

A  
TECHNICAL DESCRIPTION  
of the  
SUPREME MODEL 675 FM & TV GENERATOR  
and  
OPERATING INSTRUCTIONS

SUPREME, INCORPORATED  
Greenwood, Mississippi  
U.S.A

PRELIMINARY INSTRUCTIONS ON  
**SUPREME**  
**MODEL 675**  
**FM & TV GENERATOR**

Overall size 15½" x 11½" x 9".

Shipping Weight 28 lbs.

Power Supply Required:  
 105-125 v, 50-60 cycles, AC

Power Consumption:  
 80 watts at 117 volts

**Frequency Modulated Ranges:**

<u>CHANNEL</u>	<u>FREQUENCY</u>	<u>BAND WIDTH</u>
Channel A	4.5 mc	1 mc
Channel B	10.7 mc	2 mc
Channel C	100. mc	2 mc
Channel D	20-24 mc	4 mc
Channel E	20-28 mc	8 mc
Channel F	38-48 mc	10 mc
Channel 2	54-60 mc	10 mc
Channel 3	60-66 mc	10 mc
Channel 4	66-72 mc	10 mc
Channel 5	76-82 mc	10 mc
Channel 6	82-88 mc	10 mc
Channel 7	174-180 mc	10 mc
Channel 8	180-186 mc	10 mc
Channel 9	186-192 mc	10 mc
Channel 10	192-198 mc	10 mc
Channel 11	198-204 mc	10 mc
Channel 12	204-210 mc	10 mc
Channel 13	210-216 mc	10 mc

Sweep width variable on each channel from zero to maximum indicated above. Each channel calibrated on the single frequency indicated or in the middle of the range indicated with Sweep Width Control turned to "0".

Channels A, B, & C provided with air trimmers for calibration.

**Video Carrier Ranges:**

<u>CHANNEL</u>	<u>FREQUENCY</u>	<u>VIDEO CARRIER FREQUENCY</u>
Channel 2	54-60 mc	55.25 mc
Channel 3	60-66 mc	61.25 mc
Channel 4	66-72 mc	67.25 mc
Channel 5	76-82 mc	77.25 mc
Channel 6	82-88 mc	83.25 mc
Channel 7	174-180 mc	175.25 mc
Channel 8	180-186 mc	181.25 mc
Channel 9	186-192 mc	187.25 mc
Channel 10	192-198 mc	193.25 mc
Channel 11	198-204 mc	199.25 mc
Channel 12	204-210 mc	205.25 mc
Channel 13	210-216 mc	211.25 mc

Each of these ranges is normally unmodulated and calibrated at the frequency of the Video Carrier as indicated. Each range can be modulated by an external source, such as the Supreme Model 665 Composite Video Generator, or by any frequency from 5 cycles to 5 megacycles. The frequency response of the internal modulation amplifier is sufficient to accommodate the output of a monoscope camera.

**Marker Generator Ranges:**

Channel X 19-31 mc

Channel Y 31-50 mc

Provides "pip" marker.

**External Marker Frequency:**

(Applied to Marker Input) 1 mc to 250 mc.

**External Crystal Marker:**

Jack provided on panel for insertion of any crystal. Crystals not supplied, in order that the service technician may obtain the exact frequency he desires. Crystal Marker can be used at same time as variable Marker to provide two simultaneous markers.

**Horizontal sweep frequency:**

Voltage provided on panel to give horizontal deflection of oscilloscope at a frequency of 60 cycles per second.

**Horizontal sweep frequency (60 cycle) phase:**

Control provided to give both a retarded and an advanced sweep voltage phase.

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The Model 675 consists of four different type of oscillators in one instrument, a Video Carrier Oscillator, a Frequency Modulated Oscillator, a Marker Oscillator and a Crystal Oscillator. A brief description is given below of each of the types, the advantages obtained by the use of the particular features of the instrument and then instructions for the use of the entire instrument in the service, alignment and adjustment of television and FM receivers.

The output frequencies of the Video Carrier Oscillator are selected by the Video Selector knob in any of the standard channel ranges. The output of the Video Carrier Oscillator is normally unmodulated. A modulation amplifier is provided internally for modulating the output of the VC Oscillator. The output frequency (unmodulated) is calibrated to the Video Carrier frequency of each of the standard channel ranges. Any frequency from 5 cycles to 5 megacycles can be used for the modulation of the VC Oscillator. Three to five volts applied to the Video Input will fully modulate the carrier. The frequency and phase responses of the modulation amplifier are sufficient to accommodate a standard RMA composite signal modulated with the output from a monoscope camera. The amplifier will pass, with no noticeable distortion, 50 cycle and 300 kc square waves.

The signal output from the VC Oscillator is obtained from the Video Marker Output attenuator. This is a trombone type attenuator which picks up a portion of the signal inside the internal shield and carries it to the screw connection on the attenuator. Attenuation is accomplished by

sliding the trombone "out" or "away" from the panel. Maximum signal is obtained when the attenuator is pushed all the way in. Minimum signal is obtained when the attenuator is pulled out fully. Unintentional removal of the attenuator is made difficult by a spring load which drops into a slight ring at the end of the slide. This type attenuator was selected because it is not subject to the severe frequency discrimination which is inherent to the ordinary ladder type attenuator. Obviously if the VC output signal is to retain all the frequency characteristics of the RMA composite signal and a picture signal, only the very best type attenuator could be used, even if it were many times more expensive.

The Video Carrier Oscillator section of the Model 675 was incorporated in the unit to implement the use of the recently announced Model 665 Composite Video Generator. When the Model 665 is used to modulate the VC Oscillator section of the Model 675 the resulting signal can be used for many tests of the operation of television receivers and for many of the receiver adjustments which the service technician is called upon to make. This combination of the Model 665 and the Model 675 is in reality a miniature television transmitter with all the characteristics of the signal, including horizontal and vertical blanking pulses, horizontal and vertical synchronizing pulses, and the equalizing pulses, and in addition a "picture" consisting of dots spaced equally horizontally and vertically. When the equipment is correctly set up there are 33 dots horizontally and 23 dots vertically, making a total of 759 dots on the screen. On a 10 inch television tube the dots are approximately  $3/32$ " square.

This composite signal can be used to adjust the horizontal linearity control, the vertical linearity control, the focus control, the horizontal centering adjustment, the vertical centering adjustment, the horizontal drive, speed and locking controls, the vertical locking control, the position of the ion trap, the position of the focus coil, the position of the deflection coils. It can be used to make all these adjustments, and more, even while the television station is not on the air. No longer is it necessary to wait half the day for the two or three hours during which the station is transmitting the alignment pattern. All these adjustments can be made completely independent of the signal from the station and the service technician will know that all the adjustments will be correct when the receiver is finally tuned to the television station.

This composite signal can be used for the location and diagnosis of trouble in a receiver on the work bench completely independent of the television station. The composite signal can be fed to the antenna of the receiver under test and then, using a scope such as the Model 660 which will faithfully reproduce the synchronizing and blanking pulses, the signal can be traced through the sync separation, integration, clipper and amplification circuits. The television receiver can really be "signal-traced" completely independent of the television station.

The Frequency Modulated Oscillator section of the Model 675 contains several innovations which make it the most satisfactory alignment signal source available to service technicians at this time. First, the circuit used to obtain frequency modulation results in near perfect linearity of deviation on either side of the center frequency. This is accomplished by a specially designed electromagnetic variable capacitor which is placed across the oscillator tank and which is so designed that the linear variable in the capacitor is varied instead of the non-linear variable. Second,

frequency modulated outputs are selected in very carefully selected ranges by means of a rotary switch. If it is desired to observe the overall shape of the television receiver on Channel 2, only Channel 2 is received instead of a myriad of plus and minus beats of undetermined frequency. Third, the frequency deviation of each channel is carefully designed to be wide enough for all uses but not so wide as to cause difficulty in the hands of the inexperienced service technician. In other words, the frequency modulated section is designed specifically for the job of aligning receivers. Fourth, the inclusion of a 4.5 mc output permits (by the use of a crystal of 4.5 mc) the exact alignment of the sound IF and discriminator in intercarrier type receivers. Fifth, a frequency modulated output range is included which will cover the new RMA sound and video IF frequencies of 41.25 and 45.75 mc. Sixth, the 60 cycle sweep provided for connection to the horizontal of the scope is equipped with a phase control which gives both a retarded and advanced shift to the sweep voltage. Practically never will it be impossible to correctly adjust the 60 cycle phase. Seventh, the very high output voltages on all ranges make it possible to align television receiver front ends separately from the IF stages by the use of a crystal detector probe.

The Marker Oscillator section is designed to cover the range of 19 to 31, and 31 to 50 mc. Either range is selected at Channel X or Y on the Video Selector and the desired frequency is selected on a 3 inch dial in the center of the panel. Each range is provided with iron core and air trimmer adjustments to assure closest possible tracking. Note that markers are available covering the new RMA sound and video IF frequencies of 41.25 and 45.75 mc.

A Crystal Oscillator is provided whose frequency will be determined by an external crystal plugged in the jack in the panel. This oscillator is separate from the Marker Oscillator and makes it possible to use two markers at the same time by using a crystal of the desired frequency and setting the Marker Oscillator dial to the other desired frequency. Thus, the alignment of the receiver is made much simpler because the presence of the two signals makes it unnecessary constantly to switch back and forth to determine the width of the alignment curve.

#### ALIGNMENT OF TELEVISION RECEIVER.

At all times, it is suggested that the instructions furnished by the manufacturer of the receiver be followed.

Equipment recommended for use in the alignment of television and FM receivers:

- Supreme Model 675 FM & TV Generator
- Supreme Model 650, 655 or 660 Oscilloscope
- Supreme Model 574 Vacuum Tube Voltmeter or equivalent
- Necessary crystals for the particular receiver

#### Trap Alignment:

Connect the VTVM across the video load resistor and set controls of the VTVM to read negative DC voltage. Connect the Video Marker Output to the grid of the converter tube through a .005 uf capacitor and connector cable supplied with the Model 675. Set the Video Selector switch to Channel X or Y as desired. Set the output selector knob located in the center of the panel to the Marker-Sweep

position. Adjust the marker dial to read the frequency of the trap in the receiver as given by data furnished by the manufacturer of the receiver. Adjust the trap trimmer to give a minimum reading of the VTVM. Continue with different frequencies as specified until all the traps in the receiver are adjusted.

#### Video IF Alignment:

Leave the VTVM and the connector cable of the Model 675 connected as above. Set the marker dial to the frequency of the last IF stage and adjust the trimmer of that stage to give a maximum reading on the VTVM. Set the marker dial to the frequency of each of the other IF stages and adjust the trimmers of each stage to give a maximum reading on the VTVM at the correct frequency.

Remove the VTVM and connect the scope in its place. Connect a .01 capacitor across the vertical input of the scope. Remove the connection to the converter grid and connect this same cable capacitively to the grid of first IF stage by clipping to the insulation of the wire leading to the grid. Connect the second cable from the RF Sweep Output connection to the grid of the converter thru a .005 uf capacitor. An alternate method of inserting the signal into the converter is to slip a small shield can down over the converter tube and clipping the connector cable to it. Connect the horizontal input of the scope to the 60 cycle sweep and ground connections on the panel of the Model 675. Set the Sweep Selector knob to Channel E or F. Adjust the Sweep Width control to maximum clockwise rotation. Observe the alignment pattern on the scope and adjust the 60 cycle Phase control until the patterns most nearly coincide. Adjust the marker dial to the frequencies as indicated by manufacturer to read the correct width of the pattern. In order to obtain the clearest pip, reduce the RF sweep output by means of the Sweep Attenuator until the "grass" on the base line of the pattern just disappears. Adjust the strength of the marker signal until it is just visible on the pattern. Re-adjust the trimmers to obtain the desired shape of the pattern and to place the markers in exactly the correct places. If it is desired to use two markers simultaneously, insert a crystal whose frequency is that of one of the desired markers in the jack on the panel and set the marker dial to the other marker frequency.

#### Sound IF Alignment:

Connect the VTVM across the grid resistor of the limiter stage. Connect the Video Marker Output to the grid of first Sound IF stage. Adjust the marker dial to the Sound IF frequency. Adjust the trimmers in the Sound IF stages to give a maximum reading on the VTVM.

Leave the input to the first stage as above and the marker dial setting as above. Move the VTVM connection to the junction of the two load resistors in the discriminator cathode circuit. Adjust the secondary trimmer of the discriminator transformer all the way out, or in, to make sure it does not affect the adjustment of the primary trimmer. Adjust the primary trimmer to give a maximum reading on the VTVM. Move the VTVM connection to the upper end (farthest from chassis) of the load resistors. Adjust the secondary trimmer to give a "zero" reading on the VTVM. Note that the setting of the marker dial must not be moved when making the dis-

criminators alignment.

#### Overall Alignment Check:

Couple the Marker Output capacitively to the grid of the first video IF stage and the scope to the video load resistor as outlined above. Using the Balanced Output Unit at the end of the connector cable feed the RF Sweep Output directly to the antenna input terminals of the receiver. Note: the Balanced Output Unit supplies the correct input impedance (300 ohms) for feeding into most receivers. For some sets using 72 ohms input impedance the cable can be connected direct to the antenna terminals since the cable impedance is 50 ohms.

Set the receiver to some channel, say Channel 6. Set the Sweep Selector knob to Channel 6 and observe the overall curve on the scope. Read the marker frequencies as required by the manufacturer. Re-adjust the Video IF trimmers to obtain the correct overall curve. Check other channels and balance adjustments to give the best overall alignment on all channels.

#### MAKING SET-UP ADJUSTMENTS ON TELEVISION RECEIVERS:

Connect the Model 665 Composite Video Generator negative output terminals to the Video Input of the Model 675. Turn the negative output control of the Model 665 to maximum and set Dot Pattern switch to "ON". Set the Video Selector knob to Channel 4 and output selector switch located in center of panel to Video. Connect the Video Output to the antenna terminals of the receiver through the Balanced Output Unit. Adjust the receiver to Channel 4. Adjust the contrast control of the receiver and the video output attenuator to give a dot pattern on the receiver.

Adjust the horizontal and vertical sync controls to lock the dot pattern on the receiver. Adjust the horizontal and vertical size controls to obtain the proper size of pattern. Adjust the horizontal and vertical positioning controls to locate the pattern correctly with respect to the escutcheon on the picture tube. Adjust the horizontal and vertical linearity controls until the dots are most nearly uniformly spaced across and up and down. The correct adjustments of the pattern size will be when one row of dots on each side and top and bottom just disappears behind the escutcheon.

As a final check of the settings of the controls, switch the receiver to a different channel and then return quickly to the original one. The pattern should lock in immediately.

#### FM RECEIVER ALIGNMENT:

Connect the RF Output of the Model 675 to the converter grid of the FM receiver through a .005 uf capacitor and the vertical input of the Oscilloscope across the grid resistor in the input circuit of the limiter stage. This is usually a 220K ohm resistor with about a 100 uuf capacitor across it.

Set selector switch in the center of the panel to read Sweep and Sweep Selector switch on Channel B. This will give a signal which has a center frequency of 10.7 mc and which is a CW signal of 10.7 mc when the Sweep Width control is turned to "0".

Adjust trimmers in the IF stages to give an alignment pattern as high as possible and one which is centered in the image on the scope. The maximum height indicates maximum gain and the centering indicates alignment to the correct frequency. In the alignment procedure the Sweep Width control should be reduced until the base line on either side of the curve is only about one-tenth of the total length of the line on the scope. This "broadening" of the curve will make it easier to obtain optimum adjustment of the trimmers.

Move connection of the scope to the top end of the discriminator cathode load resistors. This usually goes directly to the volume control through a capacitor. Detune the secondary of the discriminator transformer by screwing the trimmer all the way out. Adjust the primary trimmer by adjusting for maximum height of pattern. Lastly, adjust the secondary trimmer by turning it in until the curve becomes that the characteristic discriminator pattern. That is, the curve becomes symmetrical above and below the base line. Readjust the primary trimmer slightly for maximum height and the alignment of the IF and Discriminator transformers is complete.

Connect the output cable to the antenna terminals of the receiver through the Balanced Output unit and leave the scope connected as last above. Turn Sweep Selector Switch to Channel C and adjust tuning dial of the FM receiver to 100 mc. The characteristic pattern should appear on the scope if the oscillator trimmer is adjusted correctly. Turn Oscillator trimmer to place pattern in center of screen. Adjust RF and Antenna trimmers to give a maximum height to pattern.



SUPPLEMENTARY INSTRUCTIONS FOR  
SUPREME MODEL 675  
FM & TV GENERATOR

Two marker output jacks are provided, and are located to the lower left center of panel. One is marked "Marker-Video" output and provides a variable output of both the marker and video carrier frequencies, as outlined in the instructions. The other marker output jack is located about two inches to the left and provides a high-level output, which is not variable. Although the variable output will usually be used, occasionally it may be necessary to use the high-level output, as for example in the alignment of a single stage of the video IF. Adjustment of the marker pip can be made by varying the position in the IF circuit to which connection is made.

Certain changes have been made in the wiring of the rotary switch located in the center of the panel to provide signals as outlined below:

1. In "Video" position--unmodulated frequencies as indicated by the pointer knob labelled "Video Selector".
2. In "Sweep-Marker" position--60 cycles amplitude modulated frequencies as indicated by the pointer knob labelled "Video Selector" and frequency modulated frequencies as indicated by the pointer knob labelled "Sweep Selector". In this position, the bandwidth of frequency modulation is controlled by the pointer knob labelled "Sweep Width" as indicated in the instructions.
3. In "Sweep" position--unmodulated frequencies as indicated by the pointer knob labelled "Video Selector" and frequency modulated frequencies as indicated by the pointer knob labelled "Sweep Selector". In this position, the bandwidth of frequency modulation is controlled by the pointer knob labelled "Sweep Width" as indicated in the instruction.



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