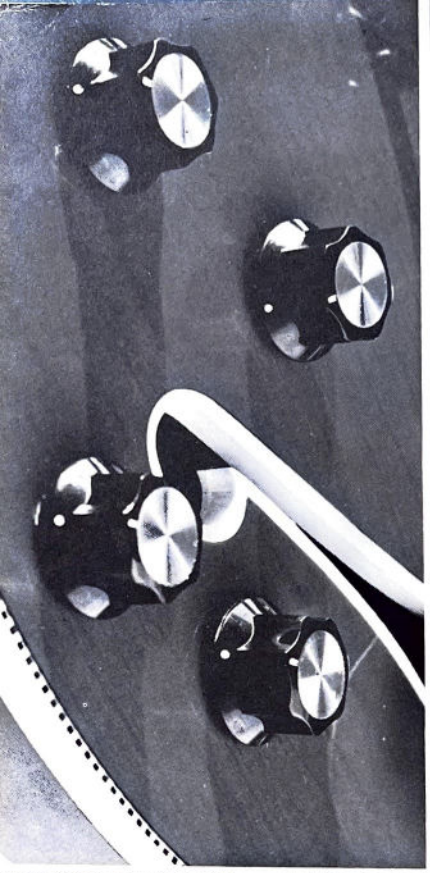
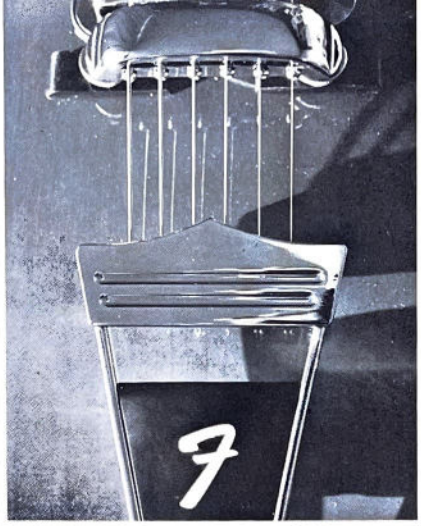
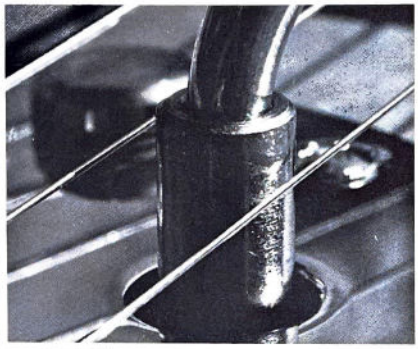
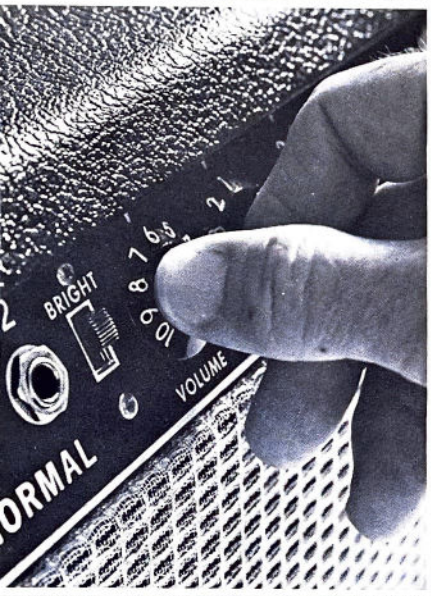
March, 1967

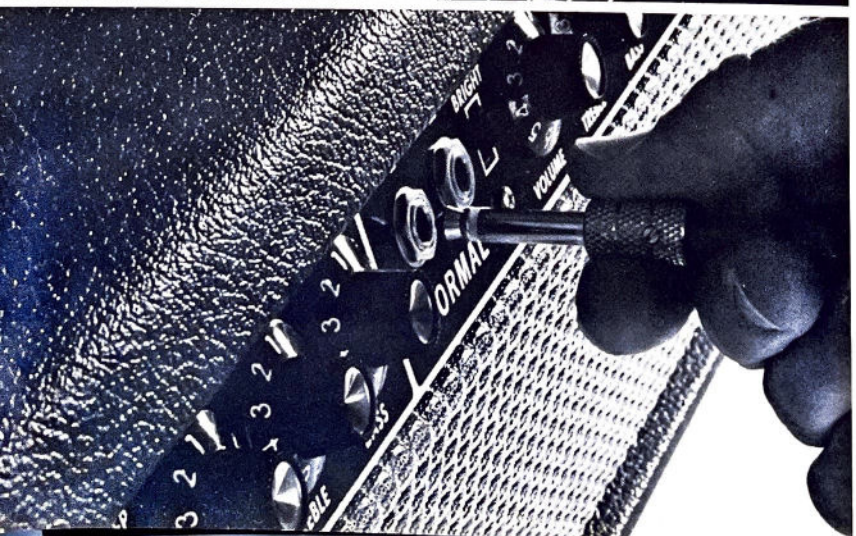
FENDER GUITAR & AMPLIFIER SERVICE MANUAL











Contents

This manual is intended to be a guide for the musician or dealer wishing to make minor adjustments or repairs without the need of consulting a professional repair shop or returning the instrument to the factory. Its contents, while not delving into major repairs, includes those areas which comprise over 90% of the troubles and annoyances.

Guitars – Quick Reference Chart

(PROBLEM)	(SOURCE) STRINGS	CORDS	PICKUP	STR. LENGTH	STR. HEIGHT	CONTROLS	OTHER	PAGES
Complete Failure		●	●				Loose Connections	5
Intermitant Operation		●					Loose Connections	5
Poor Intonation	●			●			Neck Adjustment	5, 6, 8
Poor Playing Action					●		Neck Adjustment, Tremolo Adjustment	6, 7, 8
String Rattle	●				●		Neck Adjustment	5, 6, 8
Scratchy Noise						●		5

Amplifiers (tube) – Quick Reference Chart

(PROBLEM)	(SOURCE) TUBES	CORDS	FUSE	TRANSFORMER	CONTROLS	SPEAKER	OTHER	PAGES
Intermitant Operation	All	●				●		5, 13 14.15
Smoke				●				15
Vibrato Failure	12AX7						Foot Pedal	13
Reverb Failure	12AT7 7025						Foot Pedal, Spring Channel	13,14
Scratchy Noise					●		Tube Sockets, Input Jacks	13, 14
Frying Noise	All							13, 15
Distortion	All			●		●		13, 14, 15
Complete Failure	All	●	●	●		●		13, 14, 15
Hum	All						Input Jacks, Improper Ground, Light Interference, Hum Balance Control (Bassman)	13,15
Power Loss	6L6			●				15

GUITARS

☐ Similar electrical problems may beset a solid body or semi-acoustic, because the components in each are virtually identical excepting only the peculiarities of the individual model. Normally, faults that occur in the electric guitar can be classified into these three categories:

1. Pickup failure
2. Control failure
3. Loose connections within the circuitry

In almost all instances when the guitar is completely dead the pickup itself will be defective. The only other failure that could cause complete lack of response would be a short in the wiring or a broken lead wire which can be ruled out in most cases due to the mechanics of a guitar.

When the pickup has failed, it means the replacement of the unit as they normally cannot be repaired. This can be accomplished on all models except the Stratocaster, Esquire and Telecaster by unscrewing the pickup adjusting screws all the way and removing the pickup from the recess. In order to remove the pickups from the Stratocaster, Esquire and Telecaster, the pickguard must be removed. To replace the pickup, unsolder the two wires at the pickup. Be certain to re-solder the wires to the new pickup as they were on the old.

Controls

The problem of control noise is the result of one of two factors; either the lack of use or too much use. Many times the controls will become noisy simply because they have not been used and the internal contacts have not been kept polished. Noise will occur as the control is turned. In other instances, extreme use of the controls may have caused the surface to wear and become rough and dry resulting in the same scratchy noise. In either event, there are usually remedies to correct this condition. Any electrical supply house can supply an item known as "Quiet-Trol" or "No-Noise." These are liquids having extreme penetrating qualities and a small amount injected at the junction of the shaft and the body of the control lubricates the shaft. A small amount squeezed into the control itself lubricates the sliding contact and normally repairs the control for a long period of time. Also, electrical supply houses have a small applicator which has a plastic top connected to a long needle similar to a hypodermic needle which makes the application of this liquid very simple.

While there are other components involved in the tone modification circuits within the guitar, the fact that relatively no voltage is generated in the circuit makes failure of the condensers and resistors very unlikely. Mechanical problems such as loose wires or noisy connections in the jack are something which may be corrected easily. Should any difficulties arise in locating the correct solder points, wiring diagrams are available for all models.

Electrical Cords

Problems often arise in the cord that connects the guitar to the amplifier. These defective cords can cause unnatural sounds, static, hum or intermitant operation. Most cord problems are in the plugs which may be divided into three types: molded, "quick" and solder. Molded plugs may not be repaired; to save the cord a metal type plug must be added after the existing molded plug is cut off. The "quick" type plug is a non-solder type and has a sharp point in the center of the plug and a set-screw on the side. The cord is pushed into the plug as far as possible to form the "hot" wire connection and the set screw tightened on the side to make the ground. The solder-type plug must have the center or hot wire of the cord soldered to the short or center pole of the plug and the outside or ground wire soldered to the long or outside pole of the plug.

To keep cords in good condition, it is suggested that they should be removed from the amp and instrument by pulling on the plug and not the cord itself. In addition, keep them from getting underfoot while on stage.

Strings

Occasionally a problem will occur with a guitar that may appear to be in the circuit itself when in reality the strings may be at fault. One should always use a matched set of strings; never mixing one brand or one type with another brand or different type because of the magnetic characteristics of the wire which may vary considerably. One string may have a great deal more response magnetically than another. Therefore, if strings are mixed, some may be quite loud while others quite subdued resulting in very poor or non-uniform response.

Normally, if one or two strings fail to respond, one can eliminate any thought of pickup problems because the manner in which the pickup is made will usually cause it to respond uniformly in all six string positions and the case would be rare indeed where one pole of the pickup would be less responsive than that of the others. One should be careful to make certain that strings used are of a high magnetic quality and capable of producing good results, not just accoustically but elec-

GUITARS Continued

trically. It is recommended that strings be changed frequently to maintain accurate intonation and brilliance of tone.

NOTE: *When the instrument is restrung with strings of different gauge than the original set, the resulting change of tension may cause: the neck to appear warped, improper fretting or loss of vibrato tension. These problems may be corrected by consulting the proper paragraphs covering these difficulties. To help keep the instrument in proper playing condition, it is recommended that strings be changed one-at-a-time. To assist in your string selection, a full list of all Fender Strings and their gauges is given at the end of this manual.*

Patent Heads

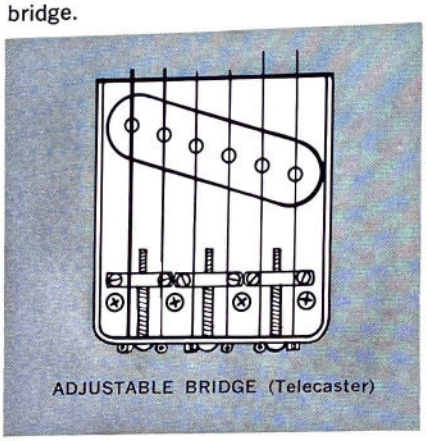
When new, guitar patent heads contain a lubricant inside the gear housing. This lubricant, in time, will dry up and it is suggested that a drop of oil occasionally be used to keep the gear and bearing units free.

Normally, when a patent head becomes stuck or slips it will require replacement. It may be possible, however, to perform a temporary on-the-job repair should one begin to slip during a performance. There are currently two types of patent heads being used on Fender Guitars; Kluson Deluxe and Fender. The Kluson may be tightened by using pliers or a punch to crimp the cap on both ends (top to bottom). The Fender type may be tightened by popping off the pressure fit cap and crimping both sides of the gear housing inwards (side to side).

Bridge Adjustments

A. Jaguar, Jazzmaster, Bass VI (Baritone), Stratocaster, Coronado II, Mandolin, Telecaster, Esquire, Jazz Bass, Precision Bass, 5-String Bass, Musicmaster and Duo-Sonic.

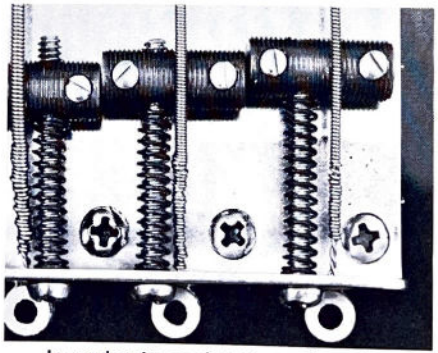
The Fender Bridge employed on the above instruments are adjustable for both length and height. Each string rides on an individual bridge which makes possible perfect intonation and custom playing height. In the case of the Musicmaster, Duo-Sonic, Telecaster and Esquire, Two strings ride on each bridge.



ADJUSTABLE BRIDGE (Telecaster)

Each bridge contains a screw adjustment on each end (allen or standard). To raise the bridge turn the screws on both ends clockwise; to lower bridge turn the screws counter clockwise.

An additional height adjustment is provided on the Jaguar, Jazzmaster and Bass VI in that the entire bridge channel may be raised or lowered at either end of the channel by inserting an allen wrench and turning clockwise to raise and counterclockwise to lower. The Coronado II has knurled discs at either end of the channel which perform the same function.



In order to maintain perfect intonation, each of the bridges is held in place by longitudinal screws which are used to vary their position (string length). If a string plays flat at the 12th fret when compared with the harmonic at that fret, turn the longitudinal screw counterclockwise so as to move the bridge bar toward the neck. If the note at the 12th fret is sharp when compared with the harmonic then the string length is too short and the bridge bar should be adjusted clockwise. These adjustments will be fractional and should be necessary only in unusual circumstances.

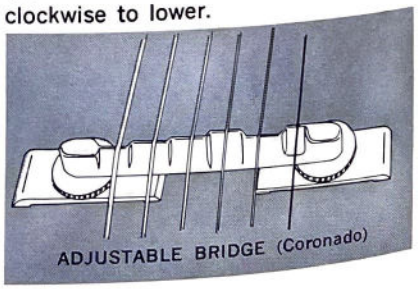
B. 12-String Electric, Mustang

The above instruments have individual barrel-type bridges for each string which are carefully graduated in size to conform to the contour of the fingerboard. To adjust for custom string height, the entire bridge channel may be raised or lowered at either end of the channel by inserting an allen wrench and turning clockwise to raise and counterclockwise to lower.

In order to maintain perfect intonation, each bridge is held in place by the longitudinal screws which are used to vary their position. If a string plays flat at the 12th fret when compared with the harmonic then the string length is too short and the bridge adjusting screw should be turned clockwise.

C. Coronado I

The bridge of the Coronado I has been formed and placed so as to give the best intonation possible. Should it become necessary to shorten or lengthen the string length for any reason, the entire bridge can be moved once the strings are loosened. To raise or lower the strings, knurled discs have been placed at either end of the bridge; turn them clockwise to raise and counterclockwise to lower.



ADJUSTABLE BRIDGE (Coronado)

D. Wildwood, Kingman, Concert, Palomino

The above instruments have individual bridges for each string which are carefully graduated in size to conform to the contour of the fingerboard. In order to maintain perfect intonation, each bridge is held in place by the longitudinal screws which are used to vary their position. If a string plays flat at the 12th fret when compared with the harmonic at that fret, turn the longitudinal screw counterclockwise to move the bridge toward the neck. If the note at the 12th fret is sharp when compared with the harmonic, then the string length is too short and the bridge adjusting screw should be turned clockwise.

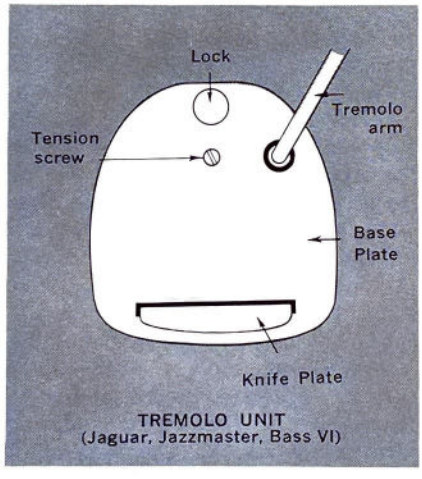
ADJUSTABLE BRIDGE
(Fender Acoustic Guitars)

Tremolo

A. Jaguar, Jazzmaster, Bass VI (Baritone)

The Fender "Floating" Tremolo designed for these instruments provides extremely smooth action with positive return to pitch. In addition, it provides a lock that centers the tension of the tremolo action should a string break during a performance. To actuate the "trem-lock," depress the tremolo arm and slide the "trem-lock" button toward the spring tension screw. To release, depress the tremolo arm and return the "trem-lock" button to its original position.

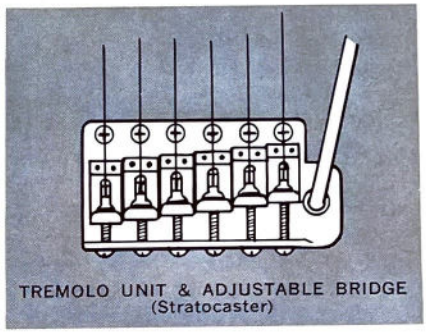
It is possible to vary the tension of the tremolo action by adjusting the tremolo spring tension screw. It should be noted that the tension of the tremolo spring directly affects the pitch of the strings and if it is tightened the pitch of the strings will be raised. Should the tension be lessened, then the pitch of the strings will be lowered. Either adjustment will in no way affect the playing action of the instrument, but will require retuning the strings to their original pitch. This feature will afford the player any degree of tremolo action he prefers; a feature which will be readily appreciated by every player. In order to remove the tremolo handle when not in use, actuate the "trem-lock" and pull out.



TREMOLO UNIT
(Jaguar, Jazzmaster, Bass VI)

B. Stratocaster

This tremolo operates on the principle of the pivot action of the bridge and tremolo accomplished by the method in which the anchor screws hold the bridge-tremolo unit to the top surface of the guitar. Removing the cover plates from the bottom of the guitar will expose five accurately engineered and tested tension springs attached to the tremolo block with the opposite end of the springs attached to a bracket. This bracket is fastened to the guitar body with the use of two phillips head wood screws. It will be readily seen how the adjustment bracket, by tightening or loosening, will compensate for the tension of the tuned springs. The spring tension is then equal to the tension of the strings tuned to natural pitch.



TREMOLO UNIT & ADJUSTABLE BRIDGE
(Stratocaster)

These facts must be carefully considered.

1. Loosening any one string considerably decreases the tension on the combined set of strings approximately 1/6. Therefore the spring tension will have a tendency to raise the pitch of the remaining five strings.

2. In tuning the guitar to higher than normal pitch, assuming that the factory adjustment of the spring holding bracket is not changed. Then the lower rear edge of the tremolo block will be forced too close or possibly up against the rear part of the cut-out in the body.

3. If the guitar is tuned lower than normal pitch, the tremolo block will be pulled forward until the tremolo top plate rests flush on the top surface of the guitar body.

Bear in mind that the tremolo block will remain in the position it happens to be in the instant the tension between the strings and spring becomes equal. Because of this, the following must be observed.

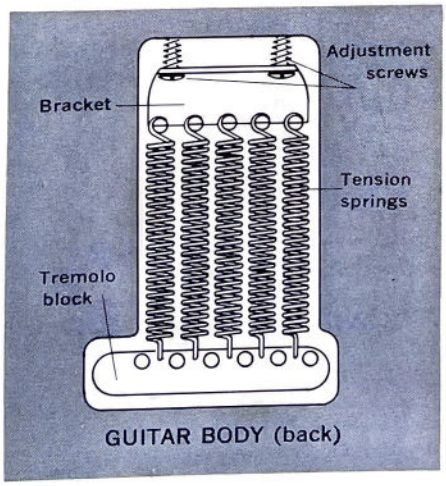
1. In installing a new set of strings, remove only one string at a time; replace it and tune the new string to natural pitch before removing the next string. With this method it should not be necessary to remove the back cover of the guitar.

2. If all of the strings are removed at the same time or if for some reason the guitar is very much out of tune, either high or low, or if the tremolo

GUITARS Continued

will not work, it will be necessary to proceed as follows:

a. Remove the bottom cover plate.
b. If the strings are off, install a new set complete. Tighten the strings until the lower rear edge of the tremolo block is forced against the rear part of the cut-out in the body.
c. With the tremolo handle in playing position, pull back until the lower part of the tremolo block is pulled away from touching the edge of the guitar body. Insert a small shim piece of 3/16" plywood, dowel or the thickness of two five cent pieces between the block and the edge.
d. It should now be possible to tune the guitar to standard pitch while the shim of 3/16" wood holds the tremolo block in position.
e. After tuning the guitar to natural pitch, touch the piece of 3/16" shim material to see how tight it fits between the tremolo block and the edge of the cut-out. It should be snug, but not tight. Tighten or loosen the two Phillips head screws, holding the tremolo spring bracket to assure the proper 3/16" spacing.
f. Remove the 3/16" shim and test the action of the Tremolo. It is then ready to have the back cover replaced.



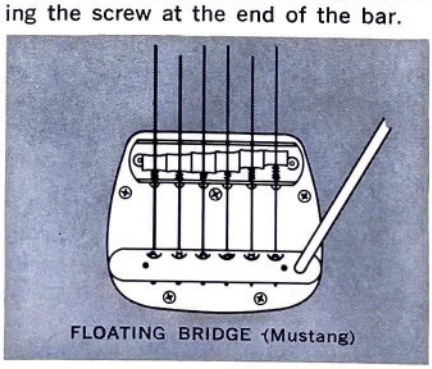
GUITAR BODY (back)

To remove the Tremolo handle when not in use, unscrew counterclockwise.

C. Mustang

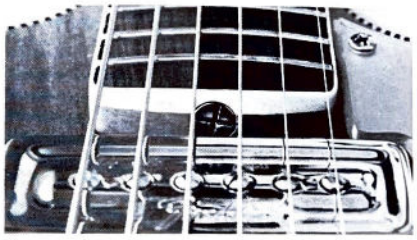
The Mustang Dynamic Vibrato provides extremely smooth vibrato action and wide pitch variation. The correct position of the Vibrato bar is when the Vibrato spring posts at either end under the bar are straight up and down. When lighter or heavier gauge strings are used, the tension may vary, causing the bar to move out of normal position, The adjustment to bring the bar back to correct position may be made by inserting an allen wrench into the holes on the top of the bar and turning in the appropriate direction. Turning clockwise will move the bar toward the neck and counterclockwise will move the bar away from the neck. It may be necessary to make this adjustment more than once; retuning the strings after each adjustment.

If extremely light gauge strings are used, the tension may vary more than may be compensated by the bar tension adjustment screws. Correct tension may be restored by removing the strings and then the entire Vibrato unit from the body. Remove, then, the two springs attached to the lower slot at the bottom of the Vibrato posts and re-attach them to the slot immediately above. Replace the Vibrato unit to the body, string and tune to standard pitch. It may be once again necessary to adjust the spring tension at the two posts with the allen wrench. When not in use, Vibrato handle may be removed by loosening the screw at the end of the bar.


FLOATING BRIDGE (Mustang)

Neck Adjustment

A well-known feature of all Fender Guitars and Basses is the adjustable neck truss-rod which maintains perfect neck alignment. If for any reason a Fender Neck appears to require adjustment, the correction can be made without necessity of returning the instrument to the factory.



You will notice that each Fender Instrument has an exposed screw at the end of the neck near the pickguard edge. This screw should be turned counterclockwise to adjust a neck that has become bowed up in the center. The screw should be turned clockwise to adjust a neck that has become concave. To accomplish the minor adjustments needed to return the neck to perfect alignment, the instrument should be laid on a table or other flat surface (covered to protect the finish). To ease the pressure on the nut, have another person hold down the body of the instrument and with your left hand depress or raise the end of the neck according to the adjustment required. With your right hand insert a small long-handled standard-head screw driver and turn the slotted screw in the appropriate direction.

The neck should have a very slight concave bow in the center; no more than 1/16" and preferably slightly less. To visualize this alignment, sight down the neck with one eye from either end of the instrument.

Flattop Acoustic String Height Adjustment

It is possible to vary the string height of any of the Fender Flattop Acoustic Guitars by adding or taking away from the amount of shim material beneath the neck.

The following procedure may be followed in order to change the string playing height. Loosen the strings, then the four screws holding the neck to the body about ¼". Raise the neck from its socket slightly by lifting straight up as there is a seating pin which fits into the neck block. Reach through the soundhole and remove one or more shims to raise the string action. A thicker or additional shim will bring the strings close to the neck therefore causing lower string action. These shims should vary only slightly in thickness as the smallest difference from standard will make a great deal of change in the playing action. After the shim or shims are again placed evenly across the neck depression, tighten the neck screws and then retune.

NOTE: *Shim material in three thicknesses is available by writing to Fender Musical Instruments.*

String Listing

MASTERSOUND FLATWOUND STRINGS

SPANISH GUITAR Flatwound		GAUGE
51	E-1st, Plain	.013"
52	B-2nd, Plain	.017"
53	G-3rd, Wound	.026"
54	D-4th, Wound	.034"
55	A-5th, Wound	.044"
56	E-6th, Wound	.054"
No. 50	Complete Set	

SPANISH GUITAR
Gold Label Flatwound

61	E-1st, Plain	.013"
62	B-2nd, Plain	.017"
63	G-3rd, Wound	.026"
64	D-4th, Wound	.034"
65	A-5th, Wound	.044"
66	E-6th, Wound	.054"
No. 60	Complete Set	

PRECISION BASS
Flatwound Electric Light Gauge

81	G-1st, Wound	.048"
82	D-2nd, Wound	.064"
83	A-3rd, Wound	.080"
84	E-4th, Wound	.095"
No. 80	Complete Set	
85	C-1st, Wound	.045"

VIOLIN*

301	E-1st, Plain	.010"
302	A-2nd, Wound	.019"
303	D-3rd, Wound	.030"
304	G-4th, Wound	.034"
No. 300	Complete Set	

DOUBLE BASS Acoustic

501	G-1st, Wound	.068"
502	D-2nd, Wound	.081"
503	A-3rd, Wound	.096"
504	E-4th, Wound	.106"
No. 500	Complete Set	

SPANISH GUITAR
Light Gauge Flatwound

506	E-1st, Plain	.012"
507	B-2nd, Plain	.016"
508	G-3rd, Wound	.024"
509	D-4th, Wound	.031"
510	A-5th, Wound	.040"
511	E-6th, Wound	.050"
No. 505	Complete Set	

6-STRING BASS GUITAR

701	E-1st, Wound	.026"
702	B-2nd, Wound	.035"
703	G-3rd, Wound	.044"
704	D-4th, Wound	.055"
705	A-5th, Wound	.075"
706	E-6th, Wound	.095"
No. 700	Complete Set	

PRECISION BASS
Flatwound Electric Medium Gauge

851	G-1st, Wound	.055"
852	D-2nd, Wound	.071"
853	A-3rd, Wound	.090"
854	E-4th, Wound	.105"
No. 850	Complete Set	
855	C-1st, Wound	.046"

PRECISION BASS 30" short scale
Flatwound Electric

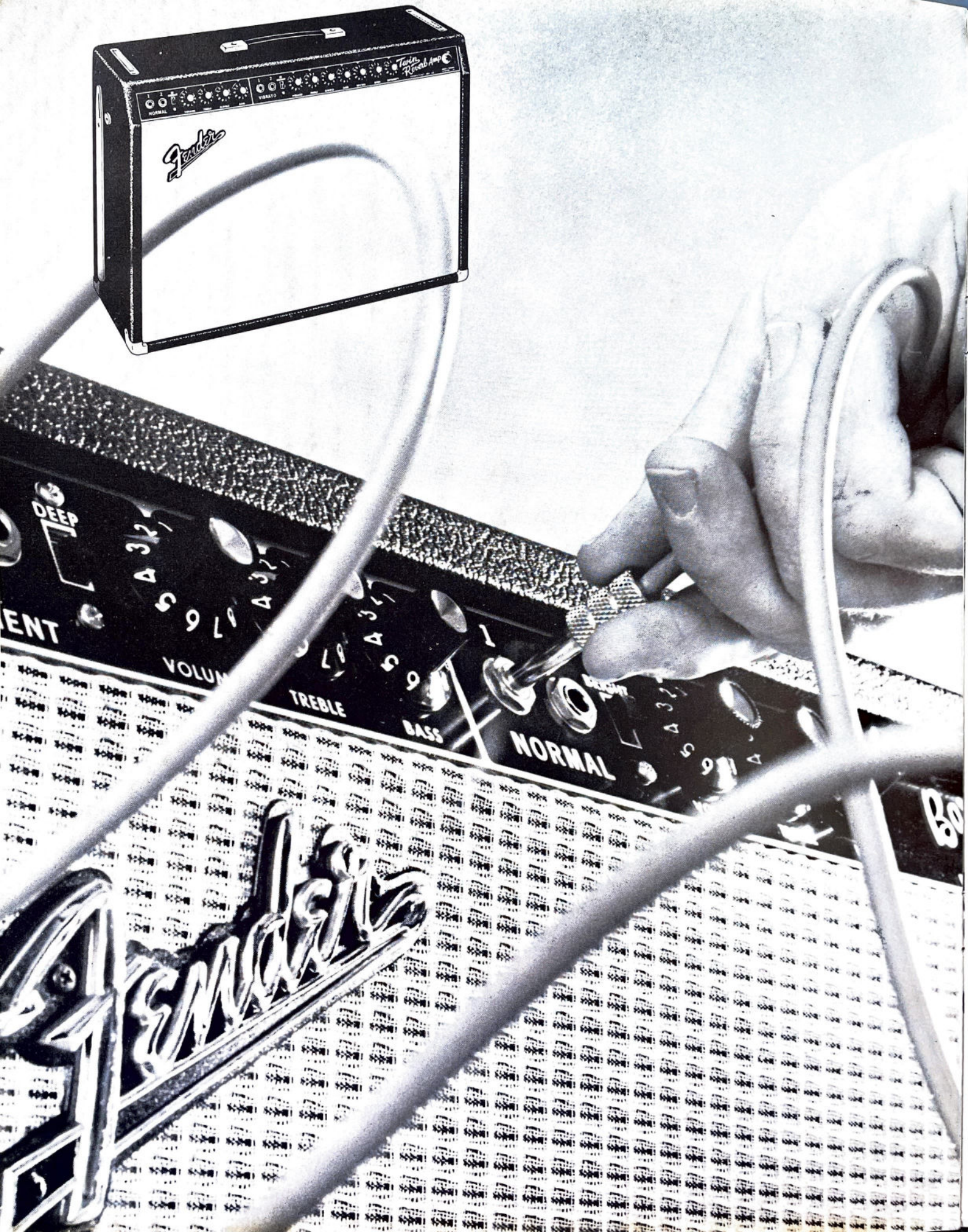
901	G-1st, Wound	053"
902	D-2nd, Wound	061"
903	A-3rd, Wound	075"
904	E-4th, Wound	095"
No. 900	Complete Set	

SPANISH GUITAR
Nylon Tape Wound

2101	E-1st, Plain	.013"
2102	B-2nd, Plain	.017"
2103	G-3rd, Tape Wound	.030"
2104	D-4th, Tape Wound	.044"
2105	A-5th, Tape Wound	.050"
2106	E-6th, Tape Wound	.060"
No. 2100	Complete Set	

PRECISION BASS
Nylon Tape Wound

2201	G-1st, Tape Wound	.058"
2202	D-2nd, Tape Wound	.072"
2203	A-3rd, Tape Wound	.094"
2204	E-4th, Tape Wound	.116"
No. 2200	Complete Set	


Fender
Twin Reverb Amp
NORMAL
VIBRATO
DEEP
TREBLE
BASS
NORMAL