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NOTES ON TWIN TIGER 6/12 STRING DOUBLE NECK GUITAR CONVERSION

Issued by:

Dr. Ing. Fabio Pasello

Date: 2010/02/09	NOTES ON TWIN TIGER 6/12 STRING DOUBLE NECK GUITAR CONVERSION	Page 1 of 12
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SUMMARY

1.	SCOPE	4
2.	APPLICABILITY	4
3.	REFERENCES	4
4.	ORIGINAL SPECIFICATIONS	4
4.1	INSPECTION AT RECEIVING	5
5.	DESIGN OF MODIFICATIONS	6
6.	IMPLEMENTATION OF MODIFICATIONS	6
6.1	PIEZOELECTRIC PICKUPS	7
6.2	MAGNETIC PICKUPS	7
6.3	COIL SPLITTING	8
6.4	MAGNETIC AND PIEZOELECTRIC OUTPUT SELECTION	9
6.5	OUTPUT JACK	10
6.6	STRAP LOCKS	10
7.	FINAL SETUP	10
8.	ANCILLARY ITEMS	10
8.1	GUITAR ACCESSORIES	11
8.2	DEDICATED ACOUSTIC/ELECTRIC PEDALBOARD	11
9.	FURTHER POSSIBLE DEVELOPMENTS	12
9.1	ONBOARD PIEZOELECTRIC PREAMPLIFIER	12
9.2	MAGNETIC PICKUPS FOR ACOUSTIC SOUND	12
9.3	PICKUP SELECTOR SWITCH	12
10.	CONCLUSIONS	12

1. SCOPE

Purpose of the document is to set the design goals for the conversion of a 6/12 string double neck electric guitar and to describe the implementation of the modifications; further possible development are also included.

2. APPLICABILITY

This document is applicable to the Dot-on-Shaft™ *Twin Tiger* 6/12 String Double Neck guitar.

3. REFERENCES

501005-110	<i>Seymour Duncan Pickup Installation Instructions</i>
DiMarzio	<i>DiMarzio® 4-Conductor Pickup Instructions</i>
Shadow SH 990-6	<i>Product Installation Instructions</i>
009-074-001 5-98	<i>Fishman Powerchip Owner's Manual - Installation Guide</i>

4. ORIGINAL SPECIFICATIONS

The *Twin Tiger* 6/12 String Double Neck guitar is a Korean made instrument manufactured for the Canadian brand Dot-on-Shaft™ (now [Carporelly Guitars™](#)); original specifications for the instrument follows.

- BODY: Quilted top on mahogany.
- NECKS: Hard maple, set necks.
- FRETBOARDS: Rosewood with mother of pearl inlays.
- FRETS: 2 × 24, “jumbo” style.
- SCALE: 24.7” (627,38 mm).
- PICKUPS (12 string): 2 covered humbuckers, 2 conductor cable.
- PICKUPS (6 string): 2 uncovered humbuckers, 2 conductor cable.
- SWITCHES: Neck Selector, Pickup Selector.
- CONTROLS: 2 volume, 2 tone potentiometers.

- BRIDGES: Tune-O-Matic™, ABR-1 stile, 6 mm Ø posts.
- COLOUR: Tiger Red Burst.

An overall picture of the received instrument is shown in Figure 1.



Figure 1 - Original Instrument Overview

4.1 INSPECTION AT RECEIVING

A first inspection on the instrument at receiving ended up with the following observations:

- Solid construction in general;
- Good resonance of the body yielding in a strong acoustic response;
- Excessive height of the 12 string neck nut;

- Vertically “slanted” pickup mounting on 12 string neck;
- Improper wiring of the Pickup Selector Switch (neck pickups always “on”);
- Slight dumping of the string vibration (particularly on the 6 string neck).

The origin of the last phenomenon was immediately recognisable, being the notches on the bridge saddles a little too deep. Fixing for the other issues was easily accomplished, while the noticeable acoustic response was particularly suitable for the design goal of installing piezoelectric bridges.

5. DESIGN OF MODIFICATIONS

The aim of design was to implement the following main modifications, while maintaining the overall appearance of the instrument as close to the original as possible:

- Implement piezoelectric bridges to get fully acoustic sound from both necks;
- Improve the pickups, allowing for coil splitting;
- Insure overall playability ad balance.

Moreover, the possibility of using the guitar in mixed mode, i.e. playing one neck acoustic and one electric almost at the same time, must be granted.

6. IMPLEMENTATION OF MODIFICATIONS

An overview of the converted guitar is shown in Figure 2, while each modification is described in the relevant following paragraph.



Figure 2 - Converted Guitar Overview

6.1 PIEZOELECTRIC PICKUPS

The selected piezoelectric bridge type was the Shadow Electronics SH 990-6 C, mainly because it is a direct replacement of the original Tune-O-Matic™, ABR-1 style one with 6 mm diameter posts. The only minor (and almost invisible) modification required on the guitar was the drilling of a little through hole to route the supplied shielded cable from the bridge bottom to the nearby pickup cavity.

Conversely, one bridge had to be modified to accommodate for 12 strings, since no specific piezoelectric device can be found on the market yet; a suitable handheld milling cutter was easily used to “double” the notches of the bridge saddles, as shown in Figure 3.



Figure 3 - Modified Shadow SH 990-6 C Bridge

6.2 MAGNETIC PICKUPS

The installed stock pickups were replaced with quality devices to improve the electric tone; in the process the original chrome frame screws were replaced by brownish flat head ones, so improving the overall aesthetics as well.

6.2.1 Pickups on the 6 String Neck

A pair of high output DiMarzio® pickups were mounted on the 6 string neck: ToneZone™ (bridge, shown in Figure 4) and AirNorton™ (neck). The standard 4 conductor wiring allowed for coil splitting.



Figure 4 - DiMarzio ToneZone™ Pickup

6.2.2 Pickups on the 12 String Neck

The availability of a classic JB™ (bridge) and The Jazz™ (neck) pickup pair by Seymour Duncan®, custom wound to specifications (shown in Figure 5), led to their direct replacement on the 12 string neck. Again, the 4 conductor wiring allowed for coil splitting.



Figure 5 - Custom Wound Seymour Duncan™ Pickups

6.3 COIL SPLITTING

On 24 fret guitars equipped with two standard humbucking pickups, the inner bobbins of the transducers are almost exactly spaced (within 3%) as the single coil ones in a Fender Stratocaster guitar. In order to emulate the typical *twang* of the named instrument when pickups are used in parallel, pickup splitting can be better implemented by grounding the outer coils instead of the inner ones (this approach appears to have been first introduced by luthier Ken Parker in his Fly guitars). Having said so, uncovered pickups of the 6 string neck have been wired that way, while maintaining the standard wiring for the 12 string covered ones. Push-pull potentiometers then replaced the original volume ones; to insure a fast and easy switching the following logic has been used (see Figure 6):

- NECK VOLUME: Coil splitting for 12 string neck;
- BRIDGE VOLUME: Coil splitting for 6 string neck.

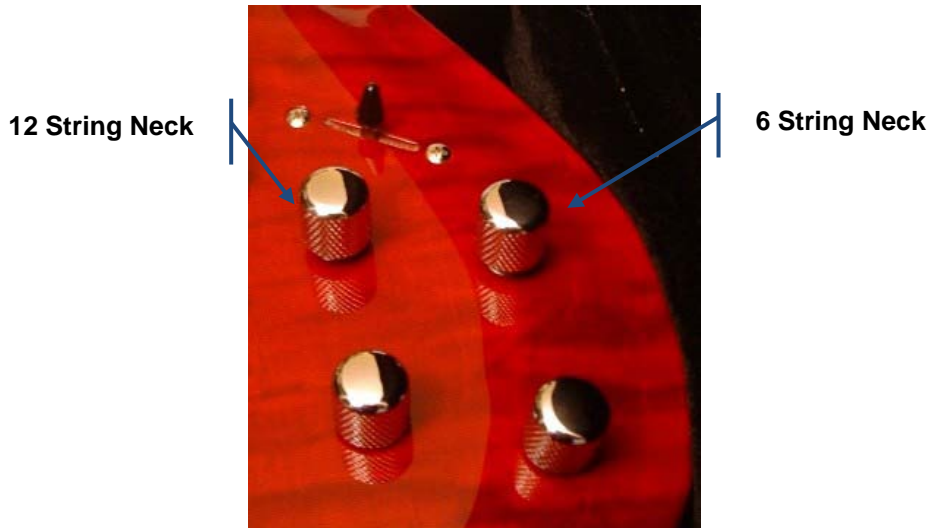


Figure 6 - Push-Pull Coil Splitting

The rationale of such a choice has clearly been the capability to activate or deactivate coil splitting for *both pickups of one neck* at a time, thus achieving the typical *in between* sound with a single act per neck.

6.4 MAGNETIC AND PIEZOELECTRIC OUTPUT SELECTION

To achieve the selection of magnetic and piezoelectric pickups (or in other words, the switching between electric and acoustic outputs), a second neck switch has been installed, as per Figure 7. The position of the switch has been defined by both the existing routing cavity on the back of the instrument and the logical association to the nearby piezoelectric bridges. The cavity had to be slightly widened to accommodate for the additional switch, but nevertheless the original cover is still suitable to close it, hence no modification can be seen on the back.



Figure 7 - Selectors for Magnetic and Piezoelectric Outputs

6.5 OUTPUT JACK

A single TRS (*Tip, Ring and Sleeve* or stereo) Switchcraft[®] jack was used to replace the original TS one, wired as follows:

- TIP: Magnetic output;
- RING: Piezoelectric output.

This modification is now standard in instruments with both magnetic and piezoelectric pickups and again, it does not alter the instrument appearance while reducing the impact of cable harness. Both magnetic and piezoelectric outputs are *always active* in the current arrangement, hence switching is demanded on the dedicated pedalboard described in paragraph 8.2; the correct phase relationship has been insured.

6.6 STRAP LOCKS

Both the intrinsic weight of a double neck instrument and the relevant safety of operation recommend the adoption of a strap locking system. The Dunlop Strap Lock[®] was then selected and installed, as per Figure 8; original white felt washers were replaced by black ones to better match the overall aesthetics.



Figure 8 - Installed Dunlop Strap Lock[®]

7. FINAL SETUP

A double final setup was performed by master luthier [Lucio Carbone](#), mainly to set a proper action on both necks. Overall playability has improved and can be specifically perceived on the already comfortable 12 string neck.

8. ANCILLARY ITEMS

The ancillary items described in this section include guitar accessories and a dedicated acoustic/electric pedalboard.

8.1 GUITAR ACCESSORIES

The two accessories shown in Figure 9 are worthwhile to be mentioned:

- Neotech™ Comfort Strap;
- Double shielded (“stereo”) cable with high reliability Neutrik® connectors.



Figure 9 - Neotech™ Strap and Custom Cable

Such a strap is constructed of elastic neoprene and covered in stitched nylon for player comfort. The tapered design is almost 10 cm at the widest point and features strong leather ends with holes large enough to accept all brands of strap locks.

8.2 DEDICATED ACOUSTIC/ELECTRIC PEDALBOARD

The dedicated acoustic/electric pedalboard of Figure 10 includes a Fishman® *Powerblend*® pedal (discontinued product), combined with a Morley® *Power Wah Volume* one.



Figure 10 - Acoustic/Electric Pedalboard

The arrangement eliminates the need of an onboard preamplifier and allows for seamless switching or mixing of magnetic and piezoelectric signals, that can be sent to separate amplification systems (an embedded direct box with XLR balanced output for the

piezoelectric signal is available for connecting to PA systems). A Rodenberg Amplification GAS 728 Overdrive pedal and a permanently connected guitar tuner are included too.

9. FURTHER POSSIBLE DEVELOPMENTS

A few further possible developments are described in the following paragraphs.

9.1 ONBOARD PIEZOELECTRIC PREAMPLIFIER

Among the several onboard piezoelectric preamplifiers available on the market, the Fishman® *Powerchip* of Figure 11 possibly is the most suitable for the current application; their exclusive “Smart Switch” circuit automatically splits piezoelectric and magnetic signals to stereo or mixes them to mono by detecting the plug type.



Figure 11 - Fishman® *Powerchip* Volume Control

The device can be installed either as a 5th knob or in place of one tone potentiometer (the remaining one should then be wired as master tone control). Finally, a 9 V battery box should be then installed on the instrument.

9.2 MAGNETIC PICKUPS FOR ACOUSTIC SOUND

State of the art acoustic sounds can be achieved today by dedicated magnetic pickups, like the Shadow *NanoMAG*. However, the reduced spacing of a 24 fret neck would make difficult to implement such a conversion if not eliminating the last fret. Suitable electronics are available and again, a battery box should be installed on the instrument.

9.3 PICKUP SELECTOR SWITCH

The existing lever-action pickup selector switch can be replaced by a toggle one, as in the case of the neck selector switches, to better match the overall aesthetics.

10. CONCLUSIONS

The feasibility of the proposed conversion of a 6/12 string double neck electric guitar has been demonstrated. Overall flexibility for a live usage have been further enhanced yielding in up to six different instruments (when accounting for either humbucking and single coil electrics or acoustics in both 6 and 12 string configurations) in one. Moreover, further suitable developments have been individuated.