm, 1-watt Resistor	.22
R4	15182	300-ohm, 2-watt Resistor	.28
R8	16143	50-ohm, ¼-watt Resistor	.11
R9, C21	9910	Temperature Compensator	2.75
R10	17165	60,000-ohm, 5-watt Resistor	.55
R11	17168	30,000-ohm, ½-watt Resistor	.17
R12	17166	4,000-ohm, 10-watt Resistor	.70
R14	17154	60,000-ohm, ½-watt Resistor	.17
CH1, CH3	19-1996	4-pie RF Choke Coil'	.37
CH4	19251	7-Henry Filter Choke	1.65
CH5	19528	2-Henry Filter Choke	1.10
CH6	19341	6-Henry Filter Choke	1.10
PT	19253	Power Transformer, 110-volt	4.40
PT	19428	Power Transformer, 220-volt	5.50
RL	19229	Automatic Stand-by Relay	3.30
SW1	19223	3-Position Selector Switch	.75
SW2	19539	"On-Off" AC Line Switch	.33
2 Req	8437	Ceramic Octal Tube Socket	.27
3 Req	17917	Aluminum Coil Shield	.28
3 Req	25-8222	Bakelite Bar Knob	.10