

This manual, published in 1933, describes the installation, operation, and maintenance of the Western Model 41 and Empire State. Use on 50 Hz power lines is mentioned twice, so this manual was apparently written for the 50 Hz models made for export to Mexico. Our Model 41 scanning mechanism, which we are using in our Empire State, is a 50 Hz model. Thanks to Peter Yanczer for providing this to us.

INSTALLATION & OPERATION
OF
EMPIRE STATE AND MODEL 41 TELEVISION RECEIVERS

INSTALLATION

Direct light from the rear of the viewing screen obscured the received image; for this reason, the Empire State and Model 41 receivers should be placed in a position that shields the back of the screen from windows and lights, preferably in the corner of a room. It is not advisable to enclose the back of the cabinet in any way that obstructs ventilation, as the heat developed by the set and motor may raise the temperature of these units above a safe value.

The antenna should be approximately 60 feet long (horizontal) with a shielded lead-in-wire for at least a distance of 20 feet beyond the antenna connection to the set. The ground lead should be short and direct to the nearest radiator, cold water pipe, or to other earthed conductors.

The Empire State and Model 41 receivers are intended for operation on alternating current power lines in synchronism with television transmission stations operating on these same lines. These receivers must be operated on 50 cycle, 125-130 volt lighting circuits.

ADJUSTMENT OF LAMP

After installation, the reproducing lamp must be adjusted before the set can be operated. On the Empire State Model, a shield can covers the lamp with the exception of a round opening in the side. This shield can is attached to the outer sliding sleeve with a set-screw, and should be adjusted so that the circular disk in the lamp is in the center of the opening.

With the set turned on, the filament voltage of the lamp should be adjusted to "strike" the lamp within a period of 15-30 seconds, after the power is turned on. By striking is meant the concentration of the fuzzy glow (which takes place when the lamp is first turned on) into the center of the circular plate in a brilliant spot. The filament voltage is adjusted by rotating with an insulated screw-driver, the slotted shaft behind the opening in the lower left corner of the rear of the chassis. Rotation to the right increases the voltage, rotation to the left decreases it. The filament voltage should be kept as low as the proper striking of the lamp will permit.

With the lamp lighted and the lens disk running, move the lamp support back and forth until sharp lines of light appear on the screen. Then, by sliding the sleeve up or down, locate the lamp vertically so that the entire screen is illuminated from top to bottom. It may be necessary, after this operation to refocus the fine lines on the screen by a back and forth adjustment of the lamp.

It may facilitate the original focussing to hold the disk stationary for a moment with the hand after the power has been turned on, and to focus the lamp to a sharp, brilliant spot on the screen.

OPERATION

The set is now ready for operation. The lower right control is the power switch and contrast control combined to operate with one knob. To turn the set on, turn the right until it clicks. To turn off, turn to left until it clicks. After the set is turned on, allow the motor to gain speed and settle down to a slight even hum. If the motor hum continues to pulsate loudly after running for 15 to 30 seconds, it must be "synchronized" by twisting the upper center knob quickly to the left several times until the pulsating hum stops. The motor is then running at normal speed in perfect synchronism with the motors at the transmitter. Turn the contrast control to the extreme right, and rotate the tuning control (right hand knob) until a steady pattern or image appears on the screen. This image may not be clear, but if it is not shifting and twisting, it is a television image, and may be made recognizable by turning the "framing" control (upper center knob) in either direction until a clear complete picture is seen. This operation is similar to the framing of a motion picture projector when a new reel is flashed on the screen and found to be apparently cut in half, with the halves reversed. However, in a television receiver, the image may be complete from top to bottom, but seem to have jagged outlines. In this case, turn the framing control until another complete picture appears on the screen. If the picture is still jagged, turn the knob in the same direction as before until the next complete picture appears on the screen. This last picture should have smooth outlines and be completely recognizable.

In other words, for a complete rotation of the framing knob there are three apparently complete pictures, only one of which is correct and clear.

After framing the picture, it will be found in most cases that the contrast control may be turned to the left to make the picture clearer and smoother, with the right degree of contrast. If the contrast is too great, detail will be lost and the picture will be black and smudgy.

When the television receiver is properly tuned and adjusted, tune the voice receiver to the station known to be broadcasting the voice and music accompanying the television program.

COMMON DEFECTS AND THEIR REMEDIES

If the tuning dial is set to receive a television station, and diamond shaped patterns appear on the screen, moving from right to left, the rotor is not in synchronism with the transmitting station. If "synchronizing" operation does not remedy the trouble, the line voltage may be too low at the socket, or the motor may have developed friction. In either case, the service department of the company from whom the receiver was purchased can recommend the remedy.

If the lines on the screen seem blurred and fuzzy, the lamp may be out of focus, or may need readjustment of the filament voltage to make it strike. (See instructions for this adjustment).

Static or electrical interference appears as a "rainstorm" across the screen. Elimination of interference from motors and electrical appliances is the same as for voice radio.

If shifting and twisting diagonal lines appear on the screen the receiver is tuned to a short wave voice station. If these patterns occur at the same time as the image appears on the screen a nearby broadcast or short wave station is interfering with the television signal. If retuning does not eliminate the patterns, the interfering signal must be trapped out of the antenna circuit by any of the usual trap circuits.

CARE OF LENSES

The lenses in the rotating disk should be cleaned whenever they become fogged and dusty. Use only a soft cloth or spectacle lens paper. Alcohol or dilute ammonia will aid in removing grease, oil, finger prints, etc. When using a liquid cleaner, clean the lens with a cloth dampened with the liquid and before the lens has dried, polish dry with another dry cloth. Use care in handling the disk to avoid bending. Do not remove the disk from the shaft.

SERVICE OF WESTEL EMPIRE STATE AND MODEL 41 RECEIVERS

The Westel Empire State and Model 41 receivers tune to the television bands, and cover the range from 1500 KC to 5000 KC approximately. The radio receiver consists of 3 stages of tuned radio frequency amplification employing '58 tubes, admitting a band approximately 40 KC wide. The detector is a '27 tube used as a diode detector. The audio system comprises two '27 tubes in resistance coupled amplification with coupled circuits designed to give a very flat audio response curve. The output stage employs a 245 tube

driving the Westel Neon Crater Lamp. The power supply used a type '80 rectifier.

Mounted on the chassis is the television reproducing device which consists of a synchronous motor mounted on cork trunnions to absorb vibration, and to allow the motor to be rotated for the framing operation. This motor drives a 45 line 3 spiral lens disk which projects the image of the crater lamp onto the screen to form the television image.

Tubes may be replaced by removing the two wood screws under the top rear of the Model 41 cabinet, and removing the sliding top.

OPERATING VOLTAGES

Typical operating voltages are as follows:

All voltages measured with 1000 ohm per volt voltmeter of appropriate range, and with contrast control at maximum.

Line Voltage -	125 volts	Plate - 3rd '58 -	225 volts
B plus -	345 "	Cathode-All '58's-	2 "
Plate 1st and		Plate- 1st '27-	70 "
2nd '58 -	100 "	Cathode-1st '27-	5 "
Screen - all '58's-	55 "	Plate 2nd '27-	175 "
Plates of 280-	400 " AC	Cathode-2nd '27-	12 "
Drop across filter		Plats- 245 -	320 "
choke-	60 " DC	lamp -	25 "
(also bias for 245)			
Filaments of all tubes-	2.5 " AC		
Filament of lamp-	2.5 to 3 volts AC		

ADJUSTMENT AND REPAIR OF RECEIVER

The alignment of the radio frequency stages is accomplished by adjusting the trimmer capacitance on the gang condenser. These are reached through the four holes on the side of the chassis.

The audio system is carefully balanced when the receiver leaves the factory, as the operation of a multi-stage resistance coupled amplifier with a good low frequency response on a filtered rectifier requires care in design and maintenance. If "motor-boating" of the set should occur after it has been in operation for some time, it may be found that the emission of the first 27 audio tube has fallen to a value below normal. Replacing this tube with one of normal emission should correct this trouble. If not, a larger bypass capacity across the cathode resistor of this tube will stop the "motorboating".

SERVICES OF TELEVISION REPAIRMAN

The synchronous motor and disk assembly are carefully adjusted when they leave the factory, and SHOULD NOT BE REMOVED FROM THE CHASSIS unless service is required.

If the motor will not pull up to the proper speed, as evidenced by the pulsating hum, make sure that the line voltage and frequency are correct (125-130 volts, 50 cycles). An auto-transformer may be necessary to raise the line voltage to the proper value in extreme cases. If the line voltage is correct, examine the copper bars on the motor and resolder the joints if they are not solid. Before soldering, squeeze the ends of the bars together until they make contact, then flow solder around the joint.

Another cause of failure to pull in to synchronous speed is excessive friction on the motor bearings, or binding of the clutch connection to the disk. This clutch connection is placed between

the motor and the disk in order to allow the motor to pull in to speed without the entire load of the disk, and then to pick up the disk speed after the armature has reached synchronous speed. The clutch also filters out the torque variations of the motor due to line voltage surges.

Excessive bearing friction may be located by spinning the disk with the hand and noting whether it comes to a free stop or if it seems to be braked quickly.

If the motor pulls into synchronism, but the picture swings from side to side at a fairly rapid rate, binding of the clutch is responsible. A binding clutch may often be released by holding the armature stationary with a screw-driver and rotating the disk slightly in both directions. If this does not loosen the clutch, or if bearing friction seems excessive, proceed as follows:

Take off the three control knobs and the four bottom mounting screws of the chassis. Remove from cabinet, take out the two rear tubes, remove disk from shaft (for Model 41 use disk Puller Nestel Part No. 1327, for Empire State - loosen set screw.) Loosen the set screw on the front frame shaft collar, spread the brackets apart and slide the motor and frame shaft forward through the collar until the motor shaft is clear of the rear trunion. The motor may be lifted up and pulled back to remove frame collar and shaft from front cork bearing. Loosen set screw in the front motor boss and remove frame shaft for ease in handling.

To locate a binding or frozen clutch, hold the armature stationary with a screw driver, and rotate the disk shaft with the fingers. It should rotate about ten degrees in either direction against an

increasing tension. Examination of the clutch construction will show its proper operation.

To loosen clutch or correct bearing friction, remove the screws in the disk bearing plate and take off the plate. In the Empire State Model, this plate holds both front and rear disk bearings. In model 41, the front bearing is in the pressed gear hub. To release the frozen clutch, hold the surge gear firmly and pull and twist the disk shaft so that the cork and brass clutch faces will separate slightly. (The cork face is placed against the side of the large gear). Allow a small amount of grease to work between these faces.

To remove bearing friction in the Empire State Model, loosen the screws holding the front disk bearing very slightly. Tap the bearing plate lightly in several directions until shaft runs freely in the bearings. Tighten the screw and if necessary repeat the operation until the shaft turns freely when the bearing plate is firmly fastened.

To remove bearing friction in the armature, adjust the tension of the four motor end bracket screws on the field stacking. This will correct minor misalignments. If this adjustment does not suffice, loosen all four screws and move either bracket by tapping; the armature runs freely. In doing this, keep the armature centered in the field, as it will drag during operation otherwise.

In reassembling the Empire State motor, replace the disk bearing plate in such a position that the gear and pinion engage completely but do not grind. Separate the gears slightly to remove

grind by tapping the disk bearing plate before the screws are fully drawn up. A small amount of automobile cup grease should be placed in the gear box before reassembly.

The bearings of the Model 41 motor have been aligned and riveted at the factory. Should they become misaligned through warping or damage of the frame, they may often be realigned by warping the pressed frames or end plates of the motor in a direction which removes the strain. The disk bearings may be aligned by adjusting the tension on the three screws which hold the rear bearing plate to the gear house.

In replacing the motor in the trunnions, do not fail to separate the brushes before dropping the motor into place.

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