Roberts Electronics
Division of Rheem Manufacturing Co.
5922 Bowcroft Street.
Los Angeles, Calif., 90016
OPERATION FEATURES 400

OPERATIONAL FEATURES
(These Key Numbers apply to all instructions in this manual)

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<th>Feature</th>
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<td>2</td>
<td>Supply Reel</td>
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<tr>
<td>3</td>
<td>Left Speaker</td>
</tr>
<tr>
<td>4</td>
<td>Speed Change Switch</td>
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<td>5</td>
<td>Mute Control</td>
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<td>6</td>
<td>Tape Tension Roller</td>
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<td>7</td>
<td>Tape Guide Roller</td>
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<td>8</td>
<td>Remote Control Jack</td>
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<td>9</td>
<td>Power On-Off Switch</td>
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<td>10</td>
<td>Monitor Control</td>
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<td>11</td>
<td>Treble Tone Control</td>
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<td>12</td>
<td>Bass Tone Control</td>
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<td>14</td>
<td>Track Selector Switch</td>
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<td>15</td>
<td>High Impedance Stereophone Jack</td>
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<td>16</td>
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<td>22</td>
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<td>24</td>
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<td>Drive Capstan</td>
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<td>28</td>
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<td>29</td>
<td>Stop Switch</td>
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<td>30</td>
<td>Rewind Switch</td>
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<td>32</td>
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<td>36</td>
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<td>52</td>
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</tbody>
</table>
OPERATIONAL FEATURES

(These Key Numbers apply to all instructions in this manual)

1, 19 Reel Holders
2 Supply Reel
3 Left Speaker
4 Speed Change Switch
5 Mute Control
6 Tape Tension Roller
7 Tape Guide Roller
8 Remote Control Jack
9 Power On-Off Switch
10 Monitor Control
11 Treble Tone Control
12 Bass Tone Control
13 Record Button
14 Track Selector Switch
15 High Impedance Stereophone Jack
16 Dual Loudness Control
17 Dual Line Input Control
18 Dual Microphone Input Control
20 Takeup Reel
21 Right Speaker
22 Tape Guide Post
23 Index Counter
24 Automatic Shutoff
25 Drive Capstan
26 Pinch Wheel
27 Track Selector
28 Edit Guide
29 Stop Switch
30 Rewind Switch
31 Play Switch
32 Fast Forward Switch
33 VU Meters
34 Record Warning Light
35 Left Channel Microphone Input
36 Right Channel Microphone Input
TRACK SELECTOR SWITCH—serves an important function in every operation of your Roberts; stereo record/play, monaural record/play, and sound-on-sound transfer. For stereo record or play it is turned to the "stereo" position. For monaural record/play it is turned to the desired track (1-4 or 3-2) as shown by the white figures. For sound-on-sound recording or whenever it is desired to transfer a recording from one track to another, it is turned to the selected track number in the red figures. The white designations are used for playback of sound-on-sound recording.

TWO-FOUR TRACK SELECTOR — The track selector switch is used to adjust and realign your playback heads to accommodate either ¼ track stereophonic or monaural pre-recorded tapes, (4 position) or 2 track (½ track) stereophonic or monaural pre-recorded tapes, (2 position).

Be sure that the track selector position switch is in the "4" position for all record functions and for all playback functions of ¼-track tapes.

Place in the "2" position for all ½-track (or 2-track stereophonic monaural playback tapes).

MUTE CONTROL — is used to push the tape from the erase, record and play heads during fast forward or rewind. This eliminates wear which could result from super fast motion of the tape across the heads.

EDIT GUIDE — The edit guide indicates the exact position of the play head. All cutting and editing is done from this point to insure accurate location for splicing.

REMOTE JACK — Located on the front panel, the “REMOTE” jack is provided as a convenient method for attaching the Remote Control. Merely raise the cover and insert the plug end of the remote control cord. All connections are thereby automatically made.

INDEX COUNTER — This counter provides reference numbers for locating individual selections on the tape. It is always advisable to turn the counter to the zero position before starting to record. Then all, or a portion of the selections can be keyed by number position on an index sheet.

AUTOMATIC SHUT-OFF — The Automatic Shut-Off lever stops reel motion when the end of the tape is reached. The loss of tape tension causes the lever to drop and release the pressure of the pinch wheel against the drive capstan. It does not turn off the power.
PUSH-BUTTON CONTROL OF SOLENOID-OPERATED
'Reversible' Automatic Function—400

AUTO DIAL consists of three parts: The Stationary Marker, the red line of which is the forward starting point for all automatic operations. The Rotating Pointer, the red arrow of which determines the stop and reverse positions. The Moving Dial, the red line of which rotates during operation between the stationary-red-line-forward-starting-point and the preset position of the red arrow on the Rotating Pointer.

CENTER CHROME BUTTON will immediately activate the "Repeat" or "Reverse" action, depending upon which button has been depressed, without waiting for the moving dial, red line, to reach the rotating pointer.

EXAMPLE: Set the red line of the Moving Dial directly opposite the red line of the Stationary Marker. Move the red arrow of the Rotating Pointer to any position around the dial. Press the Auto Control Button marked "Reverse", then press the "Play" Control Button. While the tape is playing in the forward direction, the red line of the moving dial will move until it reaches the red arrow of the Pointer. The tape will then stop and begin playing in reverse until the red line of the moving dial is back to the red line of the Stationary Marker where, once again, the tape will stop and begin playing forward. This playing forward and playing in reverse will continue indefinitely until manually stopped. (FOR MORE INFORMATION ON AUTO OPERATIONS, SEE NEXT SECTIONS.)

AUTO FUNCTION CONTROLS (REPEAT REVERSE SHUT-OFF) — The "Repeat" Button causes the tape to play forward, stop, fast rewind and play again, repeating the forward play over and over until manually stopped. The stop/rewind position is determined by the setting of the Auto Dial.

THE REVERSE BUTTON causes the tape to play forward, stop, play in reverse, stop, play forward, etc., until manually stopped. The stop/reverse functions are controlled by the settings of the Auto Dial.

THE SHUT-OFF BUTTON cancels the second repeat or reverse. Thus, if the Shut-Off Button is pressed at the same time as either the Repeat or
Reverse, the tape will play forward, stop, and either play in reverse or rewind until the tape has run out causing the Auto Stop Lever to fall, shutting off the unit.

NOTE: When playing forward, the recorder is playing tracks #1 and #3. When playing in reverse, it is playing tracks #4 and #2. By using the reverse, it is not necessary to turn a reel of stereo tape over to hear all four tracks.
SAFETY CIRCUIT:
The Amplifier is equipped with a Safety Circuit, which is designed to protect the Power Transistors from an electric surge in the A.C. line or from excessive ambient temperature. In the case of an abnormal occurrence mentioned above, the Safety Circuit will automatically disconnect the Power Amplifier from the speaker systems. The indication will be no sound or a high cracking sound. The warning lamp will come on. In this case, reduce the volume and push the reset button.

50-60 CYCLE CONVERSION
ROBERTS Tape Recorders travel all over the world. In many places outside of the United States, the standard frequency of electric current is 50 cycles, in contrast to the American standard of 60 cycles, for which your Roberts Recorder is designed.

As it is presumed that you will eventually bring your Roberts Recorder back into a 60 cycle region, and also because you will undoubtedly be playing standard 60 cycle pre-recorded tapes on your recorder, Roberts has provided for a simple conversion so that the tapes which you record in the 50 cycle areas will match in tape speed with your 60 cycle-recorded tapes.

REMEMBER, when you return to a 60 cycle area, your Roberts Recorder must be changed back to its original arrangement.
1. Remove rear panel to expose the main drive motor and flywheel.
2. Loosen screw (2) on belt guide. (Finger pressure is sufficient.)
3. Move belt (3) from outer surfaces of motor pulley and flywheel pulley to inner surfaces as shown in figures a and b above.
4. Adjust belt guide to new position and tighten screw.
5. Replace rear panel.

VOLTAGE CHART
Models 400 & 455
(use VTVM only.) (All voltages positive in relation to ground)

<table>
<thead>
<tr>
<th>PREAMP</th>
<th>PIN #</th>
<th>V1</th>
<th>V2</th>
<th>V3</th>
<th>V4</th>
<th>V5</th>
<th>V6</th>
</tr>
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<tbody>
<tr>
<td>PLAY</td>
<td>#6</td>
<td>105v</td>
<td>#6</td>
<td>100v</td>
<td>#6</td>
<td>130v</td>
<td>#6</td>
</tr>
<tr>
<td>RECORD</td>
<td>120v</td>
<td>110v</td>
<td>#1</td>
<td>90v</td>
<td>#1</td>
<td>250v</td>
<td>#1</td>
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<tr>
<td>PLAY</td>
<td>#1</td>
<td>105v</td>
<td>#1</td>
<td>90v</td>
<td>#1</td>
<td>250v</td>
<td>#1</td>
</tr>
<tr>
<td>RECORD</td>
<td>120v</td>
<td>90v</td>
<td>#1</td>
<td>90v</td>
<td>#1</td>
<td>250v</td>
<td>#1</td>
</tr>
<tr>
<td>PLAY</td>
<td>#8</td>
<td>1.0v</td>
<td>#8</td>
<td>1.0v</td>
<td>#8</td>
<td>2.5v</td>
<td>#8</td>
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<tr>
<td>RECORD</td>
<td>1.0v</td>
<td>1.0v</td>
<td>#8</td>
<td>1.0v</td>
<td>#8</td>
<td>2.5v</td>
<td>#8</td>
</tr>
<tr>
<td>PLAY</td>
<td>#3</td>
<td>1.0v</td>
<td>#3</td>
<td>0v</td>
<td>#3</td>
<td>130v</td>
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<tr>
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<td>0v</td>
<td>#3</td>
<td>0v</td>
<td>#3</td>
<td>130v</td>
<td>#3</td>
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</tbody>
</table>

POWER AMPLIFIER Pins #1 & #2 of SC (socket) #1 — 30 vdc
POWER SUPPLY: Pin #3 of SC #7 350 vdc
Pin #4 of PG #8 35 vdc
Large Pin Opening of SC #3 — 30vdc

MOTORS: Take-Up Motor in Play, 45 vac . . . in Fast Forward, 100 vac
Supply Motor in Play, 30 vac . . . in Rewind, 100 vac
EXPLANATION OF BRAKE ADJUSTMENT

Depress the POWER BUTTON to shut off the unit.
Remove recording tape and take-up reel from the unit.
To increase brake tension, rotate both the right and left BRAKE ADJUSTMENT SCREWS clockwise, using a screwdriver. To release brake, rotate the screws counter clockwise.
Turn the right and left reel spindles simultaneously by hand and finally set the adjustment screws to where brake tension of both sides of the reel shafts are well balanced or seems to be equal.

TAPE SPEED CHART

<table>
<thead>
<tr>
<th>TAPE LENGTH</th>
<th>SINGLE TRACK</th>
<th>DUAL TRACK</th>
<th>4 MONOAURAL TRACKS (¼ TRACK)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>3 ¼ I.P.S.</td>
<td>7 ½ I.P.S.</td>
<td>3 ¼ I.P.S.</td>
</tr>
<tr>
<td>225 ft.</td>
<td>11 ¼ min.</td>
<td>5 ¾ min.</td>
<td>7 ½ I.P.S.</td>
</tr>
<tr>
<td>600 ft.</td>
<td>30 min.</td>
<td>15 min.</td>
<td>11 ¼ min.</td>
</tr>
<tr>
<td>1200 ft.</td>
<td>1 hr.</td>
<td>30 min.</td>
<td>2 hrs.</td>
</tr>
<tr>
<td>1800 ft.</td>
<td>1 hr. 30 min.</td>
<td>45 min.</td>
<td>1 hr.</td>
</tr>
<tr>
<td>2400 ft.</td>
<td>2 hrs.</td>
<td>1 hr.</td>
<td>4 hrs.</td>
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HEAD DATA CHART

<table>
<thead>
<tr>
<th>Head</th>
<th>Impedance</th>
<th>D. C. Res.</th>
<th>Volts A.C.</th>
<th>Current</th>
</tr>
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<tbody>
<tr>
<td>Erase Head</td>
<td>300 ohm @ 60 KC</td>
<td>2.5 ohm</td>
<td>115</td>
<td>100 ma</td>
</tr>
<tr>
<td>Record Head</td>
<td>3 K ohm @ 60 KC</td>
<td>10 ohm</td>
<td>12</td>
<td>3.6 ma</td>
</tr>
<tr>
<td>Play Head</td>
<td>3 K ohm @ 1 KC</td>
<td>300 ohm</td>
<td>—</td>
<td>—</td>
</tr>
</tbody>
</table>

MOTOR DATA CHART

<table>
<thead>
<tr>
<th>Motor</th>
<th>Wow &amp; Flutter @ 7½ - 3¼</th>
<th>Type</th>
<th>Speed</th>
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</thead>
<tbody>
<tr>
<td>Capstan Motor (forward)</td>
<td>0.08% 0.14%</td>
<td>Hysteresis</td>
<td>3 ¼ - 7 ½ I.P.S. (15 I.P.S. optional)</td>
</tr>
<tr>
<td>Capstan Motor (reverse)</td>
<td>0.085% 0.30%</td>
<td>Hysteresis</td>
<td>3 ¼ - 7 ½ I.P.S. (15 I.P.S. optional)</td>
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<tr>
<td>Rewind Motor</td>
<td>1800-1900 RPM @ 60 cycle</td>
<td>High Torque</td>
<td>1200' in 36 secs.</td>
</tr>
<tr>
<td>Forward Motor</td>
<td>1800-1900 RPM @ 60 cycle</td>
<td>High Torque</td>
<td>1200' in 36 secs.</td>
</tr>
<tr>
<td>No. ON SCHEMATIC</td>
<td>WAFER LOCATION</td>
<td>DESCRIPTION</td>
<td></td>
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<tr>
<td>------------------</td>
<td>----------------</td>
<td>----------------------</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>F-12</td>
<td>OSC. SW.</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>A-2</td>
<td>L. BIAS</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>A-11</td>
<td>R. BIAS</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>G-3</td>
<td>L. LINE IN</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>G-10</td>
<td>R. LINE IN</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>C-2</td>
<td>L. VU METER</td>
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</tr>
<tr>
<td>7</td>
<td>D-11</td>
<td>R. VU METER</td>
<td></td>
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<tr>
<td>8</td>
<td>F-2</td>
<td>L. VU LAMP</td>
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<tr>
<td>9</td>
<td>F-7</td>
<td>R. VU LAMP</td>
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<td>10</td>
<td>C-10</td>
<td>L. REC. B+</td>
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<tr>
<td>11</td>
<td>B-11</td>
<td>R. REC. B+</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>E-6</td>
<td>L. PRE. OUT</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>D-12</td>
<td>R. PRE. OUT</td>
<td></td>
</tr>
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</table>

SHOWN IN STEREO MODE
(TYPICAL 7 WAFERS)
Underside of Deck
Topside of Deck

Diagram of parts and components for the topside of a deck.
A B C D E G RELAYS
FUNCTION RELAYS

A B C D E G RELAYS
FUNCTION RELAYS

A B C D E G RELAYS
FUNCTION RELAYS

A B C D E G RELAYS
FUNCTION RELAYS

RELAY IDENTIFICATION
FOR MODELS 4001-4000D
AND 455 & 455KD
<table>
<thead>
<tr>
<th>Ref. No.</th>
<th>Part No.</th>
<th>Description</th>
<th>Description</th>
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<tr>
<td>88-531</td>
<td></td>
<td>Amplifier, Transistor Model 400</td>
<td>Fusether holder</td>
</tr>
<tr>
<td>25-234</td>
<td></td>
<td>Amplifier, Transistor Model 455</td>
<td>Handle, Case</td>
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<tr>
<td>88-582</td>
<td></td>
<td>Automatic Function Gear Assembly Model 400</td>
<td>Head, Erase</td>
</tr>
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<td>88-583</td>
<td></td>
<td>Automatic Stop Arm Assembly</td>
<td>Head, Play</td>
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<tr>
<td>88-584</td>
<td></td>
<td>Belt, Automatic Function Gear Assembly Model 400</td>
<td>Head, Record</td>
</tr>
<tr>
<td>63-009</td>
<td></td>
<td>Belt, Capstan</td>
<td>Head Assembly Model 400</td>
</tr>
<tr>
<td>88-111</td>
<td></td>
<td>Belt, Index Counter</td>
<td>Head Assembly Model 455</td>
</tr>
<tr>
<td>88-585</td>
<td></td>
<td>Bearing, Ball, at Base of Flywheel</td>
<td>Index Counter Model 400</td>
</tr>
<tr>
<td>88-586</td>
<td></td>
<td>Bracket, Power Block Relay Model 455</td>
<td>Index Counter Model 455</td>
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<td>88-520</td>
<td></td>
<td>Bracket, Relay Bank Model 400</td>
<td>Jack, 3 Pole, Stereo Headset</td>
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<tr>
<td>88-114</td>
<td></td>
<td>Brake Assembly with Micro Switch</td>
<td>Jack, 2 Pole, Line Input and Output, Mic and Speaker</td>
</tr>
<tr>
<td>88-108</td>
<td></td>
<td>Brake Band</td>
<td>Nut for 29-7315 and 29-7260</td>
</tr>
<tr>
<td>88-587</td>
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<td>Bushing, Capstan Belt Roller</td>
<td>Jewel, Green</td>
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<tr>
<td>88-588</td>
<td></td>
<td>Button, Monitor Switch White Plastic</td>
<td>Jewel, Red Remote Control</td>
</tr>
<tr>
<td>88-535</td>
<td></td>
<td>Button, Push to Record, Metal Model 400</td>
<td>Kit, 15 i.p.s. Conversion</td>
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<tr>
<td>88-589</td>
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<td>Button, push to record, red plastic</td>
<td>Knock, Mic/Line/Loudness, Outer, Left Ch. Model 400</td>
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<tr>
<td>62-72</td>
<td></td>
<td>Cap, Pinch Wheel</td>
<td>Knock, Mic/Line/Loudness, Inner, Left Ch. Model 455</td>
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<tr>
<td>88-590</td>
<td></td>
<td>Capacitor, Electrolytic 3000 MF @ 40V</td>
<td>Knock, Mic/Line/Loudness, Outer, Right Ch. Model 455</td>
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<tr>
<td>88-591</td>
<td></td>
<td>Capacitor, Electrolytic 1000 x 1000 MF @ 50V</td>
<td>Knock, Base and Treble Model 400</td>
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<tr>
<td>14-783</td>
<td></td>
<td>Capacitor, Electrolytic 1000 MF @ 25V</td>
<td>Knock, Base and Treble Model 455</td>
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<tr>
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<td>Capacitor, Electrolytic 1000 MF @ 3V</td>
<td>Knock, Track Selector Model 400</td>
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<td></td>
<td>Capacitor, Electrolytic 500 MF @ 50V</td>
<td>Knock, Track Selector Model 455</td>
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<tr>
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<td>Capacitor, Electrolytic 500 MF @ 25V</td>
<td>Knock, Speed Change, White Model 400</td>
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<tr>
<td>88-113-1</td>
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<td>Capstan, Flywheel and Shaft</td>
<td>Knock, Speed Change, Gray Model 455</td>
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<td>88-122-1</td>
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<td>Capstan Motor Assembly Model 400</td>
<td>Knock, Pushbutton Power, White Model 400</td>
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<td></td>
<td>Capstan Motor Assembly Model 455</td>
<td>Knock, Pushbutton Power, Gray Model 455</td>
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<tr>
<td>88-511</td>
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<td>Case, Complete Less Speakers</td>
<td>Knock, Pushbutton Stop/Rewind/ Play/Fast Fwd, White Model 400</td>
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<tr>
<td>88-123</td>
<td></td>
<td>Case, Complete Less Speakers</td>
<td>Knock, Pushbutton Stop/Rewind/ Play/Fast Fwd, Gray Model 455</td>
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<tr>
<td>88-608</td>
<td></td>
<td>Case Hardware, Hinge Set, Two Pieces</td>
<td>Knock, Pushbutton Reverse/Repeat/ Shut Off Model 400</td>
</tr>
<tr>
<td>88-298</td>
<td></td>
<td>Case Hardware, Latch Set, Two Pieces</td>
<td>Knock, Repeater, Numbered Model 400</td>
</tr>
<tr>
<td>88-123-1</td>
<td></td>
<td>Case Lid</td>
<td>Knock, Repeater, Pointer Model 400</td>
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<td>88-304</td>
<td></td>
<td>Coil, Audio Choke, 6 Henrys</td>
<td>Lamp, Pilot, Bayonet Base</td>
</tr>
<tr>
<td>88-609</td>
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<td>Coil, Bias Oscillator 60 KC</td>
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THE NEW ROBERTS SPECIFICATIONS

Weight: 64 lbs. (455) 72 lbs. (400)
Size: 11½" x 17" x 18" (455)
17¾" x 16" x 12¾" (400)
Voltage and Power Requirements: 110 to 125 V AC, 50 or 60 cycle, 200 watts
Power Cord: 8' SPT-2 UL Approved Power Cord
Speeds: 3⅞ & 7½ ips — (15 ips conversion kit available as optional accessory.)
Playing/Recording Time: With ½ Mil, 2400' Mylar Tape, up to 8 hrs., 4 Track Monaural; up to 4 hrs., 4-Track Stereo.
Tube Complement, Record and Playback Preamps only:
4-12AD7, 3-12AT7, 2-12AU7
1-12BH7, 1-6X4
Power Output: 8 watts per channel from 12-transistor stereo power amplifier
Power Supply: Transformer type power supply for all electronics and control operations
Controls: Separate bass and treble tone controls; Dual separate mic. and line input controls, 4 simultaneous mixing inputs, playback loudness control track selector and sound-on-sound switch
Frequency Response: ±3 db 40 cycles to 17 kc 7½ ips
±3 db 40 cycles to 12 kc 3⅞ ips
Bias & Erase Frequency: Specially biased for perfect recording of all FM Stereo radio broadcasts; 100 KC
Erasing Efficiency: 60 db
Rewind time: 36 sec. for 1200 foot reel of tape
Timing Accuracy: within 99.5%
Wow & Flutter: 0.15% max. at 7½ ips
Speakers: 5 x 7 oval (455) 6" (400)
Signal to Noise Ratio: 45 db
Channel Separation (Crosstalk): 50 db
Recording Inputs: Mic. and line with mixing controls
Playback Outputs: Stereo cathode follower line outputs, stereo ext. speaker output and stereo headset output
Direct Electrical (Relay-Solenoid) push button controls
Record & Playback Equalization: NAB for 7½ ips
EIA for 3⅞ ips
Input Sensitivity: .5 mv in mic. input
50 mv in line input
Pre-amplifier output: 2 volts
3 Heads: Separate erase, record and playback monitor heads
3 Motors: Dual speed electrically switched hysteresis synchronous capstan drive motor with dynamically balanced flywheel. Separate take-up and supply reel motors.
Reel Size: 7"
Operating Positions: Vertical or horizontal
Remote Control: Available as optional accessory

THE ROBERTS POLICY IS ONE OF CONTINUAL DEVELOPMENT AND IMPROVEMENT.
FOR THAT REASON, ROBERTS RESERVES THE RIGHT TO CHANGE SPECIFICATIONS
WITHOUT NOTICE, AND WITHOUT INCURRING ANY OBLIGATION RELATING TO
MODELS PREVIOUSLY MANUFACTURED BY THEM.

Replacement parts are available from:

ROBERTS ELECTRONICS
DIVISION OF RHEEM MANUFACTURING CO.
5922 BOWCROFT STREET,
LOS ANGELES, CALIF., 90016

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